



Preliminary Evaluation Report for the GeoTech Center, Grant Year Four

May 2012

Submitted by:

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May 2012



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EXECUTIVE SUMMARY

Preliminary Evaluation Report for the GeoTech Center, Grant Year Four

BY: CANDIYA MANN

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WASHINGTON STATE UNIVERSITY

MAY 2012

TBD

INTRODUCTION

This is a preliminary report of evaluation results for the GeoTech Center, covering the first nine months of grant year four. It focuses on Goal Two, which is “promote the use of the GTCM and GTCM-based curriculum resources by two-year college geospatial programs”.

With the National Visiting Committee’s recommendation, the GeoTech Center focused strongly on this goal in the fourth year, and much was accomplished. Five model courses have been developed, and three more are on track to be completed by the end of the grant year. In addition, the course content and course assessment tools were refined. The model courses and tools were developed using a collaborative model, where a group of GIS professors, administrators, and industry workers attended a series of webinars and workshops to produce each project.

This evaluation reviews the results of a survey of the workshop participants, an analysis of the people registering on the Moodle server to view the model courses, and a survey of the model course users. These data sources provide insight into the following topics:

- Particularly effective elements and suggestions for improvement to the webinars and workshops
- How the course assessment tools and model courses have been used
- To what extent the model courses have influenced curriculum development and modification
- The impact on workshop participants of their involvement in developing the model courses
- The institutions and professional roles of individuals expressing interest in the model courses through registering on the Moodle server

The final evaluation report covering all six Center goals will be delivered at the end of August 2012.

MODEL COURSE DEVELOPMENT: WORKSHOP PARTICIPANT SURVEY RESULTS

Each model course was developed by a group of educators and GIS professionals from across the country. The development process was extremely collaborative. For each course, the GeoTech Center facilitated a series of four webinars and an in-person workshop where the participants decided on the necessary elements of each course. Some individuals participated in the development of multiple courses. This course development process was also referred to as the GTCM Project.

Survey Methodology

In November 2011, a survey protocol was developed in collaboration with GeoTech Center PIs. The survey sought to determine:

- **Webinars and workshops:** particularly effective elements and opportunities for improvement
- **Course assessment tools:** usefulness and impact on curriculum
- **Model courses:** extent to which model courses meet expectations of participants
- **Impact of participation in GTCM Project:** whether involvement in the project was a worthwhile use of participants' time, extent of curriculum impact

On December 4, 2011, a web survey invitation was sent to all participants of the Denver, Kentucky, and San Diego workshops, a total of 41 individuals. An email reminder was sent on December 11, 2011. The survey was closed on December 21, with 30 surveys completed, for a response rate of 73%.

On April 15, 2012, the Sacramento workshop was completed, and the same web survey was conducted with these workshop participants. Some of the Sacramento workshop participants had participated in prior workshops and had already completed the survey. On April 16, 2012, the survey invitation was sent to the 11 Sacramento participants who had not already completed the survey, and a reminder was sent on April 16. The survey was closed on April 27, 2012, with eight additional responses, a response rate of 72%.

Overall, the response rate was 73% from all four workshops; 52 individuals were invited to complete the survey, and 38 surveys were submitted. The results of these 38 surveys are presented below.

Webinars

Respondents reported attending between one and seven GTCM Project webinars, with most attending three or four webinars (33% apiece). The development of each course consisted of four workshops so the participants who attended more than this number were involved in the development of more than one course.

Figure 1: Number of Webinars Attended



WEBINAR LOGISTICS: MULTIPLE OPPORTUNITIES TO VIEW

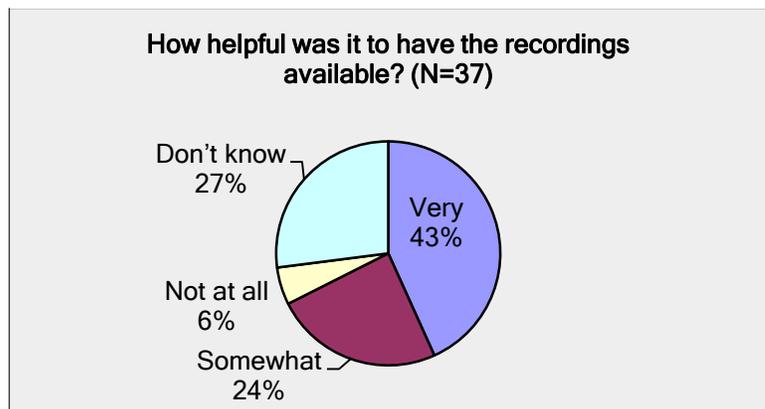
Each of the webinars was offered live at two different dates and times then the archived recordings of the webinars were made available. All respondents said it was helpful to have the workshops available on two dates and times (92% very helpful, 8% somewhat helpful).

The webinar recordings were used both by the respondents who missed a webinar and as a refresher for people who watched it live. Roughly one-quarter of the respondents (26%) missed one of the live webinars, and 60% of these respondents watched the recorded

version of the webinars they missed. Over one-third (35%, N=37) of the respondents who attended the webinars live watched at least one again in the recorded version.

Two-thirds of the respondents (67%) indicated that it was helpful to have the recordings available (43% very helpful, 24% somewhat helpful). Only 6% said that the recordings were not helpful, and over one-quarter (27%) didn't know if the recordings were helpful.

Figure 2: Helpfulness of Webinar Recordings



WEBINAR RATINGS

Overall, the webinars were rated positively by all respondents (45% excellent, 55% good). The Sacramento workshop attendees rated the webinars particularly positively (57% excellent). This could be because the Sacramento workshop was the most recent in the series, and the GeoTech Center has fine-tuned their process over time.

Figure 3: Webinar Ratings

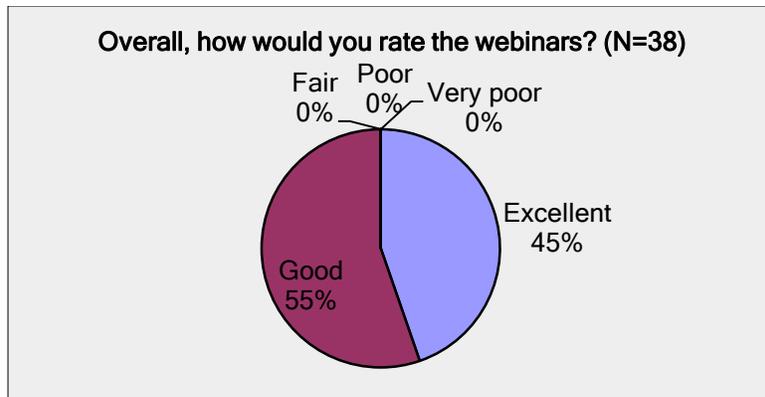
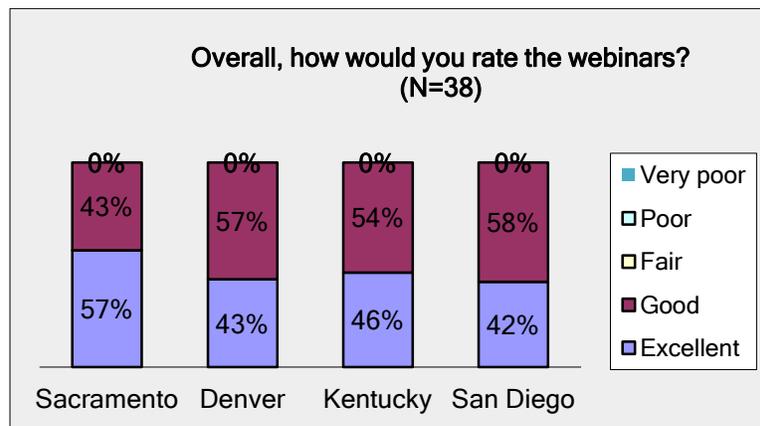


Figure 4: Webinar Ratings by Workshop Attended



EFFECTIVE ELEMENTS OF WEBINARS

Respondents were asked to identify any particularly effective elements of the webinars, and the responses to this open-ended question generally fell into two categories: 1) logistics and 2) other, generally focusing on the content and the community-building elements.

Particularly effective elements of webinars

- 1) Logistics of webinars
 - Level of preparation
 - Clarity of information
 - Organization
 - Distributing presentation among multiple presenters
 - Easy-to-understand presentation style
 - Stay on time
 - Panel discussions and PowerPoint presentations were useful
 - Ability to ask questions and discuss important elements (interactive elements)
 - Making handouts and other materials available prior to the webinar
 - Detailed workshop goals and expectations
- 2) Other effective elements
 - Helped participants think about how to improve their GIS classes and labs
 - Keeping up to date on progress of GTCM
 - Getting feedback from others
 - Builds community among faculty spread across the country
 - Cost-effective way for GeoTech to coordinate among stakeholders and make progress

Selected quotations from respondents include the following. Please see Appendix A for all responses.

I thought the amount of preparation that went into the presentations was outstanding, and they were extremely helpful in preparing me for attending the workshops. I thought the format and organization of the information that was presented was great.

They made me think about my GIS Classes and how I could improve them.

Good way to communicate information and build community among faculty who are spread around the country.

SUGGESTIONS FOR IMPROVING WEBINARS

Participants were also invited to provide suggestions for improving the webinars. There were no strong themes in the responses. The suggestions are reported below, with notations where multiple respondents made suggestions in the same theme.

Suggestions for improving the webinars

- Shorten the webinars (2 respondents)
- More frequent webinars with less content (2 respondents)
- Offer advanced webinars to previous attendees to limit repetition of basic elements (e.g., DACUM process)
- Provide action items at the beginning of the webinar and review them at the end (to clarify participants' role and what is expected of them)
- Alternate presenters every 10 minutes or so
- Improve sound quality
- Add a webinar thoroughly covering the GTCM
- Ensure that all participants have a chance to talk by having the facilitator call on each

Workshops

The survey responses reflect the opinions of participants from all four workshops. Roughly one-third of the respondents attended the Denver, Kentucky and San Diego workshops. Only 18% of the responses are from Sacramento workshop participants. Please note that the Sacramento attendees who completed the survey previously were not resurveyed.

Figure 5: Workshops Attended



WORKSHOP RATINGS

The workshops were rated positively by all respondents (79% excellent, 21% good), and the majority of respondents (92%) stated that the workshops completely met their expectations. Similar to the webinar ratings, the Sacramento cohort also provided the highest ratings of the workshops (100% excellent), compared to Denver (92%), Kentucky (92%), and San Diego (83%).

Written comments included the following:

I was impressed at the amount of work we got done in one day. It was very organized and well done. I found it one of the most productive meetings I have ever attended.

I cannot emphasize enough how valuable I have found these experiences. Both as a contributor to a really important effort as well as an opportunity for professional networking and skills development.

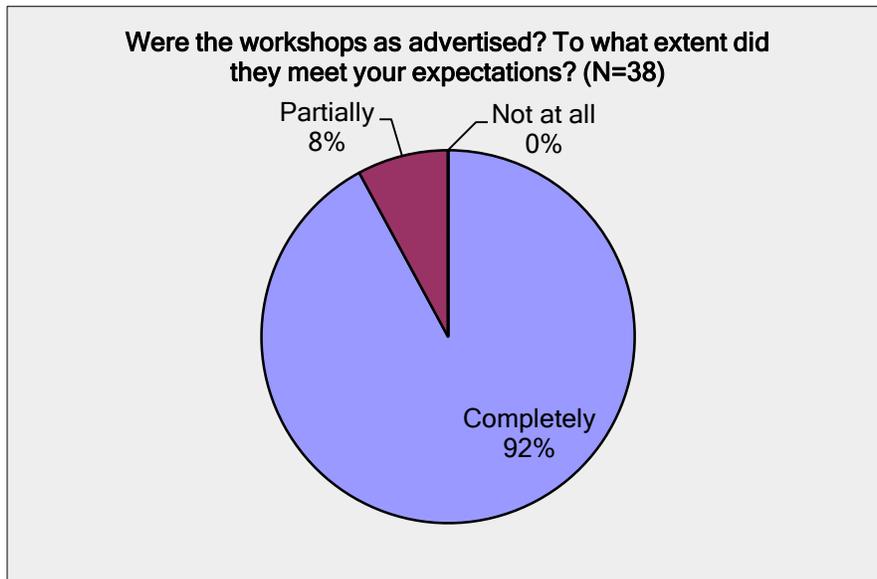
The workshops I attended had clear goals and processes that were well-articulated prior to the workshop and were addressed in the workshop.

The workshops exceeded my expectations in both cases. I had doubts that we could get through all the material, meet all the objectives, and still be academically rigorous. Facilitators were key to making both workshops successful.

