

Cover

Federal Agency and Organization Element to Which Report is Submitted:

4900

Federal Grant or Other Identifying Number Assigned by Agency:

1955256

Project Title:

Meeting Workforce Needs for Skilled Geospatial Technicians through Virtual Geospatial Information Science Technology Education

PD/PI Name:

- **Jonathan Little, Principal Investigator**
- **Catherine M DuBreck, Co-Principal Investigator**
- **Heather Pierce, Co-Principal Investigator**

Recipient Organization:

Monroe Community College

Project/Grant Period:

06/01/2020 - 05/31/2023

Reporting Period:

06/01/2022 - 05/31/2023

Submitting Official (if other than PD/PI):

N/A

Submission Date:

N/A

Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions):

N/A

Accomplishments - What was done? What was learned?

If there is nothing significant to report during this reporting period, please check "Nothing to Report" if applicable.

* Required fields

* **What are the major goals of the project?**

Meeting Workforce Needs for Skilled Geospatial Technicians through Virtual Geospatial Information Science Technology will support the growing GIST industry across Upstate New York with the development of: (1) a 60-credit online Associate in Applied Science (A.A.S.) degree, and (2) a GIST micro-credential that is designed to upskill incumbent GIST technicians. The project goal is to meet the region's rapidly growing demand for geospatial technicians with advanced skills through program development and improvement by expanding the existing certificate program into an online A.A.S. GIST degree and developing a 9-credit micro-credential designed for on-the-job educational needs across Upstate New York. The development of the A.A.S. degree in GIST will require curriculum and educational materials development, which includes creation of three new courses and updating of all existing courses to meet current GIST education guidelines. In addition, six courses will be converted to an online format.

Meeting Workforce Needs with Virtual GIST will offer students unique online mentoring support by faculty and four alumni who are in the GIST workforce. It will also develop virtual GIST internships providing students with the skills needed to work remotely. Outreach to rural libraries, high schools, digital marketing campaign, and presentations at various Upstate New York GIST conferences will spread awareness and increase enrollment.

The six key objectives for this project are:

Objective 1: Build A.A.S. Degree in GIST by adding new courses and updating existing courses


Objective 2: Augment A.A.S. Degree in GIST with online course development

Objective 3: Provide "Open" GIST lab with Virtual Student Mentors and Alumni GIST Mentors

Objective 4: Provide virtual GIST internships

Objective 5: Deliver innovative outreach and enriched virtual support from Public Librarians

Objective 6: Recruitment of Introductory GIST students and GIST Professionals

- *** What was accomplished under these goals and objectives (you must provide information for at least one of the 4 categories below)?** 

Major Activities:

The Meeting Workforce Needs through Virtual GIST PI's offered and taught the three new courses for a second year. Students are now graduating with their A.A.S. in GIST as well as the GIST Microcredential. The PIs taught the three courses that comprise the microcredential: 1) Geospatial Data Acquisition and Management (fall of 2022), Web Mapping (spring of 2023), and Introduction to Geospatial Programming (spring of 2023). Course materials were modified slightly based on feedback from students in 2021-2022 and guidance of the GIST Advisory board to align with local workforce needs.

The GIST microcredential was the first to be offered by MCC, and required extensive collaboration with SUNY and the college to create a curriculum process. Thanks to these efforts, the college now offers more than ten microcredentials, including in workforce. A second cohort of students are expected to receive the GIST micro-credential end of spring semester 2023, as well as the A.A.S. in GIST.

The PI's have updated or revised labs in our original GIST courses. For example, in Introduction to GIS, a new lab on glaciers and volcanic hazards were developed and taught. In Introduction to Remote Sensing, students now use a workforce tool called Field Maps to collect data live. With changes in technology, the GIST program has updated the ArcGIS Pro and QGIS software, requiring minor changes in Introduction to GIS, Remote Sensing, Spatial Analysis, Introduction to Geospatial Programming, and Capstone in Geospatial Technology.

The PI's taught the three new GIST microcredential courses in an online environment for the second time. Web Mapping was taught in an asynchronous online model and included recorded guest speakers. The other two courses were taught online in a hybrid synchronous (2 hrs/week) and asynchronous model (2 hrs/week).

The Virtual GIST team has provided a third cohort of GIST students with one virtual student mentor (also available in person) and five alumni mentors. Three of the five alumni have been mentoring all three years. Two new alumni that recently graduated from the University of Buffalo in GIS were added to the mentor team, and one alumni had to move on due to the demands of starting their own GIS business. For a third year in a row, each alumni mentor provided one Ask Me Anything session, with an audio recording available. Ask Me Anything sessions allow students to ask alumni any GIST and career related questions. In addition, two student tutor provided online support (and in person) during this same time period.

