

DEVELOPING A PLAN FOR THE NATIONAL COORDINATION OF
GEOSPATIAL TECHNOLOGY EDUCATION:
A COMMUNITY COLLEGE PERSPECTIVE

by

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Developing a Plan for the National Coordination of Geospatial Technology Education: A Community College Perspective

ABSTRACT

Geospatial technology is a rapidly growing and changing field. The term *geospatial technology* (GST) refers to geographical information systems (GIS), global positioning systems (GPS), and remote sensing (RS), all emerging technologies that assist the user in the collection, analysis, and interpretation of spatial data. The speed at which new fields are adopting GST, along with the speed at which equipment and software are being modified and updated, precludes many industries, much less the educational system, from keeping up to date. The issue is further complicated at the community college level because national coordination of workforce information and educational resources within the community college network is fairly poor.

Developing a Plan for the National Coordination of Geospatial Technology Education: A Community College Perspective was an effort to document the needs and concerns of community college educators and to use this information to produce recommendations for the development and operation of a National Geospatial Technology Center (NGTC).

The following ten issues were identified by community college educators as critical to GST education: 1) workforce needs; 2) core competencies¹; 3) professional certification; 4) curriculum development; 5) educational pathways; 6) professional development; 7) communication; 8) awareness and reaching underserved audiences; 9) the role of GST education in supporting college administrative tasks and entrepreneurialism; and 10) future trends in GST.

From the recommendations put forth in this study, it is clear that community college educators want a NGTC that will: represent their interests in national education and workforce initiatives, act as a clearinghouse to provide easy access to existing curricula and workforce information, and provide access to professional development opportunities, among other activities described in this report.

Additionally, it is imperative that a NGTC works with existing competency-related efforts (University Consortium for Geographic Information Science's (UCGIS) *Body of Knowledge*; GeoSpatial Workforce Development Center's (GeoWDC) *Geospatial Technologies Competency Model*; Geospatial Information and Technology Association (GITA) / Association of American Geographers (AAG) study, *Defining and Communicating Geospatial Industry Workforce Demand*, Phase I report recommendations, and existing DACUMs²) to bring them closer together so that core competencies, and in turn a core curriculum, that supports many entry-level positions, can be established and agreed upon by a wide range of stakeholders. The consequences of not coming to an agreement will certainly contribute to greater gaps between what the workforce needs and what the educational system is producing.

¹ Core competencies define the knowledge and skills required to carry out specific tasks that are common to a particular profession or occupation. Core competencies are critical links between the workplace and the classroom, since they connect job requirements to educational subject areas.

² DACUM is an acronym for developing a curriculum. It is a one or two day storyboarding process that provides a picture of what the worker does in terms of duties, tasks, knowledge, skills, traits and in some cases the tools the worker uses (DACUM, 2005)

INTRODUCTION

Geospatial Technology and the Economy

Geospatial technology is a rapidly expanding industry that crosscuts nearly every discipline and every sector of the U.S. economy (Gewin, 2004). The term “geospatial technology” (GST) is a broad term referring to geographical information systems (GIS), global positioning systems (GPS), and remote sensing (RS), all emerging technologies that assist the user in the collection, analysis, and interpretation of spatial data (U.S. Department of Labor, 2005a). It deals with the relationship and condition of manmade and natural objects within space, be it on Earth, or beyond (Bolstad, 2005). Industries as diverse as health, agriculture, construction technology, emergency services, environmental technology, government, information technology, manufacturing technology, marine science, marketing, national security, resource management, and transportation use geospatial technologies to collect and analyze data about issues and occurrences that affect people’s lives. The field of GST enables other fields to improve productivity, efficiency, and profitability while evaluating the environmental impacts of our ecosystems. Recent natural disasters from Hurricanes Katrina and Rita to wildfires in California illustrate the need for coordination and geospatial data sharing among all levels of government. To apply the lessons learned from these events, no less adapt to an information age that is increasingly tied to GST, requires a populace and a workforce that can effectively understand and use the information derived from geospatial technology.

The growth of the GST industry is phenomenal. In 2002, the market for geospatial technologies was estimated at \$5 billion and is projected to have annual revenues of \$30 billion - consisting of \$20 billion in the RS market and \$10 billion in the

GIS market - by 2005 (Gaudet et al., 2002). In the abstract *Global Positioning System: The Road Ahead*, it is estimated that market revenue for geospatial technology will be over \$700 billion by the year 2017 (Research & Consultancy Outsourcing Services, 2005).

The U.S. Department of Labor has highlighted the importance of GST in the President's High Growth Job Training Initiative. This initiative is designed to provide national leadership for a workforce with jobs in high-growth/high-demand industries of the American economy. The latest report identified 14 sectors that are projected to add substantial numbers of jobs; have a significant impact on the economy; impact the growth of other industries; are transformed by technology and innovation requiring new skill sets; and are emerging businesses projected to grow. GST is recognized as one of these 14 sectors (U.S. Department of Labor, 2005b). The tremendous potential for growth in this industry is only limited by the ability of the educational system to provide individuals with the technical expertise and geospatial technology awareness needed by government and industry.

Many environmental events over these past two years — the Asian tsunami, Hurricanes Katrina and Rita, and wildfires in southern California — have all heightened the awareness of GIS (e.g., Tsou, 2005). Millions of people have learned more about these events by using GIS-based maps and visualizations. In addition, the explosion of web-based GIS sites such as Google Earth, MapQuest, NASA's World Wind, and MSN Virtual Earth illustrate that web-based GIS is a substantial and growing medium to communicate science and geography to the general public (Butler, 2006). Web-based GIS

has the potential to increase the general population's awareness and understanding of geospatial information as never before (e.g., Peng and Tsou, 2003)

Community College Education

American community colleges have been around since the early 20th century (American Association of Community Colleges, 2005). Among the factors that contributed to their rise include the need for workers trained to operate the nation's expanding industries and the drive for social equality, which presumably would be enhanced if more people had access to higher education (Cochen and Brawer, 2003). Community colleges continued to increase in importance throughout the 20th century as more and more students graduated from high school and the demand for further education increased. In 1947, the President's Commission on Higher Education articulated the value of a population with free access to two years of study beyond high school and asserted that half of the young people could benefit from formal studies through grade 14 (Cochen and Brawer, 2003). Fifty years later, in 1998, President Clinton underscored the importance of making education through grade 14 as universal as a high school diploma.

The composition of student populations attending community colleges is far more complex than many people realize. Community college students include high school graduates continuing with grades 13 and 14 who plan to transfer to a four-year institution; students pursuing a two-year vocational degree or certificate; adults working towards achieving a General Education Development (GED)³ or entry level workplace

³ The GED is an exam developed in the United States that is available for all adults who want an equivalent of a high school diploma. It tests general academic skills and core content that are covered in four years of high school.

competencies, such as those participating in the *Welfare-to-Work*⁴ program; middle and high school age students that are co-enrolling at a community college or may be attending in lieu of their traditional school; re-entry students that may have been in the workforce for some time looking for new careers; and a growing number of “reverse transfer” students, that is, students who have already earned a Bachelor degree and are seeking new skills and skill upgrades – especially technical knowledge and skills – at a community college. Because of this growing trend of “reverse transfer,” some have referred to community colleges as the new form of graduate school (Arnone, 2001).

All total, more students, including those taking credit and non-credit courses, attend community colleges than four-year universities (Community College Research Center, 2005). This reality has led the National Science Foundation (NSF) and other agencies, such as the Department of Labor (DOL), to devote more and more resources to improving education at the community college level because of the tremendous potential to impact the nation’s workforce. Additionally, the students at community colleges are far more diverse in terms of age, ethnicity, and their socio-economic backgrounds. So, if social equality is a goal, community colleges are logical places to invest resources (Community College Research Center, 2005).

⁴ Welfare-to-work is a social program of the United States government. The concept is to wean sole parents and the disabled off their reliance on income support and encourage them back into the work force. For more information see <http://www.opm.gov/wtw/index.htm>

Geospatial Technology Education

GIS programs⁵ in higher education have grown tremendously over the past 20 years. Currently more than 2,000 of the 4,165 public and private two-year and four-year colleges and universities in the country use Environmental Systems Research Institute (ESRI) GIS software (ESRI White Paper, 2002; Infoplease, 2005). Of these, approximately 400 of the nations 1,157 two-year colleges offer some instruction in GIS; 25 offer a GIS certificate or degree (Allen, 2006). Although other GIS software is available, the vast majority of colleges and universities are using ESRI products, so these data are a good approximation of its widespread use in higher education.

GIS is a bit of an oddity within the educational system, as it is offered as both an academic and an occupational program. The curricula of community college occupational programs are generally more responsive to local workforce needs, as mandated by community college missions and their requirements for advisory committees from business and industry to guide occupational program development and implementation; many community college GIS courses are taught by occupational faculty who work fulltime as GIS professionals. For GIS, these programs range from simply offering courses in GIS and using GIS as a tool in other disciplines to offering GIS certificates and Associate degrees for GIS technicians. Many of the students enrolled in community college GIS courses are incumbent workers that need GIS for their job. As a result, some community colleges, such as Central Oregon Community College, are offering GIS certificates for people who already have an academic degree.

⁵ In most cases GIS and GST can be used interchangeably within the context of higher education. Most GIS courses and programs include some type of remote sensing and/or GPS.

Four-year college and university missions and funding sources tend to be different, and the integration of GIS into the curriculum often reflects these differences. More universities tend to view GIS as a science, rather than a tool, as reflected in the use of the term GIScience, which is gaining in popularity at universities but not commonly found at community colleges (Wright et al., 1997; Kemp, 2003). Universities offer minors or certificates in GIS at the Bachelor, Master and Ph.D. level, with some of these courses available via distance education (ESRI White Paper, 2002; Wright and DiBiase, 2005). Oftentimes the different philosophies of community colleges and universities contribute to the difficulty articulating GIS courses between two-year and four-year institutions. Additionally, GIS courses at community colleges are offered as 100 and 200 level courses and generally as 300 and 400 level courses at four-year institutions (Allen, 2005). As a result, students who plan to continue at four-year institutions can have difficulty transferring GIS/GST courses.

GIS is also becoming more commonplace in K-12 education as evidenced by a variety of national GIS programs (*GIS for 4-H, EAST, Community Mapping Project*), not to mention the countless local and regional efforts underway as a result of motivated educators and linkages to higher education programs. The presence of GIS in the K-12 community will continue to increase as the importance of GIS to many sectors of the economy grows, as clearly articulated in a recent National Research Council Report titled *Learning to Think Spatially: GIS as a Support System in the K-12 Curriculum* (National Research Council, 2005):

Spatial thinking must be recognized as a fundamental part of K-12 education and as an integrator and a facilitator for problem solving across the curriculum. With advances in computing technologies and the increasing availability of geospatial

data, spatial thinking will play a significant role in the information-based economy of the 21st-century.

This report describes spatial thinking as a *constructive combination of concepts of space, tools of representation, and processes of reasoning that uses space to structure problems, find answers, and express solutions. It is powerful and pervasive in science, the workplace, and everyday life. By visualizing relationships within spatial structures, we can perceive, remember, and analyze the static and dynamic properties of objects and the relationships between objects. Despite its crucial role underpinning the National Standards for Science and Mathematics, spatial thinking is currently not systematically incorporated into the K-12 curriculum.*

Spatial thinking has gone beyond being a specialized skill set or body of knowledge; it is entering a new age of expected general literacy. This shift is only now starting to become evident as colleges and universities are beginning to accept GIS courses to meet general education requirements in areas such as science, communications, and analytical thinking.

However, a barrier to accepting GIS as a general education course is that many people do not understand where to place it within the curriculum since it can be either an academic or occupational program and is found within a multitude of disciplines that range from agriculture to anthropology to archeology (and that only covers the first letter of the alphabet).

GIS/GST education is complex because of two factors: 1) the steep learning curve, and 2) the increase in the number of people that will need to be educated to meet workforce demands. First, though all technology has a long and steep learning curve, geospatial technology is unique because of the variety of integrated technologies; the speed at which adaptation is occurring; and the speed at which equipment and software are being modified and updated, which precludes the ability for many businesses, much less the educational system, to keep up to date (Marble, 2006). Second, geospatial

technologies are not just being used by a cadre of specialists and technicians; they are part of a system-wide integration that includes professionals and managers in all sectors of the economy. In addition to the GIS, GPS, and RS technicians who will need advanced and specialized education, there are peripheral support people such as those who work with the technicians, supervise the technicians, and use the geospatial products for decision making, who will all need additional education. All of these workers are growing at unprecedented rates (U.S. Department of Labor, 2005c).

There are a variety of national and state organizations, collegiate and secondary programs, and NSF and DOL grant projects that are working to improve curricula, provide resources, and document workforce needs for geospatial technologies. As these diverse groups develop the necessary instructional materials, offer professional development, and publish workforce information, there is a concern over duplicating efforts where there is no structure for nationally coordinating or disseminating these resources. This is especially true at the community college level. For example, several community college-based projects have developed geospatial-related task analysis summaries (DACUMs⁶) or reports. In many cases these reports are duplicated for a specific career, while other geospatial careers have had no task analysis at all. By coordinating efforts through a national center, the duplication of activities can be reduced, freeing up resources to address neglected and emerging areas in GST.

⁶ DACUM is an acronym for developing a curriculum. It is a one or two day storyboarding process that provides a picture of what the worker does in terms of duties, tasks, knowledge, skills, traits and in some cases the tools the worker uses (DACUM, 2007)

A Review of National Geospatial Technology Education and Workforce Efforts

GIS/GST education has grown and matured over the past 20 years. Several factors have contributed to a tremendous demand for GIS education – its growing use in a broad array of applications along with plentiful and easily accessible data, user-friendly software, increased computing power, and a more computer-literate public (Brown et. al., 2004; DiBiase et al., 2006). There have been many significant national efforts that have added cohesion and continuity to GIS education.

One of the earliest national GIS education efforts was conducted by the National Center for Geographic Information and Analysis (NCGIA)⁷. Published in 1990, the *NCGIA Core Curriculum in GIS* consisted of a detailed outline for a three-course sequence of 75 one-hour units (Goodchild and Kemp; 1992). In 1995, NCGIA started to develop a revised and expanded *Core Curriculum in GIScience* (last updated in 2000) and a *Core Curriculum for Technical Programs* (last updated in 1999). Both of these projects were never completed to the level envisioned (DiBiase et al., 2006). However, in a 2006 survey of 170 GIS educators (see Appendix A), the NCGIA *Core Curriculum* was still the most referenced GIS curriculum to date. In 1992, the NCGIA began a *Remote Sensing Curriculum* project that is still supported and continues to be updated and expanded under the auspices of the American Society for Photogrammetry and Remote Sensing (ASPRS, 2007).

In 1994, the University Consortium for Geographic Information Science (UCGIS) was formed to provide a “unified voice for the geographic information science research community” (http://www.ucgis.org/aboutucgis/mission_goals.htm). Currently more than

⁷ The NCGIA is a consortium of three universities founded in 1988 with funding from the National Science Foundation (University of California at Santa Barbara, State University of New York at Buffalo, University of Maine).

80 universities and three professional societies are members with several industry and government affiliate members. The leading education-focused effort by the UCGIS is the *Model Curricula* project, which began in 1999. The first portion of this on-going project, the *Body of Knowledge (BoK) for GIScience and Technology (GI S&T)*, was published in 2006 (DiBiase et al., 2006). The BoK is not a curriculum, but purports to include all pertinent GI S&T knowledge broken down into 10 “knowledge areas” (KA). Each KA is further broken down into “units,” with “topics” for each unit. The topics are defined in terms of one or more formal educational learning objectives. It is envisioned that by selecting different KA’s, pathways through the BoK could be defined that lead to different degree outcomes. Thus, the BoK could be used to develop the content for a curriculum for different levels of education and disciplines.

More recent national GIS education efforts have focused on defining core competencies rather than defining a national curriculum. As a brief review, core competencies define the knowledge and skills required to carry out specific tasks that are common to a particular profession or occupation. Core competencies are critical links between the workplace and the classroom, since they connect job requirements to educational subject areas (Sullivan et al., 2004). The competencies are the basis for the development of instructional materials, starting with assessments based on the competencies, and instructional modules based on the assessments. The establishment of core competencies for a subject area or profession has many benefits. Core competencies can provide a framework (Sullivan, 2004; DiBiase et al., 2006):

- for employers to better understand and evaluate the education of potential employees;
- to develop benchmarks for program accreditation,
- to facilitate articulation agreements;

- to make it easier to share curriculum among institutions;
- for exam-based professional certification; and
- to facilitate the placement of students in internships and jobs.

Students who understand what they know and, more importantly, what they don't know are better able to guide their education in an efficient and productive manner.

Several different groups have worked to define GIS core competencies. UCGIS does not directly refer to the BoK as competencies, but rather an “inventory of the domain” of GIS&T (DiBiase et al., 2006), however it is still an attempt to define parameters for the field of GIS&T, albeit more from an academic rather than an industry-driven perspective. In contrast to the BoK, the GeoSpatial Workforce Development Center (GeoWDC)⁸ at the University of Southern Mississippi used industry focus groups to develop a *Geospatial Technology Competency Model* (Gaudet et al., 2003; see Appendix B). The *Geospatial Technology Competency Model* attempts to identify the full range of competencies needed by a working geospatial technology professional and includes areas of business, technical, analytical, and interpersonal competencies that are independent of the GIS domain. Although the BoK provides much more depth and breadth to the GIS domain, the GeoWDC provides the framework for producing a well-rounded employee.

Many other grassroots efforts to define the core competencies for specific geospatial technology occupations have been undertaken largely at community colleges across the country using the DACUM process (Johnson, 2006). DACUMs have been used to provide the foundation for developing a GIS curriculum and/or program at a college that is aligned with local or regional workforce needs. A DACUM carried out at

⁸ The GeoSpatial Workforce Development Center (GeoWDC) is part of the National Workforce Development Education and Training Initiative (NWDETI) sponsored by the National Aeronautics and Space Administration (NASA).

San Diego Mesa College, in California, under *A Scaleable GIS Certification Program in Geographic Information Systems* (NSF/DUE 0401990), was used by Del Mar College in Texas, to define Skills Standards in Texas for a GIS Technician (Texas Skill Standards Board, 2007). The Texas Skill Standards process extends the outcome of a DACUM to include the performance criteria necessary to assess whether or not a skill or competency has been met.

Although the GeoWDC *Geospatial Technology Competency Model* is the most extensive “workforce” competency model to date (GITA, 2006), it is not being referenced to the degree that the UCGIS BoK is in national efforts underway. For example, the United States Geospatial Intelligence Foundation (USGIF)⁹ has been tasked to create an Academy to accredit courses and programs qualified to educate Geospatial Intelligence Analysts. The Academy used portions of the BoK to define the GIS-related topics required to qualify programs for accreditation (USGIF, 2007).

Another effort that is utilizing the BoK is the GIS Certification Institute (GISCI)¹⁰. The GISCI uses the BoK to identify courses that qualify for educational points under the certification process. This current process does not include an exam for certification. The lack of an exam has been a point of criticism by some professions (pers. comm., Scott Gram, Executive Director of GISCI, 2007). The GISCI is currently reviewing the BoK and its relevance to certification of GIS professionals to determine if the BoK “may serve as the backbone for an exam-based certification program” (pers.

⁹ The purpose of the USGIF is to promote the geospatial-intelligence tradecraft, and to develop a stronger community of interest between government, industry, academic, and professional organizations and individuals who share a mission focus around the development and application of geospatial intelligence data and geo-processing resources to address national security objectives.

¹⁰ The GIS Certification Institute (GISCI), is a 501(c) organization founded in 2004 to certify GIS Professionals (GISP). See Appendix C for more background information on the GISCI.

comm., Scott Gram, 2007). In 2007, GISCI surveyed their certified GIS Professionals (GISP) on the need for an exam component to the certification program and the utility of using the UCGIS BoK to determine certification status for GIS professionals. More than 560 GISPs responded to the survey; more than 70% said “use a percentage of the core knowledge areas of the BoK to determine certification,” while less than 10% said “don’t use the core knowledge [BoK] areas to determine certification” (pers. comm., Scott Gram, 2007). However, some concerns were raised by a number of the GISPs. The following quotes are examples of the types of concerns (pers. comm., Scott Gram, 2007)):

- *I don't mind using a few items from the core knowledge areas for GIS from the GIS&T Body of Knowledge, but I found that document to be loaded with doctoral thesis topics rather than everyday applications of GIS technology.*
- *I'm all for the academic nature of these core areas and the associated questions, but they're not reflective of the average GISP that's been utilizing geospatial systems for over a decade. Many of these areas should be common knowledge for practically all GISPs (e.g., principles of map design), but others are simply questions of a purely academic nature that many of us have not encountered since our undergrad days.*

Another significant effort was funded by the U.S. Department of Labor and Education Training Administration and lead by the Geospatial Information and Technology Association (GITA)¹¹. GITA, in partnership with the Association of American Geographers (AAG) and the Wharton School of the University of Pennsylvania, recommended: 1) standard definitions of the geospatial industry sector that have been vetted by industry leaders; 2) a rationale for market segmentation; 3) new

¹¹ In 2004, the U.S. Department of Labor and Education Training Administration (DOL-ETA) awarded \$6.4 million to support six projects related to the geospatial technology industry as part of the DOL’s President’ High-Growth Job Training Initiative. The grant to GITA was originally awarded to the Spatial Technologies Industry Association. It was transferred to GITA in 2005.

occupational titles for the industry; 4) methodology for estimating geospatial workforce demand; 5) modifications to the GeoWDC *Geospatial Technologies Competency Model*; and 6) actions for “closing the gap between geospatial workforce supply and demand” (GITA, 2006).

Two recommendations, from item 6 above, are particularly pertinent to this study:

- *Employers and educators must work together to develop effective strategies to close the gap between geospatial workforce demand and supply. The geospatial industry must articulate its workforce needs to ensure that educators respond with curricula that results in appropriately educated and trained individuals.*
- *Two year (community-based) colleges should assume a strong role in training new geospatial technologists and meeting on-the-job training needs of local professionals. (See Appendix C for a list of all the recommendations.)*

The GITA study has put forward constructive recommendations for the work that is needed to define, quantify, and ultimately prepare workers for the geospatial industry. Still, much of this work is yet to be done. More than ever, it is essential that the stakeholders in the geospatial industry (private, government, education, and others) agree on industry definitions and requirements including occupational titles, market segmentation, and the knowledge and skills required, especially for entry level positions requiring two-year and four-year degrees. It is also vital that the work be effectively coordinated and efficiently parceled up to ensure its completion in a timely and productive manner.

Table 1 below summarizes many of the significant national efforts that have added continuity and cohesion to GST education.

**Table 1. National efforts focused on GST education and workforce development.
[Funding agency/source]**

Year	Activity
1988	NCGIA is formed to advance the understanding of geographic processes and spatial relationships through improved theory, methods, technology, and data. [NSF]
1990-1995	<i>NCGIA Core Curriculum</i> published [NSF]
1992 - present	<i>Remote Sensing Core Curriculum</i> is published [NSF/NASA/ASPRS]
1994	UCGIS formed to provide a coherent voice for the GIScience research community
1995-1999	<i>NCGIA Core Curriculum for Technical Programs</i> [NSF]
1995 -2000	<i>NCGIA Core Curriculum for GIScience</i> [NSF]
1998-present	UCGIS <i>Model Curricula</i> Project [Multiple sources/industry]
2003	GeoWDC <i>Geospatial Technologies Competency Model</i> [NASA]
2004	GIS Certification Institute is formed [URISA/Independent]
2006	UCGIS <i>Body of Knowledge(BoK) in GIS&T</i> in published by AAG
2006	GITA/AAG study, <i>Defining and Communicating Geospatial Industry Workforce Demand</i> , Phase I report is released [DOL-ETA]
2007	USGIF Program Accreditation Criteria released
2007	National Forum on Geospatial Technology Education for Community Colleges (this study) [NSF]
2007	Texas Skill Standards for GIS Technicians

BACKGROUND ON THIS PROJECT

At the 2005 ESRI User Conference¹², there was a special meeting on the national coordination of educational GIS/GST activities at community colleges that was attended by community college faculty and members of industry. The outcome of this meeting and a subsequent round-table discussion at the Advanced Technological Education¹³ conference in October 2005, was a consensus that some type of national coordination for

¹² The world's largest GIS conference held annually with attendance exceeding 13,000 (<http://www.esri.com/events/uc>).

¹³ The Advanced Technological Education (ATE) program is a Division of the Undergraduate Education program at NSF and focuses on the education of technicians for high-technology fields that drive our nation's economy.

community college GST education was desperately needed. Many issues were discussed, most of these issues were germane to most fields of technology education and others were unique to GST (Sullivan et. al., 2005). Ten issues were selected as critical to the national coordination of GST education and the development of a National Geospatial Technology Center (NGTC). These issues were:

- 1) GST workforce needs
- 2) GST core competencies
- 3) GST certification
- 4) GST curriculum and pedagogy
- 5) GST educational pathways/articulation
- 6) GST professional development
- 7) GST community communication
- 8) GST awareness and reaching diverse audiences
- 9) The role of GST education in supporting college administrative tasks and entrepreneurialism¹⁴
- 10) Future trends in GST

A proposal to support research into these issues and to support a plan to develop a NGTC was submitted to the NSF in October 2006 (*Developing a Vision and a Plan for a National Geospatial Technology Center*) and was subsequently funded in June 2006 (NSF/DUE 063424). The author of this paper is the PI on the NSF grant; two Co-PIs and a steering committee of nine GST professionals also worked on this project. The following research methods are described in the context of this management structure.

¹⁴ Issue 9 was added later and another issue, qualities of a successful national center, was subsequently removed.

METHODS

This study was conducted between July 2006 and November 2007 and consisted of the following five phases.

1. Survey of the GST education community. An online survey was designed to gather information on practices, views, and challenges of faculty in GST education. In October 2006, many hundreds of faculty were contacted via the ESRI community college, ATE Program, MATE Center¹⁵, and the Agrowknowledge Center¹⁶ listserves and invited to participate in the survey. One hundred and seventy GST professionals, predominantly community college GST instructors, responded (see Appendix A for the survey results).
2. Conduct background research on the ten critical issues. A team of 12 GST professionals from community colleges, universities, industry, and professional societies researched the literature and reviewed survey responses to produce a written synopsis of the current state of each of the ten critical issues (see <http://www.geotechcenter.org/GSTForumReading.pdf> for the written synopsis for each issue). The team also created a list of questions that remained after their review and analysis.
3. Hold a national forum on GST education. A national forum was held January 5-7, 2007 in Monterey, California, with forty geospatial technology leaders from industry, education (predominately community college educators but a few universities educators attended), and workforce development participating. During the forum, the results of the background research and the questions that remained were shared and discussed and a set of draft recommendations for a NGTC was produced (see

¹⁵ ATE Center for marine technologies.

¹⁶ ATE Center for agricultural technologies.

<http://www.geotechcenter.org/GSTForumReading.pdf> for a forum agenda and list of participants).

4. Validate and rank the forum recommendations. Five weeks after the forum, the draft recommendations were sent out in a survey format to participants for validation and prioritization (see Appendix D for the survey and results).

5. Produce a report and a list of high priority recommendations for a NGTC. A final report that provides the context for the national coordination of geospatial activities at the community college level and a prioritized list of work for a NGTC was synthesized.

Portions of this report are contained within this document.

RESULTS

Listed below are short summaries of each issue followed by highlights of the survey and the top priority recommendations from the national forum.

1) GST workforce needs

Workforce studies can be both complex and expensive, but are essential to developing GST programs that prepare students for today's and tomorrow's workplace. Given the breadth of recommendations that emerged from the forum and the number that received a high priority rating in the validation survey, a NGTC will need to devote considerable resources to assessing the workforce; making best use of existing studies; developing strategic partnerships with other workforce-related organizations (U.S. Department of Labor (DOL), Geospatial Information & Technology Association (GITA), Association of American Geographers (AAG), etc.); and making this information readily available to community college educators in a user-friendly format.