Figure 6: Workshop Ratings



Figure 7: Extent to Which Workshops Met Expectations



EFFECTIVE ELEMENTS OF WORKSHOPS

Respondents identified elements of the workshops that they felt were particularly effective. Similar to the effective elements of webinars, the responses to the open-ended question fell into two main themes: 1) logistics and 2) other, focusing on the community-building aspects of the face-to-face interaction.

Particularly effective elements of workshops

- 1) Logistics
 - Organization, format, preparation, location, amenities, participants, presentations, time management
 - Rules of engagement, ground rules, structure for review of concepts
 - Conversation facilitation (kept on topic without GeoTech staff dominating the conversation)
 - Preparation in advance via webinars made workshops more productive
- 2) Other
 - Having all participants in one location focusing on GTCM project goals
 - Networking with others, face-to-face conversations, open discussion among participants (by far the most common theme)
 - Curriculum building module
 - Teams where more materials were prepared ahead of time

Selected quotations from the participants describe the workshop experience as follows:

The organization, format, preparations, location, amenities, participants, and presentations were outstanding.

The consensus process is quite invigorating and rewarding.

Participants came out of the workshops feeling as though they accomplished something.

Face to face interactive discussions and sharing of ideas. These brought about superior collaborative results.

The design of the workshop allowed us to plow through a huge amount of material in a short time while creating an atmosphere of collegiality in which we all felt heard. There was enough flexibility to spend extra time on more important things and less time on less important things, but that was accomplished without undermining the overall agenda and progress. Very effective model and facilitation in both workshops I attended.

SUGGESTIONS FOR IMPROVING WORKSHOPS

The survey asked respondents for suggestions to improve the workshops. While the productivity of the workshops in the limited timeframe was cited as a strength of the workshops, the tight schedule was also the most common area with suggestions for improvement. Participants described the pace as “rushed” and a “forced march” and suggested that the workshops cover a two-day span so the pace could be more relaxed.

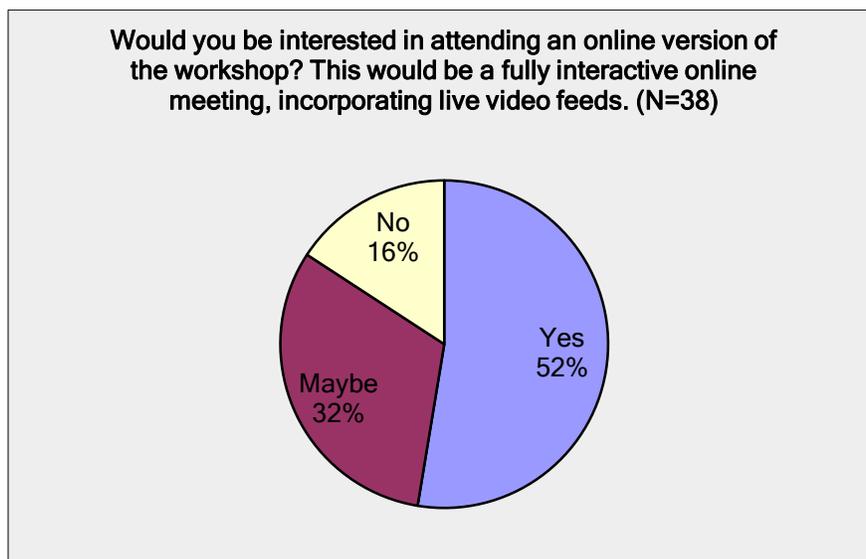
Suggestions for Improving Workshops

- Budget more time (e.g., 2 days) so pace can be more relaxed (5 comments)
- Remove redundancy in workshop documents,
 - provide a check-off list of topics that are covered in early courses, with depth of coverage, so later courses can assume a level of comfort without indicating that the info needs to be covered in that class
- Add GIS skill sessions
- Add social activity/dinner for dedicated networking time, share more information about the participants
- Uniform approach to multi-group integration
- Ensure that participants do not limit course expectations due to lack of equipment or expertise at their college
- Review parts of the GTCM more thoroughly before the workshop
- Ensure that the printed list of competencies contains the same numbers as the projected spreadsheet
- Provide short bios of all participants in advance of the workshop

INTEREST IN ONLINE WORKSHOP

The GeoTech Center was interested in seeing if respondents would be open to attending an online version of the workshop. This would be a fully interactive online meeting, incorporating live video feeds. Responses were mixed, with roughly half (52%) responding in the affirmative, 16% indicating that they would not be interested, and one-third (32%) stating “maybe”. There was no relationship between respondents’ level of interest in attending an online workshop and their level of familiarity with webinars.

Figure 8: Level of Interest in Online Workshops



In their written comments, respondents explained that they understood that a web-based version of the workshop would be more cost effective, and they liked the fact that they would avoid the hassles of traveling. Concerns were expressed that web meetings might not be as productive as face-to-face meetings. They explained that web meetings suffer from in-office distractions as participants work on email or are interrupted by visitors. They also worried that the community-building and networking aspects of the workshop would suffer in an online version.

Selected quotes include the following:

I think this would really help with not having to deal with travel arrangements and often conflicting schedules to physically meet.

I don't think you would get the same level interaction from the participants. I think these workshops benefit tremendously from social interaction of the participants at the workshop.

Curriculum Assessment Tools

CURRICULUM ASSESSMENT TOOLS RATINGS

All of the respondents rated the curriculum assessment tools positively (63% excellent, 37% good), and the vast majority stated that the tools had been useful for them (53% very useful, 44% somewhat useful). When asked how they had used the curriculum assessment tools, the most common responses were that the tools helped them 1) assess the deficiencies of existing courses and modify them and 2) design new courses.

Examples of how the workshop participants have put the assessment tools to use include the following:

We are preparing a statewide effort to assess geospatial technology curriculum in higher education using the GTCM model curricula and assessment tools. It's an incredibly valuable resource that will help to get us on the same page and directly address workforce needs in the state.

They highlighted the areas that our curriculum was missing elements.

We are revising our courses for fall 2012 to formally incorporate the assessment tools as part of our SLOs.

Provided a clear framework for organization and development; well organized, well thought out, and clearly explained

For the first time there is a set of items that guides curriculum developers and course and program developers as to what should be included in each course.

Figure 9: Curriculum Assessment Tools Ratings

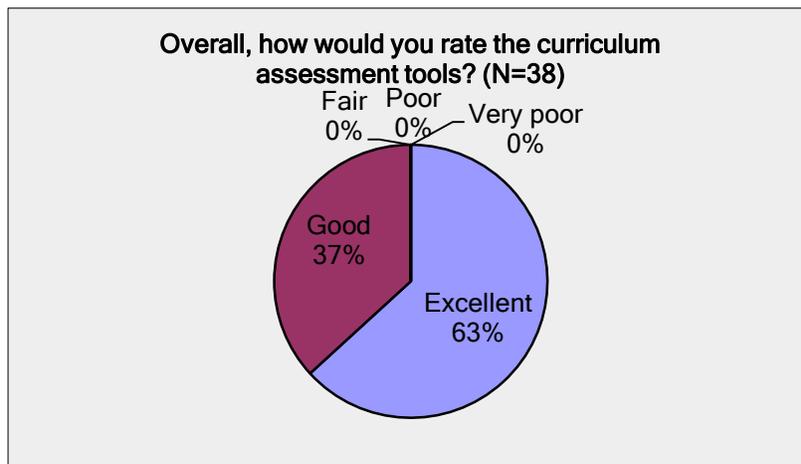
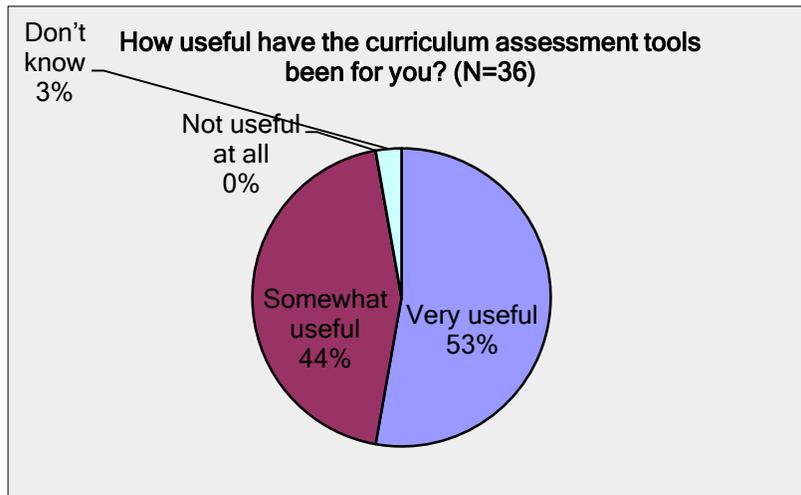


Figure 10: Usefulness of Curriculum Assessment Tools



SUGGESTIONS FOR IMPROVING CURRICULUM ASSESSMENT TOOLS

When invited to provide suggestions for improving the tools, the most common theme was that the tools could be simplified, possibly through summarizing in a list of 15-20 competencies, grouping the competencies into categories, and/or removing redundancies.

Suggestions for improving the curriculum assessment tools

- Simplify tools
- Clarify instructions
- Ensure consistency of ranking options, grammar, and language
- Provide training to new users

Model Courses

WHETHER MODEL COURSES MET EXPECTATIONS

Eighty-one percent (81%) of the respondents had looked at model courses online. Among these respondents, the majority (87%) indicated that the courses met their expectations. Many of the participants are already using the model course materials in their courses and sharing them with other educators.

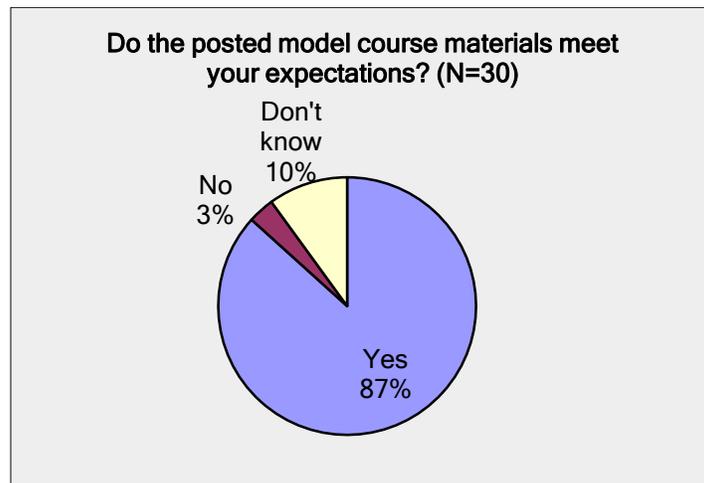
Selected quotations illustrating how participants used the model courses included the following:

I have already asked my fellow faculty and teaching assistants to review this material. We are using it in course revisions. Am also sharing this material with industry, high schools, and other community colleges that are not a part of GTCM Model Course development.

Again, I find the materials useful to my own geospatial program.

They are on target! They are better than promised.