The Virtual GIST program offered 12 virtual internships to Capstone students to 12 students. Capstone students were given pre and post surveys, and were matched with hosts depending on the skills and interests. Virtual internships hosts included the Holocaust, Genocide, and Human Rights Project (HGHRP), National GeoTech Center of Excellence, FLOW - Traverse City, University of Maine, Washington State Department of Health, Genesee Land Trust, and others. Students presented their work on May 18, 2023.

Three GIST A.A.S. graduates participated in the second paid GIST internship summer of 2022. Hosts included the Genesee Land Trust and the New York State Department of Health at SUNY Albany (2 students).

Two additional GIST enrolled students were given an opportunity summer of 2022 to conduct research with the University of Maine's CAFS (Center for Advanced Forestry Systems for 8 weeks as a part of the Skills Training in Advanced Research & Technology (START) Supplemental Funding Request for ATE at Monroe Community College (Award #1955256) with IUCRC Phase 3 at University of Maine - CAFS. Students presented their work with the CAFS faculty, staff and students on August 3, 2022. Student presentations were titled: "Cloud Masking with Machine-Learning Algorithm", and "MCC GIS Internship Successes and Possibilities". The PI presented an overview of the collaboration at the semi-annual CAFS board meeting October 25, 2022. During the spring of 2023, a Geospatial Capstone student continued the research from the summer of 2022, and integrated machine learning to develop a QGIS plug in to remove clouds and shadows from satellite imagery.

One GIST graduates will be provided with a paid summer (2023) GIST internship with the University of Maine CAFS. A new collaboration was formed with the Town of Farmington Water and Sewer

Department, and the Town plans to hire 1-3 GIST students (either current or graduates) pending interviews. Out of 12 A.A.S. students that are expected to graduate, two to four will receive a paid internship

The PIs provided two workshops for Public and College Librarians between June of 2022 and May of 2023. Ten public and college librarians attended a one-day training in September 8 (2022) in Albany, NY on: what is GIST, virtual desktop access, how to support students, and introduction to ArcGIS Desktop and ArcGIS Pro. A follow up workshop was provided October 6 (2022) focused on supporting introductory students with spatial data. Librarians supported introductory students the following week in acquiring GIST data for their project. In addition, the PI met with an MCC library intern to share more about GIS (Feb 8, 2023).

The team recruited students through the GIST web page, social media campaign (e.g., Twitter, email listserv), radio, articles, and conferences. An MCC GIST student was interviewed on radio (WHAM 1180) focused on GIST program and humanitarian mapping (June of 2023). PIs make updates to the GIST web page to note current GIST events, as well as upcoming courses/program. Esri (GIS company) reached out to our program, and published an article about it fall of 2022, titled: Microcredential Program Ensures Workplace Success. The GIST program was also highlighted in the Rochester Business Journal (Feb 17, 2023).

PIs presented informally or formally at numerous conferences, including the GeoEd (June of 2022), Northeast Arc User Group Conference (NEARC) Nov of 2022, Center for Advanced Forestry Systems (October of 2022), two humanitarian mapping events held Nov 2022 and April 2023, Association of American Geographers (March 2023), and the GIS SIG regional conference (April 2023).

Advisory Board: The GIST Advisory Board held a formal meeting October 7 of 2022. The Advisory Board provided suggestions on course improvements, specifically for Geospatial Data Acquisition and Management, Web Mapping, and Introduction to Geospatial Programming. The Advisory Board were pleased with the progress of the A.A.S. in GIST and the microcredential. The group is made of community college faculty (not MCC), four-year university faculty, regional GIS employees, and the Director of the National GeoTech Center.

Unexpected Positive Results:

MCC's mapping club was highlighted by YouthMappers (USAID funded) for their engagement of women leadership in GIS (spring of 2023).

Due to the Skills Training in Advanced Research & Technology (START) with MCC & the University of Maine -CAFS project, two additional students received a paid internship summer of 2022.

Funded externally from MCC, one to three of our recent GIST graduates will receive a paid internship with the Town of Farmington Water and Sewer district and another with the Town of Greece.

Two of our GIST students participated in a paid research experience as a part of an NSF IRES Rwanda project led by the Rochester Institute of Technology summer of 2022.

The program was awarded a new ATE International Training and Education in Advanced Technologies (ATE-I) titled: Partnership building for equity in GIST for \$31,527.

Two MCC Librarians that participated in the 2021 cohort have supported and added murals/maps on the walls in a small MCC computer lab called the GIST hub. One alumni mentor and one peer tutor use this space when offering support both virtually and in person.