It is recommended that a NGTC should:

- a) Thoroughly research former workforce assessment efforts and practices before starting or recommending new studies.
- b) Collect and compare GIS/GST DACUMs in an attempt to identify and expand a core set of tasks for GIS/GST technicians.
- c) Implement alternative workforce studies such as environmental scans¹⁷ for defining workforce needs.
- d) Establish a partnership with U.S. Department of Labor.
- e) Develop a mechanism to track student internships, jobs, and earnings.
- f) Establish a clearinghouse for internship, work experience, and service learning programs.
- g) Develop partnerships with new and emerging sectors of the economy that utilize geospatial technology.

2) GST core competencies

Core competencies can provide the foundation for the standardization of GST education if they are widely adopted by the educational community and, within a particular academic program, are clearly identified. Of the 170 GST educators surveyed in phase 1, 63% felt core competencies are needed for the national coordination of GST activities, while 33% were unsure. Only 4% felt that core competencies are not needed for national coordination. The UCGIS BoK is the most extensive document produced to date on the breadth of GI Science and Technology. A key question remains – how well does the BoK embody two-year community college GST programs that are responding to local and regional workforce needs? At the National Forum, many community college educators felt that the BoK needs to be vetted by working GIS/GST professionals as to the applicability of the Knowledge Areas (KAs) to the work GIS/GST professionals perform.

It is recommended that a NGTC should:

- a) Determine if the BoK KAs encompass the breadth of the GIS&T field from a community college perspective.

¹⁷ An **Environmental Scan** is an ongoing process of gathering and analyzing local labor market information.

- b) Assist UCGIS and AAG in continuing and expanding the BoK and making it more user friendly for undergraduate teaching and educating the incumbent workforce.
- c) Create additional units under existing KAs and/or create an additional KAs related to workforce-driven applications of GIS (e.g. emergency response, crime mapping).
- d) Create a glossary of terms for the BoK KAs specific to two-year programs.
- e) Establish partnerships with other academic centers and industries to align KAs with sector-specific applications of GIS (e.g. agriculture, forestry).
- f) Using *Geography for Life* (Boehm and Bednarz, 1994) and other models as templates, create concrete examples for each level of mastery for the BoK topics that pertain to two-year community college education and establish assessments for each level of mastery.
- g) Identified core competencies in the BoK and state them as learning outcomes consistent with accreditation language.
- h) Broaden the scope of the competencies and learning outcomes to all of geospatial technology (remote sensing, GPS) realizing that the BoK emphasizes GIS.

3) **GST certification**

“Certification” is recognition by one’s colleagues and peers that an individual has demonstrated professional integrity and competence in their field (ASPRS, 2007). In the survey of 170 educators in phase I, nearly 60% believed that higher education should try to align its curriculum with professional certification efforts underway. However, very few faculty are currently doing this. Three GST-related certifications were reviewed and are summarized in Appendix E (GISCI Professional Certification, ASPRS Certification, and SPACE STARS Certification).

It is recommended that a NGTC should:

- a) Serve as a repository of certification, accreditation, and licensing program information and help facilitate the dissemination of information to faculty and students.
- b) Evaluate certification options and provide recommendations to students, faculty, and industry about the advantages of each option.
- c) Join organizations that offer GIS/GST certifications in order to provide a unifying voice that represents community college views and interests in existing certification efforts.

4) GST curriculum and pedagogy

A plethora of workforce-aligned GST curriculum has been produced by GST educators, independently and via grant-funded GIS/GST curriculum development projects. However, most community college GST educators are not aware that this curriculum exists, which can lead to a duplication of effort, while other important subject areas may be ignored because of time constraints.

It is recommended that a NGTC should:

- a) Create an online clearinghouse that encourages submission, review, and search capabilities for geospatial curriculum materials.
- b) Develop an introductory course or modules that provide the fundamental (core) geospatial skills as outlined in the BoK (or subsequent improved version of it) that are needed by the mainstream workforce.
- c) Develop a model program of study to assist colleges in new program development and program enhancements.
- d) Create a curriculum structure that allows educators to access those resources for adaptation to the local workforce.
- e) Provide instructional materials that teach science and math skills as a part of geospatial education.

5) GST educational pathways/articulation

With increasing tuition at all levels of higher education, the American public is demanding more flexibility in education and training. Colleges and universities are under tremendous pressure from students and stakeholders, such as employers and taxpayers, to produce a technically literate workforce in shorter time without loss of course credit. In the survey in phase I, more than 71% of the faculty indicated that they do not have any course-to-course articulation agreements.

It is recommended that a NGTC should:

- a) Develop an online forum and white paper that discusses strategies for achieving articulation.
- b) Organize, compile, and compare past and future articulation agreements, memoranda of understanding (MOU), and other documents used by institutions across the nation and make the results available on a searchable database on the center website.

- c) Develop career pathways that provide guidelines for a seamless education in geospatial technology from secondary to community college to university.
- d) A problem of K12-community college articulation involves faculty credentials. A NGTC should develop standards to integrate GIS into geography AP courses and/or College-Level Examination Program (CLEP) courses to overcome the credential issue.

6) GST professional development

Most faculty currently teaching in community colleges were educated at a time when GIS was virtually absent from the university curriculum. The dynamic and evolving nature of geospatial technology dictates a critical need for the professional development of community college faculty. In the survey of 170 educators in phase I, 84% indicated that they self taught by reading literature, while more than 67% lacked membership in any professional organization. Barriers to professional development include the cost, lack of time, travel distance, lack of opportunities, and a lack of administrative support.

It is recommended that a NGTC should:

- a) Organize, compile, and disseminate up-to-date information on professional development opportunities, training materials, tutorials, and links to online resources on the NGTC website.
- b) Offer professional development training courses, workshops, and seminars.
- c) Offer geospatial technology professional development in a variety of formats including online tutorials, instructions and data, and podcasts via the website as well as face-to -ace.
- d) Identify the major barriers to professional development through surveys and feedback from community college faculty, (e.g. limited funds, inflexible schedules, and unappreciative administration) and work to minimize these barriers in order to increase professional development availability and accessibility.
- e) Keep abreast of geospatial technology trends and make recommendations on the type of professional development faculty should pursue to keep current in the field.
- f) Build partnerships with four-year universities, professional societies, government agencies, industry and NGOs to promote, encourage, and expand professional development opportunities.

7) Geospatial community communication

National coordination of workforce information and educational resources within the community college network is limited because an effective, dedicated, communication structure for this audience does not exist. Without effective communication, the evolution of GST education is slowed and less responsive to workforce needs because it relies on the work of people individually to assess workforce needs, modify curriculum, and seek professional development.

It is recommended that a NGTC should:

- a) Act as the representative body for two-year colleges, faculty, and students in the field of geospatial technology.
- b) Act as a collective voice to promote community college interests in professional societies, workforce-related studies, core curriculum projects, certification and accreditation efforts, and other activities of importance to community college audiences.
- c) Create a comprehensive website and listserve to facilitate communication.
- d) Provide up-to-date information on current and past geospatial-related NSF Advanced Technological Education (ATE) projects, ATE Centers, and other NSF Division of Undergraduate projects via the NGTC website and listserve.
- e) Provide the latest information on current and past Department of Labor projects via the NGTC website and listserve.
- f) Seek out the best existing communication network(s) that can be used to improve the flow of information.
- g) Work closely with existing regional hubs to improve communication on a regional level.

8) GST awareness and reaching underserved audiences

With the need for highly-qualified workers in STEM fields in high demand and a large portion of the current STEM workforce approaching retirement, this is a critical time to focus on increasing the diversity of the talent pool. Recruiting diverse students can be challenging; raising the awareness of geospatial technology is the first step.

It is recommended that a NGTC should:

- a) Promote GST as a mainstream scientific tool for community college education so that GST awareness and education is extended to other academic programs (e.g. economic, history, and biology).

- b) Disseminate stories of successful geospatial awareness events and identify effective GST education tools, such as Google Earth and the National Atlas web mapping services, for community college GST teachers.
- c) Provide a comprehensive list of outreach events and marketing materials and make them available online so that community college GST teachers can utilize these resources to promote GST career and technology awareness.
- d) Identify effective student recruitment approaches for GIS programs in community colleges and disseminate available resources and recruitment tools to community college teachers.
- e) Provide comprehensive information about internship and mentorship opportunities to underserved audiences in community colleges.
- f) Identify existing successful programs that reach diverse audiences.

9) The role of GST education in supporting college administrative tasks and entrepreneurialism

External forces such as declining state support and declining local tax bases have driven many community colleges to look for new sources of revenue (Evelyn, 2004). As a result, community college missions have become more complex — from reactionary organizations within communities to proactive organizations promoting local economic expansion (Grub, 1997). For the latter, the demand for institutional research, specifically the ability to acquire, manage, analyze, and communicate market-place data, has never been greater. This new way of thinking puts a geographical face, heavily laden in the demographics and economics of the region, on college entrepreneurial activity. GST can be very helpful in supporting college administrative tasks, such as workforce/economic development, institutional research, grant writing, student marketing, and facilities management.

It is recommended that a NGTC should:

- a) Develop a searchable clearinghouse with how-to templates, standard data models, and best practices so that community colleges can duplicate curriculum-driven entrepreneurial activities and experiences linking GST to community college administrative issues.
- b) Serve as a clearinghouse for geospatial data as it applies to community college demographics, enrollments, economics, etc.

10) Future trends in GST

GST is a rapidly growing and changing industry. In reviewing the various source documents for geospatial technology trends, there were two recurring themes. The first was an increasing need to include information technology instruction within the geospatial curriculum, largely relating to the evolution of GIS to enterprise GIS¹⁸. The second was the increasing need for web-based instruction and web-based data delivery.

It is recommended that a NGTC should:

- a) Assess trends in the geospatial industry in order to project changes in the industry and workforce that impact GST curricula and programs at two-year colleges.
- b) Disseminate the information on trends to two-year colleges via the NGTC website.
- c) Assist community colleges with adapting their curricula to future trends.

DISCUSSION

Along with nanotechnology and biotechnology, geospatial technology is one of the three most important emerging and evolving fields in this country (Gewin, 2004). The geospatial workforce is growing at a rate of 35% a year — 100% a year in the commercial subsection of this market (U.S. Department of Labor, 2005c). This explosive growth has been driven by dramatic increases in the capabilities of geospatial tools and the increased availability of high quality geospatial data (Marble, 2006).

However, this growth is not without its challenges. The DOL has not been able to keep up with standard industry definitions and occupational titles for the geospatial industry. As a result, labor market data is largely aggregated with other fields, making it

¹⁸ Enterprise GIS is an integrated, multidepartmental system composed of interoperable components. It provides broad access to geospatial data, a common infrastructure upon which to build and deploy GIS applications, and significant economies of scale (Definition from ESRI).

difficult to define and monitor trends. This also creates problems when trying to prepare a workforce for employment — for what jobs should people be educated?

Community colleges and universities have traditionally approached this problem from different perspectives. Community colleges tend to look at the local workforce needs in their area, while universities take a broader view of the science and theory that build the foundation for the discipline. Both approaches have advantages and disadvantages. Community colleges, if not careful, can “train” students for a particular job at that moment in time; but as the field and technology evolve, workers may find themselves “out of a job” if they do not have a foundation that is broad enough to allow them to learn new knowledge and skills. To the contrary, university students may have a better foundation on the science and theory, but may lack both the ability to practically apply this knowledge and the ancillary skills that make them employable.

Regardless of the differences in their approaches, both community colleges and universities are grasping for air without solid workforce information that identifies the knowledge, skills, and aptitudes required for entry-level positions. Furthermore, because of their differing approaches to GST education, the ability of community colleges and universities to communicate with one another is severely hampered without the framework of a common language.

Probably no issue plays a more critical role in creating this framework than the identification of GST core competencies. Core competencies connect job requirements to educational subject areas, making them a critical link between the classroom – be it a community college or a university classroom – and the workplace. Of the ten issues examined in this study, the identification of core competencies is key to addressing many

of the other issues, including workforce needs; certification; curriculum; educational pathways and articulation; and professional development.

The quest to define “core competencies” has made substantial progress, but is far from over. A multitude of benefits - including efficient curriculum sharing, benchmarks for program accreditation, widespread articulation, exam-based professional certification, and effective screening and placement of new workers into the workforce - can be attained by the national adoption of core competencies. However, in order to realize these benefits, core competencies that are accepted by two and four-year institutions and validated by working professionals are needed.

The following three efforts have made progress in this arena: the UCGIS BoK; the GeoWDC *Geospatial Technology Competency Model*; and a series of DACUMs, including the Texas *GIS Technician Skill Standards* that were derived from the DACUM process. In addition, many activities are underway that are melding workforce and educational efforts. For example, the GISCI survey of certified GIS Professionals that assesses their views on the BoK; the USGIF program accreditation that uses portions of the BoK; the GITA study that made recommendations for improving the GeoWDC *Geospatial Technology Competency Model*; and efforts associated with this study to examine four DACUMS for common tasks and to determine how they align with the BoK¹⁹.

However, any efforts to tie together workforce and educational information must be done within a framework that sits within a clearly defined geospatial industry sector. (Many of the GITA’s recommendations highlight the need for defining the geospatial industry sector — standard definitions for the geospatial industry sector, new

¹⁹ Although this was part of the grant that funded this study, it is not included in this report.

occupational titles, a rationale for market segmentation, etc.) Indeed, many parties have built new competency-related frameworks, and many agencies have funded these efforts (NSF, DOL, NASA, etc.). It is imperative that a NGTC works with and ties together the existing competency-related efforts so that core competencies, and in turn a core curriculum, that supports many entry-level positions, can be established and agreed upon by a wide range of stakeholders. Community colleges and universities have traditionally approached the content of a curriculum from very different perspectives – however understanding and compromise by both parties will be needed to move forward. The consequences of not coming to an agreement will only contribute to greater gaps between what the workforce needs and what the educational system is producing.

This study has made every effort to reach broadly and be inclusive (across disciplines including new and experienced GST faculty in rural and metropolitan regions around the country) in order to best represent the collective views on the roles that a NGTC should play in coordinating GST education at the community college level and facilitating dialogues with industry, professional societies, and four-year universities. More than 92% of the community college educators who responded to the survey conducted in phase 1 of this study felt there should be a national organization that represents community college interests relating to geospatial technologies. As to what a NGTC should accomplish, the following three recommendations received the highest rating, with more than 75% of the survey respondents rating them as high priorities:

- A NGTC should provide a means by which geospatial educators can search and retrieve curriculum, instructional materials and workforce information online.
- A NGTC should organize, compile, and disseminate up-to-date information on professional development opportunities, training materials, tutorials and links to online resources on a NGTC website.

- A NGTC should act as the representative body for two-year colleges, faculty and students in the field of geospatial technology and act as a collective voice to promote community college interests with professional societies, higher education, the DOL, and other organizations concerned with GST education.

Equally as important as what a NGTC should do, is what it should not do. The survey respondents felt strongly that a NGTC should NOT:

- Become a geospatial technology certification granting organization.
- Be an organization that provides educators with evidence (certification, certificates or licenses) that they have satisfied the minimum qualifications specific to teaching geospatial technology.
- Be an accreditation body for geospatial programs.

From these recommendations, it is clear that community college educators want a NGTC that will represent them at national venues; act as a clearinghouse to provide easy-access to current curriculum and workforce information; and, lastly, provide access to professional development opportunities.

A NGTC has been proposed to the National Science Foundation by one or more collaborative groups largely consisting of community colleges. The status of a NGTC will not be known until early 2008, but, regardless of which group is funded, its success may very well hinge on its ability to follow the recommendations of this study.

CONCLUSION

GST is a rapidly growing and changing industry that is transforming many sectors of the economy. The speed at which new fields are adopting GST along with the speed at which equipment and software are being modified and updated makes it difficult for many industries, much less the educational system, to keep up to date. To further complicate the issue, national coordination of workforce information and educational

resources within the community college network is fairly poor. If we as a nation are to remain economically competitive, achieve greater understanding in protecting our resources, and reduce the chaos and loss of life associated with manmade and natural disasters, we will need an efficient, responsive, and well-coordinated GST educational system with good communication between all levels and a better understanding of the knowledge and skills workers need to be successful in the workplace.

Developing a Plan for the National Coordination of Geospatial Technology Education: A Community College Perspective was an effort to document the issues, needs, and concerns of community college educators and produce recommendations for a NGTC that best reflect this audience while placing the recommendations within the context of the work that has been accomplished by the Department of Labor, higher education, and others organizations relating to professional certification and accreditation. It is essential that some organization, presumably a NGTC, end the community college silence and act as a collective voice to promote community college interests in issues and activities of national importance.

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Related GST Projects, Certifications, Studies, and Activities

Department of Labor Workforce Projects

Geospatial Technology Apprenticeship Project University of Southern Mississippi

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The Geospatial Business Hub Project: Preparing the Nation's Geospatial Workforce –
The Institute for GIS Studies (TN), Central Piedmont Community College

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Geospatial Industry Awareness and Opportunities – Geospatial Information &
Technology Association (GITA)

<http://www.gita.org/> Retrieved November 28, 2007.

Geo 21 Project – Nortel Networks Kidz Online, NASA Center for Distance Learning

<http://www.kidzonline.org> Retrieved November 28, 2007.

Geospatial Imagery Analysis and Practical Applications – William F. Goodling
Advanced Skills Center

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A Model for Connecting the Geospatial Technology Industry to Community College
Workforce Development: Geospatial User Needs Assessments – Rancho Santiago
Community College District

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Model Curriculum Projects

University Consortium for Geographic Information Science (UCGIS) Model Curricula

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National Center for Geographic Information and Analysis (NCGIA) Curriculum Projects
NCGIA Technical Curriculum

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National Center for Geographic Information and Analysis

NCGIA GIScience Curriculum <http://www.ncgia.ucsb.edu/giscc/> Retrieved November 28, 2007.

Remote Sensing Core Curriculum <http://www.r-s-c-c.org/> Retrieved November 28, 2007.

Institute for Advanced Education in Geospatial Sciences IAEGS Model Curriculum.

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Certification and Accreditation Programs

American Society for Photogrammetry and Remote Sensing (ASPRS) Certification
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STARS (Spatial Technology And Remote Sensing) Certification
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K-12 GIS Programs

Environmental and Spatial Technology (EAST) Initiative
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Internet GIS Websites

Google Earth <http://earth.google.com/> Retrieved November 28, 2007.

MapQuest www.mapquest.com Retrieved November 28, 2007.

NASA's World Wind <http://worldwind.arc.nasa.gov/> Retrieved November 28, 2007.

MSN Virtual Earth <http://local.live.com/> Retrieved November 28, 2007.

APPENDICES

A. Survey results of 170 GST Educators conducted in October 2006

B. GeoWDC Geospatial Competency Model. From Gaudet, C.H., H.M. Annulis, and J. C. Carr, 2003. Building the Geospatial Workforce. *Urban and Regional Informational Systems Association Journal*, Special Education V15, no.1, p.21-30.

C. Recommendations for Closing the Gap between Geospatial Workforce Demand and Supply. From Defining and Communication Geospatial Industry Workforce Demand Phase I Report, Draft for Comment GITA, 2006.

D. Validation Survey Results of the National GST Forum Recommendations.

E. Certification Efforts Reviewed in this study.

- GIS Certification Institute
- American Society for Photogrammetry and Remote Sensing (ASPRS) Certification
- Space STARS Certification

Appendix A



Summary Results: Developing a Plan for a National Geospatial Technology Center

Total Responses: 170

Visible Responses: 170

1. Please select the statement(s) that best describe you:

	Response Percent	Response Total
I am a community college instructor and teach GIS	33.3%	56
I am a community college instructor that might teach GIS in the future	19.0%	32
I am a community college administrator	10.1%	17
I work at a 4-year university and teach GIS	12.5%	21
I conduct GIS workforce studies	7.7%	13
I represent a professional society as a staff person or board member	5.4%	9
I am a GIS professional that works outside of education	12.5%	21
I am an employer of GIS professionals	1.8%	3
Other, please describe:	22.0%	37

1.	4-H educator
2.	Cornell University Cooperative Extension 4-H Youth Development Educator
3.	CTE Director at secondary
4.	Death Investigator
5.	EAST Facilitator
6.	Elementary teacher / Teacher workshop presenter
7.	Former community college instructor
8.	GIS Director, Non-profit Education Center
9.	GIS Pro currently enrolled in a MCDBA Program
10.	GIS Teacher/EAST Facilitator
11.	graduate faculty teaching theory of mind
12.	high school drafting and career teacher
13.	High School GIS instructor
14.	High School Science Teacher
15.	High School teacher that uses GIS in environmental and marine science classes
16.	I a professor at a University, use GIS and train graduate students using GIS
17.	I am a community college instructor that is scheduled to teach a marine ecology survey class using GIS
18.	I am a deputy administrator of a firefighter training and certification program housed at a community college
19.	I am a GIS high school and adult education instructor and incorporate GIS into community service learning projects
20.	I am a GIS professional that works with educators and sit on two educational boards
21.	I am a research scientist at NASA, adjunct faculty in geography at San Jose State and teach Remote Sensing at Foothill Community College


Appendix A

22. I am formulating a GIS competency model for staff hiring and development
23. I have helped develop GIS curriculum and currently manage a GIS certificate program
24. I teach GIS at a 4yr univ. & at a community college where I will probably never teach GIS
25. K-12 Education
26. k-12 educator
27. Mostly, I will be using GIS as a teaching tool in my biology classes.
28. municipal government interested in GIS mapping
29. PI for NSF funded grant implementing GIS in curricula
30. precision Agriculture Specialist
31. Research Analyst in Institutional Research
32. Researcher ob community colleges
33. retired from community college administration and instruction
34. Secondary Social Studies Educator
35. student
36. teach preservice candidates at Univ.
37. Technology High School Teacher
38. University Extension Educator sharing Geospatial Technology with youth
39. Vocational Center Instructor
40. We are developing courses and programs in geospatial science.

Respondents to this question 168

Number who skipped this question 2





2. Does your institution offer GIS courses?

	Response Percent	Response Total
Yes 	74.9%	125
No 	25.1%	42

Respondents to this question 167

Number who skipped this question 3

3. Does your institution offer a GIS certificate or degree?

	Response Percent	Response Total
No 	47.9%	80
A GIS certificate 	36.5%	61
A GIS degree 	21.0%	35
We plan to offer a GIS certificate or degree in the future 	13.2%	22

Respondents to this question 167

Number who skipped this question 3

4. Which disciplines at your institutions are associated with a GIS curriculum? (Check all that apply.)

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	Response Percent	Response Total
None	8.5%	14
Agriculture	26.7%	44
Art	2.4%	4
Archeology	7.9%	13
Biological Science	20.6%	34
Business	7.9%	13
Computer Science and Information Systems	23.0%	38
Criminal Justice	9.7%	16
Drafting	9.7%	16
Economics	2.4%	4
Engineering	14.5%	24
Fire Protection/Science	9.7%	16
Geography	48.5%	80
Geology	26.1%	43
Health (nursing and medical related)	5.5%	9
Information Technology	17.6%	29
Marine Science	17.0%	28
Natural Resource Management	22.4%	37
Physical Science (physics, chemistry, meteorology)	8.5%	14
Sociology	5.5%	9
Surveying	17.6%	29
Real Estate	1.8%	3
Other:	13.9%	23

1. Aviation
2. Coastal wetland science
3. Community Studies/ Planning
4. cultural studies
5. Dept. of Urban Design and Planning; Extension Office
6. EAST Lab
7. EAST Lab
8. Ecology, Landscape Architecture
9. Environmental Science
10. Environmental Science
11. environmental science
12. Environmental Science
13. environmental science department
14. Environmental Sciences




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15. ethnic Studies
16. Forest Management Technology, Environmental Science Technology, Rec and Parks Technology
17. history
18. History
19. History
20. just developing modules
21. K12 Education
22. Landscape Architecture
23. Mathematics,
24. None specifically but viewed as an interdisciplinary program
25. office of civic development
26. Planning and Arch.
27. public health
28. recreation; community based problem solving - public issues education
29. students take courses infor
30. These are all in the future. We have an NSF grant to develop GIS courses and modules.
31. We offer ATP ESRI training courses in our organizations

Respondents to this question 165

Number who skipped this question 5

5. What do you consider the most advantageous way to teach GIS?

	Response Percent	Response Total
Within the context of a discipline or application 	31.0%	52
As broad-based knowledge and skills that can be applied to a variety of disciplines 	57.1%	96
Other 	11.9%	20

Respondents to this question 168

Number who skipped this question 2

If other, please specify:

1. 1st course should be broad-based. subsequent courses should be application-focused.
2. A combination of the two approaches. A broad-based approach will open minds to other possible, but related uses within the main discipline. A focus within the context of the central application will provide a focus in the context of something the student already understands.
3. a variety of approaches in conjunction with online courses especially those courses developed by ESRI
4. advocate for first, second option above, and then specialize in context discipline or applications
5. Also as project base
6. Applied in field based projects and in the context of a discipline
7. As part of an experiential youth program
8. Both
9. both listed above, depends on the students
10. Both of the above
11. Both ways are useful
12. Both, if possible
13. Both, Intro as broad-based then advanced courses within the context of a discipline
14. Both: transition from generalized to discipline-specific over the course of a 4-yr degree program.
15. broad based audience youth and adults; also community partnerships
16. Broad-based initially, but narrowing to the specific needs of the discipline.
17. GIS as a tool requires a basic knowledge of the system followed by directed application for a discipline. Some students need the opportunity to continue on to GIS/IT specific training, other need to know the

Appendix A

- application within their discipline.
18. i use a cartographic approach. i hope to elaborate on it at the 2007 esri education users meeting
 19. I would like to offer a Lab Harbor of GIS to house 2 students per rotation.
 20. If depends on the class and the makeup of the students
 21. It is also a part of our Geography A.S. degree the GIS degree is an A.A.S. Degree
 22. Literacy: through modules in existing courses; then broad-based
 23. The answer to the above is both. I dont believe that there is a single most advantageous way; there are many opportunities to teach GIS and all should be taken advantage of.
 24. We do both (above) in two formats
 25. We plan to do both, and seems a good idea.
 26. web courses make it more feasible for professionals to more effeciently develop GIS skills

Respondents to this question **26**

Number who skipped this question **144**

6. What type of audiences do you serve in your GIS courses?
(Specify the relative number of students in each category with 0 indicating none and 5 indicating the greatest number of students.)