Figure 11: Whether Model Course Materials Met Expectations

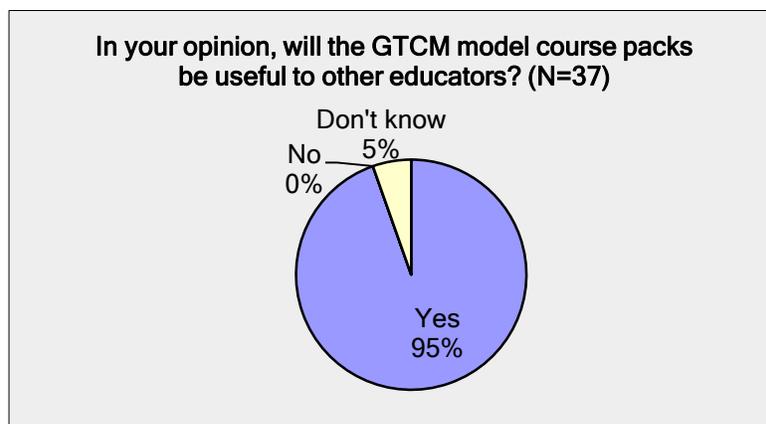


USEFULNESS OF MODEL COURSES FOR OTHER EDUCATORS

Beyond the usefulness of the course packs in their own classrooms, there was broad consensus (95% agreement) that the model course packs will be useful for other educators as well. In fact, several respondents wrote that they either have already shared the materials with other educators or they have specific situations in mind where they will share the materials. They also highlighted the need within the field for these materials. The full list of survey responses includes the following:

- *The discipline as a whole has been waiting a long time for resources like this. If they can be kept current as the workforce changes going forward, they will continue to be useful as we try to keep up with a rapidly evolving industry.*
- *These model course packs are critical to teaching GIS in the community college curriculum.*
- *This is an important contribution to geospatial technology education*
- *Standardizing how GIS courses are taught will help support the discipline.*
- *I have had other faculty that I work with access and use the GTCM materials.*
- *I am contacted at least 2-3 times per year by other schools who want to start a GIS program or class. It would be very helpful to have this nationally vetted resource to point them to.*
- *I believe those who are just starting to develop geospatial course material the GTCM course packs will be very helpful for them to derive lecture, course content, lab, and project material.*
- *I believe the course packs provide most, if not all, of the necessary information to begin an introductory geospatial technology class. With this information as a blueprint, constructing a geospatial technology course should be much more manageable.*
- *Using this material to help an instructor at another community college stand up her first GIS course! Will be the first GIS course ever offered at this school.*
- *Defines areas of study*
- *If this doesn't do it, nothing will.*
- *If the packets are more complete they will be helpful, we have to go beyond the syllabus*
- *Many educators have no idea where to start in terms of these types of courses.*
- *I would imagine if they don't have model curriculum in their field, this might provide ideas and structure in how they might go about it.*

Figure 12: Usefulness of Model Course Packs for Other Educators



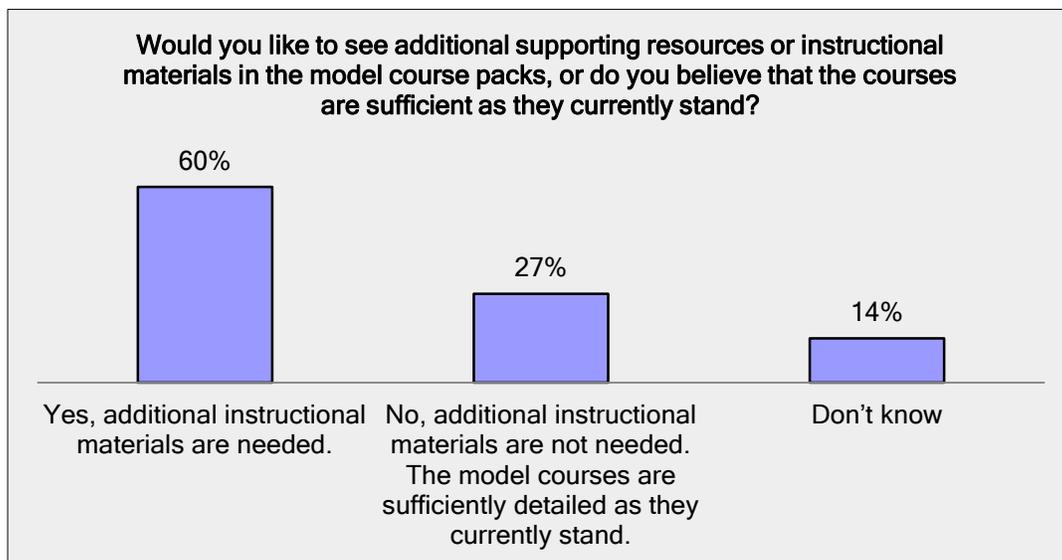
LEVEL OF DETAIL OF MODEL COURSES

The GeoTech Center was interested in hearing whether the participants thought that the model courses would benefit from additional materials and resources. The survey asked “The model course packs currently provide a syllabus, as well as course outline, evaluation rubric and teaching resources. Would you like to see additional supporting resources or instructional materials in the model course packs, or do you believe that the courses are sufficient as they currently stand?”

The majority of respondents (60%) indicated that they would like to see additional instructional materials in the model courses. Over one-quarter (27%) thought that the courses were sufficiently detailed, and 14% didn’t know. In their written comments, respondents suggested adding a variety of additional materials to the courses:

- Video clips of master teachers
- Examples of student work
- Enrichment materials
- Skill lessons
- Online exercises and activities
- Lab packs, recommended texts, assessment materials, homework, lecture notes

Figure 13: Whether Model Course Packs Are Sufficiently Detailed



Impact of Involvement in GTCM Project

EXTENT OF IMPACT OF INVOLVEMENT IN GTCM PROJECT

Overall, 88% of the respondents who are actively teaching in the classroom (N=35) stated that their involvement in the GTCM Project impacted their curriculum. Among these respondents (N=31), one-third (32%) stated that it impacted their curriculum “greatly”; 65% indicated that it influenced their curriculum “some”; and 3% marked that it affected their curriculum “a little”. All four respondents who marked “no” or “don’t know” stated that they expect to see an impact in the future.

When asked how participation in the Project influenced their curriculum, the following themes emerged:

- Evaluated and modified current course content (most common response)
- Used in planning future courses
- Referenced the GTCM in grant applications
- Shared the tools and process with colleagues: college assessment personnel, other faculty, advisory group
- Incorporated GTCM materials into professional development workshops

Examples of how the GTCM Project has influenced participants’ curriculum include the following:

I have been reassessing the content of every class in our program and will be making changes to address competencies that are currently missing from my courses, and I'll be de-emphasizing others.

I use the GTCM to evaluate my existing courses as well as designing future courses. I have also referenced the GTCM as a tool in grant applications.

development of new course, a more constructive view of how my courses are organized, and the ability to explain to administration better what we do.

This has helped us to align our course content with national standards and to be much more aware of the subject matter we need to cover.

I am currently designing professional development in GIS for educators for Michigan Virtual University as well as providing professional development workshops for teachers through Saginaw Valley State University. I have incorporated GTCM materials in those offerings by way of suggesting avenues toward professional advancement/career change options for both students and teachers.

Figure 14: Impact of Involvement in Project on Curriculum

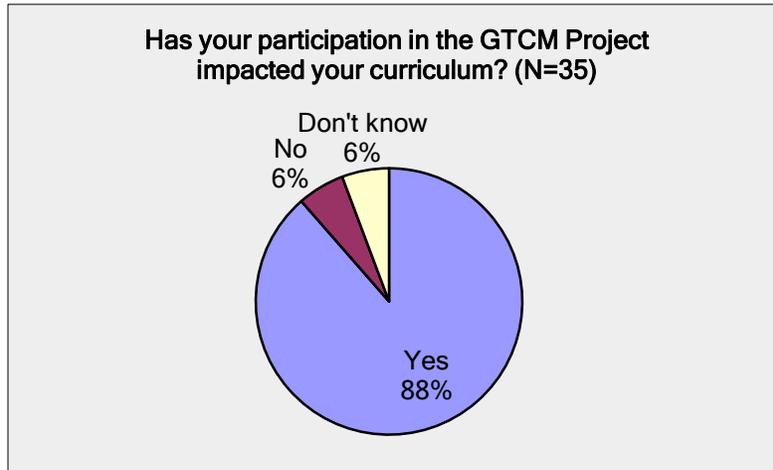
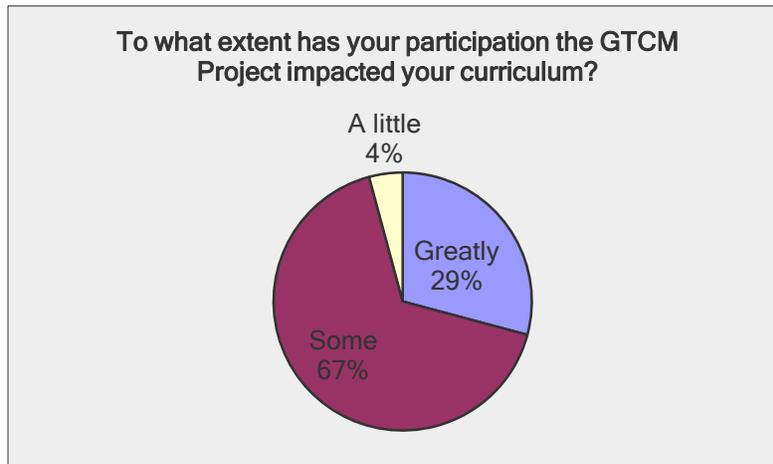


Figure 15: Extent of Curriculum Impact



RATING OF EXPERIENCE IN GTCM PROJECT

All participants rated their experience in the GTCM Project positively (81% excellent, 19% good) and said that it was a worthwhile use of their time (95% very worthwhile, 5% somewhat worthwhile). Participants described their experiences as “outstanding” and that “it was an honor to be a part of it [the GTCM Project]”

Sample quotations about participants’ experiences in the GTCM project include the following:

This was a very valuable experience to be involved in! The GeoTech center continues to deliver relevant and timely information, resources, and practices to the masses in this field, especially with two-year curriculum in mind.

This was an excellent national collaboration. Superior planning and execution, great exchange of ideas, and exciting GIS education community building.

I have experienced considerable professional growth, both as a teacher and as a GIS professional, as a result of my participation in the project.

This is very important work, and it was an honor to be a part of it.

This model for translating required competencies into curriculum is extremely innovative and effective.

Figure 16: Rating of Experience in Project

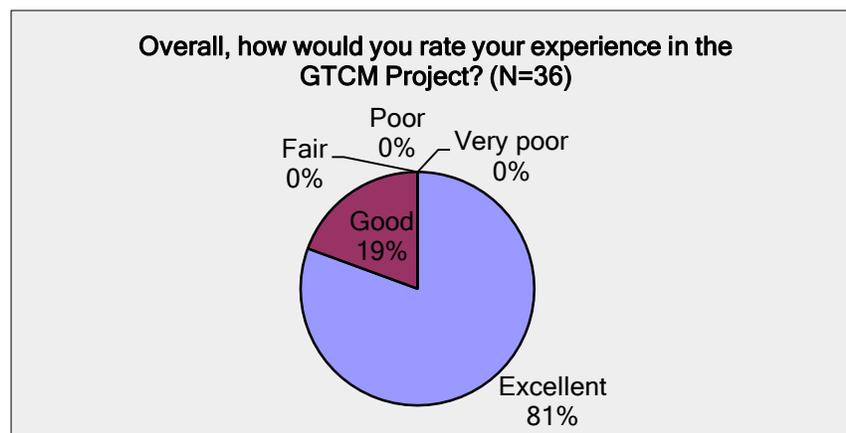
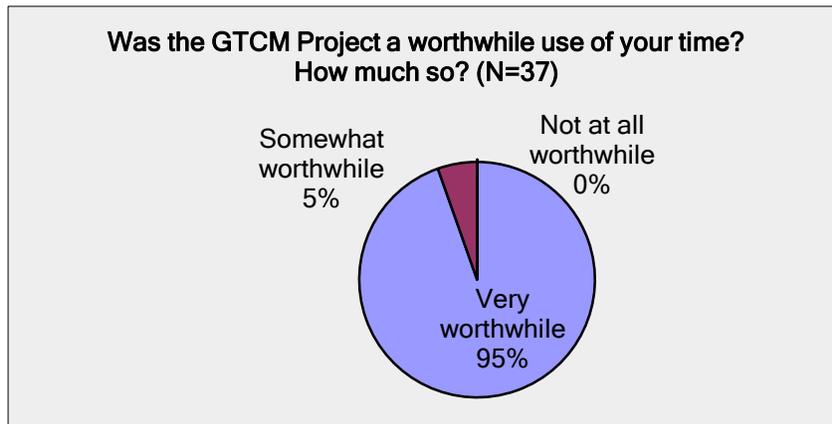


Figure 17: Whether Involvement in Project Was Worthwhile



Conclusions

- Involvement in the GTCM Project is important and meaningful to the participants.
- The well orchestrated logistics related to the webinars and workshops was a strong point.
- Participants appreciated the community-building aspects of the project.
- The webinars, workshops, curriculum assessment tools and model course packs were all rated highly.
- Participants have put the curriculum assessment tools and model course packs into use in their classrooms and shared the information with colleagues. While these products have only recently been released, they have already influenced classroom curriculum, led to the development of new courses, improved communication with advisory boards, and contributed to statewide alignment of course content and grant applications.

MOODLE SERVER REGISTRANTS

This section provides an overview of 1) the types of people who have registered on the Moodle server to view the model course packs. This information provides insight into the variety of individuals and institutions with interest in the model course packs.

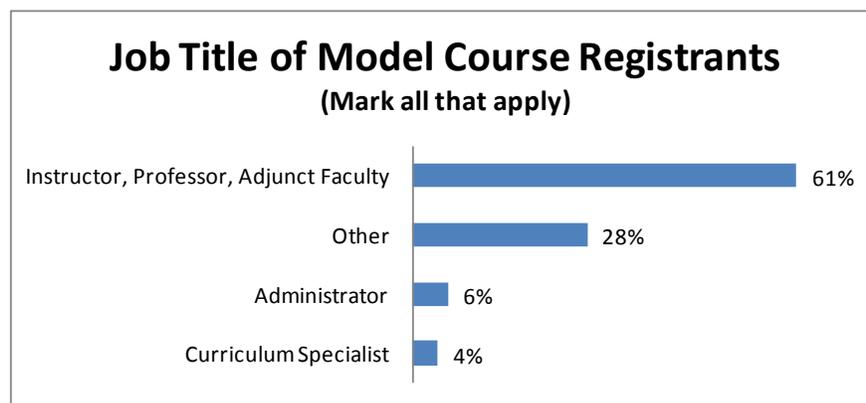
In order to access the detailed model course packs, website users are required to register on the Moodle server. The registration form collects the user's name, email address, job title and institution type. The information gathered by the registration form sheds light on the types of people and institutions who are interested in the model course packs.