Formed a new partnership with the New York State Division of Criminal Justice Services.

Specific Objectives:

Objective 1: Build A.A.S. Degree in GIST by adding new courses and updating existing courses

The A.A.S. in GIST and microcredential has seen the second cohort of students graduate with the new degree.

Objective 2: Augment A.A.S. Degree in GIST with online course development

Five GIST courses continue to be modified as technology changes, and taught in an online environment

Objective 3: Provide "Open" GIST lab with Virtual Student Mentors and Alumni GIST Mentors

Student and alumni mentors provided online support throughout the fall 2022 and spring 2023 semester.

Objective 4: Provide virtual GIST internships

Capstone in Geospatial Technology students were provided a virtual internship.

Objective 5: Deliver innovative outreach and enriched virtual support from Public Librarians

Librarians participated in an all-day virtual workshop and provided remote support to introductory GIS students.

Objective 6: Recruitment of Introductory GIST students and GIST Professionals

PIs led a significant social media campaign and the program at conferences, radio, and a published article.

- Significant results:

Objective 1: Build A.A.S. Degree in GIST by adding new courses and updating existing courses

- The A.A.S. in GIST and microcredential are now being offered to a second cohort of students after being approved by the college's Board of Trustees and the State University of New York the previous year. The three microcredential courses are now being offered for a second year: 1) Geospatial Data Acquisition and Management by senior personnel Howard, 2) Web Mapping by PI Little, and 3) Introduction to Geospatial Programming by SP Howard. Time was used in the slight modification of these three courses based on feedback from the previous year and the GIST advisory board.

Objective 2: Augment A.A.S. Degree in GIST with online course development

- For the second year, Introduction to GIS, Introduction to Remote Sensing, Cartography, Spatial Analysis and GIS, and Capstone in Geospatial Technology were taught in an online environment. To highlight, a new lab focused on glaciers and volcanic hazards was developed by PI Pierce for Introduction to GIS, and a Field Mapping lab for Introduction to Remote Sensing.

Objective 3: Provide "Open" GIST lab with Virtual Student Mentors and Alumni GIST Mentors

- Two students and five alumni mentors provided online support over the course of the 2022-2023 academic year.

Objective 4: Provide virtual GIST internships

- A total of 12 different virtual internships provided twelve students with an internship in Capstone in Geospatial Technology. Twelve students completed the virtual internship May of 2023. Coursework involves a personal GIST portfolio, competency exam, and either an unpaid internship or simulated internship through case studies. In either option, the student will work on the project for at least 45 hour, and it is for credit, and not paid.
- See unexpected positive results earlier to see details on paid internships.

Objective 5: Deliver innovative outreach and enriched virtual support from Public Librarians

- Ten librarians participated in an all-day virtual workshop September of 2022. Nine of these participants completed a follow up workshop and provided introductory students with support. One MCC library intern was given an overview of GIS and how it can be used to support research (Winter 2023).

Objective 6: Recruitment of Introductory GIST students and GIST Professionals

- Targeted recruitment efforts in the Introductory GIS courses have consisted of “Ask Me Anything” (AMA) sessions twice a semester. These sessions consist of answering a list of student questions, as well as a discussion about GIS as a career. In addition to the alumni providing AMA’s, a local GIS professional from the Town of Webster provided a Q/A.
- During spring of 2023, we presented at a local high school about our GIS program, and flyers were shared to over 30 student.
- Recruitment efforts for GIS professionals have consisted of exhibiting a booth at a local GIS conference, publication in a prominent GIS magazine, as well as the use of social media. In addition, the college hosted local GIS professionals with an online Geospatial Watch Party as a part of the NY State GIS Conference. Unfortunately, due to high school and college administrative requirements and turnover, no dual credit courses were offered over the 2022-2023 year. It appears, administrative turnover has resulted in new goals, although the PI continues to make effort to collaborate with local high schools.
 - Key outcomes or Other achievements:

External evaluator Donna Lange reported that in year 3, “Meeting Workforce Needs for Skilled Geospatial Technicians through Virtual Geospatial Information Science Technology Education” has “met or exceeded all project’s outcomes proposed medium term outcomes by the end of year three”. Here is a summary of her report:

- Implemented project components on time as planned
- Made excellent progress towards achieving project outcomes and is on track to exceeding all project outcomes.
- Created new courses and updated existing courses using the ATE GeoTech Center’s resources that meet the regional industry needs.
- Received approval from the NYS DOE for the AAS Degree in GIST.
- Met target course enrollment numbers for the current project timeline.
- Increased enrollment of students from underrepresented groups to 36%.
- Offered professional development to librarians that was well received and created interest in supporting GIST students.
- Implemented an alumni mentoring program model that effectively supports students and provides role models for students.
- Established an effective mentoring model for college librarians to successfully support students in finding data for GIS projects.