	0	1	2	3	4	5	Response Total
Students who plan on transferring to a 4-year institution	16.1% (20)	13.7% (17)	16.9% (21)	26.6% (33)	12.9% (16)	13.7% (17)	124
Students pursuing a 2-year vocational degree or certificate	17.6% (22)	5.6% (7)	12.8% (16)	23.2% (29)	20.8% (26)	20.0% (25)	125
Working professionals (students that have a Bachelor's or higher and are seeking additional skills/knowledge for their current job)	13.3% (17)	7.8% (10)	16.4% (21)	25.0% (32)	16.4% (21)	21.1% (27)	128
University students pursuing a 4-year degree and/or graduate degrees.	41.7% (50)	20.8% (25)	10.0% (12)	8.3% (10)	6.7% (8)	12.5% (15)	120
Students with degrees (A.A., B.A or higher) that are preparing for a career change	29.8% (34)	11.4% (13)	18.4% (21)	23.7% (27)	11.4% (13)	5.3% (6)	114
Other	58.5% (38)	3.1% (2)	10.8% (7)	6.2% (4)	7.7% (5)	13.8% (9)	65
Respondents to this question							148
Number who skipped this question							22

If other, please specify:

1. Again, just starting. Anticipate this mix.
2. Community Adult Volunteers who, in turn, teach older youth
3. community college students transferring into a four year degree progarm
4. elementary students
5. First Responders
6. Graduate students preparing for a M.S.
7. High School Students
8. high school students and high school drop outs
9. Hopefully Within The Community
10. In my course I will promote the use of GIS as problem solving tool across the curriculum
11. k-12
12. k-12 teachers and students
13. Law Enforcement Officers
14. middle school age, at-risk, youth

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15. Middle/High School Youth
16. No courses offered at this time.
17. Professionals that are not students at all
18. Secondary (grades 9-12)
19. Seniors graduating to attend college in the field of engineering
20. students pursuing a one year certificate
21. Students with a BA applying to graduate school
22. Students working full-time who do not have a Bachelor's and are not working towards a degree
23. Teachers and others doing it out of interest or for fun
24. teachers and they in turn use it with their students in K-12 education
25. The institution itself does not offer GIS courses, however, our training program offers a simple overview or introduction to GIS intended to provide firefighters with a awareness of the capability of GIS. I am using GIS for program-related institutional research.
26. Youth

Respondents to this question 26

Number who skipped this question 144

7. How would you characterize the region that your institution serves? The majority of the students come from:

	Response Percent	Response Total
A metropolitan city (population over 500,000)	28.1%	45
A large city (100,000 -500,000)	18.1%	29
A medium size city (50,000-100,000)	13.8%	22
A small city (10,000-50,000)	15.0%	24
Rural areas (towns with less than 10,000)	25.0%	40
Respondents to this question		160
Number who skipped this question		10

8. How would you rate the importance of the sources used in developing your GIS curriculum? (0 = no importance to 5 = very important)

	0	1	2	3	4	5	Response Total
Developed mostly by me	9.7% (14)	10.4% (15)	6.3% (9)	20.8% (30)	25.0% (36)	27.8% (40)	144
Adapted from a colleague's curriculum	17.9% (25)	16.4% (23)	15.0% (21)	25.0% (35)	20.0% (28)	5.7% (8)	140
Commercially produced curriculum products (hard copy)	9.8% (14)	11.9% (17)	19.6% (28)	23.1% (33)	19.6% (28)	16.1% (23)	143
Commercially produced online or electronic curriculum products	13.0% (18)	18.8% (26)	18.8% (26)	19.6% (27)	19.6% (27)	10.1% (14)	138
Free curriculum products on the web	12.3% (17)	11.6% (16)	15.9% (22)	24.6% (34)	19.6% (27)	15.9% (22)	138
Curriculum products from a National Science Foundation workshop	24.6% (33)	14.2% (19)	10.4% (14)	22.4% (30)	15.7% (21)	12.7% (17)	134
	52.8%						

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Other	(28)	7.5% (4)	5.7% (3)	1.9% (1)	7.5% (4)	24.5% (13)	53
Respondents to this question							153
Number who skipped this question							17

Other, please specify:








1.	4-HCCS and Garmin curricula
2.	a "model curriculum" such as the Body of Knowledge
3.	All sources are all good because they can stimulate thinking. Adaptation of the sources to meet the needs of the program is paramount, which is why "my" sources are rated most important.
4.	business and industry job needs
5.	Conferences
6.	Current materials were developed in-house, but we are interested in a program developed by Delmar College under a NSF grant and oriented to first responders.
7.	developed by our GIS or subject matter instructors
8.	developed for specific research projects
9.	EAST Initiative training (CAST/UA at Fayetteville)
10.	Endowment Fund
11.	ESRI Press
12.	ESRI software and written resources; Training opportunities
13.	first statement Developed by grant team (not me personally)
14.	from people working in the field
15.	GIS is simply a way that I can demonstrate how the intellect can be developed by using an exciting approach that students find highly motivational.
16.	Hands On Training
17.	Hopefully Within The Community
18.	I am required to use a lab manual developed by the UMaine System GIS Curriculum Consortium (that still needs a lot of work to be truly adequate)
19.	I worked with GIS specialists in the community to determine what skills they were looking for in potential employees and designed the Geographic Information Science Technology, Associate of Applied Science Degree to accommodate their recommendations
20.	If I had more resources, I would use them.
21.	John Deere training
22.	Most important is that exercises are based on datasets use din the region..
23.	NCGIA
24.	networking with others
25.	No courses offered at this time.
26.	no GIS curriculum yet
27.	Ocean Explorers curriculum
28.	Other organization's on-line modules
29.	Other sources from local business fields
30.	Our courses are ATP approved courses created by ESRI
31.	Our grant includes salaries for two full time professionals to develop curriculum together with instructors.
32.	real time information and usage are really good for teaching students in a varied community college setting

Respondents to this question	32
Number who skipped this question	138



9. Have you referenced any of the following workforce studies or core curriculum projects in designing your GIS curriculum? (Check all that apply.)

	Response Percent	Response Total
UCGIS Model Curricula 	39.5%	32

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NCGIA GIS Core Curriculum for Technical Program (CCTP)		30.9%	25
NCGIA Core Curriculum in GIS		45.7%	37
Remote Sensing Core Curricula		33.3%	27
USGIF Academy Curriculum		7.4%	6
IAEGS Model Curriculum		6.2%	5
Department of Labor studies		37.0%	30
Other studies, please specify:		21.0%	17
<ol style="list-style-type: none"> 9.2 workshop BRCC ATE job skills survey C.O.U.R.S.E County sponsored workshops Dacum charts ESRI GIS Advisory Committee recommendations. Studies of internship requirements. Studies of University curriculum where articulation agreements are in place or possible. GIS Specialists in the field - See "Other" #8 GITA I did not design the curriculum MATE Center studies and curriculum projects National 4-H None NWEDETI primarily ESRI virtual campus PSU Studies were used but unsure of the source Texas state-wide DACUM April 2005 TSTC Waco, TX DACUM Upper Midwest Aerospace Consortium EdParc division 			
Respondents to this question			81
Number who skipped this question			89

10. Do you currently have any course to course articulation agreements with 4-year universities?

	Response Percent	Response Total
Yes 	27.9%	43
No 	72.1%	111
Respondents to this question		154
Number who skipped this question		16

If yes, please list the course titles:

1. intro to g.i.s. (learning to use hardware/software for spatial data handling) 2. intermediate g.i.s. (intro to vector & raster spatial analysis) (3. advanced g.i.s. -- offered infrequently)
2. Agri 126 Fundamentals of GIS

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3. Agri 275 Introduction to Precision Farming
4. All
5. All in our CIS AAS degrees
6. ASCI 695 GPS/GIS
7. CET program to WSU and walla Walla College
8. Crime Mapping I and II. These are the GIS classes. Our fundamentals class will be part of new articulations. I'm assuming you just want the GIS based classes.
9. CRTG 1311. INTRODUCTORY GEOGRAPHY IN GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND GLOBAL POSITIONING SYSTEMS (GPS) (2-4-3) 45.0702 Introduction to basic concepts of vector GIS using several industry specific software programs including nomenclature cartography and geography. CRTG 1401. CARTOGRAPHY AND GEOGRAPHY IN GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND GLOBAL POSITIONING SYSTEMS (GPS) (3-3-4) 45.0702 Introduction to the principles of cartography and geography. Emphasis on global reference systems and the use of satellites for measurements and navigation. Prerequisite: CRTG 1311.
10. Currently informal but will be made formal in 2007
11. Forestry and Environmental Science courses but no GIS courses
12. Fundamentals of Mapping and GIS
13. GEO 106 Introduction to Geographic Information Science
14. GEOG 1000 Physical Geography GEOG 1300 Regional Geography GEOG 1400 Human Geography Meteorology 1010 Intro to Meteorology GIS 1800, 1820, 2920 - We are currently working on incorporating more theory throughout the series so that it will articulate with the Intro to GIS classes at the 4 year institutions.
15. Geog/GIS 31: Intro to GIS
16. Geography 150 (Introduction to Mapping and GIS) with San Diego State University.
17. GIS111: Intro to GIS GIS205: Intro to Vector GIS GIS121: Remote Sensing & Aerial Photogrammetry GIS122: Spatial Modeling with Raster GIS GIS 220: Advanced GIS
18. goal to articulate Geog 311 at UO (oregon) and 300 level OSU (Oregon State)
19. However we have an agreement with a 2 year for our 4 year
20. I am not entirely sure which classes transfer.
21. In an informal format. many of my physical therapist assistant graduates progress to the university using NC CCC articulate agreement based on specific courses that are accepted.
22. Informal case by case agreement with Cal Poly Pomona
23. Intro to GIS Advanced GIS Cartography Remote Sensing Technology
24. Intro to GIS AG GIS
25. Intro to GIS
26. Intro to GIS, Cartographic Design, Advanced GIS
27. Introduction to GIS GPS for GIS Remote Sensing Advanced GIS
28. Introduction to GIS Introduction to GPS Aerial Photogrammetry and Remote Sensing
29. Introduction to GIS Remote Sensing and GPS Intermediate GIS Geospatial Analysis and Applications Advanced GIS
30. Introduction to GIS (Geog 20)
31. Introduction to GIS (Geography 12)
32. Introduction to GIS, GPS, and Cartography
33. Map Fundamentals Introduction to GIS Advanced GIS Techniques in GIS Remote Sensing Cartography Physical Geography Cultural Geography World Regional Geography
34. none in GIS, too many to list in othert areas
35. Not in GIS
36. Not in GIS, but we plan to do so when our courses begin.
37. Not in GIS, only in Geography: Human Geography, World Regional Geography
38. Smith Leaver funds grant to initiate a Geospatial literacy program throughout NYS.
39. there are hundreds of courses - far too many to list
40. Through the curriculum consortium, our GIS Applications 1 course at Univ of Maine at Machias is transferable to any other consortium university.
41. Underway
42. WE are a school district. The local college and our district would like to have an articulated agreement down the line.
43. We are designing our curriculum now.
44. We have offered Introduction to GIS Technology, but dropped the offering after two semesters because of lack of interest from students. We plan an awareness campaign and pilot projects in K-12 systems.
45. World regional geography Human geography Physical Geology Meteorology
46. Yes and are are working on additional agreements

Respondents to this question 46

Number who skipped this question 124

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11. Do your GIS courses meet any general education requirements?

	Response Percent	Response Total
Yes 	30.6%	45
No 	69.4%	102
Respondents to this question		147
Number who skipped this question		23

If yes, please specify the general education requirement that it satisfies:

1. 7 of 10 in New York State
2. Accreditation Board for Engineering and Technology (ABET)
3. Area A2 - Communication and Analytical Thinking for graduation with an Associate's Degree.
4. Area D-2
5. But plans are in the works to do so.
6. communication proficiency, critical thinking, personal and cultural awareness, and understanding of personal well-being
7. Computer Science
8. critical thinking and science
9. Elective
10. General Science
11. GEOG 104 (Geographic Information Science and Spatial Reasoning) under the GE category of Mathematics/Quantitative Reasoning in the Foundations of Natural Science and Quantitative Reasoning
12. Geography
13. Geography transfer credit
14. GIS and Science interdisciplinary studies
15. GIS concentration option in forestry
16. I am not sure.
17. I believe they will satisfy math/science/computer science requirements. The modules will be in courses that satisfy requirements in their areas (science, social science, etc.)
18. I don't know enough about that to be able to say, but I would think that it does.
19. Internship Credits
20. Introduction to Cartography
21. It is something we are hoping for in the future.
22. K-12 state standards and benchmarks
23. Lab Science 4 credits
24. Language and Rationality
25. MAS Degree
26. Mathematics and Quantitative Reasoning with SDSU
27. Nat Science Opt II transfer to 4 year school
28. national education standards in geography, technology, science and math
29. Natural Resources
30. Natural Science - Lab Science
31. Not a formal GE requirement as stated by the Minnesota State College and University Guidelines, however as an institution (Itasca Community College) based requirement (in addition to GEs required for AA degree) that satisfies "Computer Proficiency".
32. Only as an elective.
33. Physical Science Gen Ed: GEOG 1000 (Earth's Surface Environs) Meteorology 1010 (Intro to Meteorology) GEOG 1700 (Natural Disasters) Interdisciplinary Gen Ed. GEOG 2200 Urban and Environmental Issues GEOG 1300 (Regional) GEOG 1400 (Human) (Others are under consideration)
34. several outcomes from each of the following headings: Integration and Application, Critical Thinking, Communication, Aesthetics & Creativity, Mathematical Reasoning & Technology
35. Social Science (3 of 6 credit hours max.)
36. social science elective
37. They do meet specific program requirements
38. Two courses were included as required for a B.S. degree in agriculture
39. We anticipate that they will.
40. We don't know yet but it is possible that one course will.




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41. We have just developed a new 104 Intro to GHIS class that will fulfill GE and math requirements
42. World Geography
43. Yes, 1/2 of our model is to embed curricula to existing STEM and Social Science transfer classes, all accepted in the state system for general ed requirements.

Respondents to this question 43

Number who skipped this question 127

12. Do you think a set of nationally recognized GIS competencies is needed for the national coordination of GIS activities (such as certification, professional development, curriculum development, articulation agreements, internship placement, etc.)?

	Response Percent	Response Total
Yes 	63.0%	104
No 	4.2%	7
Not sure 	32.7%	54

Respondents to this question 165

Number who skipped this question 5

If yes, what do you believe may serve as a starting point for this discussion?

1. 1. Development of standard GIS employment categories. 2. Clearer articulation of GIS concepts with cross-software hands-on experience
2. a discussion among community college instructors with similar wants and needs who have various skill levels
3. A list of competencies based on Industry/Business/College input that can be distilled to a list of 10 to 20 competencies that can be delivered in 12 to 24 months.
4. Accreditation Board for Engineering and Technology (ABET)
5. Agroknowledge
6. Articulation both among community colleges & with 4 year institutions
7. As I said, I believe if the local communities realized they could utilize GIS in the police department, public works, etc. they would introduce this.
8. Assess current "state of affairs" in terms of articulation, workforce needs (what employers want), etc.; what institutions are already doing in terms of training and education; and see how these align. Then determine direction for any kind of certification/articulation. (Do employers really care if their workers/applicants have an official certificate, or are they more concerned with what they know and can do? A certificate from one institution is often vastly different than a certificate from another -- in terms of courses required, rigor of program, etc.
9. begin with certificate of study, then advance to 4-yr licensure
10. Certification and curriculum development would be most useful
11. Certification in Geoscience Information Systems and Technology (proposed)
12. certification; however, this may be discipline specific
13. Commonalities between the various GIS or Geospatial Technology certification efforts currently underway
14. Conferences, professional groups, or an NSF supported project.
15. Curriculum development
16. Curriculum Development
17. Curriculum Development.
18. Development of core competencies for GIS programs
19. Discipline specific tests
20. Discussion with professors at colleges and universities
21. ESRI
22. Funding to local non-profit organizations that can partner with community colleges to implement local real-world projects utilizing GIS, GPS, to solve regional, or local environmental problems, as is the case

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- with my organization.
23. geography, i.e. the notion that the data being processed/analyzed are located somewhere on the planet and it's critical to convey that notion of 'spatial'.
 24. Geospatial technologies are fundamental to the economic growth and sustainability of the planet and its people.
 25. Geospatial Technology Apprenticeship Program
 26. GIS counting as a GE articulation
 27. GIS offers a wide variety of uses that cross discipline boundaries. A certification process typically acts to limit cross discipline studies. As an researcher in the education and psychology field with a quantitative background I am aware of how research technologies (such as GIS or other model technologies) can be seen as a research speciality rather than a tool to use to explore areas. Within education research this has led to slow integration of research tools, including GIS.
 28. Good work has been done with GIS competencies (Dr. Cyndi Gaudet) and certification standards. NWCC offers professional development non-credit workshops with ESRI certified instructors on a regular basis. Standardized curriculum would allow for articulation agreements. Internships are important, also.
 29. I believe all types of schools should be in the discussion: Community Colleges, non R - 1 institutions and R - 1 institutions.
 30. I believe competencies are needed as part of any developed curriculum.
 31. I feel there is a need for identifying competencies, but don't know if a "one size fits all" is appropriate. Flexibility for a variety of levels/programs would be important to me.
 32. I think competencies as guidelines, so each project is not doing yet another DACUM analysis--but I do think the competencies are different for different purposes, uses of GIS
 33. I think one important place to start is to resolve the question of software-oriented vs. general skills-oriented GIS education. In my courses, I've come down somewhere between, but I think we need to have a broader conversation about what competency means in that context. Beyond that, I think that we need to discuss problem-solving as a competency and then develop pedagogies for teaching it.
 34. I think the market changes too rapidly and as soon as you develop the competencies they would need to be updated.
 35. I think we need a hierarchy of certifications that reflect the different levels of competencies needed in professional GIS fields.
 36. I'm too new to the field to be specific, but having national state competencies for curriculum with help future employers recognize levels of knowledge and skill.
 37. Identifying key competencies
 38. In K12 GIS will become real enough for classrooms when it is filtered for direct use inside lessons or units.
 39. Industry partners that will help develop certificates and put them within their job descriptions as required qualifications for employment.
 40. Industry standardization
 41. Look at existing competencies (UCGIS, NCGIA). These focus much more on the academic 4-year vision of GIS education however. In addition, survey curriculum currently being taught at the 2 year level and employer needs. We need to reconcile the current gap that exists between 2-year programs aimed at workforce development and technician training with 4-year and graduate level academic programs.
 42. My view is that the discipline should progress from basic concepts through the various levels of abstraction and complexities until the practitioner reaches a level where he/she can function creatively, conduct research at the rigorous level of objective science, and solve problems at the expert level within his/her discipline.
 43. No doubt, the UCGIS BoK and USGIS Models
 44. not sure if a nationally recognized certificate would be used, even though it might be helpful.
 45. Not sure if it is "needed", but I do think it could be helpful. Identify best practices, resource clearing house, and dynamic dialogue between those teaching GIS in community college.
 46. Pointing out & demonstrating how GIS affects many of the everyday work activities of a particular type of work or profession.
 47. Seeking agreement on a broad-based job task analysis, by discipline, to identify primary tasks used by all GIS users and secondary tasks used within specialties. With that analysis, job performance requirements may be developed and from there specific learning objectives identified. The job performance requirements become, essentially, the "national standard" for GIS training to be adopted by institutions and incorporated into their training curriculum.
 48. software, basic exercises usable by many disciplines
 49. sorry, not sure
 50. specific conference proceedings called for this purpose. (or cyber conference)
 51. Still unsure.
 52. Subdivision of the discussion by discipline.
 53. take a look at typical/majority of States' learning standards and relate those to Geospatial Technology, careers trends and community public policy (decision making) trends.
 54. The first step should be to complete a needs assessment. Exactly how can GIS be embedded into a broader general education curriculum? Any national certification or standard must take into account the current state of many academic and vocational disciplines. Additionally, the needs assessment must determine the attitudes of various academic instructors and leaders to determine probable acceptance.

Appendix A

The needs assessment must also include studies of the current state or articulation between colleges and among the K-16 community. The needs assessment should concentrate on barriers to implementation and their removal.




55. The Penn State World Campus certification program offers a starting model for standardized curriculum. ESRI classes, on the otherhand, or more topical and skill driven verses project driven. Skills are learned best if used in pursuit of a project objective.
56. The program should distinguish GIS casual users from practicing professionals from GIS related business management. Core competencies should be established for each. The program must NOT be GIS software dependent but treat the discipline of GIS independent of the tools. It should recognize differences between theory and practice. IT should invoke technical standards for the care of data. The discussion should involve as many commercial entities as it does public sector participants. It should recognize GIS as a formal discipline of management information systems.
57. The starting point of this study should come from the professionals that would be hiring new graduating students. The skills and knowledge that are needed should be standardized and set. This will allow all curriculum to look at the standards and develop the needed lessons to teach these standards. There also needs to be a standard for levels of competency for the Geo-technology professional, this would included knowledge of not just GIS, all imagery studies, database management, and other areas of expertise the are needed in the geo-technology fields.
58. the work that GITA did last year to develop the GIWIS
59. This surveyed followed with regional meetings
60. US DOL core competencies
61. We need to decide on the scope of competencies and where they fit within the broad range of activities listed above. Seems that different guidlines and flexibility are needed for the varied list above.
62. While a set of nationally recognized competencies may be beneficial and a good model to follow, I feel that a community college might first consider local or state needs/requirements and adapt to these based on national competencies.
63. Workplace/employer feedback about needed skills/competencies from a broad range of disciplines and industries.
64. Yes and No. On the topic of curriculum development, consider this: I have taken several GIS courses from instructors at different institutions and each has emphasized different components of a curriculum as "important". What I have gained by a lack of coordinated effort is a broader based, academic and private professional perspective on the field and its related emphasis. This has been to my benefit. In a similar way, I teach physical geography as a general education requirement that I am quite certain that while addressing major issues, has placed emphasis in very different areas than that which is experienced by students taking physical geography at other institutions across the nation. It may well be that the diversity of personalities, their experiences and teaching pedagogies serve the needs of the student more than any predefined set of steps or competencies. The real world doesnt appear to work that way (unless you are assembling a car--where there is a specific set of steps that ought to be followed). On the topic of Certification: No. What is the intent of "certification" anyway? And does it deteriorate if you dont use a GIS on a regular basis? Software evolves rapidly. We (at Itasca Community College) offer a 15 credit "Certificate". I tell the students that GIS is an important and evolving skill set that many organizations both public and private are investing large sums of time and money in. They really arent going to care if you walk into an interview and say "I'm certified in GIS". They are going to want to know what you can do with your transferrable GIS skill that will enhance thier organization. Certification at our (CC) level is a bit of a joke because I've seen programs with various curriculums and required college credits all offering certification. My question would be--should we even offer a certificate, and if so, shouldnt we have an ethical obligation to inform certificate pursuers that it is essentially meaningless?? On the topic of professional development: NO. Every individual has his/her own specific professional directives/interests,etc. Maybe developing some sort of summaries of the value of professional development opportunities--i.e. how valuable were they to a group--might help us attend some and avoid others?? Relative to curriculum development: I'd probably lean towards No. The reason is that I believe we can do better service to our community members by tailoring thier learning objectives to their experience levels. Questions that might be considered include: Who is the customer (i.e. returning professional, transfer student, young students with no real idea of what/where they are going to end up) and what do they desire? What are the needs of the local community? What is the plan/intention of surrounding coordinating agencies that utilize GIS/GIS products with whom your graduates might be employoed? With regard to articulation agreements, my experience has shown that there is a tremendous amount of "territoriality" at the 4 year university level. I have sent students to 4 year universities who (nearly mock me) wont under any circumstances allow a CC to provide university credit for even the Introduction to GIS course. Students who have gone through my program report that even that universities upper division coursework was "a joke", "easy" and/or "redundant". I believe that I mention that GIS is not rocket science somewhere else in this course. Critical thinking on the other hand is something we could all use alot more of. With regard to internship placement, I'd say No. The reason is that I place students with a variety of locally based private and public organizations who all have specific needs. I maintain a GIS Advisory Committee--representatives from this group and other professionals--who help me understand the current and evolving needs of their organizations. I'm thinking that while there is certainly going to be a "core" set of compete

Appendix A




Respondents to this question 64

Number who skipped this question 106

13. Are you involved in developing/advising any of the GIS or Geospatial Technology certification efforts underway? (Check all that apply.)

	Response Percent	Response Total
No 	91.4%	148
USGIF Academy Certification	0.6%	1
ASPRS Certification	0.6%	1
GISCI 	2.5%	4
Other, please specify: 	4.9%	8
1. College certificate 2. Department Head Responsibility 3. Mississippi through the IHL Geospatial Education Council and Memphis Area Geographic Information Council (MAGIC) 4. not certification, however, 4-HCCS curriculum was just released 5. we are doing some research to find out how to develop gis needs for policing agencies 6. Workforce and Career Development Grant State Chancellors Office 7. You should contact Mr. Sun at Casaper College for this informaiton		
Respondents to this question		162
Number who skipped this question		8







14. Do you believe that institutions of higher education should try to align their curriculum with professional certification efforts underway?

	Response Percent	Response Total
Yes 	59.6%	99
No 	5.4%	9
Not sure 	34.9%	58
Respondents to this question		166
Number who skipped this question		4

15. How do you acquire professional development in GIS? (Check all that apply.)

	Response Percent	Response Total
ESRI User Conference 	50.3%	83

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Regional User Group Meetings		52.1%	86
Commercial, for-profit, short courses		28.5%	47
Community college courses		20.6%	34
University courses		27.9%	46
Self taught by reading literature		84.2%	139
Other, please specify:		25.5%	42
<ol style="list-style-type: none"> 1. Agrowknowledge 2. Agrowknowledge, ESRI short courses 3. Attend many workshops with groups like GISetc., who teach ESRI programs, other education oriented workshops 4. by teaching 5. community GIS projects 6. currently licensed as a Physical therapist and do not acquire professional development in GIS 7. Direct market contact 8. EAST training 9. ESRI courses 10. ESRI On line courses 11. ESRI training 12. ESRI Training 13. ESRI Virtual Campus 14. ESRI virtual campus 15. ESRI Virtual Campus courses; Lots of exchange with colleagues 16. ESRI virtual courses and ESRI certified workshops at local community colleges 17. free-to-state govt shortcourses 18. grant & contract projects as well as consulting 19. grant funded prof devel 20. I hope to expand this list. 21. Internet lectures & virtual campus courses 22. Local seminars and open house events 23. Marine Advanced Technology Education (MATE) Center 24. MATE 25. MATE 26. MATE Center 27. NSF grant funded training 28. NSF Workshop from GIS/GPS Consortium 29. Ocean Explorers 30. on-line courses 31. Online: tutorials and magazines 32. PA GIS Consortium, Penn-State 33. regional workshops, especially if I participate in *teaching* them 34. Resource people in public agencies / Would like to take part in regional user group meetings to learn more 35. teaching professional workshops; project work with colleagues; beta testing and project work with vendor technical support 36. Trained by Professionals/Internships 37. Tutorials 38. We are in the process of developing it now. 39. Web Based Seminars 40. Working experience 41. workshops 42. workshops at professional meetings, State Cartographers Office 			
Respondents to this question			165
Number who skipped this question			5

16. What barriers, if any, are there to your participation in GIS professional development

Appendix A

activities?

Please explain:

1. \$
2. \$\$\$\$
3. A relatively small percentage of my time (position description) pertains to geospatial science...and to learn this technology one needs to learn it and apply it on a regular basis (use it or lose it syndrome). A great deal of my time goes into developing Geospatial educational programs and training. It is very difficult to keep up with the new and expanding technology (specifically the new software) when receiving training once or twice a year. This problem is one that we will have to overcome when it comes to training secondary school science teachers too, in my opinion.
4. Access to computers and software limited by community college budgets.
5. As I work for NYS, I do not know how much time my supervisor(s) would allow for GIS professional development activities. My supervisor(s) is/are approachable though, and there is always personal time to use.
6. Availability of funds
7. Availability on a teaching schedule.
8. Available travel funds and time limit me in participating in some of the larger, national meetings.
9. Being the only faculty member in my department, my teaching load keeps me too busy to participate in GIS activities outside the walls of academia.
10. Budgeting ... I usually pay for any/all attendance
11. Community college does not allocate any funding for this type of PD. It would be nice if grants were available for more PD.
12. Conflicts with teaching schedule
13. Convincing our administration that a GIS program is needed
14. Cost
15. Cost
16. Cost
17. Cost (Mainly from travel expenses because conferences & lectures are in larger metropolitan areas).
18. Cost and time
19. Cost and time
20. Cost and time are both barriers at times.
21. Cost of Software
22. Cost of software is seen as a barrier for our small community college.
23. Cost of Travel
24. cost too high, location of most classes & conferences too far away
25. Costs and locations of events and workshops; Workshops don't address local issues as examples
26. Distance & funding
27. Distance and money are the reasons. My college has limited fund for travelling.
28. Distance to areas where activities are offered.
29. Don't know what they might be, the college has a new GIS degree, a wonderful lab, and great potential.
30. Few opportunities for K-12 educators to learn how to use GIS more fully. Not finding sources for free or low-cost data -- no budget to acquire data. Also my lack of know-how for grabbing and incorporating information from such sources as the Census Bureau and the US Geological Survey agency.
31. For courses, lack of time is the big issue. A 4-7 day summer GIS refresher workshop would be welcomed, but regular full semester college courses are too big of a commitment as a mid-career educator. For me if professional development was too basic, that would not be a good use of my time. On the other hand, there are plenty of fairly basic GIS tasks that I wouldn't mind sharpening up on (take editing, data integration, model building, DEM data use, etc.) Benefit most from real world intermediate to just advanced skills that would be useful to share with my students who are getting just past basic GIS.
32. for informal & local g.i.s. professional development activities there are no barriers other than time.
33. Funding
34. Funding and time.
35. Funding for Prof Development and workload issues at the CC teaching.
36. funding is sometimes a problem as some of the conferences are very expensive
37. Funding, funding, funding
38. Funding. We are a minority schools with limited funding and not always able to afford the cost of attending professional development courses, seminars and conferences
39. funds
40. Having the administration and department heads understanding the need in this environment that GIS is used on a daily basis. Getting students to understand the need and how to use the GIS in developing studies and locating specific places and landmarks.
41. I am 50 miles from the nearest community college. It would be better for me if I could use the internet to learn.
42. I have little time during the school year to "get away" to attend conferences or training.
43. I teach school so the classes have to be at the right time and price.