A total of 126 individuals have registered for access to the model course packs as of January 2012.

REGISTRANT JOB TITLES

The majority of registrants (61%) are instructors, professors, or adjunct faculty. Six percent (6%) marked that they are administrators, and 4% are curriculum specialists. Over one-quarter of the registrants indicated that they have a job title outside of these categories. These users were allowed to write in their job title. The "other" job titles tended to fall into the categories of GIS professionals, researchers, students, and other higher education job titles. See Appendix A for the full list of "other" job titles.

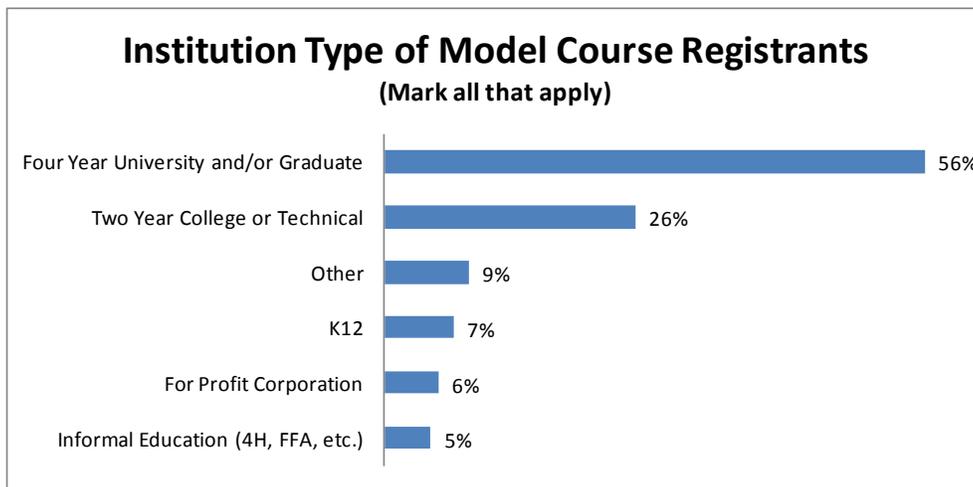
Figure 18: Job Title of Model Course Registrants



REGISTRANT INSTITUTION TYPE

While the model courses were originally designed for the two-year college audience, there is considerable interest from representatives of a wide range of organizations. Over half of the registrants (56%) are associated with a four-year university or graduate program. Just over one-quarter (26%) are from a two-year college or technical program. Less than 10% are from a K-12 institution (7%), for-profit corporation (6%) or informal education organization, such as 4-H or FFA (5%). Nine percent (9%) indicated that they work for a different type of institution. The registration form did not collect any additional information about these “other” registrants. See Appendix B for the full list of institution names.

Figure 19: Institution Type of Model Course Registrants



MODEL COURSE USER SURVEY RESULTS

In addition to surveying the workshop participants who helped to develop the model courses, Moodle server registrants were also invited to provide their feedback and opinions on the model courses. This survey is helpful for assessing whether the model courses meet the need of the broader community, beyond the workshop participants who helped develop the courses. The model course user survey covered the following topics:

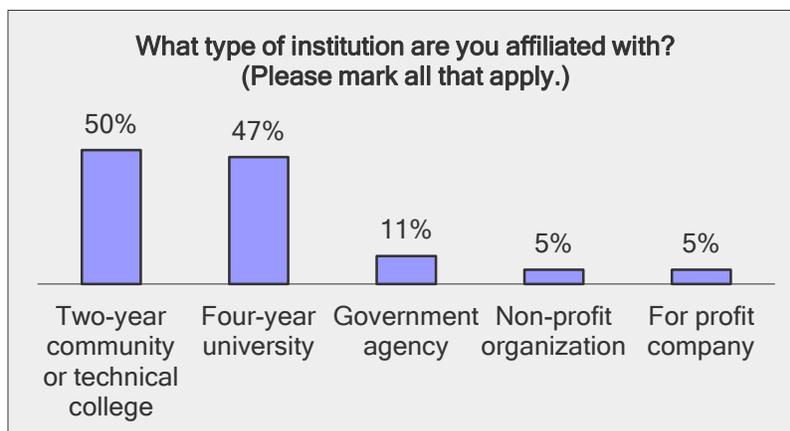
- Respondents' goals for accessing the model courses
- Whether the model courses met their needs and covered the topics they expected
- If the model courses have been useful
- To what extent the model courses influenced their curriculum
- Overall ratings of the model courses

On March 26, 2012, an email invitation was sent to the 137 Moodle registrants who accessed the model course website after registering. Reminders were sent to the non-respondents on April 3 and April 17. The survey closed on April 27 with 41 surveys completed, a 30% response rate.

RESPONDENTS' INSTITUTIONAL AFFILIATION AND PRIMARY ROLE

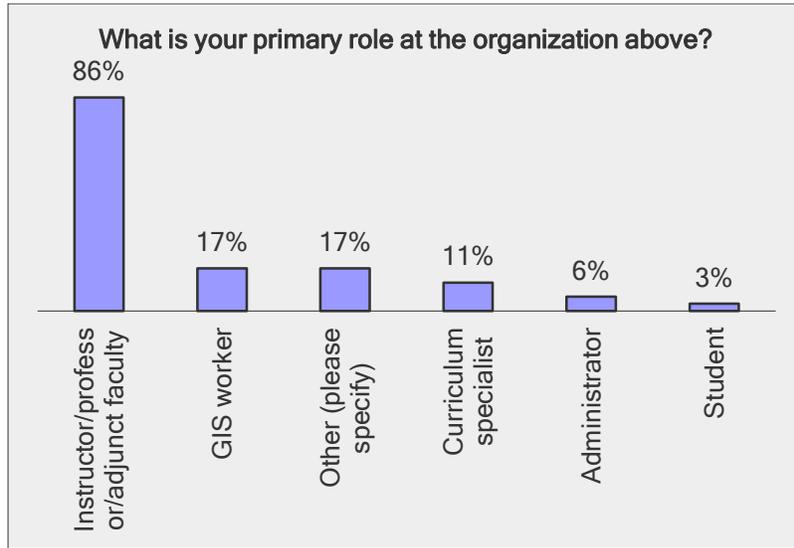
Surveys were completed by individuals affiliated with two-year community and technical colleges (50%), four-year universities (47%), government agencies (11%), non-profit organizations (5%), and for-profit companies (5%).

Figure 20: Respondents' Institutional Affiliation



Most of the respondents (86%) identified their primary professional role as an instructor, professor, or adjunct faculty. Other respondents were GIS workers (17%), curriculum specialists (11%), administrators (6%), students (3%), or marked the box for “other” (17%). The “other” roles included advisor, GST program head, and geospatial center administrator.

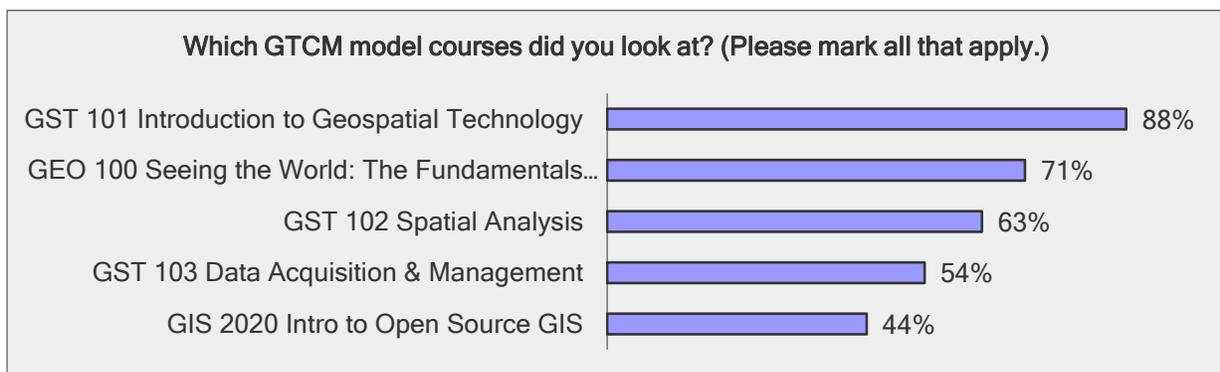
Figure 21: Respondents’ Primary Professional Role



MODEL COURSES VIEWED AND GOAL WHEN REVIEWING COURSES

The survey asked respondents to mark which of the model courses they viewed and their goal when they looked at the courses. The courses generating the most interest were GST 101 Introduction to Geospatial Technology (88%) and GEO 100 Seeing the World: The Fundamentals of Geospatial Science and Spatial Reasoning (71%). Over half of the respondents looked at GST 102 Spatial Analysis (63%) and GST 103 Data Acquisition and Management. GIS 2020 elicited less interest, with 44% of the respondents viewing this course.

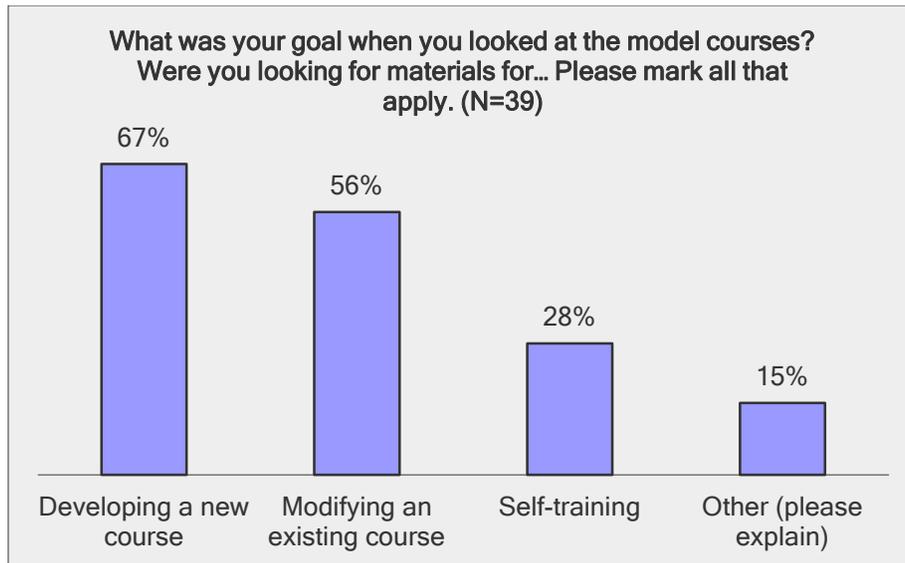
Figure 22: Model Courses Viewed



The most common reasons that respondents went to the Moodle server were that they were looking for materials for developing a new course (67%) or modifying an existing course (56%). Over one-quarter (28%) wanted information for self-training, and 15% had another reason. Other reasons included the following, in the respondents' own words:

- *Compare course content to our existing community college GIS certificate program*
- *As part of a 3 or 4 part series*
- *I work for a Community College and wanted to see your model courses.*
- *I participated in prioritizing the competencies and I did look at the course to see the result. I am currently working at a community college and will be offering an existing intro course consisting of lecture and lab and I looked at the geotech courses as a) a resource to update the existing course and b) as material to expand the single course offering to a multiple course offering.*
- *just doing research*
- *Just exploring what others were doing*

Figure 23: Goal When Reviewing Model Courses



WHETHER COURSES MET RESPONDENTS' NEEDS

The majority of respondents stated that the courses met their needs (81%) and covered the topics they were expecting (92%).