Year 3 Outcomes:

1. Projected Outcome (year 3): 20 students will enroll in online Web Mapping, UAS Data Acquisition, and Programming for GIS, and 16 will pass (Obj. 1 and 2)

Actual Outcome (Year 3): By the end of year three, 43 students enrolled in Web Mapping and 40 passed (93%), while 23 students enrolled in Geospatial Data Acquisition and Management with 91% passing (21/23), and 19 enrolled in Introduction to Geospatial Programming with 89% passing (17 /19).

2. Projected Outcome (year 3): 60 students will enroll in online Cartography and Spatial, and 48 will pass. (Obj. 2)

Actual Outcome (YR3): By year 3, 68 college students enrolled in Cartography and 89% passed (68/76). By year 3, 48 college students enrolled in Spatial Analysis and 92% passed (44/48).

3. Projected Outcome (year 3): 48 students will enroll in the online GIST Capstone Course, 42 will pass. (Obj. 2)

Actual Outcome (YR3): By the end of year 3, forty-one college students enrolled in online GIST Capstone Course and 90% passed (37/41).

4. Projected Outcome (year 3): 16 students will enroll in approved micro-credential and 14 will graduate. (Obj. 2)

Actual Outcome (YR3): By the end of year 3, sixteen students enroll in the micro-credential and 14 graduated. Year 2 was the first year the micro-credential program was offered.

5. Projected Outcome (year 3): 15 new students will enroll annually into the AAS degree, attain an 80% retention rate in the programs first year (year 2 of grant) and a 85% retention rate the second year (year 3 of grant), graduating 14 students per year from the program (obj. 1 and 2).

Actual Outcome (YR3): Twelve students enrolled into the AAS degree, and one will graduate from the program in year 2. All students from year 2 were retained (100%) and graduated spring of 2023. A few additional students enrolled into the AAS degree,

and a total of 13 graduated by spring of 2023 (yr 1 + 2 total).

6. Projected Outcome (year 3): 360+ hours of online support will be provided from Alumni GIST/student mentors

Actual Outcome (YR3): Four alumni supported students for 15 weeks in the fall 2022 semester, and an additional 15 weeks spring of 2023 for a total of 120 hours. Two additional hours were provided during the alumni's ask me anything sessions for a total of 366 hours by year 3.

7. Projected Outcome (year 3): 18 students will complete a virtual internship (Obj. 4).

Actual Outcome (YR3): In year 1, 14 students completed a virtual internship, 11 in year 2 and 12 in year three for a total of 37 students. Students were matched to their host based on their skills, and interests. The instructor in Capstone in Geospatial Technology met virtually with the hosts multiple times during the semester.

8. Projected Outcome (year 3): Ten recent graduates will receive a paid internship. (Obj. 4).

Actual Outcome (YR3): Three recent graduates completed a paid internship summer of 2022. In 2023, three additional students will receive a paid internship for a total of twelve by year 3.

As an outcome of the awarded (May, 2022) Skills Training in Advanced Research & Technology (START) supplement with Monroe Community College's GIST program & the University of Maine - Center for Advanced Forestry Systems (CAFS) project, two additional students received a paid internship summer of 2022. A collaboration with the Rochester Institute of Technology provided two additional students with a paid GIS experience summer of 2023, for a total of 7 in 2022.

Additional students have been given a paid internship through organizational funds. For example, one student had a paid internship through the Town of Greece, NY spring of 2022, and 1 to three are expected to have a paid internship with the Town of Farmington summer of 2023.

9. Projected Outcome (year 3): 40 public and MCC librarians will participate in PD. (Obj.5)

Actual Outcome (YR3): A third cohort of nine librarians, predominantly from the Capital region and Hudson valley completed the all-day professional development workshop (Sept) and the follow up workshop (Oct) in year 3. In year 1, there were 12 that completed the all-day fall workshops and in year 2, there were 16 for a three-year total of 37. In addition, 11 more attended a two-hour training in the spring of year 2, over 50 in year 1, and one intern for a two-year total of 99.

10. Projected Outcome (year 3): Enrollment of underrepresented students in program will increase to 25% (Obj. 6)

Actual Outcome (YR3):

Previous data in underrepresented GIST Certificate students shows an increase from 10% in fall of 2019, 20% in fall of 2020, and 28% in fall of 2021. Since Fall of 2022, the A.A.S. in the GIST enrollment shows 5 of 13 as underrepresented giving us 38%.