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44. I was interested in your Health conference, but currently management my program with re-affirmation of accreditation is all I can keep up with now. Maybe when I retire, I can consider branching out with your efforts. When I was in Planning School Cartography was my favorite class.
45. I would appreciate prof devel activites being available
46. If R - 1 institutions are the only one at the table - see Body of Knowledge book.
47. Institution does not see value in widespread integration of GIS (yet)
48. insufficient awareness by administration as to the capabilities of gis and its application in various fields.
49. It is not my main area of skill development, it is a research tool I have on my list of areas to learn about.
50. It would be good if there were more workshops - i.e. 1-2 weeks in lenght focus on topics specific to teaching GIS at community colleges.
51. just time
52. Lack of a substantial budget for off-site training and travel
53. Lack of free time
54. Lack of funding for CC professors to gain professional development
55. Lack of local training and professional development opportunities outside the largest metro areas like Denver, Austin, San Diego. Little to nothing in medium and small urban areas.
56. lack of time
57. Lack of time
58. Lack of time.
59. Limited funding at the local CC level.
60. Limited learning opportunities. i.e. no courses at local community colleges. Also, limited pool of professionals because of a rural environment.
61. Living in rural Nevada, 3 hours from the nearest city of any size, poses many limitations on my development; as well as working for a small community college with very limited funds.
62. Location and budget
63. Location of training
64. Locations of the meetings.
65. Meaningful, useful events to attend for a reasonable fee are hard to find.
66. Money
67. MONEY. I don't have a budget right now to do serious professional development, even though there are some important new things I should be including in our curriculum. Unfortunately, lots of the professional development I need would require travel, and that makes it very difficult.
68. Most are not aimed at teachers, so their schedule does not accommodate the academic calendar.
69. No reasonably local resources. Must travel/stay somewhere for any training.
70. No time or money
71. No time!!
72. None
73. None
74. None
75. none
76. None - I'm fortunate to have performed twenty years of commercial practice in GIS before engaging the educational environment. As a result of the professional work, I joined a network of GIS participants and development activities.
77. None other than scheduling time
78. None so far. I do travel more than most other faculty on campus so I do stand out as being different.
79. None, now that I use only mass adoptable free web based resources designed for end users in K12.
80. None.
81. Normal Time Constraints
82. Not enough time to train
83. NWCC offers GIS professional development activities through the Workforce Development Center and Continuing Education non-credit courses. We try to offer the courses at the most convenient times and locations for working professionals.
84. Often the time and financial backing of my department is not available for me to get more training
85. Our NSF grant has been the catalyst at our school. We are trying to generate interest among a larger segment of the faculty. It is not understood conceptually.
86. Palau is a small Pacific Island that is very distant for most places where these activities take place. Travel costs are high, as are professional development activities.
87. Permission and time from my employer to attend shortcourses and other training events. Also, there is somewhat limited availability of applicable courses. These are offered on a selective basis to state govt employees so I'm not always part of the pool that gets to go.
88. Possibly funding.
89. Price.
90. Professional experience requirements not applicable to academic instructors, cost.
91. school budget and this is not my main job function
92. Software access. Every application requires a different extension or program but there is no "full license" readily spelled out/ available. It is all "piece meal". Very frustrating.
93. The Antelope Valley is an isolated region & has not been able to support a users group. ESRI meetings &


Appendix A

product updates tend to be offered on T, W, or Th when I am teaching.	
94.	The primary obstacle is cost of attending workshops and other professional development activities
95.	There is no budget for professional development in the community college that I work for. :(
96.	Time
97.	Time
98.	Time
99.	Time
100.	Time & Class loads
101.	time - there is simply no relief from academic obligations to find the time
102.	Time and Distance Community College Instructors are teachers and as such, their full-time job is teaching. There is little time for other activities other than evening meetings of local professional society chapters. The nearest large metropolitan area is 250 miles away, and there is limited GIS development activities there.
103.	time and financial support
104.	time and funding available for training
105.	Time and funding. I am on my own to a great extent in terms of financing conference attendance and other professional development.
106.	Time and lack of other faculty in my department to share the workload. I coordinate the Geography transfer program, the GIS degree program, and serve as Director of the Science and Technology center at our college which provides development, outreach, and faculty coordination for science and technology projects. There ain't enuff hours in the day.....
107.	Time and location (it's two hours or more to available training sessions)
108.	Time and money to travel to workshops, and time off from teaching. Faculty development could take place during the summer when teach load is reduced.
109.	Time and money: best opportunities to learn more GIS for me came through the ESRI on-line courses
110.	time and travel funds
111.	Time available to attend activities.
112.	Time management with teaching duties
113.	Time, funding
114.	Time, Money
115.	Time, money, busy schedule
116.	Time, support from college
117.	time, travel expense, administration's lack of knowledge of GIS
118.	Time. GIS is often a secondary skill used by some researchers in conjunction with their investigations. Time to work with GIS is under severe pressure from other responsibilities. Dedicated GIS personnel are hard to find and fund.
119.	Time: as full-time faculty, I'm booked.
120.	Too busy... lack of time.
121.	travel distance/money
Respondents to this question	
121	
Number who skipped this question	
49	



17. Are you a member of any geospatial professional societies? (Check all that apply.)

	Response Percent	Response Total
No 	65.0%	106
Association of American Geographers (AAG) 	16.0%	26
American Society for Photogrammetry and Remote Sensing (ASPRS) 	9.2%	15
Cartography and Geographic Information Society (CaGIS) 	0.6%	1
Geospatial Information and Technology Association (GITA) 	4.9%	8
National Council for Geographic Education (NCGE) 	8.0%	13
Urban and Regional Information Systems Association (URISA) 	9.2%	15

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Other, please specify: 	11.7%	19
<ol style="list-style-type: none"> 1. AAPG and GSA 2. American Physical Therapy Association; AARP; Audobon Society; subscribing member of the National Geographic Society 3. American Psychological Association//Cognitive Science Speciality 4. Arizona Geographic Information Council 5. BAAMA, BAR 6. Geographic and Land Information Society (GLIS) 7. GIS Councils in Mississippi and Tennessee 8. GSA AMS 9. Have been in the past. 10. I have a GIS certification from ASPRS as well 11. IACA 12. IEEE G&RS 13. ILGISA 14. illinois Geographic Information Systems Association 15. Kansas Association of Mappers (KAM) 16. MAGIC (local user group) 17. National Association of Extension 4-H Agents Geospatial Taskforce (Chair), Coordinator of new 4-HCCS curriculum (Exploring Spaces, Going Places) 18. SCAUG 19. State GIS 20. Utah Geographic Information Council 21. Various grant co-PIs are members of NCGE 		
Respondents to this question		163
Number who skipped this question		7

18. Do you have, or have you had, any National Science Foundation (NSF), Department of Labor (DOL) or other agency grants that focus on GIS or geospatial technology (GST)?

	Response Percent	Response Total
Yes 	27.6%	45
No 	72.4%	118
Respondents to this question		163
Number who skipped this question		7

If yes, please give the titles, dates, and funding agencies for your projects.

<ol style="list-style-type: none"> 1. "Mapping, Analyzing and Problem Solving Using Geographic Information Science: Implementing a GIS Curriculum for Technical Literacy," (NSF DUE # 0603492) June 2006 2. (1) GIS Access (2000-2001) NSF-ATE (2) Community College District project: 2 colleges are working with area high school teachers. (2006-2008) Chancellor's Office grant 3. "GIS/GPS Laboratory Exercises Using Workplace Data Sets", National Science Foundation (\$394,318) Co-Principal Investigator, 1998-2000. 4. 2001 NSF 5. AgriKnowledge conference in the midwest this past year. ESRI Users Conference, July, 2006 6. Applied Sciences Human Capital Development: Inspiring the Next Generation of Students in the Geosciences Aug 2005 - Aug 2007 NASA 7. But I did write the GIS course notes for the GIS/GPS Consortium out of Salina Kansas (An NSF funded consortium), 8. But our TAH grant supports it 9. Current new project: NSF ATE grant, Mapping, Analyzing and Problem Solving Using Geographic 	
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- Information Science, MAPS GIS, #0603492
10. Current NSF-ATE grant "A Scalable Skills Certification Project in GIS" that will be completed in 2008
 11. Developing a Vision and a Plan for a National Geospatial Technology Resource Center, 6/1/06-5/31/07, NSF.
 12. DOJ - Crime Mapping
 13. ESRI software grant for survey and civil degree program. Granted 25 seats of ArcGIS and several extensions. Received a NSF grant to do a workshop for high school tech teachers in GPS/GIS
 14. GIS Technology Implementation Project (GIS-TECH). NSF project June 2004-May 2007.
 15. I am not a PI on either of these grants, but currently we have two grants supporting some of our activities. NSF Grant 0525118 "Community for Rural Education, Stewardship, and Technology (CREST): A comprehensive project for students and teachers." NSF Grant 0126639 "Developing an integrated undergraduate GIScience curriculum for five University of Maine System campuses." This is Maine GIS Curriculum Consortium grant that is near its end. We also have a small grant from the Maine Coast Protection Initiative for our GIS Service Center to cooperate with the Island Institute to provide GIS services to local land trusts via student service learning projects.
 16. I am not a PI, but am working with the group that got the following grant: NSF Embedded Internet and Professional-Technical GIS at Lane (may be a working title) 2006-2009
 17. I've completed two USDA grant worth over \$600 K to enhance Agricultural GIS programs. I just completed a Tech Prep grant (75K) with the State Chancellor's Office for Community Colleges. I just received a \$440K two year grant to develop a model program for spatial thinking focused on high school and middle school curriculum.
 18. ISLET - Investigative Sciences and Law Enforcement Technology. We received a three year continuing grant a year ago. The GIS component we are to develop is Crime Mapping. We have since developed a fundamentals to GIS course
 19. Just received an EPSCoR grant (mini-grant from Hawaii EPSCoR/NSF grant) for the purchase of GIS workstations and large format printer.
 20. Lane Community College NSF grant
 21. Mapping, Analyzing and Problems Solving (MAPS) Using Geographic Information Science: Implementing a GIS Curriculum for technical Literacy NSF 0603492 Project Start Date Fall 2006
 22. MAPS GIS Mapping, Analyzing & Problem Solving Using Geographic Information Science NSF#0603492 July 2006 - June 2009
 23. Mentorlinks Grant; AACCC funded, 2004-present
 24. Micronesian Regional GIS Training Program. October 2003 through December 2004. U.S. Department of Interior--Operations and Maintenance Improvement Program.
 25. NASA - 1975-1982
 26. Not just focus on GIS, but utilize it. Each year we receive grant from NSF for Research Experience for the Undergraduate program. Our projects involved with landform evolution of western Colorado. The interns are required to use GIS and GPS data gathering and analyzing of the geology of the areas.
 27. NSF ATE 0603455 "Using a web-based GIS to teach problem based science in high school and college". 9/2006-9/2009
 28. NSF Ocean Sciences NSF Digital Government NSF Information Technology Research NOAA CSC GIS Integration and Development NSF Office of Intl Science & Development
 29. NSF Support; current project
 30. NSF, Biocomplexity in River/Road Networks, 2002 - 2007
 31. NSF, Estudio de Las Fortalezas de Tikal 2002-2006. NSF and FAMSI, Proyecto Oztuma-Cutzamala, 1998
 32. NSF-ATE, 0401990 - A Scalable Skills Certification Program in Geographic Information Systems (GIS)
 33. NSF-ATE, Scalable Skills GIS Certificate Program, 2004-2007
 34. One course in GIS is included in our NSF funded Marine Science Curriculum.
 35. Our college applied for NSF grant for GIS at 2 year level, but were not granted.
 36. PA Department of Environmental Protection-Arc View 3.2 Software and 2 Day Training
 37. State University System in Wisconsin
 38. Subgrantee with Rancho Santiago Community College for HGJTI grant-time frame 12/1/04 to 5/31/06 "A Model for connecting the geospatial technology industry to community college workforce development"
 39. Supervisor Training in Integrated Spatially Distributed Sensors in Agriculture, US Department of Agriculture, 9/04-8/06, \$300,000 (PI - Project Director) Training and Internships in Geographic Information Systems to Improve Recruitment Strategies and Student Success for Agriculture Majors, US Department of Agriculture, 9/03-8/05, \$260,000 (Co-Project Director, Bill Thiemann, Director) "A GIS Core Curriculum for the 2-year Colleges", NSF Advanced Technological Education (ATE), 7/96-12/98, \$188,000, Co-PI's: Michael Goodchild, Karen Kemp.
 40. The Finger Lakes GIT Ahead Project: Creating Career Paths for Geospatial Technology Professionals Through Teacher Enhancement and Student Engagement Advanced Technological Education NSF Grant
 41. The Northeast Rural Development Center provides dollars for the northeast regional geospatial center project meetings.
 42. Title: "Using a Web-based GIS to Teach Problem-based Science in High School and College" Period of Support: September 1, 2006 - August 31, 2009 Funding Agency: NSF Title: NASA Earth Science for Teachers Period of Support 8/15/05 - 8/15/08 (NASA cancelled the grant 7/1/06) Funding agency: NASA Title: Strengthening TCUs Earth Science Curriculum with Mentoring Partnerships and Innovative

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Geospatial Technologies Period of Support 8/15/05 - 8/15/08 (NASA cancelled the grant 7/1/06) Funding Agency: NASA

43. Title: Center of Excellence GIS, 10/04/2006-10/03/2007. USDA-NRCS
44. USDA Challenge Grant to train CC instructors 2000-2003
45. USDOL The Geospatial Business Hub Project
46. While our WIRED CIC grant, funded by the DOL through the CA State California Space Authority, has as one of its project goals, "Develop and execute recruitment strategies to increase student interest in an engineering technology-based curriculum including, but not limited to, geographic information systems (GIS), mechanical engineering, electronics, robotics, 3-D technology, and/or computer science," GIS is NOT a focus that AHC will be specifically addressing. Rather, AHC's grant deliverable will specifically relate to the Mechatronics program, involving mechanical engineering, electronics, robotics, and computer science. I believe that one of our WIRED team partners, Santa Monica College, wanted to focus its attention on the GIS aspect.
47. Wyoming/NASA Educational Grant

Respondents to this question 47

Number who skipped this question 123

19. What GIS conferences do you attend to learn about new information on GIS education? (Check all that apply:)

	Response Percent	Response Total
ESRI 	73.3%	85
Geospatial World 	1.7%	2
GITA – Geospatial Information Technology Industry 	6.9%	8
Other, please specify: 	40.5%	47

1. 4-H
2. AAG, SEDAAG
3. ACSM
4. AgrowKnowledge
5. Agrowknowledge
6. Arkansas' GIS Users Forum Conference
7. ASPRS
8. CAA
9. Can't afford to go
10. Cannot afford it out of my own pocket
11. collaboration and workshops
12. Colorado
13. Cornell University
14. County Programs
15. Direct Contact
16. don't attend conferences
17. E.A.S.T.
18. GeoInt
19. GIS in the Rockies, Texas GIS Conference
20. ILGISA (Illinois Geographic Informations Systems Association
21. International Precision Agriculture
22. local symposiums
23. MAGIC, Annual KAM Conference
24. Maine GIS Users Conference, when possible
25. MN GIS/LIS conference
26. MO GIS Conference
27. NCGE, AAG
28. NEARC, New York State GIS Conference
29. NIJ Crime Mapping Annual Conference
30. None

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31. none
32. none at this time
33. NSF
34. NYS GIS conference
35. NYSGIS
36. OAGEE, NYGA
37. Regional conferences
38. regional GIS conference
39. SCAUG
40. Sometimes in GSA meeting
41. State GIS
42. State Regional
43. State, Local conferences
44. TUGIS
45. UCGIS Summer & Winter Meetings
46. UGA-GATECH Educators GIS Conference
47. URISA
48. URISA
49. UW and others in the business
50. We plan to go.
51. Wildlife Society
52. would like to attend others, but time and funding tend to prohibit participation

Respondents to this question 116

Number who skipped this question 54

20. What websites do you visit to learn about new information on GIS education? (Check all that apply:)



1. AAG, NCGE
2. AGRC
3. All of these and many other different sources.
4. DigitalQuest
5. eastproject.org
6. GeoStor
7. Intergraph, Autodesk, Map Info
8. MARIS
9. Mississippi Automated Resource Information Systems
10. National 4-H Cooperative Curriculum review/resources
11. National Geographic
12. NCDOT
13. NRIS
14. Ocean Explorers

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15. one or two g.i.s. related blogs
16. PASDA
17. Planet geospatial (blogging)
18. regional/state GIS websites
19. Too many to list
20. too many to list
21. Trimble
22. various colleges
23. various US and European university distance learning programs
24. www.ucgis.org

Respondents to this question 162



Number who skipped this question 8

21. What other events do you attend to learn about new information on GIS education? (Check all that apply:)

	Response Percent	Response Total
Local GIS/GST user group meetings	71.5%	93
Faculty development workshops sponsored by the National Science Foundation	26.9%	35
Professional workshops/seminars offered by the private sector that charge a fee	37.7%	49
Other, please specify:	17.7%	23
1. American Society Agronomy		
2. anything I can find!		
3. colleagues		
4. EAST Initiative		
5. ESRI online classes		
6. esri website/newsletters		
7. Free workshoops from NYSGIS		
8. Free workshops or trainings		
9. I am relatively new to this and so far have only attended ESRI events such as open-house or product seminars.		
10. List Services on-line		
11. local Community College GIS Program Committee		
12. MATE		
13. NASA Educational seminar for high school teachers		
14. Nitle workshops		
15. None		
16. None		
17. none		
18. none - no time		
19. none at this time		
20. Read a lot!!!		
21. Regional offerings		
22. same as fee, above, except free to me as govt employee		
23. UW System workshops		
24. workshops and sessions at AAG and NCGE conferences		
25. Workshops offered by community colleges and senior colleges in the region		
26. Would like to take part in NSF workshops or a summer program at the University of West Texas		
Respondents to this question	130	
Number who skipped this question	40	

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22. Do you think there should be a national organization that represents community college interests relating to GIS and geospatial technologies (GST)?

	Response Percent	Response Total
Yes 	92.1%	151
No 	7.9%	13
Respondents to this question		164
Number who skipped this question		6

23. If so, how would you rate the importance of the possible responsibilities of this organization? (0 = no importance to 5 = very important)

	0	1	2	3	4	5	Response Total
Develop new GIS/GST curriculum	1.3% (2)	1.3% (2)	13.7% (21)	17.0% (26)	24.8% (38)	41.8% (64)	153
Disseminate existing GIS/GST curriculum	0.0% (0)	0.7% (1)	4.6% (7)	11.8% (18)	34.0% (52)	49.0% (75)	153
Promote the standardization of GIS/GST curriculum by means of a nationally recognized set of core competencies	3.9% (6)	2.6% (4)	9.1% (14)	14.9% (23)	29.2% (45)	40.3% (62)	154
Distribute information on workforce needs	0.6% (1)	1.3% (2)	6.5% (10)	21.3% (33)	25.8% (40)	44.5% (69)	155
Share best practices in pedagogy	0.0% (0)	1.9% (3)	6.5% (10)	16.2% (25)	33.1% (51)	42.2% (65)	154
Provide professional development opportunities	0.6% (1)	1.9% (3)	2.6% (4)	12.3% (19)	29.9% (46)	52.6% (81)	154
Provide a framework for articulation between 2 and 4-year institutions	0.7% (1)	4.6% (7)	8.5% (13)	17.0% (26)	21.6% (33)	47.7% (73)	153
Other	34.1% (14)	0.0% (0)	2.4% (1)	2.4% (1)	7.3% (3)	53.7% (22)	41
Respondents to this question							156
Number who skipped this question							14

Other, please specify:

1. Index of database links available. 2. Catalog of institution curriculae nationwide.
- Begin the basic interest in HIGH SCHOOL EDUCATION
- Community Involvement
- Cooperative liasion with UCGIS
- Create and disseminate modules that use GIS to teach concepts in other disciplines: "off-the-shelf" materials that can teach concepts while heightening awareness of the power of GIS in teaching, learning, and research.
- Develop a collaborative space for certificates that have been developed and the process of development. This would also develop a picture of changing needs and technology so we can stay current.
- First option: "Explore" new GIS/GST curriculum benefits/disadvantages I rate as very important--5.

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Disseminate findings would be beneficial of course. Promote Standardization--I probably dont agree.
Distribute workforce information--this of course would be beneficial to all. Pedagogy--definitely--as educators we are continuously looking for ways to make students' educational experiences better.
Professional Development-- this could be a nice piece of information depending on how it was set up.
Articulation--Yes--if nothing else to help us communicate a larger goal--serving the students.

8. get it into K-12 education
9. I have been working with several people who are wanting to get GIS started at their respective schools. A great opportunity.
10. In my experience, it's less useful to develop complete curricula than to help people develop their own
11. opportunities for scholarship, job market trend
12. Promote GIS across disciplines. Target market GIS to other substantive area sof interests.
13. Promote GIS as a career to middle and high school students
14. Provide a communication hub for community college GIS educators
15. Provide framework for implementation of GST degree/cert. at 2-year institutions
16. Provide GIS teaching materials
17. Provide grants to non-profit organizations to develop co-op or internship opportunities
18. review curricula and ensure solid background in GIScience; attempt coordination with high school and university study programs
19. sharing ideas on marketing GIS to prospective students
20. Should have joint cooperation between 4-year colleges and community colleges
21. Student recruitment is a problem
22. The organization must also concentrate on providing information and training about the use of GIS for general education purposes. The incorporation of GIS into existing curriculum should be a major emphasis of the organization.
23. Work with K-12 education

Respondents to this question 23

Number who skipped this question 147

24. **Would you like to participate in a national forum addressing critical issues in GIS and GST education with a focus on community colleges? (The forum will be held January 5-7, 2007 in Monterey, California.) Please note this is not an invitation at this time. Due to budget constraints, we will only select a few candidates to participate and support their travel and lodging. Details will follow in one to two weeks.**

	Response Percent	Response Total
Yes 	68.7%	114
No 	31.3%	52

Respondents to this question 166

Number who skipped this question 4

25. **At a national forum, how would you rate the importance of discussing national coordination of these GIS-related activities in relation to community college education? (0 = no importance to 5 = very important)**

						total
Workforce needs	0.0% (0)	1.8% (3)	14.7% (24)	35.6% (58)	47.9% (78)	163
Core GIS competencies	0.0% (0)	3.1% (5)	12.3% (20)	36.2% (59)	48.5% (79)	163
Curriculum and pedagogy	1.2% (2)	3.7% (6)	16.0% (26)	34.4% (56)	44.8% (73)	163

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Articulation and educational pathways	1.2% (2)	3.7% (6)	23.9% (39)	33.1% (54)	38.0% (62)	163
Professional certification	1.8% (3)	9.8% (16)	33.1% (54)	33.7% (55)	21.5% (35)	163
Professional development for faculty	1.2% (2)	6.1% (10)	18.4% (30)	31.3% (51)	42.9% (70)	163
Communication structures to facilitate the sharing of GIS information	0.6% (1)	4.3% (7)	19.8% (32)	34.0% (55)	41.4% (67)	162
GIS awareness and reaching underserved audiences	1.2% (2)	8.0% (13)	23.5% (38)	27.2% (44)	40.1% (65)	162
The influence of globalization and regionalization on GIS	1.8% (3)	20.2% (33)	27.6% (45)	28.8% (47)	21.5% (35)	163
Future trends in GIS technology and education	0.6% (1)	4.3% (7)	18.4% (30)	36.2% (59)	40.5% (66)	163
GIS as a tool for conducting institutional research	1.8% (3)	12.9% (21)	30.7% (50)	26.4% (43)	28.2% (46)	163
The role of a national center in coordinating GIS education at the community college level	0.6% (1)	5.6% (9)	18.0% (29)	29.2% (47)	46.6% (75)	161
Respondents to this question						163
Number who skipped this question						7

26. When you look ahead, where do you think the greatest opportunity in GIS education lies within your college and why?

- Incorporate GIS into existing curriculum in almost all areas. -GIS specialization programs with certification.
- 1) Articulating more coursework with 4 year schools to encourage more traditional (undergraduate transfer oriented) students to take GIS classes. 2) Spreading the use of GIS across the campus (we are starting this year with a campus wide GIS for facilities management, scheduling etc). 3) Making closer connections with employers, other local community colleges and 4-year institutions to insure that our curriculum meets community needs and standards.
1. General Education for GIS. 2. Business and Homeland security areas.
1. Teaching GIS to the incumbent workforce. 2. Integrating GIS into other occupational programs on campus.
- 3D GIS advances are the future. More people recognize data in 3D than in any other format and people are most comfortable with that to which they most easily relate. 3D. Visualization of realworld data and the preparation of real datasets and project are my future. A virtual online campus in 3D. Marketing and the PIO using GIS to best connect with the community. On campus demographics being viewed temporaly will help to best utilize and plan assets.
- A cross curricular course exposing students to the fundamental use GIS software and potential value of GIS in their future careers.
- A new GIS Certificate for technical users in the Washington DC region. We have the resources of other CC's in the State of Virginia to meet core curriculum.
- Agriculture and Geology
- Agriculture, biological sciences -
- Application in the provision of rural medical services. Idaho is one of the underserved states, and could do better.
- As Mesa State is located in the rural area of northwestern Colorado, several community colleges have asked me about joint cooperative program perhaps in sharing projects, databases, etc.
- As the learning curve for basic GIS becomes less steep, we will be able to integrate it into the subject matter easier. At our institution that will be field biology and geology.
- At 4 year colleges I can see the impact of integrating GIS into current curricula, while 2 year colleges would be set for certification.
- At our small 4yr institution we are just beginning to develop a certificate program--linked through service learning to our GIS service center--that would serve multiple disciplines and audiences and answer the enormous unmet needs of local communities and organizations for GIS services. Part of this will be to work with the two-year schools and high schools in the area on articulation agreements. We hope and believe we can increase the number of students moving through our program and therefore serve the

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workforce needs of the area more effectively than a program focused on a narrow audience in a couple of disciplines.