Figure 24: Whether the Courses Met Respondents' Needs

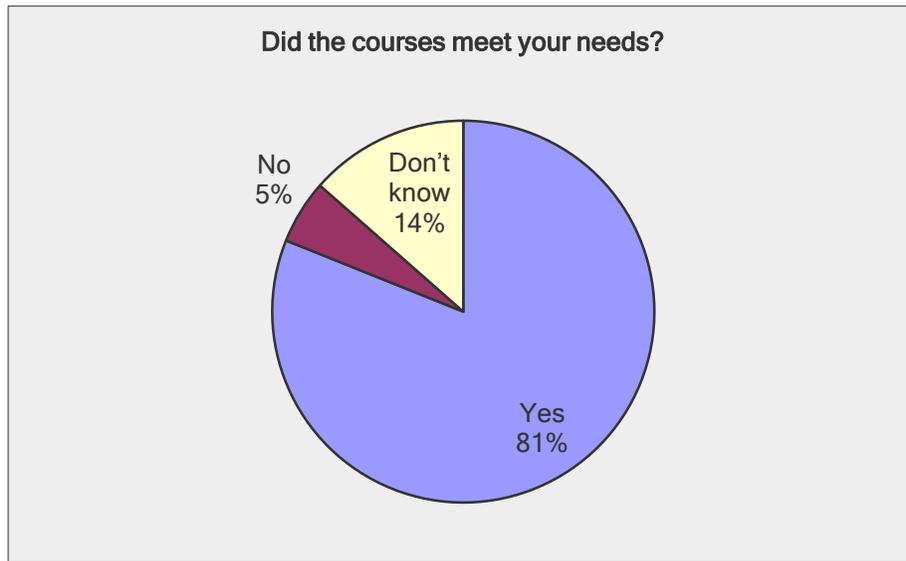
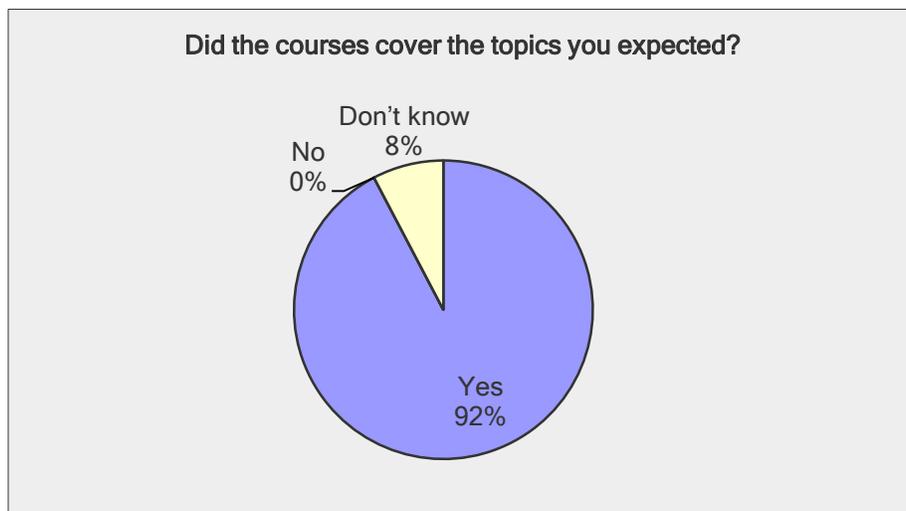


Figure 25: Whether the Model Courses Covered the Expected Topics



USEFULNESS OF COURSES

Ninety percent (90%) of the respondents indicated that the model courses have been useful for them (60% very useful, 30% somewhat useful). When asked how the courses have been useful, respondents provided responses that fell into the following themes. These responses mirrored the ways that the courses have been useful for the workshop participants.

- Evaluation of existing courses
- Developing new courses
- Developing a new GIS minor
- Guiding discussion with advisory committee
- Comparing their courses with national expectations

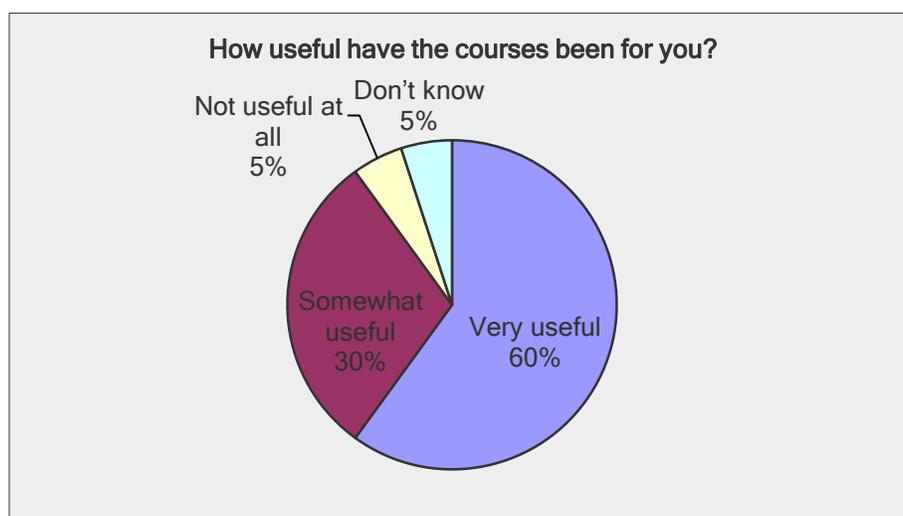
Examples of how the courses are being used include the following. Please see Appendix B for the full list of responses.

Used them as a template for new course development and for designing a course for the GIS Certificate program

I have used them to promote revamping the GIS Minor at my university and to outline new course

The courses were very useful as a guide for my internal evaluation, as a vehicle for discussion with my Advisory Committee, and as a comparison with national expectations. I hope that in the future the course elements will be used for higher levels of articulation among educational institutions.

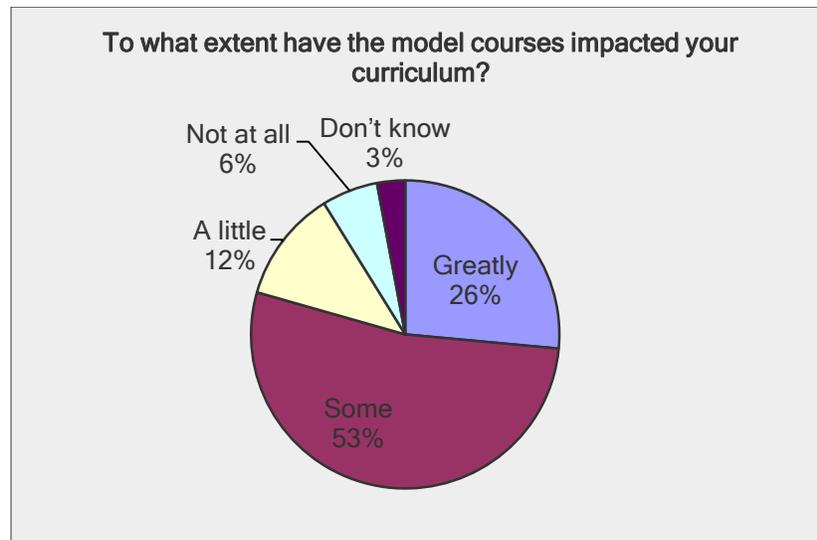
Figure 26: Usefulness of Model Courses



IMPACT OF MODEL COURSES ON CURRICULUM

Similarly, 91% stated that the courses have impacted their curriculum (26% greatly, 53% some, 12% a little). Close to half of the respondents indicated that they had used the model course materials, including the syllabi, course outlines, course objectives, learning objectives, lab exercises, and website referrals. Respondents implemented the materials in their classrooms and used the materials as background information when designing new courses.

Figure 27: Impact of Model Courses on Curriculum



SUGGESTIONS FOR IMPROVING MODEL COURSES

Respondents suggested improving the courses by...

- Adding more course content and resources (most common suggestion),
- Identifying how the courses are related to each other, and
- Changing the Moodle server website navigation, making it easier to find all the materials.

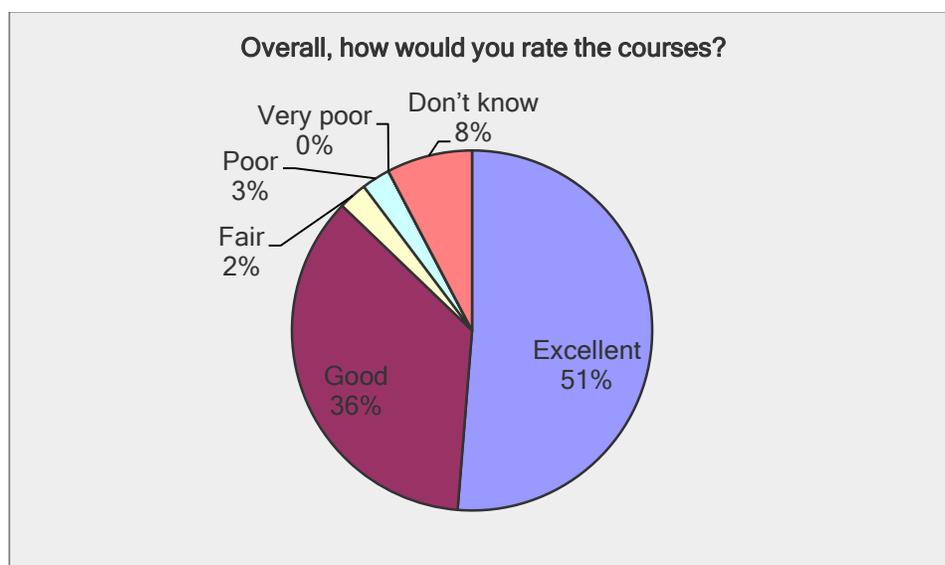
MODEL COURSES RATING

Overall, 87% of the respondents rated the courses positively (51% excellent, 36% good). Only 2% gave the courses a rating of fair, and 3% rated them as poor. No one marked that the course were very poor. Eight percent (8%) were unable to provide a rating. Respondents provided comments including the following:

All the course materials have been very well thought out and cover the core competencies needed.

Very comprehensive in the content each module covers

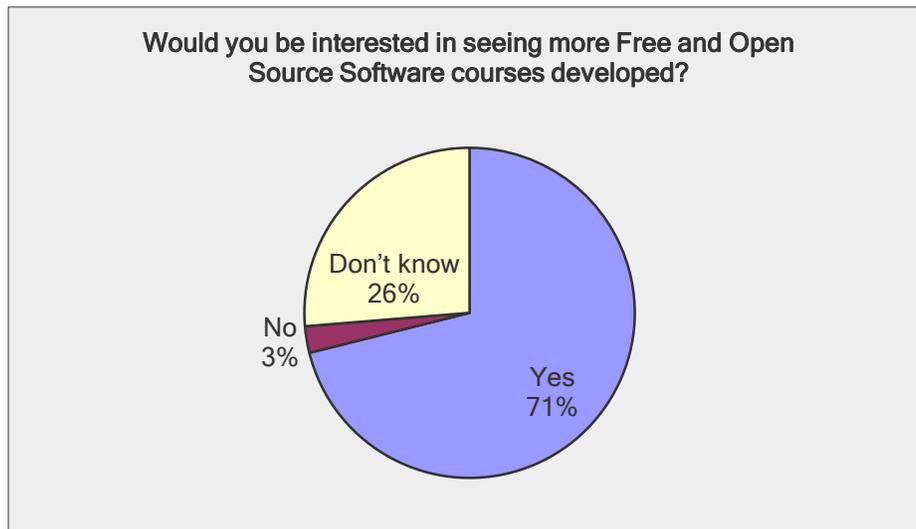
Figure 28: Overall Rating of Model Courses



INTEREST IN ADDITIONAL FREE AND OPEN SOURCE SOFTWARE COURSES

The GeoTech Center was interesting gauging the level of interest in the community for the development of additional Free and Open Source software courses. Close to three-quarters of the respondents (71%) indicated that they would like to see additional courses in this area.

Figure 29: Interest in Additional Free and Open Source Software Courses



CONCLUSIONS

The survey findings were very positive and were consistent with the results of the survey of workshop participants, leading to the conclusion that overall, the model courses meet the needs of the community. Respondents gave high ratings to the courses and reported that the courses met their needs and expectations. While the courses have only recently been released, they have already influenced curriculum of 91% of the respondents.

APPENDIX A: MODEL COURSE DEVELOPMENT WORKSHOP PARTICIPANT SURVEY: RESPONSES TO OPEN-ENDED QUESTIONS

Was anything about the webinars particularly effective?