11. Projected Outcome (year 3): 10% of introductory GIST students will be retained and 30 attend GIST summer camp (Obj. 6)

Actual Outcome (YR3): 32 high school students attended a virtual summer camp by year 3. Unfortunately, since these are minors, we have been unable to track these students. During COVID, dual credit offerings were hard to maintain as the technology to go virtual was cost prohibitive. Administrative changes and retirements have made new partnerships challenging.

*** What opportunities for training and professional development has the project provided?**



A six-hour professional development workshop (Sept 8) for ten librarians spread geospatial awareness and the background needed to support introductory GIST students in their search for geospatial data. A 1.5 hour workshop on Oct 6 was held to review and prepare librarians as they support introductory GIST students with acquiring spatial data for their project. An individual conversation and overview of GIS was provided to an MCC intern winter of 2023.

*** Have the results been disseminated to communities of interest? If so, please provide details.**

Dissemination has occurred at local events, regional, and national conferences.

- Senior Personnel Howard presented at GeoEd titled: *Strategies for Cultivating Successful Virtual Internships in GIS* (June 7, 2022)
- SP Howard led a drone day introduction to interested students and the public Sept 17, 2022.
- PI Little led a GIST Advisory Board meeting (Oct 7, 2022)
- PI Little presented at the NSF Center for Advanced Forestry Systems semi-annual board meeting (Oct 25, 2022)
- PI DuBreck presented at the Northeast ArcUser group conference Nov 6, 2022. The presentation was titled: *Enhancing the Virtual Geospatial Experience: A Monroe Community College Case Study*
- PI Little presented at the Association of American Geographers conference in Denver, Colorado (March 24, 2022). The presentation was titled: *International*

Virtual Internships and Research Opportunities in Geospatial Technology for Community College Students

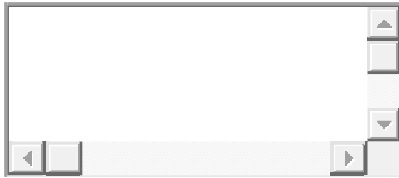
- Two MCC GIST Capstone students presented at GIS SIG (April 11, 2023). Presentations focused on using GIS Story Maps to highlight a Holocaust Survivor, while the other presentation was titled: *You're Right To Vote: Examining the Relationship Between Income and Voter Turnout in Monroe County, NY*. PI Little and PI Pierce were the advisors.
- A GIST Capstone student presented at the SUNY Undergraduate research conference (April 14, 2023) with PI Little chaperoning, and SP Howard and Dr. Kasey Legaard (University of Maine) advising. The poster was titled: *"OpenCloudRemover": A Python-based QGIS Plugin for Efficient Cloud Removal from Sentinel2 Imagery Using Machine Learning*
- MCC's student led mapping club held an in person and virtual mapathon during geography awareness week (November 14, 2022). The event was co-sponsored by the college's Global Education and International Services Office and Holocaust, Genocide, and Human Rights Project. An additional mapping event was held in person on March 28, 2023. PI Little is the advisor for the club.
- In the January of 2023, PI Little met with Anthony D'Abruzzo, Training Coordinator Office of Crime Analysis & Strategic Partnerships with the NYS Division of Criminal Justice Services. Several additional meetings in the spring of 2023 has led to a new partnership and a new course integrating the three new GIST courses, focused on crime mapping expected fall of 2023.
- The Micro-credential page was developed continues to highlighted our GIST micro-credential, A.A.S. in GIST, and GIST Certificate. Go to: <https://www.monroecc.edu/special-programs/geospatial-information-and-technology/>
- On May 3, 2023, one MCC GIST students was showcased at the college's Scholars' Day. The presentation titled: *Holocaust Survivors of Rochester: Their Stories and Legacy* used GIS Story maps. SP Howard served as an advisor.
- The GIST Advisory Board met formally October 7 of 2022.
- The Rochester Business Journal noted MCC's GIST program Feb 20, 2023.
- Esri highlighted MCC's microcredential as a part of their online user story series. The article was titled: How to Modernize GIS Education with a Microcredential to Ensure Workplace Success. Go to: <https://www.esri.com/en-us/lq/industry/education/stories/ensuring-workplace-success-with-a-gis-microcredential>
- Esri highlighted MCC's microcredential program in their ArcUser Magazine fall 2022 edition. The article was titled: *Microcredential Program Ensures Workplace Success*
- Four virtual Ask Me Anything webinars were led by MCC's GIST alumni three fall of 2022, and one more spring of 2023. Audio recordings are available on the program's NSF ATE web site. These were hosted by PI DuBreck.
- The Mapping Club hosted an Ask Me Anything event April 20, 2023 with a local GIST professional.
- Pi DuBreck sent emails to many list serv fall of 2022, highlighting the new GIST program opportunities, including the: New York State GIS Association, other state affiliated GIS Associations, and LinkedIn, MCC highlighted our geospatial program through social media, from twitter to Facebook.
- The Monroe Community College (MCC) GIST program web site continues to be updated. PI Little continues to update the NSF ATE Virtual GIST web site which includes all important events since the start of this grant.