15. At the University of Denver, the greatest opportunity lies in online courses, and I believe, at other universities as well. Another opportunity is for this community to teach online GIS courses for K-12 teachers and even K-12 students.
16. At this point, it is in the area of crime analysis because of the focus of our grant but we have a community service learning project that has given us many opportunities for expanding and well as learning how to apply education to the workplace.
17. Aviation related GIS / GPS applications
18. Because of the growing demand, we are hoping to develop a certification program. On a smaller level. we want to make all our students at least GIS literate through the use of modules.
19. Certification. Most employers are trying to train existing employees to do GIS tasks because of limited funding. However, once a certification program becomes successful the next step would be a full degree program.
20. CIS, criminal justice applications
21. Civil & Environmental Engineering Technology, Criminal Justice, Alternative Energy
22. Combination of providing certificates for individuals changing jobs and preparing students for articulation to 4 year colleges. Also seeing a growing trend to providing services for the community - community mapping projects.
23. Community colleges play two roles: as places for students to prepare for entry into 4-year colleges and as sources of vocational skill enhancement. GIS competency seems to me to fit the latter role. It is a tool to extract more value from other disciplines.
24. Continue to provide GIS education to provide our student access to jobs available in this sector/employers access to technicians.
25. Coordinated efforts within multiple departments
26. Creation of a GIS course specifically for students majoring in other disciplines with an emphasis on how GIS can support that discipline.
27. Currently we are working on raising the level of GIS awareness, by educating both faculty and students. This includes helping faculty across the curriculum to develop modules using GIS for teaching their subject matter.
28. Currently, all GIS courses are taught in the Geology/Geography Department. I see a great opportunity to foster cross disciplinary curriculum, research, and teaching between the GIS faculty and hard/applied science faculty across campus.
29. Currently, so little is being taught regarding GIS that any addition to agriculture, animal science, construction, and other majors would be a 100% improvement. However, the greatest opportunity lies in agriculture and engineering.
30. Definitely in the Community Colleges
31. Developement of Alternative Agriculture, because the industry is small and needs to examine its market reach and distribution network
32. Developing an understanding on the part of faculty as to how broad an application GIS is and why it should be taught across the curriculum. GIS should be expanded into a much wider range of disciplines and this can only happen through repeated exposures to the tools and an understanding of how it can help address a wide range of problems.
33. Due to increasing stresses on our natural resources, GIS is the key to managing these limited resources, and most students that are now entering the work force in these areas are realizing the critical role that GIS plays.
34. EAST students because they learn on their own and can potentially learn more than a class teacher can teach.
35. Economic development, healthcare, and environmental studies
36. Education of working professionals. The response to our professional certificate has been overwhelming. Also, collaboration with other units such as computer science, business, and public health, which are showing new interest in GIS.
37. Enabling other spatial disciplines with GIS. GIS is a tool used in many fields. Even if some students don't know it yet, they will be using GIS in their future.
38. Environmental Sciences Most interested and motivated discipline and most opportunity for using the technology for environmental data mapping. We are spearheading in Marine Science but the terrestrial side is interested.
39. Expand the role of Geography in education
40. Expanding GIS across the curriculum and into the administration of the college (marketing, institutional research, facilities management, emergency response planning, etc. In other words, everywhere across the campus. It's not being used nearly as much as it should. Some new administrator have recently come to the campus, and I am working with them -- headway is being made.
41. Focused topical workshops-- epidemiology, emergency management-- alternating with technical workshops liek database management, programming, etc. Marketing the topical workshops is challenging, however, because it is essential to find the right audience.
42. From my perspective, the greatest challenge for community colleges is currently the lack of consistent articulation between 2- and 4-year programs. This creates an obstacle between those students interested

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- in a GIS career who begin their education at a community college, and career opportunities at companies which hire only 4-year or M.Sc. degree holders. Assuming the growing need for GIS professionals is part of the U.S. trend toward a "knowledge-based economy," the demand for 4-yr or M.Sc. degree holders in GIS education will dominate growth in the profession. Without articulation between 2- and 4-yr program, community colleges will see their role in responding to this growth become progressively less significant.
43. General awareness of the uses of the technology in so many disciplines and building the concept into various courses. Our college, in partnership with The University of Mississippi, plans to work with at least five high schools in the state to implement community projects using GIS technology. The projects will be determined by planning with local elected officials and community leaders. Mentors will be volunteer community colleges and senior colleges in the area.
 44. Geospatial technologies are applied across disciplines and are ideally suited to integrate data of many types and from multiple sources--educators should be using the technologies both to teach multi-dimensional and analytical thinking, as well as interdisciplinary problem solving (at local and global scales)...because these skills are necessary to remain technologically viable and innovative in a global environment and to promote sustainability for local communities and regions
 45. Getting my HIGH SCHOOL kids learning social studies and other social sciences through advanced technologies, like GIS, allow students to move quickly to higher order concepts.
 46. GIS education will become a tool that almost all degree programs will need to be familiar with. GIS has made huge advancements in nontraditional geospatial arenas, and combining those advancements and the advancements in the technology it really is a field with the potential to outpace the supply of trained professionals.
 47. GIS has been "owned" in many cases by geography departments. This would be similar to Computer Science owning Excel. GIS needs to break free of this and evolve as a common tool in many disciplines.
 48. GIS integrated into Surveying Curriculum
 49. GIS is now about age 35. It should be a common resource denominator in human information intelligence. Students in GIS need to reach deep into practical skills in the geographic information trades to sustain themselves and their businesses. GIS skill is a peculiar mix of information awareness, spatial analytics, information technology proficiency and social conscience. Few other courses reach across such an ambitious spectrum of knowledge. The community college role is to create confident, knowledgeable practitioners of this GIS thing who can turn an idea into a visual information asset.
 50. GIS skills across a broad range of disciplines. This would be an accurate reflection of the power of GIS technology, and it would help reduce the cost burden on any one program.
 51. Giving students the basic skills needed to collect, interpret and present GPS and GIS data.
 52. I am currently an instructor at a vocational center. Although I am not currently at a community college, I have and am working in an advisory capacity to two community colleges. For these schools the immediate opportunity lies in creating GIS as a "value added" component of existing programs. This type of addition can be quickly implemented and deployed frequently using adjunct faculty. Deploying GIS training this way allows the school to begin developing labs and expertise to create a more complete program. By offering an introductory GIS course, followed by GIS infused in other programs as an integral part helps the students appreciate the power and breath of application of GIS. Applied GIS may be included in programs such as; Business, Health, Agriculture, Natural Resource Management, Urban and Landscape Planning, Drafting, and Pre-Engineering curriculum.
 53. I am developing the first GIS course for our College
 54. I am not in a Jr College. I am an coop extension specialist, off campus working with non-traditional audiences
 55. I am not sure anyone in administration currently is considering GIS as an options, but I see it could be a great opportunity for a lot of folks in our region. We are becoming the new FL and with development trends and baby boomers retiring to our area, good work with GIS could help Planners make appropriate decisions. Think we may be in an Ostrich Syndrome where our heads are in the sand; or maybe it has not been considered. I will forward the survey to our VP of Technology.
 56. I believe that the greatest opportunity exist within business curriculum.
 57. I teach at a high school, but I see the greatest role of GIS as addressing issues of global importance - such as global warming. I see the greatest opportunity in GIS education as a being a tool to enable people to become literate in the concept of geospatial issues.
 58. I think the greatest opportunity in GIS education lies with the large body of students who don't have any idea about GIS and students who are not sure about their career goal. I think more students will be interested about GIS if they are aware of the applications and opportunities.
 59. I think the greatest opportunity lies at exposing students from other disciplines to GIS. I think it is something that everyone should have exposure to for their specific needs.
 60. I think the greatest opportunity lies in offering GIS courses in other disciplines - not just geography. I also think that teaching GIS to pre-service teachers is extremely important to getting the technology into the K-12 setting.
 61. I think there is a great deal of potential to integrate GIS with other programs at my college such as fire science, criminal justice, landscape architecture, etc. I have made presentations to students in these programs and have attracted some to my GIS courses. I also hope in the future to integrate the GIS/Remote Sensing courses with the Geography Department. This has been a problem because Geography is in Arts and Sciences while we are in Trades and Technology. This is a problem. I have tried

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- to initiate a relationship with some of our administrative departments to do institutional research without much success--they just don't seem interested. I am also keen to get some grants for student research--I am full of ideas, but as the only full-time instructor and Chairperson, my time is quite limited.
62. I would like to see our community college partner with Western Kentucky University in developing a seamless Associate Degree to a four-year GIS transition degree either online or in a hybrid form. Currently, GIS in Kentucky isn't supported very highly at the community college level, and I would like to see more collaborative efforts with our regional and state research institutions in the GeoSpatial Technology field.
 63. Imbedding gps/gis within current course offerings and expanding skill levels with at least two full course offerings
 64. In developing applications for GIS education with regard to natural resource management -- that is the strength of the program at CSU.
 65. In partnership with other disciplines.
 66. In the applications of GIS technologies to disciplines which need it such as agriculture, wildlife. Because GIS add value to degree given in these fields, both in term "student training" and "finding a job" after graduation.
 67. Including students outside of Geography - encouraging other disciplines to accept GIS as a tool - not a separate technology
 68. Incorporating GIS education into other disciplines beyond computer science would be the single greatest opportunity (and challenge) within the college - this give students from a broad range of disciplines one more "tool" to take with them into the workforce.
 69. Infusing the technology into present and future programs of study teaching GIS as a tool of the respective industries.
 70. Integration into associated degrees
 71. Inter-disciplinary research Promoting spatial thinking and analysis Restoring geographic education
 72. Internet-served GIS needs to be developed more.
 73. Involvement of other departments in our curriculum to supplement and enhance their course offerings.
 74. It lies within K-12 b/c we can use GIS to foster analytical skills while opening up potential career opportunities.
 75. Job Training
 76. Most of our GIS students are working professionals or career-changers. I would like to get more traditional students interested in GIS. Also, we have started a crime analysis program within our criminal justice degree/certificate which will use GIS. This could be a good start.
 77. My institution is Cornell University Cooperative Extension. We have a unique role in that our audience is much more broad than that of a community college. However, many of the youth (and young adult volunteers) who gain skills and knowledge from Extension programs go on to community/two year colleges and Agricultural Universities. Therefore my views/ideas on curriculum development in GIS education and geospatial literacy comes from a broad community based perspective. It also encompasses a wide age range of learners from upper elementary age levels through college age.
 78. N/A
 79. NA
 80. NA
 81. Opportunity to provide an entire curriculum of GIS studies for transfer or professional certification. Growing need for trained professionals in all job sectors. Planning initiatives in our county involve using GIS.
 82. Our current program is centered within the geography department. We also have a regional police academy, which could benefit from the integration of this curriculum.
 83. Our grant team has a vision of Lane having a seamless, stable embedded GIS curriculum with a course sequence to highlight careers options for students. A future Professional technology (PT) program, workforce training seminars and a smooth transfer to a 4 year institution are options we believe we can provide for our community. Our administration (President and Vice President of Instruction) has a clear understanding of our vision for GIS and the opportunity our team presents. With plans to collaboratively pursue more grants, partnerships and ties we believe we can accomplish our goals.
 84. Our NSF ATE grant is the first step toward bringing GIS education to our students. We think building literacy among students and faculty will be the foundation to the three-course sequence we will design. Our aim is the GIS end user, not the technician. So we are interested in bridging the gap between the "technical" GIS person and the knowledgeable problem-solver.
 85. Our one year certificate seems to meet the needs of the smaller communities in our region. Keeping the curriculum up to date & focused on workforce needs is most important.
 86. Our programs that provide technicians for coastal wetland preservation, restoration, and rebuilding.
 87. Over the next year I will be developing an Oceanography program that I hope will incorporate some GIS training for students. Although GIS is part of the strategic plan for the Physical Science department at Cuesta, it has yet to be implemented.
 88. Preparing civil and survey technicians with the ability to use GIS as a tool to integrate within the engineering sector. Having a two year civil/survey graduate that can do CADD as well as GIS is a prime candidate for the workforce in engineering.
 89. Preparing individuals to work with GIS related technologies in the local business sectors; to drive GIS into

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- academic areas where appropriate.
90. Probably in the agriculture industry. The revenue generated in crops is huge in the central coast. The application of GIS/GPS can greatly enhance agricultural practices to lower costs and raise profits.
 91. Programming devices. Use of devices as tools.
 92. Providing awareness of the potential of GIS within selected disciplines. Providing basic GIS user training within selected disciplines. State budgetary issues most likely preclude development of a standalone GIS technician program within our college; training courses within selected disciplines is a viable strategy.
 93. Providing practical GIS offerings to technical programs. The average CC student has not developed critical thinking skills sufficiently to adequately understand advanced GIS topics. The failure of several CC GIS efforts have come from attempting to teach GIS at the theoretical level rather than the practical.
 94. Providing the capability for technical advancement to those in the work force; also for application and use in all science labs
 95. Setting up a pipeline of students from the high schools through the college and into internship and employment positions. This means having a connection between the high schools and college (faculty and counselors). It means creating and using a very clear, incremental curriculum which produces students who can meet the needs of the local employers. And it means spreading the word of its success back to highschools and college campuses.
 96. Social sciences probably has the greatest need but aren't ready to accept the technology. Engineering probably is the most open and available.
 97. Solving environmental and economic redevelopment opportunities in Northeastern PA, where environmental damage caused by past mining practices have scarred the land and waterways, leaving many, many opportunities for GIS, GPS, and educational opportunities to solve regional and local problems within reach of some of our community colleges
 98. some type of in-service program because of the current situation for needed trained GIS techs in Micronesia, and the lack of existing positions for GIS professionals. GIS is emerging in Micronesia, but there are not that many paying positions for it in the region, yet.
 99. Stennis Space Center, MS actually has a fairly robust GIS industry. Providing this industry with the number of entry level employees, with the necessary skills, which the industry demands combined with the needed on going workforce training.
 100. Studing the environment and the condition of the city on how its has change after the Hurricanes. Locating the dead spots before the Hurricane and how the land mass has change.
 101. Teacher education. If K-12 students are introduced to GIS, facility with the technology may be extended well beyond their base learning as they move through their college years. To begin GIS experience at the college level is to delay potential gains beyond the basic levels of competency.
 102. Teaching across the curriculum and utilizing GIS in an administrative role to demonstrate to both administration and faculty the power of GIS to visualize big issues.
 103. Tech Ed. curriculum and related academics
 104. The biggest challenge is recruiting students & making the community aware of GIS. Antelope Valley College has a good relationship with the community & our GIS students work on community based real GIS projects as part of their curriculum.
 105. The extraction industries are booming here in Wyoming and GIS is an excellent tool for both regulatory agencies and industry. Funding for educating workforce for these groups is potentiatlly very available.
 106. The graetest opportunity would be developing a GIS curriculum for K12 teachers and developing few courses using GIS a s a tool research analysis
 107. The greatest opportunity at our college is to use GIS as a technique to support the current curriculum. Academic disciplines should be able to use GIS as a tool to support general education goals and departmental learning outcomes. Additionally, our institution in participating in a statewide K-16 initiative to "standardize" learning outcomes, standards, and curriculum. This would be an excellent opportunity to introduce GIS as a necessary technique to incorporate into the K-16 initiative.
 108. The greatest opportunity lies in expanding awareness of the utility of GIS to disciplines that currently do not standardly make much use of GIS or who do not encourage their students to develop some level of proficiency in GIS
 109. The greatest opportunity lies in two areas. The first is to infuse GIS curriculum into existing programs, Business, Environmental Science, Humanities, etc. The second area is to deliver expertise and training to local businesses so that they can use GIS to their advantage.
 110. The greatest opportunity will be for the students and their future employers if we can get other departments to adopt the curriculum.
 111. The greatest role it will play will be to introduce freshman and sophomores to the technology and hopefully turn them on enough so they explore further study. It would be nice to have additional classes and certification but that is not in the cards politically at the moment.
 112. The integration of GIS as a teaching tool within other disciplines. This has already occurred to a minor degree within Environmental Science and Geology. It is required within Forestry, Law Enforcement, Wildland Firefighting and Geography. Additionally, a movement to educate high school faculty in the utilization of GIS technology in the classroom. We already participate in a joint grant funded program with the Minnesota Alliance for Geographic Education and MN State Department of Natural Resources project called FIREWISE. Itasca Community College (our location) has been selected the past 3 years to serve as a host--and was singled out for 2007 due to successes experienced there in administering the program.

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This project has put GIS in the hands of junior high and high school students--who have become excited about its possibilities. Towards this high school faculty idea, GIS is not rocket science. My 5 year old son can open ArcMap add data sets and find information about locations across the globe (I'll read to him where his skills are not quite developed enough). Junior high and High school students can easily make use of the technology to participate in multi-agency on the ground projects. Our ability to integrate the concepts and ideas of GIS within high schools means we will receive "experienced" GIS users at the CC level. This will expedite our ability to push critical thinking and project design/database management/programming concepts within the curriculum. I believe this can create a more skilled generation of GIS'ers.

113. There are several opportunities to be explored regarding the future of GIS. Like many skills, there is a vocational track aimed at turning out skilled analysts who can put enterprise-wide systems in place on networks and consult with those looking for solutions within their particular interest, and then there are skills to be used to augment other disciplines--like a minor degree. The trick is teaching the versatility that will provide a curriculum useful and hold the interest of an economist, biologist, and geographer.
114. three items: 1. it appears there's less and less need for intro g.i.s. classes at the community college level. because we're in a metro area, the majority of our students are employees of city/county organizations which have migrated to g.i.s. ten years ago, we were the only show in town, so to speak. we got numerous employees in our classes who wanted to learn the new technology. as the pool of competent g.i.s. folks w/in those organizations grew, they started to run in-house workshops for their staffs. our enrollments are dwindling as we are getting fewer and fewer professionals in our g.i.s. classes. 2. concomitant w/ the rise of in-house training for g.i.s. in city/county organizations has been increasing competition from on-line courses. we offer an intro to g.i.s. course via the internet in addition to the on-campus course. the internet intro to g.i.s. course has been getting good enrollments. the failure rate is high, however. furthermore, the students who complete the on-line intro to g.i.s. course are poorly prepared for intermediate g.i.s. i think there's opportunity in on-line courses, but we haven't found a way to make it work successfully for us...yet. 3. i think the greatest opportunity for teaching g.i.s. is as part of existing courses in biology, geology, geography, business, etc. in the future, g.i.s. will for the most part disappear w/in fields that can use it, like word processing software, or spreadsheet software. i've worked w/ history classes, science majors, archeology students, business students, and engineering professionals who are looking for tools to help w/ their area of interest and study. they don't want to 'major' in g.i.s. their professional and/or academic plates are full. how can we make g.i.s. more transparent, and still substantive w/o requiring a degree.... if that's even possible. i've had no success integrating g.i.s. in an intro geography class using google earth and nasa world wind. i'd love to have course materials that successfully integrates g.i.s. w/ intro g.i.s. i even used 'g.i.s. for everyone' book from esri, but w/ limited success.
115. To have the center located at my institution. We have a building for it. To strengthen ties between all user groups. Secondary, Postsecondary seamless education. Develop standards. Certification for industry and government.
116. To train adults who are working in fields that are beginning to use and apply GIS practices. These people will have a need to know how GIS works and to learn the skills required to operate a GIS system. (Younger students who see GIS applications in their fields of study will be encouraged to take at least introductory courses in GIS.) Also, coordination with county or regional GIS centers to provide expertise and internships.
117. Training GIS professionals, and in integrating GIS as a tool for spatial thinking within existing curriculum and for diffusion of curriculum to high school and middle schools levels.
118. Training technicians to fill the numerous geospatial technology positions that will be available through state, local, and federal agencies within our region. Being the state capital, home to an Air Force base and national guard, and having a variety of other government agencies in the area opens these opportunities.
119. unlimited
120. Using GIS to teach the spatial skills identified in our California academic standards.
121. We are attempting to integrate the GIS curriculum with other disciplines: agribusiness, business, environmental science, etc. We also see it as a workforce development issue. Many of the students currently in the program are taking these courses for professional development. Our best opportunities lie within workforce development.
122. We are currently developing concentration, diploma, and certificate programs, not only to get students more interested in GIS, but to get area employers more interested in hiring graduates with GIS skills. We are in a rural area with small natural resources businesses that don't use GIS because of the cost of implementation and training. If we can produce a workforce and show employers the long-term financial benefits of incorporating GIS into their business, we can increase the demand for GIS education from current and prospective students.
123. We are currently developing Internet-Based GIS modules which are embedded in a variety of disciplines across the community college. Our next step is a three-course sequence in GIS. We need to facilitate articulation between the community college and the local universities to support the continued teaching and learning of GIS. In the future we will develop a professional technical program with strong college articulation and industry wide support.
124. We are currently in the process of rolling out our 1st GIS courses (and hopefully soon a curriculum as well). In preparation, I did a institution-wide audit of current curricula & career paths served. What I

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found was ~ 2/3 of the current curricula could benefit from GIS training. The problem is the general lack of understanding as to what GIS is. Getting GIS into these areas provides an exciting challenge where all involved stand to benefit.

125. We are looking at developing a GIS course and to integrate it in science and engineering courses. We have no current classes or faculty who are knowledgeable in teaching. I am currently attending the University of Rhode Island on a one-year sabbatical to learn it.
126. We could make use of it best in Environmental studies.
127. We have the physical facility in place and have a large population, (over 20,000 students), and just great potential.
128. We need to initiate interest in the Panhandle for AG purposes, waterway instruction, Arbor interests.
129. We serve a rural population of students and are incorporating one basic introductory GPS course as core to an AS Degree in Agriculture.
130. We want to incorporate more GIS into our precision agriculture program as well as add other disciplines such as 1st responders through our criminal justice program.
131. While I think all of the above concepts are top priorities, most college administrators are going to zero in on "workforce needs". Most of the students in this area are focused on job preparation and it is courses that meet this need that boosts enrollment. The beauty of GIS is that the student not only prepares for a specific job, but also develops his/her intellect in ways that I consider far superior to what many other major fields are able to accomplish.
132. With a new AA degree, we hope to engage more of the traditional transfer students. We have many student internship opportunities go unutilized since most students are carrying enough units. Also, with greater transferability of GIS courses to 4-year institutions, the GIS courses become more attractive to the transfer student. A second opportunity is to develop a seminar series so that local professionals with particular skills/knowledge can share them with our GIS community.
133. With the integration of at least one GIS course in other disciplines. I see history, sociology, etc. as fertile fields for GIS expansion.
134. Workforce Development

Respondents to this question **134**

Number who skipped this question **36**

27. Do you have additional comments you would like to share with us?

1. A National Geospatial Technology Center and industries employing GIS professionals would be well served by a dialogue which develops a mutual understanding and alignment of the foundational competencies appropriate for GIS technology and the knowledge and skills needed to deploy and sustain GIS within a business environment. Hopefully such alignment would lead to identification of competencies appropriate for application of GIS in industry, and better understanding and utilization of the technology by industry.
2. Articulation with a 4 year school may hurt programs if, like SACS, a Master degree in the discipline is required for transfer courses. We focus on training students in basic GIS skills so that they can obtain entry level positions.
3. As a start-up project, we very much want to be part of this National Discussion. Lane CC is a member of the League for Innovation; the college administration strongly supports our efforts to develop GIS curriculum here. We have the opportunity to do this right, and to benefit from the thinking of the larger GIS CC community. I talked with Deidre at the NSF ATE meeting last month and our whole grant team is very excited about this conference and how it might inform our project and further GIS efforts at Lane. Our core team is: Jane Benjamin, PI; myself, Lynn Songer and Linda Loft as co-PIs; and Eric Sproles, as GIS instructional designer. Thanks!
4. As an educator in an academic discipline (history), I have successfully incorporated the use of GIS into my courses. This has been extremely valuable to students as another research technique. I have the opportunity to informally discuss these techniques with local colleagues and as a member of the Illinois State Board of Higher Education's History Panel. This panel tackles articulation issues between community colleges and universities. The interest in the use of GIS is in demand, however, the knowledge, experience, and technology is lacking. When educators are given a brief "look" at the possible uses of GIS, they are excited, but disappointed because of technical issues.
5. At my institution, we have an empty building, access to a major airport and industry stakeholders that are involved in GIS. Industry could partner and stamp its approval on a center.
6. Best wishes for success!
7. Bring it to people who have no other alternatives.
8. Currently we have prepared proposal to offer certificate in Geoscience Information Systems & Technology. If everything goes well, we may start offering certificate in fall semester, 2007. Currently the biggest hurdle at this time is the vast rural area of NW Colorado. Many people living so far would like to take GIS program here at Mesa State. However distance, time, and money prevent them from coming to Mesa

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State. They do have community college campuses, but small in size and don't have the resources to get GIS software.

9. Education leads to Careers... and our High Schools are the portals to college. We need to create the awareness with the Junior and Seniors in high school and plant the seeds for college bound adults.
10. Ever since I discovered GIS my motivating thought has been, "what a great tool for developing the cognitive powers of the mind." Especially, I believe that GIS, properly utilized, would be a godsend for all those young boys who have such a difficult time trying to stay focused on what the teacher is saying, but wind up tuning out. With GIS the kids would have something in hand. They would be active. They would be getting immediate feed back. Further, a single GIS project could be designed to permit the teacher to develop language skills, math, social studies, and art as well as many other cognitive, emotional, social aspects of knowledge. Of course you wouldn't want the students at the computer all day, but again, part of the beauty of GIS is the various opportunities it creates for the development of other academic skills including field work, team work, and library work. For example, students of all ages would enjoy going into the community to collect GPS data that could be added to a map. Then drawing conclusions from their work and making a presentation to city council members, etc. GIS programs could be designed that would be appropriate for students at least by the third grade. Just in time to prevent the "fourth grade slump," and the subsequent "acting out" behavior that results in a prescription for Ritalin. Well, I'm sure you can see where I'm going at this point, so I will stop here. If the need should arise, however, I could easily turn this into a full length essay, and with a grant it could become a major research project.
11. GIS is so very important to the global community; however, exposure to the tremendous capabilities of the information system seems to be lacking.
12. GIS programs in the college from which I retired were ahead of their time and therefore suffered from lack of students. A greater awareness of GIS, its use and job opportunities will be important for any future success of the program.
13. Glad you got the planning grant. Be happy to participate in the national conference in January (though we have a short winter break this year and I haven't cleared it with the family yet.) While I do feel I have a lot to offer, I know there are many capable and knowledgeable folks out there these days, so I won't mind if you don't invite me. It would be nice to identify workplace competencies/skill sets (such as CAD to GIS conversion, or layer annotation, or preparation for large format output, or real-world editing tasks/mastery) and have small plug-n-play units developed that instructors could add as they see fit to their GIS courses/program.
14. Having worked in the public sector for most of my career, I think the biggest hurdle to GIS acceptance in rural communities is a means to find legitimacy for geospatial technology as a whole with the 'old guard' officials. Most often penny-pinching commissioners and officials see GIS as a toy and fail to understand the real benefit because the technology integrates transparently with so many things. That said, some strategy besides dog & pony shows with pretty maps must be devised to sell these folks on GIS if students coming out of our colleges are to find gainful employment in rural settings.
15. I admire the effort to promote professional involvement for the community college crowd. We are a second class group of professionals in most arenas and really need our own group to promote our unique interest.
16. I am currently enrolled in the GIS program with Penn State University, as well as, applying to the Ph.D. Geographic Education program at Texas State University San Marcos. Serving on this national forum would be an honor I would accept fully and responsibly at the national, state, and local levels of education.
17. I am not an instructor and cannot possibly answer the questions that relate to the faculty side of the college. The Research Office uses GIS for planning purposes. Our latest report was done to investigate possible locations for a new extension center in our county.
18. I am not associated with one college or university, as I work for the State of Utah's GIS coordinating office. But, I am working, through my office in developing a K-12 program bring GIS into the classroom as a teaching tool and as a learning tool. I am also working with educators at the Community College to develop a 2 by 2 program with the High School in Geo-technologies that would allow the student to progress through either a Geo-technology certification at the high school level, a AAS degree at the Community College level, or a complete Bachelor's degree at the University level. Also I work to promote the use of GIS across disciplines, not just science or geography. I feel the the geo-technologies are a 21st century technology that will grow and be in demand and that standardization and utilization of this technology is fundamental to the education of all students.
19. I have a problem with community colleges teaching a certificate program that sound comparable to the programs in 4-year colleges. They list courses that are comparable to our upper division courses, however, their institution does not teach (nor should they) the higher level prerequisite courses that 4 yr colleges do. If they had the charter to teach the quality & intellectual level of our upper division courses, they would be 4-yr colleges. I have no problem with Community colleges teaching lower division introductory courses, but not the upper division level of course. For me it's also a matter of maintaining a very high level of intellectual compendacy within the graduates who become professionals in the field. There is enough "down-grading" of intellectual requirements & qualifications for students in American academia already. Is GIS a "votech" field or do we want professionals who are capable of mastering the periferal, supporting knowledge that goes to developing a truly competent professional in the field?
20. I have worked with developing a competency based GIS component for my Computer Aided Drafting

