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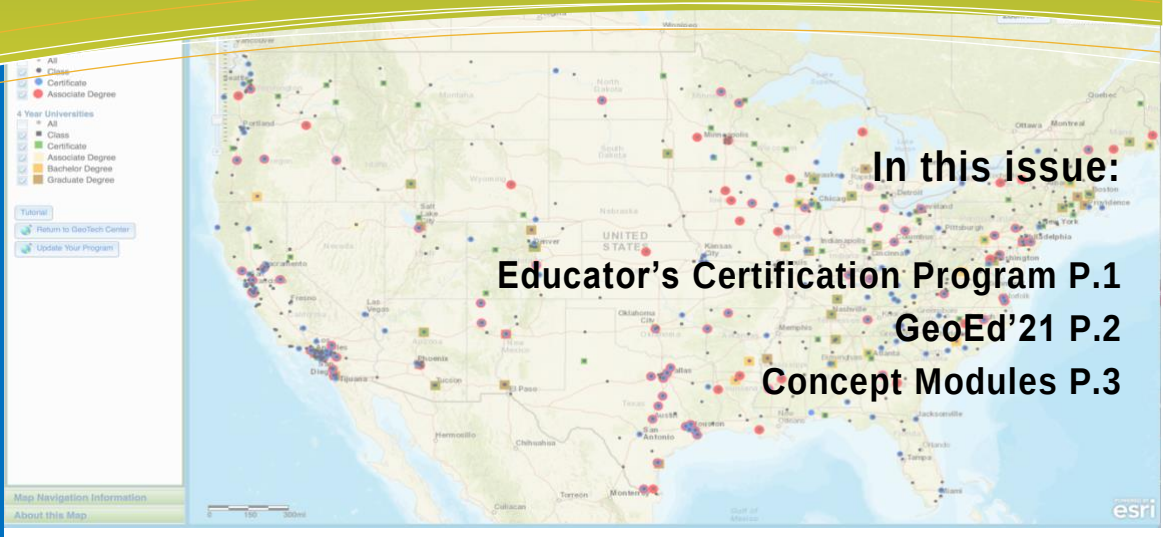
Empowering Colleges: Expanding the Geospatial Workforce



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GeoTech Center Information

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The GeoTech Center is virtual, comprised of a Director, four Associate Directors, and eight Assistant Directors from institutions across the nation. The central office is located at Jefferson Community and Technical College (JCTC) in Louisville, KY.

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Geospatial Science and Technology Educator's Certification Program

Geospatial Science and Technology (GST) integrates innovative tools and techniques that enable users to visualize, analyze, query, and predict temporal, spatial and critical relationships. Whether it is the map on a phone, the navigation system in a car, or the maps that one sees on TV, "geospatial" is all around. In fact, GST has been at the forefront of the news, with scientists, researchers, and the general public needing the most up-to-date information regarding the geographic spread of the COVID19 virus.

Due to the ubiquitous nature of GST and the need for spatial analysis across many disciplines, more and more instructors today -- from middle school through college -- are embedding GST into their curriculum or are offering GST specific courses or programs at their respective institutions to prepare students to successfully enter the workforce.

In the summer of 2018, Charlie Fitzpatrick, K-12 Manager of the Education Team at the Environmental Systems Research Institute (Esri) confirmed that a number of states were beginning to require secondary teachers provide "evidence" of their GST competence in order to teach GST courses. In 2019, the GeoTech Center held a forum with educators and GST professionals to discuss the concept of offering a GST educators certificate that would qualify as proof of expertise. Presently, secondary educators are left with two options to show expertise: 1) Return to school for an additional academic certificate or degree, or 2) acquire professional certification from the GIS Certification Institute (GISCI) or some other certifying body. For many educators, completing a full academic program in GST is simply not a viable solution due to time commitments, costs, and even availability. In addition, professional certifications typically require an accumulated number of years of professional level GST workforce experience. Many educators will not be able to meet that qualification.

In 2020, the GeoTech Center administered a GST educators pilot program. Participants for the program were recruited to the program using the GeoTech Center's listserv, webinars, presentations at conferences, and direct emails to prospective educators. An application rubric was created to select a diverse group of participants (i.e., demographics, region, level of educational institution, and underserved or underrepresented communities). 62 applicants applied for 32 spots. The list of participants included educators from secondary institutions, 2-year colleges, and surprisingly, 4-year colleges/universities. In fact, there were just as many 4-year applicants as there were 2-year applicants. Participants had varying levels of GST education and GST teaching experience. They also represented locations from across the entire nation (with 30% of the participants teaching at institutions with significant underserved/underrepresented populations). Reasons that applicants applied for the program included:

- To enhance/augment their GST skillset.
- To learn to design GST curriculum/courses/programs.
- To learn best-practice pedagogy.
- To network with other GST educators.
- To gain career information to share with students.
- To be prepared to offer GST professional development themselves.
- To show evidence of expertise for: job security, teaching a course, grant submission and development, presenting at conferences, students and parents, collaboration with other institutions (curriculum development and articulation agreements).