- *** What do you plan to do during the next reporting period to accomplish the goals?**
 - A new course that integrates the three microcredential courses will be developed focused on crime mapping. This new course is to support New York State public safety initiatives.
 - Geospatial Data Acquisition and Management will be offered at Monroe Community College for the third time fall of 2023. The class will be offered as a remote live/hybrid course. An alumni plans to support students in the class for two hours each week fall of 2023.
 - Introduction to Geospatial Programming will be offered again for the third year, in the remote live/hybrid format during spring of 2024. Web Mapping will be offered a third time as well, completely online during spring of 2024.
 - Introduction to GIS, Cartography, and Remote Sensing curriculum will be fine-tuned and modified as needed based on new materials from the 2023 GeoEd conference. As technology evolves, and artificial intelligence plays a larger role in the geospatial industry, a total of three modules need revision. A phased process will be implemented with two new modules, including videos to support the new labs developed summer of 2023.
 - Two alumni will continue provide 60 hours of online support to students in Introduction to GIS, Remote Sensing, as well as Spatial Analysis and GIS. A third year of online alumni support will be given to students in Data Acquisition and Management as well as Introduction to Geospatial Programming.
 - A new cohort of students will complete virtual internships in Capstone in Geospatial Technology.
 - At least two new students will receive a paid summer GIST internship.
 - The GIST Advisory Board will meet in person fall of 2023 to provide an update and fine tune the new courses and program.
 - Recruitment efforts will expand to other states within SUNY's new tuition match.
 - Dissemination will continue at several GIS conferences.

Supporting Files

You may upload pdf files with images, tables, charts, or other graphics in support of this section. You may upload up to 4 pdf files with a maximum file size of 5 MB each.

- **Please select a file.**
- Description (required if uploading a file). Please provide a description of the content contained in the attached file.



- Evaluation
External evaluator Donna Lange reported that in year 3, “Meeting Workforce Needs for Skilled Geospatial Technicians through Virtual Geospatial Information Science Technology Education” has ...
 - ArcUser Magazine article titled: Microcredential Program Ensures Workplace Success
 - Student award letter for paid virtual internship
 - USAID recognized MCC’s Mapping Club for Woman leadership and participation

Products

[Submit New Product\(s\)](#)

Select the type of product you want to add to your report or upload multiple products using BibTex file.

Select

Product:

--OR--

Supporting Files

You may also upload PDF files with images, tables, charts, or other graphics in support of this section. You may also upload up to 4 PDF files with a maximum file size of 5 MB each.

- **Please select a file.**
- Description (required if uploading a file). Please provide a description of the content contained in the attached file.
 - Summer research experience final poster with the University of Maine and the NSF Center for Advanced Forestry Systems. Project integrated machine learning and remote sensing. https://atecentral.net/downloads/24849/Casmir_FinalPoster.JPG
 - MCC's GIST web site <http://www.monroecc.edu/go/geospatial>

The college's GIST home page.

- NSF ATE Virtual GIST Main Web Site
https://atecentral.net/msites/MCC_GIST/home

Meeting Workforce Needs for Skilled Geospatial Technicians through Virtual Geospatial Information Science Technology Education activities in 2020-2023.

- Esri user story titled: How to Modernize GIS Education with a Microcredential to Ensure Workplace Success
<https://www.esri.com/en-us/industry/education/stories/ensuring-workplace-success-with-a-gis-microcredential>

Participants & Other Collaborating Organizations - Who has been involved?

For NSF purposes, for separately submitted and awarded collaborative proposals, the PI should report progress on his/her institution's portion of the collaborative effort only.

In each of the subsections below, note which collaborators or contacts are involved in data contribution and/or management.

- * Required fields
 - * **What individuals have worked on the project?**

What individuals have worked on the project?