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Class. My program is essentially a survey class in computer aided drafting and engineering. Students come in to the class with a wide range of interests and expectations, exposing them to GIS and geospatial technologies opens their eyes to more opportunities. I presented the concept of competency based training for secondary students using the computer aided drafting labs at the ESRI Education Conference 2002. <http://gis.esri.com/library/userconf/educ02/pap5044/p5044.htm>

21. I hope that you are successful and I would like to know more about your efforts in GIS.
22. I like the idea of a national organization for the community colleges to promote GIS/GST. However, without more information I would have more concerns than kudos. Who will administer the national organization and what structure will there be for getting the information out into the field? Will there be regional offices with some clout to do the moving and shaking or will it be directed from the west coast? What resources will be made available so that faculty can REALLY work towards a strong national organization. it has to be more than just a paper tiger. The absolute BIGGEST thing a national org. could do would be to provide a coordinated presence for the community college programs - especially those that have GIS programs... not just GIS courses. The articulation programs we developed with our transfer institutions are phenomenal - and a testament to the way the four year schools see our program and our students (some of our courses transfer in at the junior and senior level). However, as you know the community college programs as a whole are looked at as second rate programs at best. The national organization, if it develops, must make a concerted effort to work with the four year schools to take our courses in transfer for their full course value.
23. I love the community college and another love is earth sciences. I think that have the opportunity to work in GIS in Community college would be great.
24. I really believe an emphasis is needed in the area of educating faculty because the technology is changing rapidly and I would think a large contingent of faculty don't know what it is or have a very narrow view of what it can be used for.
25. I teach distance courses at the U. of Washington from a remote elocation in southern Oregon. Most of my students are from the Seattle area but others are elsewhere.
26. I think a national collaboration for GST is a great move forward and will only lead to more programs and opportunities for education with a standardized set of skills.
27. I think many community college faculty and administrators "just don't get it" in terms of the potential of GIS. Veteran faculty are resistant to moving out of their comfort zone and learning new ways to help their students learn. Administrators must realize that GIS can and will help the campus run more smoothly and effectively, and some of the facilities personnel should use GIS in everyday operation of the campus and planning. We know that GIS is not just a tool for use in academic geography/cartography or something for vocational students who are seeking jobs in GIS. It's happening, but much too slowly (see item # 26).
28. I think the need has been growing for a regional and/or national center, and believe that national recognition of a center has be recognized. Substantial funding opportunities exist to fill the gap as has happened recently with funding of GIS/GPS grants specifically targeting students in California.
29. I think this is a very important effort that you are undertaking.
30. I think this is an interesting endeavor and long overdue. It seems that some of the people I know that have gotten NSF grants are not the same people I see at the community college functions at AAG, NCGE, GSA and AMS meetings. Sometimes they are at the ESRI UC. I have served on several NSF ATE panels, have been active in DOL and NASA geospatial workforce development and have been a reviewer on other geospatial grants. The concept of "articulation" with the wider GIS community and even peer institutions are key items lacking in most of these discussions. Coupled with the difficulty in gaining professional development funds for two-year college faculty this results in us operating in our own little isolated boxes. I feel this isolation and I am fairly professionally active!
31. I think what you are doing here is wonderful. I think creating a community of CC educators to share ideas regarding curriculum and workforce requirements is extremely important. If there's any other way I can help or get involved, please let me know. Another issue I would like to see some discussion about is how to attract students to the program. This remains my greatest challenge to date.
32. I truly believe that community colleges are the best place to bring widespread GIS education to the most people. We are affordable, convenient and student friendly. We however have serious challenges providing GIS education to the masses - namely obtaining adequate funding for purchasing high-level software and computers. We cannot compete with the 4-year schools who can secure funding for technology and have GIS as required courses for geography etc. majors. We struggle with getting enough students to run a single class. If I do not send out mass marketing brochures, I do not reach enough people to potentially fill a class. Of course, we have little to no budget for marketing, too. This is the community college conundrum.
33. I would VERY much like to see what is being considered to be taught at the 2-year level.
34. I'd like to see this information filter down to K-12. If you have kids hooked on this they will demand it down the line in education. Let the consumers supply your demand. Also, all of this needs to be more user friendly to K-12 educators. I would be happy to advocate for that.
35. i'm wondering about the integration of geographical information systems and geographical information science. i think enough time has passed for the g.i. science folks to have some substance to offer g.i.s. folks. what are those g.i.science topics and how can they best be integrated into g.i.s.?
36. Iam not associated with a community college. However, I graduated from a community college with a degree in drafting. My employer needed a GIS individual but had limited resources. Therefore, My degree

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was as close to GIS as they could get. All of my GIS knowledge is self-taught. That is why I think your idea for GIS education at a Comm. College level is truly a great idea. On a local level, I am involved in a community college advisors committee. Once a year we discuss issues and trends in our field (drafting). GIS has started to become a topic.

37. In a perfect world there should be no need to separate Community Colleges and Universities in curriculum development. However, due to the different natures of the people we serve, courses designed for university delivery do not work well when they must be parsed to tailor them to a specific audience. This leaves open the need for a unification process at the community college level.
38. It would be wonderful to have a template for the design and implementation of a GIS program for Cuesta College.
39. Let us get it started. We are in need of some leadership.
40. Make sure there is a demand for 2-year GIS professionals. If there is a demand, show me current numbers and where they came from. Maybe this organization could provide guidance on how to integrate GIS into other disciplines. PS. It seems that Geomatics is more accepted around the world. What is the relationship of geomatics to geospatial? Are we making things more confusing?
41. MECC currently has an ongoing NSF GIS project. WE also have a complete on-line GIS certificate available to anyone in the country.
42. Most companies are on a limited budget, which does not allow for a lot of training for GIS professionals. ESRI's virtual campus is a wonderful way to learn GIS. Because the field is so broad and diverse in applications, one can take virtual courses and apply them to the facet of GIS that they are involved in in their local company. This is the most affordable and practical to enlarge the level of GIS professionals in our world because ERSI staff makes it so easy to learn more. The courses are extremely well done and easy to master.
43. Most of this survey didn't apply since I am not with an institution that teaches GIS. I tried to provide some input in some instances.
44. Most professional employment requires baccalaureate or advanced degrees in GIS oriented subjects. At a community college our job is to provide technical or freshman-sophomore transfer education. Don't develop a graduate level curriculum and then expect community colleges to adapt it.
45. N/A
46. NA
47. no
48. No more comments at this stage.
49. No.
50. No.
51. Not really, but I would simply insist that GIS applications is where the future is.
52. Off the shelf, easy to use, and mass adoptable should be your key issues for K12 end users of GIS.
53. One central issue in developing GIS curriculum and competencies is figuring out how we can teach critical thinking and problem solving, rather than just giving those ideas lip service (don't even get me started!). I've been working with new pedagogies myself and would very much like to hear what other people are doing to crack that nut. How are they ensuring their students can apply their skills to novel situations and know clearly what their maps and analyses mean? I don't teach GIS at a community college and will be away during the January meeting.
54. Our college is currently becoming more distance education-oriented than ever before, particularly in the Computer Technology department (where GIS resides). I would love to hear from other distance ed teachers as well as be interested in best practices for teching GIS using mostly online and other distance education methods.
55. Our Grant Team and I would very much like to join the discussion in January.
56. Our organization has a shortage of people who are skillful enough in the area of GIS, GPS deployment, even while in college, so through an internship or cooperative program that focuses on workforce development and learning skills necessary to do an effective job in the field would be a plus. Our regional non-profit organization has developed great relationships with our community colleges and regional 4 yr colleges that have an environmental focus or GIS program, including the Penn-State University.
57. Please continue to support these types of efforts in GIS--it is greatly appreciated!
58. Please hurry!! I'm tired of feeling like I'm inventing the wheel.
59. Please visit our web-site at
60. Sure. I think that as a group of CC's (and universities as well), if we are interested in examining the benefits of a coordinated curriculum, we should focus less on the actual software and more on the concepts. So often I observe students in the classroom whose thinking is bounded by the abilities of the software--and not the realities of a) the real world, or b) what they could actually accomplish if they wanted--independent of the software itself. On question #15: Why are you singling out ESRI? Why not include the many other GIS conferences that are vendor specific? On question #19: Again, Why ESRI? I am able to attend conferences that are applicable to a wide range of GIS constituencies. ESRI is pushing a GIS angle for profit and despite a prominence in GIS world, if you are interested in core commonalities, are you suggesting GIS as a discipline--or GIS as it comes from ESRI? I dont believe they should be a part of your survey. On Question 20: Same comment regarding ESRI. On Question #22: Interests yes, curriculum not so sure. Thanks for doing this work. I'm sincerely interested in improving the way I teach GIS and constantly re-examining whether the topics I'm teaching are effectively serving the students and

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agencies they are working for. I believe that working with other colleges, universiteis and local organizations can do alot of good towards maintaining currency in the evolving set of skills required for success in professional GIS employment.

61. The conference in January may be a problem for me. It is a short fuse and there may be conflicts. There may be other instructors here available for that conference however.
62. This century is spatail thinking one and we should more to reachout to educacate our community with the GIS application
63. This is an exciting and timely project!
64. This is an international issue and needs to be opened to others outside the USA
65. We have also discovered the positive impact that volunteers (both professional and avocational)familiar with geospatial technology can have in the community. We have seen their interest adn involvement increase interest, enthusiasm and competency levels for teachers in secondary schools as well as community colleges. Community partnerships can be a strong componet in GIS education and geospatial learning in general. Although I consider myself near the beginning of the geospatial (GIS)learning curve, my MPS degree is in Adult and Continuing Education and Curriculum Development. I find the emerging geospatial technolgies field intriguing. It is rapidly becoming a new criticle base of knowledge that will be needed in almost every field of study/career. I serve as the key staff leader for the recently formed New York State 4-H Geospatial Leadership Team, a task force of youth and adults determining GIS/GPS resources and direction for future Cornell Cooperative Extension 4-H Programs. I would look forward to being involved to some extent with a National Geospatial Technology Center, Especially inlight of potentially mutually beneficial relationships with Exension and community colleges
66. We very much need awareness of GIS technology and its uses for local and state entities. Katrina brought home the fact that our local, state,and national GIT resources must be coordinated and data must be shared between various agencies at all levels.
67. While I am not teaching at a community college, I'd like to share some "off-the-cuff" thoughts. If a student at a community college AND college administration and faculty recognizes that there are GIS career and/or transfer opportunities for the 2-year student, it makes the degree/technology more marketable. I also feel while a set of national standards may be important, the community college faculty should recognize that these standards may/should be modified to better fit the local needs, job-market, students.
68. While we are not a community or technical college, we currently work with an underserved individuals age 16-24 preparing them for opportunities in the workplace and in higher education. We have seen how GIS can help them develop a broader understanding of issues and their communities.

Respondents to this question 68

Number who skipped this question 102

Appendix B. GeoWDC Geospatial Competency Model

From Gaudet, C.H., H.M. Annulis, and J. C. Carr, 2003. Building the Geospatial Workforce. *Urban and Regional Informational Systems Association Journal*, Special Education V15, no.1, p.21-30.

				ROLES											
				Applications Development	Coordination	Data Acquisition	Data Analysis	Data Management	Management	Marketing	Project Management	Systems Analysis	Systems Management	Training	Visualization
COMPETENCIES	Technical	Ability to Assess Relationships Among Geospatial Technologies		●					●	●		●	●	●	●
		Cartography			●	●									●
		Computer Programming Skills	●		●		●				●				●
		Environmental Applications	●			●									●
		GIS Theory and Applications	●			●	●	●		●		●	●	●	●
		Geology Applications				●									
		Geospatial Data Processing Tools			●	●					●	●	●	●	●
		Photogrammetry	●		●	●									●
		Remote Sensing Theory and Applications	●		●	●						●			●
		Spatial Information Processing	●		●	●							●	●	●
		Technical Writing	●	●		●		●	●	●	●	●	●	●	●
		Technological Literacy	●		●	●	●	●		●	●	●	●	●	●
		Topology				●									●
	Business	Ability to see the “Big Picture”	●	●			●	●	●		●	●	●		
		Business Understanding		●				●		●					
		Buy-in/Advocacy		●				●	●		●		●	●	
		Change Management	●	●		●	●	●	●	●	●	●	●	●	●
		Cost Benefit Analysis / ROI		●			●	●	●	●		●	●	●	●
		Ethics Modeling				●		●	●	●		●	●	●	●
		Industry Understanding	●	●				●	●				●	●	●
	Legal Understanding		●												
	Organization Understanding		●				●				●				
	Performance Analysis and Evaluation			●			●		●	●	●	●			
	Visioning		●				●	●	●	●	●	●			
	Analytical	Creative Thinking	●	●	●	●	●	●	●	●	●	●	●	●	●
		Knowledge Management		●		●		●		●		●	●	●	●
		Model Building Skills	●				●	●				●	●	●	●
Problem-Solving Skills		●	●	●	●	●	●	●	●	●	●	●	●	●	
Research Skill		●			●							●			
Systems Thinking		●					●			●	●	●	●	●	
Interpersonal	Coaching		●				●						●		
	Communication	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Conflict Management		●				●		●		●	●	●		
	Feedback Skills	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Group Process Understanding		●				●		●		●	●			
	Leadership Skills		●			●	●	●	●		●	●	●	●	
	Questioning		●				●	●		●	●	●			
	Relationship Building Skills		●				●	●	●	●	●	●			
	Self-Knowledge/Self-Management		●				●	●		●	●	●	●		

Appendix C. Recommendations for Closing the Gap between Geospatial Workforce

Demand and Supply

From Defining and Communication Geospatial Industry Workforce Demand Phase I Report, Draft for Comment GITA, 2006.

Recommendations for Closing the Gap between Geospatial Workforce Demand and Supply

- GIS education needs to become much more prevalent in all levels and links between related areas of study, such as CAD design classes, to geospatial applications need to be strengthened. The percentage of students enrolled in GIS programs needs to be significantly increased through aggressive outreach campaigns and by building awareness of the geospatial industry in general.
- Geographical sciences and geospatial technologies must be embedded in core curricula of K-12 and K-16. The entire educational continuum (from K-12, community colleges, undergraduate and graduate programs, to life-long continuing education) must be involved.
- The National Research Council's publication Learning to Think Spatially: GIS as a Support System in the K-12 Curriculum should be used to better integrate geospatial thinking into existing courses. The report is available on line at <http://www.nap.edu/catalog/11019.html>.
- In addition to the NRC report, efforts by professional associations, such as the AAG's Enhancing Departments and Graduate Educations (EDGE) project and Teacher's Guide to Modern Geography, the forthcoming Geographic Information Science and Technology (GI S&T) Body of Knowledge, and the NCGIA's Core Curriculum in GISci, should be leveraged to help build a comprehensive educational strategy to help meet the current and future geospatial workforce demand.
- Employers and educators must work together to develop effective strategies to close the gap between geospatial workforce demand and supply. The geospatial industry must articulate its workforce needs to ensure that educators respond with curricula that result in appropriately educated and trained individuals.
- Two year (community-based) colleges should assume a strong role in training new geospatial technologists and meeting on-the-job training needs of local professionals.

Within social, behavioral and economic sciences, there is not enough emphasis on use of geospatial methods and techniques. There is a need for training in spatial analysis within the domains of statistics and quantitative analysis.

1. Name:		
		Response Count
		39
	<i>answered question</i>	39
	<i>skipped question</i>	0

2. Institution or organization:		
		Response Count
		39
	<i>answered question</i>	39
	<i>skipped question</i>	0

3. Email address:		
		Response Count
		39
	<i>answered question</i>	39
	<i>skipped question</i>	0

4. Did the Forum clearly address the topic(s) you came to discuss?			Appendix D	
			Response Percent	Response Count
Yes, right on	<div><div></div></div>		61.5%	24
Pretty much	<div><div></div></div>		33.3%	13
Somewhat, but not entirely	<div><div></div></div>		2.6%	1
Just marginally			0.0%	0
No, not at all			0.0%	0
Other (please specify)	<div><div></div></div>		7.7%	3
	answered question			39
	skipped question			0



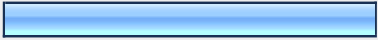


5. Overall, were the breakout sessions well-led and well-organized, with ample opportunity for participant interaction?			
		Response Percent	Response Count
Yes, first-rate	<div><div></div></div>	64.1%	25
Yes, pretty much	<div><div></div></div>	28.2%	11
Not bad	<div><div></div></div>	2.6%	1
Only fair		0.0%	0
No, they were pretty ragged		0.0%	0
Other (please specify)	<div><div></div></div>	15.4%	6
	answered question		39
	skipped question		0



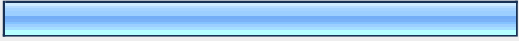
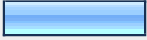
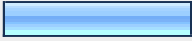
6. Were the overall logistics for the Forum well organized and satisfactory?			Appendix D	
			Response Percent	Response Count
Yes, first-rate	<div><div></div></div>		89.7%	35
Yes, pretty much	<div><div></div></div>		7.7%	3
Not bad			0.0%	0
Only fair			0.0%	0
No, they were inadequate			0.0%	0
Other (please specify)	<div><div></div></div>		5.1%	2
	answered question			39
	skipped question			0

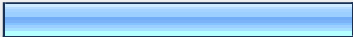
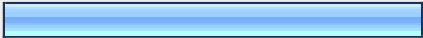
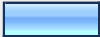

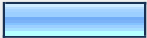
7. Were you content with the quantity and quality of the food that was provided during the Forum?			
		Response Percent	Response Count
Yes, first-rate	<div><div></div></div>	69.2%	27
Yes, pretty much	<div><div></div></div>	17.9%	7
Not bad	<div><div></div></div>	5.1%	2
Only fair	<div><div></div></div>	5.1%	2
No, not at all		0.0%	0
Other (please specify)	<div><div></div></div>	7.7%	3
	answered question		39
	skipped question		0




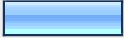

8. Were you pleased with your hotel accommodations during the Forum?			Appendix D	
			Response Percent	Response Count
Yes, first-rate	<div><div></div></div>		71.8%	28
Yes, pretty much	<div><div></div></div>		23.1%	9
Not bad	<div><div></div></div>		2.6%	1
Only fair			0.0%	0
No, not at all			0.0%	0
Other (please specify)	<div><div></div></div>		5.1%	2
	answered question			39
	skipped question			0

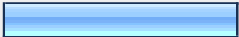
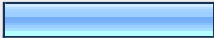
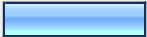
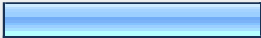
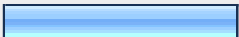
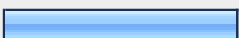

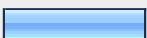
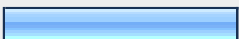
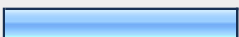

9. The Forum gave me a much better idea of the breadth of issues affecting geospatial technology education.				
			Response Percent	Response Count
Yes, a great deal	<div><div></div></div>		74.4%	29
Yes, a fair amount	<div><div></div></div>		17.9%	7
Yes, a little	<div><div></div></div>		2.6%	1
No, not at all	<div><div></div></div>		2.6%	1
Other (please specify)	<div><div></div></div>		7.7%	3
	answered question			39
	skipped question			0

10. I intend to modify my curriculum based on the information I learned at the Forum.			Appendix D	
			Response Percent	Response Count
Yes, a great deal			12.8%	5
Yes, a fair amount			25.6%	10
Yes, a little			41.0%	16
No, not at all			7.7%	3
Other (please specify)			33.3%	13
			<i>answered question</i>	39
			<i>skipped question</i>	0

11. I intend to modify my teaching strategies based on the information I learned at the Forum.			
		Response Percent	Response Count
Yes, a great deal		7.7%	3
Yes, a fair amount		10.3%	4
Yes, a little		56.4%	22
No, not at all		15.4%	6
Other (please specify)		20.5%	8
		<i>answered question</i>	39
		<i>skipped question</i>	0

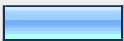


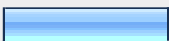
12. I intend to (or have) shared information I learned at the Forum with others.			Appendix D	
			Response Percent	Response Count
Yes, a great deal			38.5%	15
Yes, a fair amount			46.2%	18
Yes, a little			10.3%	4
No, not at all			2.6%	1
Other (please specify)			15.4%	6
			<i>answered question</i>	39
			<i>skipped question</i>	0



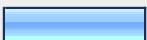


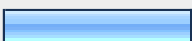
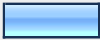



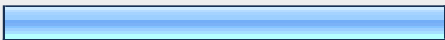


13. I plan to modify my program or start a new program based upon information learned at the Forum.			
		Response Percent	Response Count
Yes, a great deal		17.9%	7
Yes, a fair amount		23.1%	9
Yes, a little		35.9%	14
No, not at all		12.8%	5
Other (please specify)		23.1%	9
		<i>answered question</i>	39
		<i>skipped question</i>	0

14. Please indicate the breakout groups in which you participated during the forum.			Appendix D	
			Response Percent	Response Count
Issue 1 Workforce Needs			25.6%	10
Issue 2 Core Competencies			23.1%	9
Issue 3 Certification			15.4%	6
Issue 4 Curriculum and Pedagogy			28.2%	11
Issue 5 Articulation and Educational Pathway			25.6%	10
Issue 6 Professional Development			25.6%	10
Issue 7 Communication			2.6%	1
Issue 8 Awareness and Underserved Audiences			15.4%	6
Issue 9 GIS, Institutional Research, and Entrepreneurialism			25.6%	10
Issue 10 Future Trends			25.6%	10
I was not able to attend the Forum			2.6%	1
	<i>answered question</i>			39
	<i>skipped question</i>			0

15. Please select the statement(s) that best describe you.		Appendix D	
		Response Percent	Response Count
I am a community college instructor and teach GIS.	<div><div></div></div>	66.7%	26
I am a community college instructor that might teach GIS in the future.	<div><div></div></div>	7.7%	3
I am a community college administrator.	<div><div></div></div>	10.3%	4
I work at a 4-year university and teach GIS.	<div><div></div></div>	12.8%	5
I conduct GIS workforce studies.	<div><div></div></div>	7.7%	3
I represent a professional society as a staff person or board member.	<div><div></div></div>	15.4%	6
I am a GIS professional that works outside of education.	<div><div></div></div>	10.3%	4
I am an employer of GIS professionals.	<div><div></div></div>	7.7%	3
Other (please specify)	<div><div></div></div>	12.8%	5
		answered question	39
		skipped question	0

16. Does your institution offer GIS courses?			
		Response Percent	Response Count
Yes	<div><div></div></div>	100.0%	39
No		0.0%	0
		answered question	39
		skipped question	0

17. Does your institution offer a GIS certificate or degree?			Appendix D	
			Response Percent	Response Count
No			12.8%	5
A GIS certificate			64.1%	25
A GIS degree			41.0%	16
We plan to offer a GIS certificate or degree in the future			17.9%	7
			answered question	39
			skipped question	0

18. Which disciplines at your institution are associated with a GIS curriculum? (Check all that apply.)				
			Response Percent	Response Count
None			5.1%	2
Agriculture			10.3%	4
Art			0.0%	0
Archeology			15.4%	6
Biological Science			17.9%	7
Business			17.9%	7
Computer Science and Information Systems			20.5%	8
Criminal justice			10.3%	4
Economics			5.1%	2
Engineering			7.7%	3
Fire Protection/Science			2.6%	1
Geography			48.7%	19
Geology			30.8%	12
Health (nursing and medical related)			2.6%	1

Information Technology	<div><div></div></div>	17.9%	7
Marine Science	<div><div></div></div>	17.9%	7
Natural Resource Management	<div><div></div></div>	25.6%	10
Physical Science (physics, chemistry, meteorology)	<div><div></div></div>	15.4%	6
Real Estate	<div><div></div></div>	2.6%	1
Sociology	<div><div></div></div>	7.7%	3
Surveying	<div><div></div></div>	17.9%	7
Other (please specify)	<div><div></div></div>	23.1%	9
	answered question		39
	skipped question		0

19. How would you characterize the region that your institution servers? The majority of the students come from:			
		Response Percent	Response Count
A metropolitan city (population over 500,000)	<div><div></div></div>	41.0%	16
A large city (100,000 – 500,000)	<div><div></div></div>	15.4%	6
A medium size city (50,000 – 100,000)	<div><div></div></div>	23.1%	9
A small city (10,000 – 50,000)	<div><div></div></div>	7.7%	3
Rural areas (towns with less than 10,000)	<div><div></div></div>	12.8%	5
	answered question		39
	skipped question		0

20. A National Geospatial Technology Center (NGTC) will thoroughly research former workforce assessment efforts and practices before starting or recommending new studies.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	48.7%	19
Medium Priority (a center should do this)	<div><div></div></div>	41.0%	16
Low Priority (only do if time and money allow)	<div><div></div></div>	5.1%	2
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	5.1%	2
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

21. A NGTC will encourage new DACUMs to be conducted by partner institutions and others across the country.

Appendix D

DACUM stands for "Developing A Curriculum". The DACUM process is a structured type of occupational or task analysis that is used by businesses, industry, and educational institutions to identify knowledge and skills required to perform the job. See www.dacumohiostate.com/ for more information.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	25.6%	10
Medium Priority (a center should do this)	<div><div></div></div>	53.8%	21
Low Priority (only do if time and money allow)	<div><div></div></div>	15.4%	6
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	2.6%	1
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

22. A NGTC will organize, compile, and compare past and future DACUMs and make the results available on the center website.

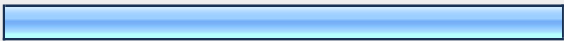
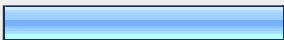


Appendix D

By maintaining a repository of DACUMS, the center can better recommend future DACUMs in terms of geography and job titles to examine. It was also noted that DACUMS should be conducted for occupations where GIS is considered an ancillary knowledge and skill set (e.g. resource management, crime analysis, etc.). It was also noted that DACUM participants, many times, come from the public sector. It is recommended that a center encourage greater participation from the private sector. There is skepticism regarding whether or not a core set of tasks can be identified across several DACUMs. It was also noted that DACUMs are not possible in worker-poor, expert-poor regions.

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	51.3%	20
Medium Priority (a center should do this)	<div></div>	38.5%	15
Low Priority (only do if time and money allow)	<div></div>	10.3%	4
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

23. The NGTC will complement the DACUM process with other techniques, such as “environmental scans” that identify regional economic trends and assist practitioners in defining current and future workforce needs.

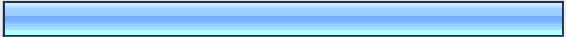
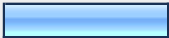




Appendix D

		Response Percent	Response Count
High Priority (a center must do this)		61.5%	24
Medium Priority (a center should do this)		30.8%	12
Low Priority (only do if time and money allow)		2.6%	1
A NGTC should not do this.		5.1%	2
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
	answered question		39
	skipped question		0

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	38.5%	15
Medium Priority (a center should do this)	<div><div></div></div>	41.0%	16
Low Priority (only do if time and money allow)	<div><div></div></div>	17.9%	7
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

25. The NGTC will use the content of the BoK to construct a workforce survey where the incumbent geospatial workforce can validate and prioritize the content of the BoK. <div>Appendix D</div>			
		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	43.6%	17
Medium Priority (a center should do this) Low Priority (only do if time and money allow)	<div><div></div></div>	48.7%	19
A NGTC should not do this.	<div><div></div></div>	7.7%	3
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

26. A NGTC will establish a partnership with U.S. Department of Labor in order to develop mutual goals and projects to increase the efficiency and coordination of both organizations.			
		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	69.2%	27
Medium Priority (a center should do this)	<div><div></div></div>	23.1%	9
Low Priority (only do if time and money allow)	<div><div></div></div>	7.7%	3
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

27. A NGTC will operate with a spirit of social and environmental responsibility.			Appendix D	
			Response Percent	Response Count
High Priority (a center must do this)			61.5%	24
Medium Priority (a center should do this)			17.9%	7
Low Priority (only do if time and money allow)			5.1%	2
A NGTC should not do this.			2.6%	1
I don't know enough to comment on this but the statement makes sense.			5.1%	2
This statement does not make sense.			7.7%	3
			0.0%	0
	answered question			39
	skipped question			0

28. A NGTC will develop a mechanism to track student internships, jobs, and earnings at the local and national level.

Appendix D

It is always a difficult task for centers to track students but vital to demonstrating the impact of a center. This work group suggested that the NGTC develop and host a “My Space” or My GeoSpace -style web presence for student portfolios and information exchange (static and interactive). This would be professionally done to entice students, not only to participate, but continually update their electronic portfolio as they move through the educational system and into the workforce. This could make student tracking much easier and much more successful.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	48.7%	19
Medium Priority (a center should do this)	<div><div></div></div>	25.6%	10
Low Priority (only do if time and money allow)	<div><div></div></div>	20.5%	8
A NGTC should not do this.	<div><div></div></div>	5.1%	2
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

29. A NGTC will establish a clearinghouse for internship, work experience, and service learning programs in order to remove geographic barriers to job placement (internship process materials should be made available on the NGTC website).