- *The webinars provided a clear overview of what was expected and allowed time to answer questions prior to meeting in person. This meant that the time spent together could be focused on the tasks at hand rather than answering general questions.*
- *It was brief, organized and addressed the material directly.*
- *Very systematic and thorough*
- *typical presentations that I have experienced before. All of the pieces of the webinar were effective.*
- *Being able to visit live with colleagues was great. Being able to bounce ideas off of each other is helpful.*
- *The information provided in the webinars was presented in a clear and effective manner.*
- *I thought the amount of preparation that went into the presentations was outstanding, and they were extremely helpful in preparing me for attending the workshops. I thought the format and organization of the information that was presented was great.*
- *They helped in two way:*
 - 1) *They made me think about my GIS Classes and how I could improve them*
 - 2) *They made me think about my GIS labs and how I could improve them*
- *Clarity of presentations; organization; distributing the presentation among many presenters*
- *Keeping in touch with updates and the progress of the GTCM*
- *Getting feedback from others is always helpful*
- *I find the information is always presented in a very easy-to-understand manner.*
- *Good way to communicate information and build community among faculty who are spread around the country*
- *They stayed on topic and on time. The overviews and presentations were helpful and the panel discussion was useful.*
- *Ability to chat--ask questions, offer observations--in general, discuss important elements*
- *survey and feedback*
- *Every time the GeoTech Center coordinates a GTCM meeting, they move the ball a little further along. The GeoTech Center has no formal authority and must patiently coordinate with stakeholders to achieve a unified goal. This is a methodical process and these webinars are a cost effective tool for making progress.*
- *Open discussion and questions*
- *Power points were excellant,they were well prepared.*
- *ppt's with live explanation and ability to ask questions was good*
- *Sharing information and meeting with others in a web environment.*

- *Interaction by participants*

Freeflow of discussion

having handouts (or survey results) available before the webinar

- *Current material and discussions/interactive aspects.*
- *Nothing in particular stands out, but in general, I found the webinars helpful*
- *Organized presenters*
- *Gets us all in "one place" to go over the material and to ask questions.*
- *Resources, experiences shared, delivery mode*
- *The applied nature of the webinars.*
- *It is very detailed, and outlined workshops' goals and expectations. The timeline included in each webinar is also helpful.*

Do you have any suggestions for improving the webinars?

- *When covering two different courses, if the format is the same, portions that are similar can be skipped over. For example, I don't think it was necessary to go through the matrix that would be filled out for each course twice. Nothing had changed in the matrix, so it was easy to understand what would be required to fill it out. But then I realize that there were probably folks who were only participating in one of the webinars and might have only listened to that part.*
- *Timing was difficult for me because of a busy schedule. I'm not sure how to improve that, but the two options didn't fit into my schedule.*
- *I think in order to ensure that everyone has a chance to jump in and talk, it might be helpful for Phil, Ann, or whoever is hosting the webinar to make sure that everyone on the call is "called out". I think sometimes it is hard to jump in. You aren't sure when you can jump in, and you want to jump in but you don't want to cut anyone else off. Maybe going down the list of participants and asking each person if they have anything to add would be effective?*
- *I think another webinar that thoroughly covers the complete GTCM rather than specific workshops would aid those participating in the workshops.*
- *The webinars were pretty long, especially the first one. I feel asleep.*
- *I think they're very effective*
- *No. Phil runs a good webinar*
- *More frequent, less content per webinar. I think breaking stuff down into smaller chunks would help.*
- *The webinars have gotten successively more focused over time. Each has very specific goals, and we are able to meet this in good order. Continue to revise--efforts of Phil and SME's to make the webinars as content rich and productive as possible is noted and much appreciated!*
- *more specifics*
- *Maybe let folks know what the action items will be at the beginning of the meeting and then revisiting those action items at the end. This will help attendees better understand their role and what is expected of them in the process.*
- *They were all well prepared and informative. I appreciate all the effort that went into making*

them so effective.

- *Maybe less material and more of them.*
- *Sound has been erratic several times*
- *One small critique, as I've attended all the webinars that have been offered, some of the information becomes repetitive. This is not altogether bad, as it's reinforced my understanding and appreciation of the methodology being used (DACUM, etc.) but perhaps there is a possibility of offering "advanced" webinars for previous attendees.*
- *Generally, they are quite good. It is good when they are kept to an hour or close to it. When they start going to an hour and 1/2 they can get too long. Helps when a couple of people share giving the webinar and alternate every 10 minutes or so to keep it more interesting.*
- *They are quite excellent.*

Were the workshops as advertised? To what extent did they meet your expectations?

- *The workshops I attended had clear goals and processes that were well-articulated prior to the workshop and were addressed in the workshop.*
- *I will be attending the workshop in KY, May 11th.*
- *The workshops were designed very well. There was a particular structure to the workshop and the hosts were flexible to adapt to the needs of the participants very well to make the workshops run more effectively.*
- *Phil was great, I was going through an adoption process and he allowed me to participate at the Kentucky meeting (via web)*
- *The first workshop was what I expected, this is something new and there would be some growing pains to work out the process but it was good. During the second workshop in Denver, the GeoTech Team should have refined the documents much more prior to the workshop. There was still a lot of redundancy and inconsistency in the language so it makes the process much, much more tedious than it needs to be. Plus the more redundancy and poor language in the documents we have to work, the less value the final product will have.*
- *It was a good experience; well organized, seemed quite effective.*
- *I wasn't sure of the goals of the workshops until I arrived.*
- *Not enough time in the San Diego workshop. We were very rushed at the end and did not have the opportunity to do wrap-up/next steps. Overall it worked really well, but we just needed more time.*
- *It was a great experience. I think it was very well done.*
- *The workshops exceeded my expectations in both cases. I had doubts that we could get through all the material, meet all the objectives, and still be academically rigorous. Facilitators were key to making both workshops successful.*
- *maybe more time so we could have finished our tasks*
- *They were very good. We could have used more time. I would like to see one or two where we could just talk more about how this is all going together and how we all teach.*
- *I was impressed at the amount of work we got done in one day.*

It was very organized and well done. I found it one of the most productive meetings I have ever attended

- *They met all my expectations. They could have been improved in an operational/organizational sense but this was a new effort and a learning aspect must be expected.*
- *I cannot emphasize enough how valuable I have found these experiences. Both as a contributor to a really important effort as well as an opportunity for professional networking and skills development.*
- *The workshops were well-organized and had specific objectives.*
- *Didn't know quite what to expect, but it was a great time.*

Was anything about the workshops particularly effective?

- *The opportunity to discuss matters in detail with other experts in the field face to face.*
- *The design of the workshop allowed us to plow through a huge amount of material in a short time while creating an atmosphere of collegiality in which we all felt heard. There was enough flexibility to spend extra time on more important things and less time on less important things, but that was accomplished without undermining the overall agenda and progress. Very effective model and facilitation in both workshops I attended.*
- *Very thorough*
- *meeting staff from the different colleges was really effective to see how each of us are teaching and using materials in the classroom to teach subject matter.*
- *Face to face meetings made it a great way to communicate.*
- *I believe just having all of the participants at one location focusing on the goals of the GTCM project made the experience that much more useful.*
- *The organization, format, preparations, location, amenities, participants, and presentations were outstanding.*
- *It was great to hear everyone's ideas, etc.*
- *It was good!*
- *Very well organized and on time.*
- *Networking with others and learning from other participants*
- *The open discussion among the participants.*
- *The curriculum building model worked well (two groups given identical assignments, then everyone meets and discusses how the results of the groups aligned, then worked as a whole to come up with a synthesis of the two groups work)*
- *The face-to-face conversation is much better than phone conversation. More engaging.*
- *Structure for review of concepts. Rules of engagement for the process. Ground rules that all opinions would be heard, and treated respectfully.*
- *Group discussion and leadership*
- *The GeoTech staff did a great job of leading attendees in a general direction without dominating the process.*
- *Yes. Face to face interactive discussions and sharing of ideas. These brought about superior collaborative results.*
- *The teams where more material was prepared ahead of time and more directed.*
- *the workshop leaders were good at keeping the tasks at hand moving and focused.*

- Working with colleagues and having the opportunity to interact in real time.
- The pre-workshop preparation and the interactive nature of the participation.
- The consensus process is quite invigorating and rewarding
- working with other instructors in the gis field of study who had more experience teaching the gis program
- Face-to-face discussion with participants from a wide range of backgrounds and Geospatial Technology use.
- Participants came out of the workshops feeling as though they accomplished something.
- Getting us all together. Having us prepare ahead of time via webinars made the actual workshop more productive. Having snacks and food right there helped us to stay close by to get everything done in a shorter amount of time. The logistics were excellent in Denver.
- Facilitators of the groups - did a great job
- Determining which items should belong in each course.

Do you have any suggestions for improving the workshops?

- Attending the Sacramento workshops provided plenty of time to discuss each course. However, I wouldn't schedule more than two workshops back to back again in the future. Two was just enough.
- The list of competencies in our notebooks didn't include the numbers shown on the screen in the Excel spreadsheet. Having that info on the printed spreadsheets or having the participants follow on computers with the spreadsheet itself would have eliminated lots of shuffling and confusion.
- Having a short bio from each participant ahead of time and what they teach would be good or have this available online to all workshop and webinar participants for individual review would be good.
- I would like to have reviewed certain parts of the GTCM more thoroughly before attending the workshop.
- Yes, really improve the language and remove the redundancy in the document that we work with.
- Add some GIS skill sessions to the workshops
- There was a lot to cover and so it felt a bit rushed at times.
- (1) Budget more time

(2) Include a group activity/dinner etc. as I view these workshops as an opportunity to network with other Geospatial educators. The workshops were so packed that there was no time for chit-chat.
- As an experiment, spread over two days rather than doing a one-day "forced march." Pros and cons to each approach (not the least of which is funding), but I do have some questions regarding whether we were as rigorous at the end of a very long day as we had been when the day began.
- More time.
- It may be less exhausting to do the same amount in two days, however, perhaps we would lose focus

- *A more uniform approach to multi-group integration.*
- *Provide a check off list of topics that are covered in earlier courses and the depth of coverage so that later courses can "assume " a level of background and either review the prior content or build to a higher level without indicating that the information needs to be covered in the current class.*
- *It might be helpful to have a bit more information on the other participants.*
- *It seemed a few people didn't have as much experience teaching and had low expectations for what their college could/would do in terms of new curriculum. This influenced how they saw the new courses as they would decide that since their college couldn't teach a topic, due to lack of equipment or expertise, they wouldn't include it in a course. This came up a number of times. It is important that participants are clear ahead of time not to impose these limitations. It was mentioned to the participants, but it didn't seem to get through to everyone. Perhaps more repetition of the point?*
- *More time*

Would you be interested in attending an online version of the workshop? This would be a fully interactive online meeting, incorporating live video feeds.

- *It would be interesting to see how this can work, and I'm always interested in ways of collaborating that are more cost-effective.*
- *I think this would really help with not having to deal with travel arrangements and often conflicting schedules to physically meet.*
- *It is the next best thing to live, and when \$\$\$ is an object it is important that we will communicate this way.*
- *Technology allows for greater remote participation in workshops such as this which in turn allows for greater participation in general. However, I believe that the results of the workshop and the overall experience of the participants is enhanced by in-person engagement.*
- *I don't think you would get the same level interactoin from the participants. I think these workshops benefit tremendously from social interaction of the participants at the workshop.*
- *I still think it's good to meet in person.*
- *As much as I dislike travel, the face to face interaction of an in person workshop is more effective because we are removed from all the distractions of our offices/workplace. In a video conference you will always have 50% of the participants who are trying to multi-task and end up not being engaged at all.*
- *Maybe this could be a spread over a couple of days?*
- *Workshops were long, intense, and community oriented, and I do not know if a web version would work*
- *The great thing about the workshops is that you are on site have face-to-face exchanges. An extended webinar would suffer from email and office distractions that are minimized in a face-to-face meeting. I believe a webinar is good medium for exchanging information or resolving a single issue, but would be less effective with complex or multi-tiered issues.*
- *I cannot imagine they would be as effective as direct exchange. Being able to assess others commitments, to clarify, and understand fully was very important.*
- *Online is ok but in person is best.*

- *I think some of the quality of a face to face meeting would be lost, but I also think it would add a new dimension to the process as well as allow participants to explore a cutting edge technology*
- *Would require significant background or off line work to be successful. Would work better with participants that knew each other. Better for higher level classes as it would be almost impossible to complete some basic classes with this method.*
- *Webinars are good for sharing information, but not for interaction such as we had at the Denver meeting.*
- *I don't think this is optimum, although it would certainly be less expensive for the center. Faculty have little opportunity to be in the same room with other faculty teaching geospatial from around the country. Face-to-Face provides many benefits that just can't be accomplished via webinar. I think having initial webinars to prepare people for the on-site webinars is best, then the actual workshop, the follow-up via webinar. After that additional workshops via webinar etc may be effective with groups of people that have met face-to-face.*
- *This would be difficult, especially with educators who are no strangers to talking*
- *The workshops required a lot of lively discussions and instant clarifications/feedback that will not be feasible in the online environment*

Please provide additional detail about how the curriculum assessment tools have been useful or why they have not.