The added value of a GST educator's certification includes additional proof to students, parents, and administrators of the skillset of the instructor. It contributes to job security and affords an opportunity for professional development and growth. It also places educators in a better position to acquire grants, have abstracts accepted to present papers at professional conferences, and furnishes evidence of expertise when collaborating with other institutions for curriculum development and articulation agreements. And because the GST certification program is based

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GeoEd'21

GeoEd'21!

The National Geospatial Technology Center of Excellence is pleased to announce that the **GeoEd'21 conference** will be held virtually on June 8, 9, and 10. There will be three pathways available and will include daily keynote speakers. In addition, two pre-conference and one post-conference session will be held. The pathways include:

- ***Pathway 1****:* Geospatial Education including: Open Educational Resources, Geospatial Libraries, GeoTech Curricular Resources, NSF Funding Opportunities, Geospatial NSF Funded projects, GISP Exam Practice, Geospatial Instructional Resources, Q-Study

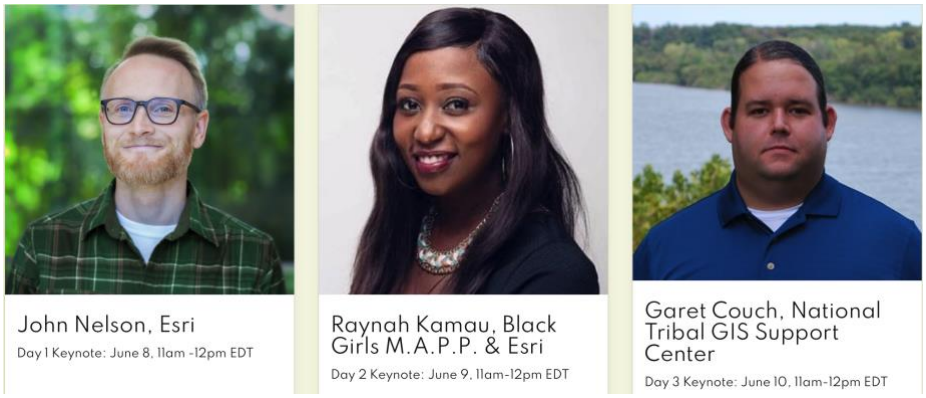
- ***Pathway 2:*** Web GIS: Insights, OpenStreetMap, ArcGIS Hub, ArcGIS Story Maps, ArcGIS Dashboards, Experience Builder, The New Map Viewer, The Living Atlas

- ***Pathway 3:*** ArcGIS Pro: Getting Started with ArcGIS Pro, Cartography in ArcGIS Pro, Data Creating & Editing in ArcGIS Pro, Spatial Analysis in ArcGIS Pro, Business Analyst Desktop, Python in ArcGIS Pro, Remote Sensing & Image Analysis in ArcGIS Pro, Working with Drone Imagery in ArcGIS Pro

Each pathway will include two-hour Exploratorium's on a variety of topics. Participants will be able to navigate between sessions and pathways without requiring individual registrations. Each day will also include general sessions with a Keynote presenter(s) and a Mappy Hour at the end of the day for networking. **This year we ask that you *only* register for the conference. You will then be able to attend the different sessions as you like. Registration is now open!** ***As in the past there is no charge for attending the GeoEd conference.***

Keynote Speakers

- ***June 8th*****:** John Nelson from Esri
- ***June 9th*****:** Raynah Kamau from Black Girls M.A.P.P. and Esri
- ***June 10th*****:** Garet Couch from the National Tribal GIS Support Center



Pre and Post Conference Sessions

The pre-conference and post-conference sessions require a separate registration. If you have already registered for GeoEd'21 and would like to attend one of the pre or post conference sessions please register for these items as well using the following link: https://survey123.arcgis.com/share/5caf494d2fbd411da64dadadafb4b710

- ***June 7th there will be two pre-conference session:***
  - Getting Started with Google Earth Engine.
  - Counter Drone Technologies.
- ***June 11th there will be one post-conference session:***
  - Using Field Probes to Measure & Make Cumulative Risk Maps.