Name Most Senior Project Role Nearest Person Month Worked

Little, Jonathan PD/PI 1

DuBreck, Catherine Co PD/PI 1

Pierce, Heather Co PD/PI 1

Full details of individuals who have worked on the project:

Jonathan Little

Email: jlittle@monroecc.edu

Most Senior Project Role: PD/PI

Nearest Person Month Worked: 1.5

Contribution to the Project: Jonathon Little led curriculum development for the new A.A.S. in GIST, the micro-credential, and online course conversions (Obj.1 & 2). He assisted with professional development for MCC and public librarians (Obj. 5). He oversees dissemination, recruitment efforts (Obj.6) and the lead GIST mentor (Obj. 3); updated Introductory Remote Sensing labs (Obj. 2); and developed, coordinated, and assisted in the implementation of the virtual GIST internships (Obj. 4). Little provided budget oversight, write annual and final reports, monitor all project activities, and interact with the external evaluator.

Principal Investigator will be compensated for work to oversee the START Maine student portion of

the project, revise activities as needed, develop a module for remote sensing, and co-participate alongside the students and monitor the students well-being and learning objectives summer 2022.

Funding Support: \$11,116, 1.5 months, Summer 2022. Grant pays Other Personnel for equivalent of 3 Release Hours in Fall 2022, and 3 Release Hours Spring 2023 (additional 2.0 release spring of 2023).

Catherine M DuBreck Email: cdubreck@gmail.com Most Senior Project Role: Co PD/PI Nearest Person Month Worked: 1

Contribution to the Project: Catherine DuBreck shared information about the GIST events as the public relations coordinator (Obj. 4, 5, & 6). She led the GIST Alumni mentors (Obj. 3), and disseminated information via social media (Obj. 6).

Funding Support: \$832 0.25 month Summer 2022, \$4,200 1.0 month Fall 2022 and Spring 2023.

Heather Pierce Email: hpierce@monroecc.edu Most Senior Project Role: Co PD/PI Nearest Person Month Worked: 1

Contribution to the Project: Heather Pierce reviewed all new course materials, aligned courses with industry standards, and course learning outcomes (Obj. 1 & 2). She updated and converted Cartography and Spatial Analysis to online and taught each course (Obj. 3). She also updated labs in Introduction to GIS (Obj. 2). She co-led the summer librarian professional development (Obj. 5).

Funding Support: \$2,260, 0.5 month, Summer 2022.

Grant pays Other Personnel for equivalent of 3 Release Hours in Fall 2022.

- *** What other organizations have been involved as partners?** Nothing to report

- ***Were other collaborators or contacts involved? If so, please provide details.** 

List any other people or organizations involved in the project that were not separately reported as participants or partner organizations.

- New
 - University of Maine
 - NSF funded Center for Advanced Forestry Systems
 - Schoodic Institute
 - University of Maine at Fort Kent
 - Barbara Wheatland Geospatial Lab at U of Maine
 - Holocaust, Genocide, and Human Rights Project (HGHRP)
 - Washington State Department of Health
 - Saving Africa's Nature (SANA)
- State Department of Health SUNY Albany

- River Area Council of Governments
- National GeoTech Center of Excellence
- Water for South Sudan
- Cornell University
- New York Sea Grant
- New York GIS Association
- Geographical Information Sharing – Special Interest Group (GIS-SIG)
- MRB Group
- FLOW - Traverse City
- Genesee Land Trust
- The Nature Conservancy
- NYS Department of Environmental Conservation
- New York Geographic Alliance
- SUNY Cortland Geography
- Syracuse University Information Library Sciences
- EagleView
- LaBella Associates
- Rochester City School District
- Webster Central School District
- University of Rochester
- Rochester Institute of Technology
- American Red Cross
- Youth Mappers (funded by The United States Agency for International Development)
- Upward Bounds
- Rochester Regional Library Council
- Pioneer Library System Monroe County Library System
- Capital District Library Council

Impact - What is the impact of the project? How has it contributed?

INSTRUCTIONS - This component will be used to describe ways in which the work, findings, and specific products of the project have had an impact during this reporting period.

For NSF purposes, include, where appropriate, discussion of data resources and the acquisition of data skills. Include the emergence of new career paths, such as data scientists, or new disciplines.

If there is nothing significant to report during this reporting period, please check "Nothing to Report" if applicable.

* Required fields

• *** What is the impact on the development of the principal discipline(s) of the project?**

Describe how findings, results, techniques that were developed or extended, or other products from the project made an impact or are likely to make an impact on the base of knowledge, theory, and research and/or pedagogical methods in the principal disciplinary field(s) of the project.

As a result of successfully bringing geospatial awareness to many public librarians for a third year, the New York GIS association and its education committee, as well as public librarians across the state, have indicated that they would like to see increased geospatial workshops for librarians.

A couple of four year universities across New York State and Maine are now interested in partnering with our advanced GIST students to support their research efforts in GIS.