- *We are preparing a statewide effort to assess geospatial technology curriculum in higher education using the GTCM model curricula and assessment tools. It's an incredibly valuable resource that will help to get us on the same page and directly address workforce needs in the state.*
- *They have helped me understand the 'ecosystem' of ideas in a good remote sensing course*
- *I think the methods used to do ranking and presentation of these ranks is very useful and summarizes each task and overall ranking from all participants.*
- *The curriculum tools allow for instructors to review the many possible topics that may be introduced into a standard geospatial technology class. This might introduce some pertinent topics that may have been overlooked.*
- *Via the Meta-DACUM process, the tool indentified possible course content, and it provided a good methodology for ranking the relevance of the potential competencies respective to the particular course.*
- *I have started to go through my GIS course and redesign it using the tools.*
- *Again, remove the redundancy in the document and use consistent language/grammar structure throughout the document.*
- *We're building up a program. The tool WILL be useful, just not yet!*
- *I teach High School and have not had the opportunity to employ the assessment tools yet*
- *These have been very useful for providing me with a "checklist" of material that should be included in our curriculum*
- *I use the assessment tools to evaluate my existing courses and for designing future courses.*
- *They highlighted the areas that our curriculum was missing elements*
- *I can see where my courses fall short of meeting GTCM but I am not sure I am able to redesign*

them and I think that at the community college, I teach the components of the technical skills course over the span of 3 courses.

- *We are revising our courses for fall 2012 to formally incorporate the assessment tools as part of our SLOs.*
- *The GTCM competencies are good, but need to be summarized into 15 to 30 competencies. As currently drafted, there are approximately 300 competencies. Can you imagine a job description with 300 competencies listed?*
- *They allow me to seriously evaluate each course and it's adherence to current concepts and trends.*
- *Just great to see what everyone else thinks and is doing.*
- *It took awhile to understand the format. There are a lot of questions that pertain to weeding out curriculum that was not included in these courses. It is not good or bad, it was just a bit confusing till you got the hang of it. They were exhaustively long*
- *Provided a clear framework for organization and development; well organized, well thought out, and clearly explained*
- *I rated the assessment tools as excellent but I wish there had been a "very good" category. They were better than good. In some cases the instructions could have been more clear and in at least one instance the ranking categories were "0-4" for one set and "1-5" for another. Making sure answers were consistent required unnecessary effort. Some categories were repeated due to multiple listings in the GTCM structure.*
- *I am not currently teaching any GIS courses (although I have in the past) so I have not had an opportunity to directly apply the assessment tools.*
- *It has allowed me to go back and look at my classes that I have been teaching to verify the content as it relates to the GIS model*
- *The curriculum in our institution is fairly set.*
- *Useful for assessing curriculum at my college.*

I found it a little confusing at first that they are called GTCM assessment tools, yet some of the categories come not from the GTCM, but from the meta-DACUM.

I do like the structure of the assessment tool, with Blooms taxonomy and the circles.

- *Provided a great place to evaluate current curricula at our institution based on what others thought was important*
- *For the first time there is a set of items that guides curriculum developers and course and program developers as to what should be included in each course.*

Do you have any suggestions for improving the curriculum assessment tools?

- *Again, remove the redundancy in the document and use consistent language/grammar structure throughout the document.*
- *Create 15 to 30 summary competencies that succinctly describe what the knowledge and skills required of a successful GIS Technician.*
- *More interactive. Online?*
- *Not at this time, but will be using it more over the next few months. Over the long term (if*

geotech funded again), having these tools available on the web, with automated feedback for where there are gaps would be fantastic and likely more widely used and useful.

- *Perhaps the weeding out could be done in a separate process, then focus on the details of what would really be in the class.*
- *Placing this material with the model curricula in Moodle is brilliant!*
- *The list of competencies is so long, it's hard to grapple with. I've been thinking that dividing the competencies into separate clumps, perhaps things to be addressed at introductory, intermediate and advanced levels might make the list less ungainly. I'm not sure how that would work, but it might be worth exploring.*
- *The tool itself is fine, but some of the tasks and items did not seem to match some of the "course" specific concepts and learning outcomes. This may be a disconnect with previous workshops and interviews that may have resulted in a mismatch of task(s) to learning outcomes or were not stated clearly with respect to the industry knowledge, skills, and abilities.*
- *They are pretty complex, and they aren't standardized between the two courses I was a part of developing.*
- *They will likely need continuous revision as the technology and expectations change.*
- *We need to know more about what everyone is doing and how.*

Do the posted model course materials meet your expectations?

- *I'm not sure what my expectations were, though I find them enormously useful.*
- *I think most of these do. I can certainly make use of this material and be able to incorporate it as needed when reviewing and revising my own course content.*
- *The course materials include all necessary information that would normally be included in a college syllabus.*
- *Yes, again I am using the materials to re-work my course.*
- *They look pretty good. Expecting more specific resources for teaching, but I think those are forthcoming, no?*
- *Again, I think that I need more time to examine the course materials before the next academic year.*
- *The level of detail is very helpful; my one concern is how to best fit so much information into one class.*
- *Again, I find the materials useful to my own geospatial program.*
- *It was basically the same stuff we saw at the workshop and at subsequent webinars. I expected more course development.*
- *I have already asked my fellow faculty and teaching assistants to review this material. We are using it in course revisions. Am also sharing this material with industry, high schools, and other community colleges that are not a part of GTCM Model Course development.*
- *looking forward to exercises being published*
- *They are a good start for an instructor or department chair that has nothing. The syllabi seem more geared to meeting administrative requirements (e.g. SCANS) than actually informing a student of what is expected of them and what they can expect to learn.*
- *They are on target! They are better than promised.*

- *Would like to see more flushed out for teaching purposes.*
- *Actually, these resources have far exceeded my expectations.*
- *Need to look them over again.*
- *Very nice!*

Do you have any suggestions for improving the GTCM model course packs?

- *For introductory courses, in particular, the easier it is to hit the ground running the better. If I have everything I need, including lab packs, texts, assessment materials, etc. for a GIS 1 course, it's much easier for me to assist a partner college in implementing the course.*
- *add homework/test questions, labs, suggested texts, lecture notes*
- *I hope that all (or most of) the workshop participants upload their own course material to be able to draw from a pool of materials from a variety of people and institutions.*
- *The course packs seem to include the basic information necessary.*
- *Not at this time.*
- *This is a good start, a think additional curriculum materials/modules/lessons would be a nice addition.*
- *Maybe video clips of 'master' teachers? Maybe examples of student work?*
- *Enrichment materials and skill lessons would be a great addition.*
- *Online exercises/activities are always helpful--though I realize it requires considerable effort to create these and to keep them current.*
- *Break down the course into modules. That way they can be pieced out and a custom course created. Create supporting materials for each module. Basic lecture guides, web links, etc.*
- *Have provided Phil some materials off-line.*
- *exercises for each outcome*
- *Lectures, assignments, and projects. Also, work with publishers to create textbooks in support of the GTCM.*
- *The fact is, everything can always be improved. These are excellent as they stand, and if we see things to add we can.*
- *Lots of additional material as mentioned previously could be added to create more of a week to week teaching packet.I would love to work on this.*
- *Hire instructors on a consultant basis to develop materials and contribute more resources.*
- *online external resources (where appropriate) which overlap with course objectives*
- *I will after I review them*
- *I do think these materials work splendidly as stand alone tools, however, I would never be adverse to even more resources.*
- *Somehow I missed the clear instruction to review the GTCM model after our work in Denver.*
- *Add more unit content or ideas for instructors - this is so valuable for individuals emplacing Geospatial Tech curriculum at their campus.*
- *Including sample lab activities will be useful for someone that is just starting to teach those courses.*

How has participation in the GTCM impacted your curriculum?

- *I have been reassessing the content of every class in our program and will be making changes to address competencies that are currently missing from my courses, and I'll be de-emphasizing others.*
- *Given me some new lab/activity ideas*
- *I think I have gained additional insight to what other community college professors are doing and seeing what they are spending/not spending time on. This helps me refined my own course offerings.*
- *Informed curriculum creation*
- *We need to all be on the same page when teaching these introductory courses at the 2 year level. I didn't have to change much of my curriculum, but I have added and detracted when/as necessary.*
- *development of new course, a more constructive view of how my courses are organized, and the ability to explain to administration better what we do*
- *It has given it clear direction and good guidelines.*
- *Again, I am going through my lectures and labs and applying some of the project's goals.*
- *This has helped us to align our course content with national standards and to be much more aware of the subject matter we need to cover.*
- *I use the GTCM to evaluate my existing courses as well as designing future courses. I have also referenced the GTCM as a tool in grant applications.*
- *It has highlighted areas that our curriculum needs to be reinforced.*
- *I am reviewing all of our syllabi and SLOs to see where we can add GTCM components.*
- *Mapping all lessons at NOVA to the GTCM Project (SLOs) in a matrix. Discussed this process with the college assessment personnel. Timing was good, as we have just completed the on-site visit for our 10-year re-accreditation.*
- *I plan on using the GTCM curriculum suggestions to propose new courses based on them.*
- *I utilize the GTCM model and competencies to align my programmatic and course curriculum. We did a great deal of programmatic planning this semester and I relied heavily on the GTCM. Over time, I hope to see the GTCM model better reflected in my course curriculum as well.*
- *It has shored up our commitment, enhanced our content, and clarified a number of issues.*
- *Given me ideas for new materials and to update existing materials.*
- *made me look at my courses and their content in a different way; made me look at the organization of topics, exercises, texts, etc. from a broader perspective (i.e., they have gotten me out of my comfort zone to examine my courses).*
- *It has affected the balance of emphasis placed on the topics within my introductory courses. I have included some additional material to address the GTCM standards.*
- *I am currently designing professional development in GIS for educators for Michigan Virtual University as well as providing professional development workshops for teachers through Saginaw Valley State University. I have incorporated GTCM materials in those offerings by way of suggesting avenues toward professional advancement/career change options for both students and teachers.*
- *It has let me have discussions with other instructors in the state as well as my advisory group*

to see how we can improve our courses to align with other schools thru out the US

- *I am using what I've learned to improve courses - fill in gaps. Being around other faculty who are working on the GTCM project has been very helpful for sharing ideas and discussing what is important to all of us - improving Geospatial education.*
- *Looking at adding another course (Seeing the World), strengthening our current curriculum with some additional content focused on the course outcomes listed.*
- *Having the items as a goal in terms of what to include in each course.*
- *I reorganized labs and curricular among my GIS courses to better align with the GTCM.*
- *I expect to revise the course outline and modify some of the topics covered in our Fundamental GIS course. Many of the topics are already discussed in our GIS course but I certainly see where some enhancement is needed.*
- *We will be reviewing our curriculum this spring and comparing it in detail to the outlines. However, I think the content is pretty close already.*
- *When revisions are made, the model will be a good baseline to ensure that key items are included in a variety of courses.*

Was the GTCM Project was a worthwhile use of your time? How much so?

- *This work will likely have a very strong impact on our work.*
- *It articulated the learning goals very systematically based on discipline competencies*
- *I am happy to have participated in this endeavor and felt like I have been able to provide my contribution to a greater endeavor and am glad to see the geospatial community making a national presence for the Dept of Labor and the overall labor market. GIS and related fields have been difficult to "categorize" and also provide career paths and salary ranges since GIS and geospatial fields have matured.*
- *It has been a pleasure meeting with colleagues to discuss the basic information needed in an introductory geospatial technology course. Not only does this information assist future GIS educators, but allows current instructors to review their own programs and modify them as necessary. This would also increase the curriculum alignment between institutions.*
- *It was outstanding.*
- *As an educator, I need to be stay current with GIS and geography education.*
- *I appreciated the opportunity to become more familiar with the model and how it was designed to be used. I also have appreciated the various webinars and workshops as they have allowed me to be involved in discussions with fellow geospatial educators -- always a worthwhile experience.*
- *The overall outcomes have been good. The webinars are well-run. The workshop (San Diego) could have been better organized.*
- *Was a significant amount of time, but the results make it all worth it. Many 4-year schools and industries are very interested in what has been accomplished in this process.*
- *This was an excellent national collaboration. Superior planning and execution, great exchange of ideas, and exciting GIS education community building.*
- *I have been creating courses and developing GIS materials for 25 years, this is a great project. I would like to be more involved and put more time in.*
- *I believe strongly in the competency model. I have personally observed so much variation in*

the quality of GIS education and in the materials covered that the need for some guidance was obvious. Industry needs to be confident that students are adequately prepared with a well designed skill set. Articulation with other institutions, particularly 2 year to 4 year, is also a major issue and compliance with GTCM standards will, we hope, assist in that process. Finally, GIS certification is an issue with growing importance. A degree of standardization will better prepare students and assist organizations in creating and administering certification standards.