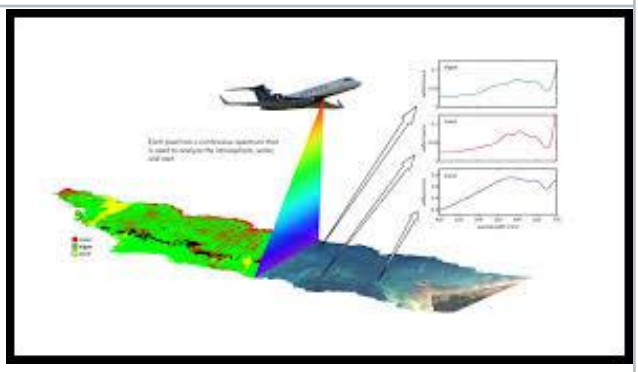
Additional Professional Development Opportunities

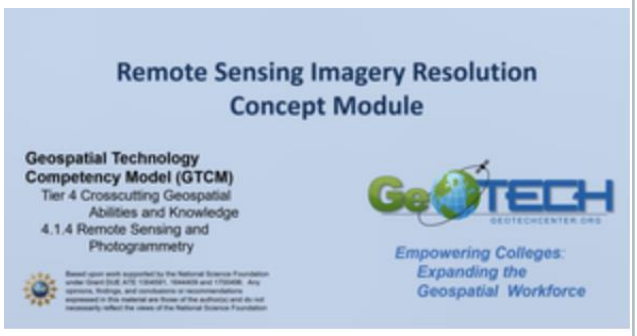
The GeoTech Center is planning on building on the GeoEd'21 pathways during the summer and fall with follow-up professional development events, including an OER workshop, a Mapbox workshop, Web GIS Online, and more extensive concepts using ArcGIS Pro. These workshops will include hands-on activities using the various software tools. Please visit the following site for a list of events (including free and available MOOC's) as well as registration information: https://storymaps.arcgis.com/stories/40457f8b3d1e414c93c02884fdabe812

NOTE: If you are interested in participating in the Geospatial Science and Technology Educator's Certificate Program (see Pg. 1 of this newsletter), we recommend that you consider attending a GeoTech Center professional development event(s).

For GeoEd'21 conference information and to register please visit: **https://geoed21-kctcs.hub.arcgis.com/** and visit our website (https://geotechcenter.org) to stay informed about all of the other events offered by the **GeoTech Center**.

Concept Modules (and Demo Videos)





With most programs moving to online instruction, the GeoTech Center wants you to know about resources that can be used as part of your courses. Students can freely access Concept Modules that review basic concepts from the GeoTech Center website and YouTube Channel. The modules are short (less than 20 minutes) and focus on concepts that students need to know yet are complex enough to need a refresher. Topics include:

1. Map Projections
2. Datums
3. Statistics (part 1 and 2)
4. Color
5. Metadata
6. Programming (part 1 and 2)
7. Scale
8. Topology
9. US Census
10. Attribute Relationships
11. Data Management
12. Remote Sensing Resolution
13. Remote Sensing Overview
14. Data Visualization (MAUP)

Demo videos are short demonstration videos designed to show students and educators how to perform a particular task in a step-by-step manner. The topics covered by the demonstration videos include managing geospatial data in ArcGIS Pro, collecting field data using real-time kinematic GPS, and implementing high accuracy workflows in drone data processing. To suggest topics for future demonstration videos, please contact the GeoTech Center team.

See the full list and links to these modules and Demonstration Videos on the GeoTech Center website at:

http://www.geotechcenter.org/concept-modules-and-demonstration-videos8203.html

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on the skills and competencies needed by the workforce (such as the Geospatial Technology Competency Model – the GTCM), then those critical competencies will become part of the curriculum taught in more classes and programs, providing a bridge between secondary education, post-secondary GST instruction, and the workforce.

Program Components: The program is a hands-on process, providing educators with: 1) Evidence of expertise to continue to teach (or begin to teach) workforce-aligned GST; 2) Instruction regarding advances/changes in GST; 3) A community of practice in order to network, collaborate, and/or share content; 4) Pedagogical techniques to effectively teach GST; 5) Additional skills to create GTCM-based curriculum for real-world, work-related GST applications; 6) Information to share with students regarding career opportunities in the GST industry; 7) Notification to their respective administrators of the achievement.