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	51.3%	20
Medium Priority (a center should do this)	<div><div></div></div>	23.1%	9
Low Priority (only do if time and money allow)	<div><div></div></div>	23.1%	9
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

30. A NGTC will build partnerships with new and emerging sectors that utilize geospatial technology (e.g. graphic artists associated with the gaming industry). <div>Appendix D</div>			
		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	48.7%	19
Medium Priority (a center should do this)	<div><div></div></div>	33.3%	13
Low Priority (only do if time and money allow)	<div><div></div></div>	15.4%	6
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

31. A NGTC will determine if the BoK Knowledge Areas encompass the breadth of the GIS&T field from a Community College perspective.

Appendix D

The UCGIS Body of Knowledge is the most extensive document produced to date on the breadth of GI Science and Technology. The BoK is partitioned into 10 Knowledge Areas which are intended to cover all of the knowledge associated with GIS&T. Each KA is broken down into Units which are further broken down into Topics. Each Topic includes Learning Objectives related to a specific Topic. A key question remains – how well does the BoK reflect the content of 2-year community college courses and programs that are responding to local and regional workforce needs?

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	64.1%	25
Medium Priority (a center should do this)	<div><div></div></div>	25.6%	10
Low Priority (only do if time and money allow)	<div><div></div></div>	5.1%	2
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	2.6%	1
This statement does not make sense.	<div><div></div></div>	2.6%	1
		0.0%	0
	answered question		39
	skipped question		0

32. A NGTC will assist UCGIS and AAG in continuing and expanding the BoK and making it more user friendly for undergraduate teaching and educating the incumbent workforce (identifying and filling gaps, etc.).

Appendix D






It is recommended that the NGTC specifically set aside funds to continue the work of the BoK in partnership with UCGIS and AAG.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	53.8%	21
Medium Priority (a center should do this)	<div><div></div></div>	30.8%	12
Low Priority (only do if time and money allow)	<div><div></div></div>	15.4%	6
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

33. 3. To better meet the needs of 2 year schools, a NGTC will work to create additional units under existing Knowledge Areas (KAs) and/or create an additional KAs related to workforce-driven applications of GIS (e.g., emergency response, crime mapping).

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	43.6%	17
Medium Priority (a center should do this)	<div><div></div></div>	46.2%	18
Low Priority (only do if time and money allow)	<div><div></div></div>	7.7%	3
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	2.6%	1
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

34. A NGTC will help create a glossary of terms for the Body of Knowledge KAs specific to 2 year programs.			Appendix D	
			Response Percent	Response Count
High Priority (a center must do this)			17.9%	7
Medium Priority (a center should do this)			41.0%	16
Low Priority (only do if time and money allow)			30.8%	12
A NGTC should not do this.			5.1%	2
I don't know enough to comment on this but the statement makes sense.			0.0%	0
This statement does not make sense.			5.1%	2
			0.0%	0
	answered question			39
	skipped question			0

35. A NGTC will establish partnerships with other academic centers and industries to align Knowledge Areas with sector-specific applications of GIS (e.g. agriculture, forestry).

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	53.8%	21
Medium Priority (a center should do this)	<div></div>	28.2%	11
Low Priority (only do if time and money allow)	<div></div>	17.9%	7
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

36. A NGTC will, using Geography for Life and other models as templates, create concrete examples for each level of mastery for the BoK topics that pertain to 2-year community college education and establish these to assessments for each level of mastery.

Mastery levels are related to the Categories of Educational Objectives (see page 42 of BoK) modified from [A Taxonomy for Learning, Teaching and Assessment](#) (Anderson and Krathwohl, 2001), which identified a matrix of Cognitive Processes and Knowledge Types with levels defined as:


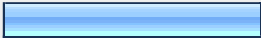

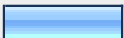


- a. Remember*
- b. Understand*
- c. Apply*
- d. Analyze*
- e. Evaluate*
- f. Create*

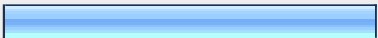




		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	28.2%	11
Medium Priority (a center should do this)	<div><div></div></div>	56.4%	22
Low Priority (only do if time and money allow)	<div><div></div></div>	7.7%	3
A NGTC should not do this.	<div><div></div></div>	5.1%	2
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	2.6%	1
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

37. A NGTC will establish a method for selecting core competencies for the mission statement of a particular (college's) program: discipline-specific or workforce. This would be made available on the center website.

Appendix D

A core competency is one that all covers basic skill sets needed to carry out a particular task or process. Depending upon the feasibility of using the BoK to define a framework for core competencies, this statement may or may not apply to the BoK.

		Response Percent	Response Count
High Priority (a center must do this)		28.2%	11
Medium Priority (a center should do this)		28.2%	11
Low Priority (only do if time and money allow)		20.5%	8
A NGTC should not do this.		12.8%	5
I don't know enough to comment on this but the statement makes sense.		5.1%	2
This statement does not make sense.		5.1%	2
		0.0%	0
	answered question		39
	skipped question		0

38. A NGTC will take identified core competencies in the BoK and state them as Learning Outcomes consistent with accreditation language. Appendix D			
		Response Percent	Response Count
High Priority (a center must do this)		41.0%	16
Medium Priority (a center should do this)		35.9%	14
Low Priority (only do if time and money allow)		15.4%	6
A NGTC should not do this.		5.1%	2
I don't know enough to comment on this but the statement makes sense.		2.6%	1
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

39. A NGTC will help to broaden the scope of the competencies and Learning Outcomes to all of geospatial technology (remote sensing, GPS) realizing that the BoK emphasizes GIS.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	41.0%	16
Medium Priority (a center should do this)	<div></div>	41.0%	16
Low Priority (only do if time and money allow)	<div></div>	12.8%	5
A NGTC should not do this.	<div></div>	5.1%	2
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

40. A NGTC will determine if community college educators can create Exemplary Pathways (core courses with specific content and electives) for 2 year programs that are cross referenced to the BoK.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	25.6%	10
Medium Priority (a center should do this)	<div></div>	38.5%	15
Low Priority (only do if time and money allow)	<div></div>	10.3%	4
A NGTC should not do this.	<div></div>	12.8%	5
I don't know enough to comment on this but the statement makes sense.	<div></div>	7.7%	3
This statement does not make sense.	<div></div>	5.1%	2
		0.0%	0
	answered question		39
	skipped question		0

41. A NGTC will provide a unifying voice to represent community college views and interests in existing certification efforts.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	66.7%	26
Medium Priority (a center should do this)	<div><div></div></div>	23.1%	9
Low Priority (only do if time and money allow)	<div><div></div></div>	7.7%	3
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

42. A NGTC will create a repository of certification and licensing programs and disseminate information about certification and licensing programs to faculty and students (newsletter, web page, other).

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	64.1%	25
Medium Priority (a center should do this)	<div><div></div></div>	28.2%	11
Low Priority (only do if time and money allow)	<div><div></div></div>	7.7%	3
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

43. A NGTC will evaluate certification options and make recommendations to students, faculty and industry about the advantages of each.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	35.9%	14
Medium Priority (a center should do this)	<div></div>	28.2%	11
Low Priority (only do if time and money allow)	<div></div>	23.1%	9
A NGTC should not do this.	<div></div>	7.7%	3
I don't know enough to comment on this but the statement makes sense.	<div></div>	5.1%	2
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

44. A NGTC will help define certification criteria and specify the minimum standards for certification.		Appendix D	
		Response Percent	Response Count
High Priority (a center must do this)		28.2%	11
Medium Priority (a center should do this)		41.0%	16
Low Priority (only do if time and money allow)		25.6%	10
A NGTC should not do this.		5.1%	2
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0

45. A NGTC will become a geospatial technology certification granting organization.			Appendix D	
			Response Percent	Response Count
High Priority (a center must do this)			20.5%	8
Medium Priority (a center should do this)			5.1%	2
Low Priority (only do if time and money allow)			25.6%	10
A NGTC should not do this.			41.0%	16
I don't know enough to comment on this but the statement makes sense.			7.7%	3
This statement does not make sense.			0.0%	0
			0.0%	0
	answered question			39
	skipped question			0

46. A NGTC will be an organization that can provide educators with evidence (certification, certificates or licenses) that they have satisfied the minimum qualifications specific to teaching geospatial technology.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	23.1%	9
Medium Priority (a center should do this)	<div></div>	25.6%	10
Low Priority (only do if time and money allow)	<div></div>	12.8%	5
A NGTC should not do this.	<div></div>	28.2%	11
I don't know enough to comment on this but the statement makes sense.	<div></div>	7.7%	3
This statement does not make sense.	<div></div>	2.6%	1
		0.0%	0
	answered question		39
	skipped question		0

47. 7. A NGTC will work with industry to evaluate Certificate programs offered by colleges and disseminate minimum standards of core competencies (those skills that a person performing a task should have) for different certificate unit (semester credit hours) loads (e.g. 9 units, 10 to 20 units, 20 to 30 units, etc.).




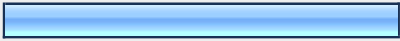

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	17.9%	7
Medium Priority (a center should do this)	<div><div></div></div>	33.3%	13
Low Priority (only do if time and money allow)	<div><div></div></div>	30.8%	12
A NGTC should not do this.	<div><div></div></div>	10.3%	4
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	7.7%	3
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

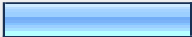



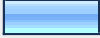
48. A NGTC will provide support for a new overarching national professional organization for Spatial Sciences practitioners.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	15.4%	6
Medium Priority (a center should do this)	<div><div></div></div>	43.6%	17
Low Priority (only do if time and money allow)	<div><div></div></div>	17.9%	7
A NGTC should not do this.	<div><div></div></div>	10.3%	4
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	10.3%	4
This statement does not make sense.	<div><div></div></div>	2.6%	1
		0.0%	0
	answered question		39
	skipped question		0

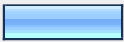

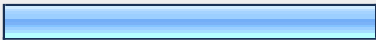
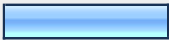


49. A NGTC will serve as an accreditation body for geospatial programs.			Appendix D	
			Response Percent	Response Count
High Priority (a center must do this)			10.3%	4
Medium Priority (a center should do this)			17.9%	7
Low Priority (only do if time and money allow)			20.5%	8
A NGTC should not do this.			43.6%	17
I don't know enough to comment on this but the statement makes sense.			7.7%	3
This statement does not make sense.			0.0%	0
			0.0%	0
	answered question			39
	skipped question			0

50. A NGTC will form a partnership with geospatial professional organizations (i.e., GITA, URISA, ACSM, ASPRS) and then be the “governing organization” that works through ABET to create “GIS/geospatial” accreditation criteria. <div>Appendix D</div>			
		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	25.6%	10
Medium Priority (a center should do this)	<div><div></div></div>	25.6%	10
Low Priority (only do if time and money allow)	<div><div></div></div>	17.9%	7
A NGTC should not do this.	<div><div></div></div>	17.9%	7
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	10.3%	4
This statement does not make sense.	<div><div></div></div>	2.6%	1
		0.0%	0
	answered question		39
	skipped question		0

51. A NGTC will work with USGIF to create a 2-year-level accredited Geospatial Intelligence Analyst model course or program. Appendix D			
		Response Percent	Response Count
High Priority (a center must do this)		20.5%	8
Medium Priority (a center should do this)		23.1%	9
Low Priority (only do if time and money allow)		35.9%	14
A NGTC should not do this.		10.3%	4
I don't know enough to comment on this but the statement makes sense.		10.3%	4
This statement does not make sense.		0.0%	0
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0

52. As new initiatives surface regarding certification or other licensing, a NGTC will provide administrative support for such testing such as proctoring, building tests or setting standards.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)		12.8%	5
Medium Priority (a center should do this)		20.5%	8
Low Priority (only do if time and money allow)		41.0%	16
A NGTC should not do this.		17.9%	7
I don't know enough to comment on this but the statement makes sense.		5.1%	2
This statement does not make sense.		0.0%	0
		2.6%	1
	answered question		39
	skipped question		0


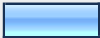



53. A NGTC will compile curricular components such as a) workforce needs, b) core competencies in the form of learning objectives, and c) instructional materials to support teaching of these objectives.

Appendix B

Workforce needs would be in the form of DACUMs, or other industry based occupational job task analyses. Workforce needs would be compiled and organized by the type of task analysis or by the type of career/occupation.

Core competencies would be in the form of the UCGIS Body of Knowledge (BoK) as edited for use by community colleges and associate degree programs. Measurable learning objectives would be key to making this useful for instructors.

Instructional materials would include learning objects, modules, on-line courses, laboratory activities, courses, workshops and model programs.

		Response Percent	Response Count
High Priority (a center must do this)		79.5%	31
Medium Priority (a center should do this)		10.3%	4
Low Priority (only do if time and money allow)		2.6%	1
A NGTC should not do this.		2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		5.1%	2
	answered question		39
	skipped question		0

54. A NGTC will provide a framework that cross-references all of the aforementioned curriculum components to assist colleges in the development of educational programs.

Appendix D

By providing a framework which cross-references all of these curriculum components, instructors are more easily able to find the information needed to support articulation, certification and program development.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	76.9%	30
Medium Priority (a center should do this)	<div><div></div></div>	17.9%	7
Low Priority (only do if time and money allow)	<div><div></div></div>	2.6%	1
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)	<div><div></div></div>	2.6%	1
	answered question		39
	skipped question		0

55. A NGTC will provide the processes and best practices by which a curriculum framework is used to develop a program that meets the local industry needs.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	43.6%	17
Medium Priority (a center should do this)	<div></div>	38.5%	15
Low Priority (only do if time and money allow)	<div></div>	10.3%	4
A NGTC should not do this.	<div></div>	5.1%	2
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.	<div></div>	2.6%	1
		0.0%	0
	answered question		39
	skipped question		0

56. A NGTC will complete a gap analysis of curriculum components to determine possible development of missing components.

Appendix D

A gap analysis is based on a review of all compiled curriculum materials and working with instructors and industry representatives to determine specific components are missing that would assist colleges in building geospatial programs.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	46.2%	18
Medium Priority (a center should do this)	<div><div></div></div>	25.6%	10
Low Priority (only do if time and money allow)	<div><div></div></div>	23.1%	9
A NGTC should not do this.	<div><div></div></div>	5.1%	2
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

57. A NGTC will compile current GIS introductory course curriculum objectives and reference them to the BoK.

Appendix D

There have been many introductory geospatial courses developed. Compiling these courses and cross-referencing them to the core competencies in the BoK allows instructors to use one of these courses instead of developing a new course.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	30.8%	12
Medium Priority (a center should do this)	<div><div></div></div>	53.8%	21
Low Priority (only do if time and money allow)	<div><div></div></div>	12.8%	5
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

58. A NGTC will provide FAQ (Frequently Asked Questions) on the Center web site pertaining to geospatial technical education and the development of curriculum programs.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	69.2%	27
Medium Priority (a center should do this)	<div><div></div></div>	23.1%	9
Low Priority (only do if time and money allow)	<div><div></div></div>	5.1%	2
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.	<div><div></div></div>	2.6%	1
		0.0%	0
	answered question		39
	skipped question		0

59. A NGTC will create an online format for submitting and reviewing resources to Center’s clearinghouse.
Appendix D

A website based on a component management system allows any registered user to submit materials by uploading files or documents to the web server. These materials would undergo a peer review process before they became available to other registered users.

It should be recognized that in the first 3 years of the center’s existence, the majority of the materials will be submitted by center staff. As the center matures and the clearinghouse becomes more robust, it is expected that more of the materials will be submitted by partners.

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	61.5%	24
Medium Priority (a center should do this)	<div></div>	33.3%	13
Low Priority (only do if time and money allow)	<div></div>	2.6%	1
A NGTC should not do this.	<div></div>	2.6%	1
I don’t know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

60. A NGTC will provide a means by which geospatial educators can search and retrieve curriculum components and instructional materials online.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	89.7%	35
Medium Priority (a center should do this)	<div></div>	10.3%	4
Low Priority (only do if time and money allow)		0.0%	0
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

61. A NGTC will compile and make available, as part of the clearinghouse activities, instructional materials that use geospatial technologies to teach concepts of science, math and technology.

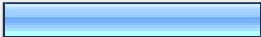


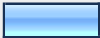


Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	43.6%	17
Medium Priority (a center should do this)	<div></div>	48.7%	19
Low Priority (only do if time and money allow)	<div></div>	5.1%	2
A NGTC should not do this.	<div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

62. A NGTC will compile and support the development of curricula in technology based applications such as, but not limited to, archeology, agriculture, criminal justice, marine technology, and natural resources.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	35.9%	14
Medium Priority (a center should do this)	<div></div>	43.6%	17
Low Priority (only do if time and money allow)	<div></div>	17.9%	7
A NGTC should not do this.	<div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

63. The NGTC will support the concept of good teaching and student learning by providing pedagogical standards. Appendix D			
		Response Percent	Response Count
High Priority (a center must do this)		28.2%	11
Medium Priority (a center should do this)		38.5%	15
Low Priority (only do if time and money allow)		17.9%	7
A NGTC should not do this.		10.3%	4
I don't know enough to comment on this but the statement makes sense.		2.6%	1
This statement does not make sense.		2.6%	1
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0






64. A NGTC will support the use of pedagogical standards by referencing one of the 5 standards for all appropriate instructional materials (listed in comments below).

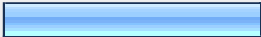






Appendix D

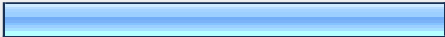


The Center for Research on Education, Diversity and Excellence (CREDE) lists five Standards for Effective Pedagogy which can serve as good guidelines for enhancing geospatial education:

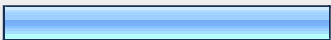
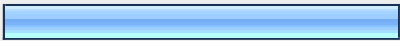




- 1. Teachers and Students working together - Facilitate learning through joint productive activity among teacher and students.*
- 2. Developing Language Across the Curriculum - Develop competence in the language and literacy of instruction across the curriculum.*
- 3. Connecting School to Students' Lives -Connect teaching and curriculum to students' experiences and skills of home and community (Contextualization).*
- 4. Teaching Complex Thinking - Maintain challenging standards for student performance; design activities to advance understanding to more complex levels. Challenge students toward cognitive complexity.*
- 5. Emphasizing Dialogue over Lectures - Instruct through teacher-student dialogue, especially academic, goal-directed, small-group conversations (known as instructional conversations), rather than lecture.*

(From CREDE, Center for Research on Education, Diversity and Excellence, October 27, 2006. <http://crede.berkeley.edu/standards/standards.html>)

		Response Percent	Response Count
High Priority (a center must do this)		20.5%	8
Medium Priority (a center should do this)		43.6%	17
Low Priority (only do if time and money allow)		12.8%	5
A NGTC should not do this.		7.7%	3
I don't know enough to comment on this but the statement makes sense.		15.4%	6
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
		answered question	39
		skipped question	0

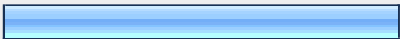


65. A NGTC will create educational experiences that mimic high-performance work environments.			Appendix D	
			Response Percent	Response Count
High Priority (a center must do this)			28.2%	11
Medium Priority (a center should do this)			28.2%	11
Low Priority (only do if time and money allow)			20.5%	8
A NGTC should not do this.			5.1%	2
I don't know enough to comment on this but the statement makes sense.			5.1%	2
This statement does not make sense.			10.3%	4
			2.6%	1
	<i>answered question</i>			39
	<i>skipped question</i>			0

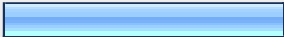



66. A NGTC will develop model programs of study that provide guidelines for geospatial associate degree programs. Appendix D			
		Response Percent	Response Count
High Priority (a center must do this)		48.7%	19
Medium Priority (a center should do this)		38.5%	15
Low Priority (only do if time and money allow)		12.8%	5
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0

67. A NGTC will promote articulation through standardized learning outcomes tied to the Body of Knowledge (BoK). Appendix D			
		Response Percent	Response Count
High Priority (a center must do this)		35.9%	14
Medium Priority (a center should do this)		43.6%	17
Low Priority (only do if time and money allow)		7.7%	3
A NGTC should not do this.		7.7%	3
I don't know enough to comment on this but the statement makes sense.		2.6%	1
This statement does not make sense.		2.6%	1
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0

68. A NGTC will organize, compile, and compare past and future articulation agreements, Memorandums of Understanding (MOU) and other documents nationwide and make the results available on searchable database on the center website.

Appendix D

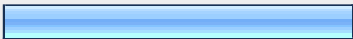



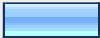
		Response Percent	Response Count
High Priority (a center must do this)		43.6%	17
Medium Priority (a center should do this)		35.9%	14
Low Priority (only do if time and money allow)		20.5%	8
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

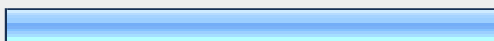
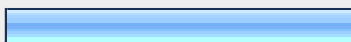

69. A NGTC will review and summarize policies of state and regional accrediting agencies to facilitate articulation. Appendix D			
		Response Percent	Response Count
High Priority (a center must do this)		30.8%	12
Medium Priority (a center should do this)		28.2%	11
Low Priority (only do if time and money allow)		33.3%	13
A NGTC should not do this.		7.7%	3
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0

70. A NGTC will develop a rubric of geospatial skills tied to the BoK that is linked to each education level.			Appendix D	
A template that could be followed is the Geography for Life. For an example, see http://www.hawaii.edu/hga/Standard/Standard.html				
			Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>		38.5%	15
Medium Priority (a center should do this)	<div><div></div></div>		41.0%	16
Low Priority (only do if time and money allow)	<div><div></div></div>		15.4%	6
A NGTC should not do this.	<div><div></div></div>		2.6%	1
I don't know enough to comment on this but the statement makes sense.			0.0%	0
This statement does not make sense.			0.0%	0
Other (please specify)	<div><div></div></div>		2.6%	1
	answered question			39
	skipped question			0

71. A problem of K12-CC articulation involves faculty credentials. A NGTC will develop standards to integrate GIS into geography AP courses and/or College-Level Examination Program® or CLEP courses to overcome the credential issue.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)		38.5%	15
Medium Priority (a center should do this)		28.2%	11
Low Priority (only do if time and money allow)		10.3%	4
A NGTC should not do this.		12.8%	5
I don't know enough to comment on this but the statement makes sense.		10.3%	4
This statement does not make sense.		0.0%	0
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0

72. A NGTC will develop an online forum and white paper that discusses strategies for achieving articulation.			
Appendix D			
		Response Percent	Response Count
High Priority (a center must do this)		53.8%	21
Medium Priority (a center should do this)		38.5%	15
Low Priority (only do if time and money allow)		7.7%	3
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

73. A NGTC will use the BoK to create equivalencies between freshman & sophomore level courses at community colleges and junior & senior level courses at 4-year institutions.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	28.2%	11
Medium Priority (a center should do this)	<div><div></div></div>	46.2%	18
Low Priority (only do if time and money allow)	<div><div></div></div>	15.4%	6
A NGTC should not do this.	<div><div></div></div>	7.7%	3
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.	<div><div></div></div>	2.6%	1
		0.0%	0
	answered question		39
	skipped question		0

74. A NGTC will perform a cost/benefit analysis that would indicate the cost if there were no articulation agreement (credit hours lost and dollar costs) between schools and colleges and universities.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	12.8%	5
Medium Priority (a center should do this)	<div><div></div></div>	23.1%	9
Low Priority (only do if time and money allow)	<div><div></div></div>	41.0%	16
A NGTC should not do this.	<div><div></div></div>	17.9%	7
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	5.1%	2
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

75. A NGTC will seek to secure a baseline database of existing geospatial education (programs, faculty/staff, # of students) nationwide. This may be achieved through collaboration with AAG or a similar nationally-recognized effort.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	38.5%	15
Medium Priority (a center should do this)	<div></div>	46.2%	18
Low Priority (only do if time and money allow)	<div></div>	15.4%	6
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

76. A NGTC will develop curriculum pathways (core courses and additional course content for specific disciplines) based on the UCGIS GI S&T Body of Knowledge.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	30.8%	12
Medium Priority (a center should do this)	<div><div></div></div>	48.7%	19
Low Priority (only do if time and money allow)	<div><div></div></div>	12.8%	5
A NGTC should not do this.	<div><div></div></div>	5.1%	2
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.	<div><div></div></div>	2.6%	1
		0.0%	0
	answered question		39
	skipped question		0

77. A NGTC will develop career pathways that provide guidelines for a seamless education in geospatial technology from secondary to community college to university.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	51.3%	20
Medium Priority (a center should do this)	<div><div></div></div>	25.6%	10
Low Priority (only do if time and money allow)	<div><div></div></div>	15.4%	6
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	5.1%	2
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

78. A NGTC will organize, compile, and disseminate up-to-date information on professional development opportunities, training materials, tutorials and links to online resources on a NGTC website.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	76.9%	30
Medium Priority (a center should do this)	<div></div>	15.4%	6
Low Priority (only do if time and money allow)	<div></div>	7.7%	3
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

79. A NGTC will offer professional development training courses, workshops, and seminars.			Appendix D	
			Response Percent	Response Count
High Priority (a center must do this)			51.3%	20
Medium Priority (a center should do this)			30.8%	12
Low Priority (only do if time and money allow)			15.4%	6
A NGTC should not do this.			2.6%	1
I don't know enough to comment on this but the statement makes sense.			0.0%	0
This statement does not make sense.			0.0%	0
			0.0%	0
	<i>answered question</i>			39
	<i>skipped question</i>			0

80. A NCTC will offer geospatial technology professional development in other formats (not face to face) such as online tutorials, instructions and data, and podcasts via their website.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	51.3%	20
Medium Priority (a center should do this)	<div></div>	38.5%	15
Low Priority (only do if time and money allow)	<div></div>	10.3%	4
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

Appendix D

81. A NGTC will understand major barriers to professional development through surveys and feedback from community college faculty, (e.g. limited funds, inflexible schedules and unappreciative administration) and work to minimize these barriers to increase professional development availability and accessibility.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	41.0%	16
Medium Priority (a center should do this)	<div><div></div></div>	30.8%	12
Low Priority (only do if time and money allow)	<div><div></div></div>	23.1%	9
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.	<div><div></div></div>	2.6%	1
		0.0%	0
	answered question		39
	skipped question		0

82. A NGTC will keep abreast of geospatial technology trends and make recommendations on the type of professional development faculty should pursue to keep current in their field.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	64.1%	25
Medium Priority (a center should do this)	<div><div></div></div>	25.6%	10
Low Priority (only do if time and money allow)	<div><div></div></div>	7.7%	3
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

83. A NGTC will build partnerships with 4-year universities, professional societies, government agencies, industry and NGOs to promote, encourage and expand professional development opportunities.