- I have experienced considerable professional growth, both as a teacher and as a GIS professional, as a result of my participation in the project.*
- I developed a new set of colleagues and learned that it is important to have a K-12 voice at the table in these discussions.*
- It was very well organized and professional. I hope the center gets refunded so that the impact of the GTCM and the model courses can be tracked over time and modified as needed.*
- Top notch colleagues involved and a pleasure to work with them.*
- This model for translating required competencies into curriculum is extremely innovative and effective. The GTCM as a whole is incredibly detailed, but it is overwhelming in its raw form to someone aiming to develop or revise curriculum. The model courses, and especially the workshop model, are really effective ways of moving through that process to produce practical results. It could serve as a model for adapting curriculum to workforce needs in dozens of other fields.*
- Very worthwhile project that starts the work of seeding two year colleges with viable GIS programs and courses. This is a great national need.*
- This is a great project and am glad this has come about. I think there are great opportunities to prepare students in the geospatial field for a variety of careers, esp. those in a community college program.*
- It has been a great experience and I am proud to have been able to participate in this undertaking.*
- I just think the people who have organized and managed this project are incredible, as are all of the participants that I've met.*
- I've been consistently impressed with the quality of the work that is being generated from the GTCM project.*
- The effort needed to develop all of these material is substantial and the GTCM team has done an excellent job of shepherding this process along. Those efforts are greatly appreciated by us out here in "the trenches"! It is very important to have a path to standardizing our curriculums*
- I like the idea that the GTCM provides an industry-based schematic for teaching geospatial-related courses and programs.*
- This is a very important project. GeoSpatial curriculum at the undergraduate level needs to be defined and outlined so that we can move toward a common course outline to achieve articulation among schools.*
- Please keep supporting the GeoTech Center and the GTCM. We've got a long way to go.*
- Outstanding work!*
- I have worked with other centers and was a PI on several projects and two centers, this is the best organized, with a great team.*
- I will be looking at the Moodle site in the near future and will be glad to share my observations*

at that time. I felt that with finals, the holidays, etc. I should reply to the survey now.

- *This is very important work and it was an honor to be a part of it. What I see is a huge need to help faculty keep up-to-date, so that they are learning what students need to know that we didn't learn when we were in school. The concepts in general haven't changed, but there is a much greater need for students to understand server technology and web-mapping. It would be interesting for faculty to use the GTCM tools to see where they have gaps and share these results (anonymously, if they are embarrassed :)) with the geotech center. This could help in focusing webinar topics for professional development.*
- *This was a very valuable experience to be involved in! The GeoTech center continues to deliver relevant and timely information, resources, and practices to the masses in this field, especially with two-year curriculum in mind.*

APPENDIX B: MODEL COURSE USER SURVEY, RESPONSES TO OPEN-ENDED QUESTIONS

How did you locate the GeoTech Center's GTCM model course website?

- *Link in an email that was sent out.*
- *I have it bookmarked*
- *OSGeo discussion list.*
- *not sure what you mean - I navigated from the GeoTech Home page.*
- *Link from email*
- *I have worked with the GeoTech Center on development of several of the courses.*
- *Research professionals through social media.*
- *I don't remember, probably Google.*
- *going to the site,I worked on the project.*
- *By following URL*
- *I attended an online seminar where I learned about it and through that I was able to apply for a Username and Password.*
- *I'd been told about it during a webinar.*
- *I was part of the team*
- *Directions Magazine email blast*
- *Directions Magazine \ Friend*
- *Through Lakeland Community College Geography instructor*
- *through the geotech's website*
- *email from friend*
- *From Career One Stop Webpage -*

<http://www.careeronestop.org/CompetencyModel/pyramid.aspx?GEO=Y>

- *Professional associate*
- *Do you mean how did I locate it or what I thought of it?? I located it by clicking on the link in the recent email. I think that it's well organized and easy enough to navigate.*
- *As a participant in the GTCM remote sensing model course development*
- *Directed there by email from geotech center*
- *Colleagues and Affiliations*

Please provide additional detail about how the model courses have been useful. If they have not been useful, please share why they were not.

- *All the course materials have been very well thought out and cover the core competencies needed.*
- *The model courses help provide an instruction guide for topics and content required to achieve student competency*

- *Haven't implemented them yet, but will use the structures for curriculum proposals.*
- *The courses were useful to give me an overview of the topics. I would have liked links to material used to teach each topic, eg textbooks, journal articles or links to websites.*
- *I was under the assumption that it would have content not just subject titles*
- *You get a good idea of what is important to many people.*
- *I appreciate the syllabi and outlines, but I am looking for guidance and examples of the materials themselves. I was expecting there to be more content developed. I realize it's been a matter of time and money, but at some point the user community should develop things to share.*
- *Used them as a template for new course development and for designing a course for the GIS Certificate program*
- *I am working with a community college and "surveying" course has been very helpful in starting discussions of the curriculum.*
- *Very comprehensive in the content each module covers*
- *I have used them to promote revamping the GIS Minor at my university and to outline new courses*
- *The courses were very useful as a guide for my internal evaluation, as a vehicle for discussion with my Advisory Committee, and as a comparison with national expectations. I hope that in the future the course elements will be used for higher levels of articulation among educational institutions.*
- *The materials are sufficient to develop and adapt to specific course training.*
- *I am just beginning the process of course revision and development, but plan to rely heavily on the model courses.*
- *In keeping my current course content in line with the GTCM.*
- *again - just LOOKING at the courses.*
- *I have only begun to examine this course so some of the questions I am unable to provide a clear, supportive answer.*
- *I have used two of the lab exercises (Google Maps and Spatialite) in a GIS course I currently teach. The course is a pretty standard GIS that mostly focuses on ArcGIS, but I wanted to give the students some introduction to open source tools.*
- *We are trying to develop a series of training course that will provide the core, common GIS competencies necessary for a deployed military support role.*
- *was useful to see what in it even though not relevant to current interest/needs*
- *We are trying to determine what aspects of the course material are most useful and how we might replicate the course design.*
- *People I teach do not always have access to ArcMap licenses*
- *Useful in explaining what you can do with Open Source apps to do GIS. Currently an ESRI product user but always curious about less expensive alternatives.*
- *I suspect this WILL be a useful resource once I take the time to pay attention to it! I only just did a quick review of it; didn't try to actually go through the course yet.*

Which materials have you used, and how have you used them?

- *Syllabi*
- *Data management and spatial analysis course materials.*
- *Course Outlines, Syllabus and Learning Objectives. The content has been carefully chosen to support development of student skills and preparation for work.*
- *Mostly resources for putting new material into primarily labs.*
- *I have used the syllabi and some of the websites.*
- *From each course. Helped to provide a framework for the material to cover.*
- *I will be using the Seeing the World materials this fall and the Intro to GIS next spring*
- *Syllabi, course outlines and objectives, and student learning outcomes.*
- *Ken Yanow's Seeing the World... I have adapted them and combined them with other materials to teach an introductory course in GIS.*
- *I have used the outline as inspiration and reference for a course. We are developing a course and book called Community Geospatial. The course is hosted at the Peer to Peer University <http://p2pu.org>. All contents are CC-by-SA.*
- *Google Maps lab exercise.*
Spatialite lab exercise.
I have looked at some of the other material and would be interested in using them for a future course.
- *QGIS items. I also use a QGIS Tutorial from CUNY.*
- *The final project was helpful in helping us rework our final project for our WOES courses.*

Do you have any suggestions for improving the courses?

- *Identify how the courses are related to each other. For example GST 101 (Introduction) contains subject matter that leads into other courses like GST 105 Remote Sensing. A curriculum needs to be approved/accepted by not only a college but by state or other governing boards as well. The linkages between courses strengthen a certificate program.*
- *add actual content*
- *They need to be really filled out. more lectures ,resources etc.*
- *Invest in development time.*
- *expand the resources component*
- *I think the courses are of exceptionally high quality. I expect to use large chunks of the material unmodified.*
- *Decrease the barrier to entry by allowing guest/anonymous access to the learning materials.*
- *Less information buried inside Word documents and PDFs. If the Topic Outline page were formatted more like the syllabus (titles of reading assignments, links separated into labs, readings, etc.) it would be easier to navigate.*
- *Would like to see more in the use of open source RDMS software packages like POSTGIS.*
- *I think the sites they've created for delivering the course content is excellent.*
- *My summer break I will be more involved in further assessments and review for course edits.*

Please describe the additional Free and Open Source Software courses that would be useful for you.

- *Web Mapping. GRASS GIS. Open Source Cartography with Inkscape.*
- *We use open source in all kinds of ways to support proprietary software (commercial grade) applications. I think you have to provide both industrial strength training in brand name software and full training as well in development tools both open source and closed source.*
- *1) This course emphasizes breadth over depth. I would be interested in a course that went more in depth on a specific tool or closely related set of tools to tackle more complex spatial analysis projects, e.g. using Quantum GIS's many analysis plug-ins.*
- *2) A course in programming, either programming tools for analysis, or programming for plugin development.*
- *an intro GIS course built with QGIS*
- *Python*
- *Open Source classes on FOSS4G RDBMS software packages.*
- *I have not exhausted the existing materials yet.*
- *PostGIS, R*
- *I'm not certain there is an extremely high demand for open source software training, although I do know at least one major player, (Mosaik, formerly American Roamer) uses open source software almost exclusively.*

APPENDIX C: MOODLE (MODEL COURSE) REGISTRANT JOB TITLES

This is the full list of “other” job titles, as written by the registrants.

Adjunct Instructor
Application Developer
Assistant Dean
Assistant Professor
Assoc Professor of CS
Assoc. Director
Associate Director, Center for Teaching and Learning
Associate Professor
Asst. Lecturer
Business Services Representative
Comp. Tch.
Consultant
Dean
Director GIS Lab
Director of Spatial Curriculum & Research
Education Program Manager
Geographer - GIS Specialist
Geographic Information Specialist
GIS Analyst
GIS and Mapping Support Consultant
GIS Associate
GIS Cartography Supervisor
GIS Coordinator
GIS engineer
GIS Interested
GIS Specialist
GIS Specialist and Instructor
GIS Technician

GIS tutor
GIS/CAD Teacher
GIScience Program Director
Graduate Research Assistant
Instructor GIS Environmental Technologies
Librarian
Manager - Environmental Operations
Manager GIS Services
Planner
Practicum student
Professor and Director of Life Sciences
Professor of Geography
Program Director
Project Coordinator
Research Fellow
Research Specialist
Senior Adviser, Business & Technical Programs
Senior Adviser, Business & Technology Programs
Senior Project Officer
Spatial Analyst
Student
Teaching Assistant Professor
Technology Apprentice

APPENDIX D: MOODLE (MODEL COURSE) REGISTRANT INSTITUTIONS

This is the full list of institution names, as written by the registrants. Note: Misspellings have not been corrected.

	Frequency
	16
Adams County, WI	1
American Sentinel University	2
Assiniboine Community College	1
ATCO ELeetric	1
Bismarck State College	1
Carroll College	1
Center for Advanced Spatial Technologies	1
City of Carbondale	1
City of Salisbury, NC	1
Clark State Community College	2
Colorado State	1
Colorado State University	1
Columbia University CIESIN	1
Del Mar College	1
DOI - Office of Surface Mining	1
Dublin Institute of technology	1
Durban Univ. of Technology	1
East Carolina University	2
east west center	1
Eastern New Mexico University	1
Edgecombe CC	1
Education Corporation of America	1
Elmhurst College	1
EMCC	1
Esri	1
Front Range Community College	2
Furman University	1
Geocentric Innovations	1
Geoessentials, Inc	1

Geomatic Engineering Dept	1
GIS Training Mutual	1
Green Mountain College	1
Harrisburg Area Community College	1
Harvard University	1
Helix Charter HS	1
Highland Community College	1
Hunter College CUNY	2
IIC Technologies Inc	1
Illinois State University	1
Indiana University South Bend	1
Institute of Development and Equity Studies	1
Island Institute	1
Kaskaskia College	1
Kathamandu University Department of Civil and geomatics engineering	1
King County	1
Lakeland Community College	2
Loyalist College	1
Loyola University Chicago	1
McMaster University	1
Melbourne Univeristy	1
Mesa Community College	1
Monroe Communtiy College	1
MVCC	1
National Science Foundation	1
National University of Uzbekistan	1
NMDOT	1
None	1
Northern Arizona University	1
Northern Virginia Community College	3
Nothern Virginia Community College	1
NOVA	1
Oklahoma State University	1
Old Dominion University & Tidewater Community College	1
Oregon State University	2
oslandia	1
Pictometry International	1

Politecnico di Milano	1
Polytechnic Institute of NYU	1
Polytechnic University of Puerto Rico	1
Portland Community College	1
Portland Community College (Portland, OR)	1
Private individual	1
Private Person	1
Rhodes College	1
San Bernardino Valley College	1
TEI of Serres	1
Texas A&M University - Corpus Christi	1
Texas Tech University	2
THomas Nelson COmmuntiy College	1
Unhas	1
University of Calgary	2
University of Kentucky	1
University of Maine	1
University of Maine at Machias	1
University of Maine Farmington	1
University of Massachusetts, Amherst	1
university of minnesota duluth	1
University of Nottingham	1
University of Redlands	2
University of South Bohemia	1
University of the West Indies	1
University of Toronto	3
US Army	1
Virginia Tech	1
Wollega University	1
Woolman Semester School	1
Total	126