***Pre Self-Assessment*:** Participants completed a self-assessment survey to score how they viewed their level of GST skills for 190 skills/competencies (including, for example, basic cartography, data display, GST applications, GNSS, field data collection, remote sensing, developing a problem statement, geostatistical analysis, 3D analysis, and image analysis). The skills/competencies were based on the GeoTech Center Program Content Tool, a self-assessment tool based on workforce needed competencies defined in the GTCM, and ranged from 'fundamental' to 'advanced', using the following scale:

0 Unaware – no exposure to concept
1 Aware – basic knowledge. Have heard of concept but not applied or used it.
2 Novice – limited experience in using concept and needs in-depth guidance.
3 Proficient – can apply and use concept but needs some guidance.
4 Expert – can apply and use concept without assistance and teach others about the concept.

Post Self-Assessment: Upon completion of the pilot program, participants took the self-assessment again. According to the post self-assessments, *all* cohorts asserted significant knowledge gains across all knowledge areas. On *average*, there was a nearly 1-point increase in the level of knowledge gain reported per topic across all cohorts.

Continuation Program: The GeoTech Center received a supplemental grant to continue the educator's program. The mission, broader impact, intellectual merit, goals, objectives and activities for the continuation of the program are based on the outcomes, review, and evaluation of the pilot. The program is a hands-on process, providing educators with: 1) Evidence of expertise to continue to teach (or begin to teach) workforce-aligned GST; 2) Instruction regarding advances/changes in GST; 3) A community of practice in order to network, collaborate, and/or share content; 4) Pedagogical techniques to effectively teach GST; 5) Additional skills to create GTCM-based curriculum for real-world, work-related GST applications; 6) Information to share with students regarding career opportunities in the GST industry; 7) Notification to their respective administrators of the achievement.

***Mission Statement**:* Develop a Geospatial Technology Education Certification for secondary and post-secondary educators that will recognize educational expertise in workforce-aligned geospatial technology skills and competencies and demonstrate effective pedagogy in GST instruction.

***Broader Impact**:* As more GST-certified teachers expose more and more students to GST workforce-aligned curriculum, there is potential for a broad impact on society. Namely, a growing population of students introduced to geospatial concepts, tools, and techniques will lead to a growing geospatial-thinking society, an advancement of GST career awareness, more people in society who can critically analyze geospatial data, a potential for higher enrollment in GST courses and programs at post-secondary institutions, and a long-term expansion of the nation's GST workforce. The program will also address the impeding shortage of certified secondary educators needed to teach high school Advanced Placement (AP) coursework in GST. The activities will be delivered primarily online, which enables the project team to recruit participants with diverse interests and backgrounds from different geographical settings and regions. This will allow educators at schools serving rural/underserved populations (that don't necessarily have training/travel budgets) to advance their careers and better educate their students. Moreover, a resource repository that includes the capstone projects of the participants will be made openly available to any educator to access and modify through a Creative Commons license, enabling users to adapt the products to their needs and thereby expose even more students to GST concepts.

***Intellectual Merit**:* Due to the pervasiveness of GST across society today -- whether via in-car navigation, location-based services, or the maps we see in the news (e.g., COVID19 dashboards), educating the future workforce about its use, applications, and ethical considerations is imperative. In addition, there are several benefits of creating a workforce-based educator certification program: 1) Those same skills and competencies will become part of the curriculum taught in more classes and programs. 2) The students in the programs with a certified instructor will have assurance that the program includes workforce critical content. 3) Administrators will have a yardstick on which to base qualifications to teach the subject. And 4) Industry will recognize the skills and competencies to which the students from these programs have been exposed.

Student Honor Society: Incorporating a student GST honor society within the Community of Practice (CoP) of geospatial educators will provide students direct access to instructors from across the nation and also provide those same instructors with a dynamic platform of learners who will have an opportunity to share 'what works' and 'what doesn't work' in terms of GST pedagogy. A GST honors society has the potential to create a network for students to tap into for career goals, a platform to recognize achievement (and share that recognition with potential employers), and a source of benefits that would be professionally useful (for example, internship opportunities, discounts to take professional certification exams and attend conferences, etc.). A GST honor society would also have the benefit of assisting in *interdisciplinary* networking between students as well as between students and faculty. The project team will develop a GST Honors Society and reach out to any potential partners who would like to participate in the development and organization of the society.

Interested in Applying for the Program?

Our expected start date for the next program offering will begin in October, 2021. Application information will be coming soon. Until then, feel free to contact Nicole Ernst (nernst@hacc.edu) or Ken Yanow (kyanow@swccd.edu) for additional information.