Appendix D

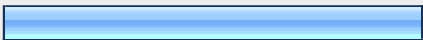
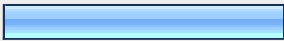



		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	69.2%	27
Medium Priority (a center should do this)	<div></div>	17.9%	7
Low Priority (only do if time and money allow)	<div></div>	12.8%	5
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

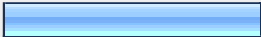


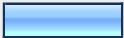


84. NGTC will provide up-to-date information on current and past geospatial-related NSF Advanced Technological Education (ATE) projects, ATE Centers, and other NSF Division of Undergraduate projects via website and listserve.

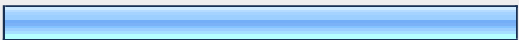
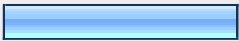



Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	61.5%	24
Medium Priority (a center should do this)	<div><div></div></div>	20.5%	8
Low Priority (only do if time and money allow)	<div><div></div></div>	12.8%	5
A NGTC should not do this.	<div><div></div></div>	5.1%	2
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

85. NGTC will provide latest information on current and past Department of Labor projects via website and listserve. Appendix D			
		Response Percent	Response Count
High Priority (a center must do this)		43.6%	17
Medium Priority (a center should do this)		33.3%	13
Low Priority (only do if time and money allow)		15.4%	6
A NGTC should not do this.		7.7%	3
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0

86. NGTC will seek out the best existing communication network(s) that can be used to improve the flow of information. Appendix D			
		Response Percent	Response Count
High Priority (a center must do this)		46.2%	18
Medium Priority (a center should do this)		30.8%	12
Low Priority (only do if time and money allow)		10.3%	4
A NGTC should not do this.		5.1%	2
I don't know enough to comment on this but the statement makes sense.		7.7%	3
This statement does not make sense.		0.0%	0
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0

87. NGTC will develop a new communication infrastructure to facilitate geospatial information exchange.			Appendix D	
			Response Percent	Response Count
High Priority (a center must do this)			28.2%	11
Medium Priority (a center should do this)			23.1%	9
Low Priority (only do if time and money allow)			25.6%	10
A NGTC should not do this.			12.8%	5
I don't know enough to comment on this but the statement makes sense.			7.7%	3
This statement does not make sense.			2.6%	1
			0.0%	0
	answered question			39
	skipped question			0

88. NGTC will work closely with existing regional hubs to improve communication on a regional level.		Appendix D	
		Response Percent	Response Count
High Priority (a center must do this)		56.4%	22
Medium Priority (a center should do this)		25.6%	10
Low Priority (only do if time and money allow)		7.7%	3
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		5.1%	2
This statement does not make sense.		5.1%	2
		0.0%	0
	<i>answered question</i>		39
	<i>skipped question</i>		0

89. A NGTC will act as the representative body for 2-year colleges, faculty and students in the field of geospatial technology and act as a collective voice to promote community college interests in professional societies

Appendix B

These professional societies could include University Consortium of Geographic Information Science (UCGIS), Association of American Geographers (AAG), American Society for Photogrammetry and Remote Sensing (ASPRS), Urban and Regional Information Systems Association URISA, Geospatial Information and Technology Association (GITA), National States Geographic Information Council (NSGIC), Cartography and Geographic Information Society (CaGIS) and others.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	76.9%	30
Medium Priority (a center should do this)	<div><div></div></div>	17.9%	7
Low Priority (only do if time and money allow)	<div><div></div></div>	5.1%	2
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

90. A NGTC will identify effective student recruitment approaches for GIS programs in community colleges and disseminate available resources and recruitment tools for community college teachers.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	51.3%	20
Medium Priority (a center should do this)	<div><div></div></div>	35.9%	14
Low Priority (only do if time and money allow)	<div><div></div></div>	7.7%	3
A NGTC should not do this.	<div><div></div></div>	5.1%	2
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

91. A NGTC will promote GIS as a main stream scientific tool for community college education. GIS awareness and education will be extended to other academic programs (e.g. economics, history and biology).

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	69.2%	27
Medium Priority (a center should do this)	<div></div>	23.1%	9
Low Priority (only do if time and money allow)	<div></div>	7.7%	3
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

92. A NGTC will disseminate success stories of geospatial awareness events and identify effective GIS education tools, such as Google Earth and the National Atlas web mapping services, for community college GIS teachers. <div>Appendix D</div>			
		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	66.7%	26
Medium Priority (a center should do this)	<div><div></div></div>	23.1%	9
Low Priority (only do if time and money allow)	<div><div></div></div>	10.3%	4
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

93. A NGTC will promote geospatial technology awareness and establish a future vision for bridging the GIS education gaps between community colleges and high schools.

Appendix D

For example, a NGTC can encourage existing AP Geography courses in high schools to embed GIS components inside their curricula.

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	51.3%	20
Medium Priority (a center should do this)	<div></div>	35.9%	14
Low Priority (only do if time and money allow)	<div></div>	12.8%	5
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

94. A NGTC will identify effective methods to facilitate the information exchanges and sharing of the resources for Geospatial Technology Awareness among community college teachers and students.

Appendix D

A NGTC can introduce new tools and utilize new media formats, such as creating on-line pod-casting, multimedia movies, and weblogs for GIS awareness.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	35.9%	14
Medium Priority (a center should do this)	<div><div></div></div>	38.5%	15
Low Priority (only do if time and money allow)	<div><div></div></div>	20.5%	8
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.	<div><div></div></div>	2.6%	1
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

95. A NGTC will provide a comprehensive list of outreach events and marketing materials and make it available on-line.
Community college GIS teachers can utilize these resources to promote GIS career and GIS technology awareness.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	61.5%	24
Medium Priority (a center should do this)	<div></div>	23.1%	9
Low Priority (only do if time and money allow)	<div></div>	10.3%	4
A NGTC should not do this.	<div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.	<div></div>	2.6%	1
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

96. A NGTC will participate in and help coordinate GIS awareness events, such as GIS day and GIS education conferences. NGTC will encourage GIS teachers in community colleges to coordinate with other agencies for their local GIS awareness event.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	25.6%	10
Medium Priority (a center should do this)	<div><div></div></div>	56.4%	22
Low Priority (only do if time and money allow)	<div><div></div></div>	17.9%	7
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

97. A NGTC will keep abreast of the social and culture trends in an effort to help bridge inequity gaps in the geospatial technology workforce. The NGTC will post a document of relevant trends on the center web site and update it annually.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	33.3%	13
Medium Priority (a center should do this)	<div></div>	38.5%	15
Low Priority (only do if time and money allow)	<div></div>	25.6%	10
A NGTC should not do this.	<div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

98. A NGTC will provide comprehensive information for underserved audiences in community colleges about internship and mentorship opportunities.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	46.2%	18
Medium Priority (a center should do this)	<div><div></div></div>	30.8%	12
Low Priority (only do if time and money allow)	<div><div></div></div>	20.5%	8
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
)		0.0%	0
	answered question		39
	skipped question		0

99. A NGTC will develop a system to evaluate the progress of increasing the number of underserved students in the GIS programs at community colleges.

Appendix D

		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	33.3%	13
Medium Priority (a center should do this)	<div></div>	41.0%	16
Low Priority (only do if time and money allow)	<div></div>	23.1%	9
A NGTC should not do this.	<div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

100. A NGTC will identify existing successful programs that reach diverse audiences, such as NSF STEM program and NOAA NSF AMS. By learning from these successful examples, the NGTC can focus on the gaps in economic, culture, age, and gender groups. A comprehensive report document should be generated at the first year of the NGTC to indicate the population distribution in different groups as a baseline for the future comparison.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	43.6%	17
Medium Priority (a center should do this)	<div><div></div></div>	33.3%	13
Low Priority (only do if time and money allow)	<div><div></div></div>	20.5%	8
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
		0.0%	0
	answered question		39
	skipped question		0

Appendix D

101. The NGTC will develop a searchable clearinghouse with how-to templates, standard data models and best practices to duplicate curriculum driven entrepreneurial activities /experiences linking GSTs to community college administrative issues.			
<i>By maintaining a repository of GSTs case studies on administrative applications of GSTs, the NGTC will serve as a valuable dissemination arm for linking community college policy leaders to the potential benefits of the technology. Many community colleges are currently, or planning, projects linking community college GST programs with institutional needs relating to data analysis and acquisition. The NGTC could serve as a single repository for these projects and disseminate the valuable role GSTs could play in effective data management of community college campuses. As a result, the NGTC could assist in linking GSTs to the growing entrepreneurial mission of community colleges and elevate GSTs as critical decision support tools in managing modern community colleges.</i>			
		Response Percent	Response Count
High Priority (a center must do this)	<div></div>	71.8%	28
Medium Priority (a center should do this)	<div></div>	17.9%	7
Low Priority (only do if time and money allow)	<div></div>	10.3%	4
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

102. The NGTC will coordinate a Memorandum of Understanding (MOU) with government & industry about what community college GST programs can and cannot do to generate income under state law.

Appendix D

How can community colleges ethically and legally leverage project based GST learning opportunities within existing and future GST programs at community colleges? Using students to address local or institutional GST needs could cause conflict with regional private sector vendors. The NGTC will need to coordinate issues like charges of unfair competition and regulatory state laws in maximizing how community colleges elevate their entrepreneurial mission through GST programs.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	28.2%	11
Medium Priority (a center should do this)	<div><div></div></div>	25.6%	10
Low Priority (only do if time and money allow)	<div><div></div></div>	23.1%	9
A NGTC should not do this.	<div><div></div></div>	12.8%	5
I don't know enough to comment on this but the statement makes sense.	<div><div></div></div>	5.1%	2
This statement does not make sense.	<div><div></div></div>	5.1%	2
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

103. The NGTC will serve as a clearinghouse for community college geospatial data.

Appendix D

The NGTC will coordinate and develop a one-stop-shop for community college data through some web-based portal. This portal will allow any community college administrator, board member, faculty, local community members or students to visualize and access local/regional information around any community college. The data and information housed by the site should be based upon extensive input from community college policy leaders. This input will assist the NGTC in a designing a clearinghouse that best serves the community college system in addressing current and future issues like documenting access, student diversity, grant writing, economic development, and marketing. Services like this will institutionalize GSTs to achieving the community college mission and develop a unique niche for the NGTC in promoting long-term sustainability.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	48.7%	19
Medium Priority (a center should do this)	<div><div></div></div>	7.7%	3
Low Priority (only do if time and money allow)	<div><div></div></div>	30.8%	12
A NGTC should not do this.	<div><div></div></div>	12.8%	5
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

104. The NGCT will assess trends in the geospatial industry in order to project changes in the industry and workforce that impact GT curricula and programs in two year colleges.

Appendix D

This will be a forward-looking effort (5-10 years) and will be accomplished through an advisory board with key representatives from professional organizations, industry, and academia, an online forum to discuss trends and issues that impact Geospatial curricula and programs, and an online links page with links to websites and reports from industry, professional organizations, and academia that provide up-to-date information on trends.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	53.8%	21
Medium Priority (a center should do this)	<div><div></div></div>	43.6%	17
Low Priority (only do if time and money allow)	<div><div></div></div>	2.6%	1
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

105. The NGCT will disseminate the information on trends to other two year colleges.

Appendix D

To accomplish this the NGCT will provide a links page with links to websites and reports from industry, professional organizations, and academia that provide up-to- date information on trends, an annual trends outlook as a digital report online, and a center website with a redux of blogs, RSS feeds, podcasts, etc. that are related to trends.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	51.3%	20
Medium Priority (a center should do this)	<div><div></div></div>	38.5%	15
Low Priority (only do if time and money allow)	<div><div></div></div>	7.7%	3
A NGTC should not do this.	<div><div></div></div>	2.6%	1
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

106. The NGCT will assist community colleges in adapting their curricula to future trends.

Appendix D

The NCGT will provide regional faculty development workshops through on site instruction, by distance learning, and /or by a hybrid combination of distance learning and onsite instruction, provide opportunities for solution sharing through online forums, a Webinar, and /or by teleconference, assist Community Colleges in developing surveys to submit to industry, alumni, etc., and provide a clearinghouse of content-specific experts to assist community colleges in adapting curricula and programs to future needs.

		Response Percent	Response Count
High Priority (a center must do this)	<div><div></div></div>	41.0%	16
Medium Priority (a center should do this)	<div><div></div></div>	38.5%	15
Low Priority (only do if time and money allow)	<div><div></div></div>	20.5%	8
A NGTC should not do this.		0.0%	0
I don't know enough to comment on this but the statement makes sense.		0.0%	0
This statement does not make sense.		0.0%	0
Other (please specify)		0.0%	0
	answered question		39
	skipped question		0

Appendix E. GISCI Professional Certification, ASPRS Certification, and SPACE STARS Certification Guidelines

GIS Certification Institute (GISCI)

Info as of	8/15/07
Sponsor	GISCI, its own organization just for GIS certification 501 (c)(6)
Start year	2004
Recognizing Organizations	<p>Four Member Organizations appoint representatives to our Board of Directors: The Association of American Geographers (AAG), The National State Geographic Information Council (NSGIC), University Consortium for Geographic Information Science (UCGIS), and The Urban and Regional Information Systems Association (URISA)</p> <p>North Carolina, Oregon, and the National Association of Counties have endorsed the program</p> <p>A number of small groups and chapters have shown informal and formal support for the program.</p>
# people certified	1,664 Certified GIS Professionals (GISPs) as of 7/25/07
% applicants who fail	Each month GISCI has a handful of applications that fail. However, the GISCI application process is different from most certification programs. Applicants have a strong idea on whether or not they will pass when the application is submitted. We do have applications that fail due to miscalculations, misrepresentations, and documentation errors.
# members in sponsor org	GISPs are not members of the organization. They are professionals recognized by the Institute.
Fees	\$250, recertification is \$115.
Administration	GISCI, its own organization just for GIS certification 501 (c)(6). GISCI has a staff of 3 (Executive Director, Certification Coordinator, Accountant).
Education requirements	<p>GISCI uses a point based system for certification. Achievement (points) must fall into 3 categories.</p> <p>Educational Achievement: Bachelor's degree with some GIS courses (or equivalent) (30 points)</p> <p>Professional Experience: Four years in GIS application or data development (or equivalent) (60 points)</p> <p>Contributions to the Profession: Annual membership and modest participant in a GIS professional association (or equivalent) (8 points)</p> <p>Plus an additional 52 flex points in any of the three categories.</p>

Appendix E

	Minimum points = 150
Experience requirements	Professional experience: Four years in GIS application or data development. Most applicants have between 7-8 years.
Test requirements	No test.
Other requirements	Contributions to the profession: see above
Continuing requirements	Every five years the applicant must earn 75 points Educational Achievement: 3 pts Professional Experience: 37 points Contributions to the Profession 7 points Additional “Flex” Points: 28 pts
Renewal interval	Every five years an applicant must submit a recertification application.
Web site	www.gisci.org

ASPRS Remote Sensing/Photogrammetry – 6 certifications

Certified Photogrammetrist (1975)
 Certified Mapping Scientist, Remote Sensing (1991)
 Certified Mapping Scientist, GIS/LIS (1991)
 Certified Photogrammetric Technologist
 Certified Remote Sensing Technologist
 Certified GIS/LIS Technologist

http://www.asprs.org/membership/certification/certification_guidelines.html#GENERAL_INFORMATION

Info as of	6/6/07														
Sponsor	American Society for Photogrammetry & Remote Sensing														
Start year	1975 for Photogrammetrist; 1991 for Mapping Scientist Remote Sensing & Mapping Scientist GIS/LIS In 2006 a provisional certification program that allows students to take the test once they have completed the course work and they can become “provisionally certified” unit they complete the on-job experience requirement														
Recognizing Organizations	ASPRS Certified Professionals are specified as a requirement for contract services by the US Army Corps of Engineers, the US Geological Survey, State and local government agencies when procuring services. ASPRS Certification is recognized by employers seeking to fill positions. ASPRS Certified Professionals are working closely with the National Council for Examination of Engineers and Surveyors on the development and maintenance of a national photogrammetry exam to support implementation of the Model Law by individual states.														
# people certified	Total Number of Active Certified: 860 (Membership in ASPRS is not required; approx. 60 are outside of the US)														
% applicants who fail	In 2006: 14% failed to be certified or failed to be recertified.														
# members in sponsor org	6150														
Fees	<table><tr><th colspan="3">ASPRS Certification Application Fees</th></tr><tr><th>Type of Application</th><th>ASPRS Members</th><th>Non-Members</th></tr><tr><td>Initial Certification</td><td>\$275 (US)</td><td>\$400 (US)</td></tr><tr><td>Provisional Certification</td><td>\$150 (US)</td><td>\$200 (US)</td></tr></table>			ASPRS Certification Application Fees			Type of Application	ASPRS Members	Non-Members	Initial Certification	\$275 (US)	\$400 (US)	Provisional Certification	\$150 (US)	\$200 (US)
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		<div><div>1. Initial Application</div><div>2. Final Application</div></div>	\$150 (US)	\$300 (US)	
		Recertification	\$150 (US)	\$275 (US)	
		Initial Certification, Technologist	\$150(US)	\$275(US)	
		Recertification, Technologist	\$100(US)	\$150(US)	
Administration	ASPRS Board of Directors, Evaluation for Certification Committee, Professional Conduct Committee, Professional Practices Division				
Certified Photogrammetrist (ASPRS)	<p>Certified Photogrammetrist (ASPRS)</p> <p>A professional who uses photogrammetric technology to extract measurements and make maps and interpret data from images. The Photogrammetrist is responsible for all phases of mapping and other mensuration requirements, which include planning and supervising survey activities for control, specifying photography or other imagery requirements, managing projects for mapping or other mensuration requirements and interpretation.</p> <div><div>1. Six years of experience in photogrammetry, three years of which were in a position of professional responsibility demonstrating professional knowledge and competence.</div><div>2. References from four persons who are holding, or who have held, responsible positions in photogrammetry and have first-hand knowledge of the applicant’s professional and personal qualifications.</div><div>3. Declaration of compliance with the Code of Ethics of the ASPRS.</div><div>4. Successful completion of a written examination.</div></div>				
Certified Mapping Scientist, Remote Sensing (ASPRS)	<p>Certified Mapping Scientist, Remote Sensing (ASPRS)</p> <p>A professional that specializes in analysis of images acquired from aircraft, satellites or ground bases, or platforms using visual or computer-assisted technology. Analysis is used by various specialized disciplines in the study of natural resources, temporal changes, and for land use planning. They develop analytical techniques and sensor systems.</p> <div><div>1. Three years of experience in photogrammetric and/or cartographic applications, all of which have</div></div>				

	<p>been in a position of responsibility that demonstrated knowledge and competence in planning and application.</p> <ol style="list-style-type: none"> 2. Three years of specialized experience at a professional level in remote sensing and interpretation of data from various imaging systems and/or design of remote sensing systems. 3. References from four persons who are holding or who have held responsible positions in the mapping sciences and remote sensing and have first-hand knowledge of the applicant's professional and personal qualifications. 4. Declaration of compliance with the Code of Ethics of the ASPRS. 5. Successful completion of a written examination.
Certified Mapping Scientist, GIS/LIS (ASPRS)	<p><i>Certified Mapping Scientist, GIS/LIS (ASPRS)</i> A professional involved in GIS/LIS systems design and/or systems application of data base management and computer programs that allow for the utilization of spatially referenced data bases for solving user analysis requirements. They are responsible for the integration of data needs and the development of correspondence between and the utilization of various spatial systems of often-different generic origins that are used to solve requirements.</p> <ol style="list-style-type: none"> 1. Three years experience in mapping sciences or photogrammetry in a position of responsibility demonstrating professional knowledge of and competence in mapping science and mapping procedures. 2. Three years of professional experience in the Geographic or Land Information Systems, during which professional knowledge and competence in those systems were demonstrated. 3. References from four persons who are holding, or who have held, responsible positions in the mapping sciences and in the Geographic or Land Information Systems area and have first-hand knowledge of the applicant's professional and personal qualifications. 4. Declaration of compliance with the Code of Ethics of the ASPRS. 5. Successful completion of a written examination.
Other	When computing the number of years of experience under basic

requirements	<p>requirements, credit may be taken, in lieu of actual job experience, for degrees in engineering, or in the natural or physical sciences, on the following basis:</p> <table data-bbox="812 336 1104 546"> <tr> <th>Type of Degree</th><th>Years of Credit</th></tr> <tr> <td>Bachelor's</td><td>1/2</td></tr> <tr> <td>Master's</td><td>1/2</td></tr> <tr> <td>Doctorate</td><td>1/2</td></tr> </table>	Type of Degree	Years of Credit	Bachelor's	1/2	Master's	1/2	Doctorate	1/2
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All three Technologists	<p>BASIC REQUIREMENTS, Technologists</p> <p><i>Certified Photogrammetric Technologist (ASPRS)</i> A technician who performs or supervises technical photogrammetric tasks to extract spatial data from photographic or digital imagery and other remotely-sensed data.</p> <p><i>Certified Remote Sensing Technologist (ASPRS)</i> A technician who performs or supervises tasks to interpret, manipulate, extract, process and convert remotely sensed data from photographic or digital imagery and other remotely-sensed data.</p> <p><i>Certified GIS/LIS Technologist (ASPRS)</i> A technician who integrates a variety of spatial data sets into a GIS format designed for graphic output or analysis.</p> <p>Requirements: These requirements apply for all Technologist categories:</p> <ol style="list-style-type: none"> 1. A total of three years experience, of which two are in the specialty category. 2. Four references must be submitted from persons knowledgeable of the applicant's work experience and personal conduct. 3. Applicant must submit a non-refundable application fee. The Application includes a declaration of compliance with the Code of Ethics of the ASPRS. 4. The successful completion of a written examination following peer review and approval. <p>EDUCATIONAL CREDITS, Technologists</p> <p>An Associate, or higher education degree can be counted as one-half year towards total time.</p>								

Continuing requirements	<p>Recertification applicants are required to fill out the Recertification application to show the type of activity that they have practiced and their professional involvement in the mapping sciences. They must also have four references who have knowledge of the applicant's professional and personal involvement in the last five years. Each applicant must earn twenty-five points based on the following criteria that will be reviewed by the evaluation for Certification Committee.</p> <p>RECERTIFICATION CRITERIA</p> <table> <tr> <th data-bbox="678 678 792 751"><u>Possible Points</u></th><th data-bbox="889 678 1179 714"><u>Evaluation Criterion</u></th></tr> <tr> <td data-bbox="678 831 792 867">up to 20</td><td data-bbox="821 758 1247 940">Applicant has been active in providing services in the area to be recertified, or has been in the academic arena involved directly with those subjects.</td></tr> <tr> <td data-bbox="678 982 792 1018">up to 8</td><td data-bbox="821 947 1211 1056">Applicant has participated in panels, presented or published technical papers.</td></tr> <tr> <td data-bbox="678 1119 792 1155">up to 8</td><td data-bbox="821 1062 1247 1203">Applicant has attended and taken workshops or classes in related subjects or Equal Industry Standards.</td></tr> <tr> <td data-bbox="678 1329 792 1365">up to 4</td><td data-bbox="821 1209 1247 1465">Applicant has attended technical conferences sponsored by ASPRS, URISA, SPIE, or GITA, and other appropriate professional meetings. Applicant has actively served on ASPRS Standing Committees.</td></tr> </table>	<u>Possible Points</u>	<u>Evaluation Criterion</u>	up to 20	Applicant has been active in providing services in the area to be recertified, or has been in the academic arena involved directly with those subjects.	up to 8	Applicant has participated in panels, presented or published technical papers.	up to 8	Applicant has attended and taken workshops or classes in related subjects or Equal Industry Standards.	up to 4	Applicant has attended technical conferences sponsored by ASPRS, URISA, SPIE, or GITA, and other appropriate professional meetings. Applicant has actively served on ASPRS Standing Committees.
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Renewal interval	Recertification every 5 years.										

A growing number of scientific and technical disciplines depend on photogrammetry and the mapping sciences for reliable measurements and information. It is in the interest of those who provide photogrammetric and mapping sciences services, as well as the user of these services, that such information and data be accurate and dependable. The ASPRS Certification Program has as its purpose the establishment and maintenance of high standards of ethical conduct and professional practice among photogrammetrists, mapping scientists, and technologists.

The primary objectives of the programs are:

1. To identify and recognize those persons who, after careful, just appraisal by their peers, and after passing a written examination are considered to have met the requirements established by the Society for certification.
2. To provide a basis for weighing the validity of allegations and complaints that involve practicing photogrammetrists and mapping scientists, and for taking appropriate action in connection therewith.
3. To encourage persons as yet not fully qualified to work towards certification as a goal of professional achievement.
4. To encourage certified persons, through the recertification process, to continue their professional achievements as the rapid change in technology occurs.

The ASPRS Certification Program is voluntary and open to all qualified individuals, whether or not they are members of the American Society for Photogrammetry and Remote Sensing.

STARS (Spatial Technology And Remote Sensing)

<http://www.digitalquest.com>

STARS is a competency based, industry recognized, entry-level, geospatial certification. The four series of courses that make up the STARS certification are mapped directly to the "GWD" (Geospatial Workforce Development) model. The GWD is recognized by NASA, the U.S. Department of Labor and by industry leaders as the basis for determining the skill set needed to make the best possible geospatial employee. STARS is also the educational component of the US department of labor's STARS Geo AP Apprenticeship Program.

Digital Quest works with Colleges and School Districts to establish "Geospatial Hub Sites". These sites use our materials to deliver the instruction. Digital Quest delivers; four sequential levels of instruction, six software titles, ten student books (per student), sixteen teacher books (including: lesson plans, customized assessments, power point notes, and student manuals), PowerPoint presentations for every lesson, hundreds of layers of information, hundreds of test bank questions, three final "Capstone" Projects (students are required to pick one), and one Internet delivered final exam. Digital Quest gathers and delivers local county wide data and imagery and creates customized assessments for the Geospatial Hub Site. Digital Quest trains the instructor either on site or at the SPACESTARS teacher training laboratory located at NASA's John C. Stennis Space Center, MS.

The STARS development team is working on a series of software, books and materials designed for individuals that do not have access to Geospatial Hub sites.

Ed Hanebuth, president

Target audiences: Entry-level Geospatial Technicians including High Schools, Apprenticeship Programs, Continuing Education, Workforce Education and Community College programs.

Info as of	11/25/07
Sponsor	Creator: Digital Quest Inc; Sponsored by Mississippi Enterprise for Technology (MsET) Located in the Center of Geospatial Excellence, NASA's John C. Stennis Space Center, MS.
Start year	2002
Recognizing Organizations	MsET, Department of Labor office of Apprenticeship. Completing the STARS Courses students receive educational achievement credit toward the GISCI certification.
# people certified	2003 - 8 2004 - 17 2005 - 26 2006 - 45 2007 - 60

Fees	A STARS Certified “Geospatial Hub Site” receives the first 50 STARS Certification Exams included in the curriculum price \$150 per student after the first 50 students \$500 for someone who doesn’t take the courses at a STARS Certified “Geospatial Hub Site” Free to college students that compete in SkillsUSA
Administration	The STARS certification is administered, supported, and delivered by Digital Quest and its partners. At Geospatial Hub sites the exam is proctored by STARS certified instructors. Updates are requested, reviewed and/or monitored by our Geospatial Hub Sites and our strategic partners.
Education requirements for STARS Series	Completion of four 90-hour series of curriculum (360 hours of materials) approximately 4 semesters.
Experience requirements for complete program	No GIS experience required, however students must be fairly computer literate
Experience requirements for STARS certification	To pass both components of the exam a student must show a working knowledge of geospatial project management(planning, implementation and presentation) , hardware tools(computers, printers, GPS units), and software tools(ArcGIS with the following extensions; Spatial Analysis, 3D Analysis, Network Analyst and Image Analysis)
Test requirements	Yes, two components are assessed. First, each student must show they have the skills required of a GIS technician by completing a capstone project. They can choose one of the following projects: fire study, vegetation, or site selection. Second, the student is required to pass an online exam.
Other requirements	none
Continuing requirements	Because we recommend our STARS certified technicians to continue in the path towards the GISCI certification, there are no direct continuing requirements.
Renewal interval	The Geospatial Hub Sites are required to update software and courseware as needed.

Application information: www.digitalquest.com