*** What is the impact on other disciplines?**

Describe how the findings, results, or techniques that were developed or improved, or other products from the project made an impact or are likely to make an impact on other disciplines.

As a result of a presentation at the American Association of Community Colleges on how virtual internships provide equitable experiences, individuals in other STEM fields, including robotics expressed an interest in collaborating and implementing their own virtual internships. Furthermore, interest at MCC in virtual internships has increased. The PI is in the early stages of writing a new NSF ATE proposal focused on virtual internships in geospatial technology and other workforce field, with a focus on strategies to support diversity, equality and inclusion in STEM internships.

*** What is the impact on the development of human resources?** 

Describe how the project made an impact or is likely to make an impact on human resource development in science, engineering, and technology.

Ten librarians received geospatial awareness and spatial data acquisition training. Of these 10, nine supported introductory GIST students with acquiring spatial data.

PIs' teaching and mentoring in GIS science and technology areas deepened the skills of New York librarians.

***What was the impact on teaching and educational experiences?**

Describe how the project made an impact or is likely to make an impact on teaching and educational experiences.

The microcredential in GIST was the college's first. Several micro-credentials have been submitted after others have noted strong student interest in microcredentials. In addition, the State University has continued to reach out to the PI to support their efforts in expanding microcredentials.

*** What is the impact on physical resources that form infrastructure?**

Describe ways, if any, in which the project made an impact, or is likely to make an impact, on physical resources that form infrastructure, including physical resources such as facilities, laboratories, or instruments.

As a result of the increased use of the virtual desktop, the college has used their own funds to purchase a virtual desktop failover system to avoid any student interruptions. In addition, the college has purchased 20 high end laptops for those students that have the need in the geospatial technology and geoscience program.

• *** What is the impact on institutional resources that form infrastructure?**

Describe ways, if any, in which the project made an impact, or is likely to make an impact, on institutional resources that form infrastructure,

Nothing to report

*** What is the impact on information resources that form infrastructure?**

Describe ways, if any, in which the project made an impact, or is likely to make an impact, on information resources that form infrastructure,

Nothing to report

*** What is the impact on technology transfer?**

Describe ways in which the project made an impact, or is likely to make an impact, on commercial technology or public use.

Nothing to report

*** What is the impact on society beyond science and technology?**

Describe how results from the project made an impact, or are likely to make an impact, beyond the bounds of science, engineering, and the academic world.

Geospatial technologies are increasingly important for understanding our complex world. Many specialize in areas such as agriculture, mining, health care, retail trade, urban planning, crime mapping, or military intelligence. For example, the New York State Division of Criminal Justice Services has reached out to our program to deliver a unique course that integrates two new GIS courses on geospatial data acquisition and web mapping.

GIS awareness has increased in all of Upstate New York as a result 99 librarians receiving professional development and a total of 23 (3-year total) supporting introductory GIST students.

Twelve students completed the virtual internship spring of 2023. In this year's cohort, three GIST students plan to take the complete and paid internship summer of 2023, five plan to seek GIST employment, three plan to transfer to a four-year university, and the remaining students are undecided.

*** What percentage of the award's budget was spent in a foreign country?**

Describe what percentage of the award's budget was spent in foreign country(ies) for this reporting period. If more than one foreign country was involved, identify the distribution of funding between the foreign countries.

Nothing to report

Changes/ Problems

INSTRUCTIONS -

The PI is reminded that the grantee is required to obtain prior written approval from the awarding agency grants official whenever there are significant changes in the project or its direction. See agency specific instructions for submission of these requests.

If not previously reported in writing to the agency through other mechanisms, provide the following additional information or state, "Nothing to Report", if applicable:

* Required fields

Notifications and Request

For more information on Grantee Notifications to and Requests for approval from the National Science Foundation, please visit the Notifications and Requests section in FastLane or refer to Exhibit VII-1 of the Proposal & Award Policies & Procedures Guide (PAPPG).

- *** Changes in approach and reasons for change**

Nothing to report

- **Actual or Anticipated problems or delays and actions or plans to resolve them**

Nothing to report

- *** Changes that have significant impact on expenditures**

Nothing to report

- *** Significant changes in use or care of human subjects**

Nothing to report

*** Significant changes in use or care of vertebrate animals**

Nothing to report

*** Significant changes in use or care of biohazards**

Nothing to report

*** Has there been a change in your primary performance site location from the originally proposed? If so, please provide the location of your new primary performance site and reason for the change in location.**

Nothing to report

Special Requirements

*** Required fields**

- **Respond to any special reporting requirements specified in the award terms and conditions, as well as any award specific reporting requirements.**

Nothing to report