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Preview of Award 1742304 - Annual Project Report

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Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	1742304
Project Title:	Scholarships-Creating Opportunities for Applying Mathematics
PD/PI Name:	Yu-Ju Kuo, Principal Investigator Frederick A Adkins, Co-Principal Investigator Daniel A Burkett, Co-Principal Investigator Michele Norwood, Co-Principal Investigator Edel Reilly, Co-Principal Investigator
Recipient Organization:	Indiana University of Pennsylvania
Project/Grant Period:	03/15/2018 - 02/28/2023
Reporting Period:	03/01/2019 - 02/29/2020
Submitting Official (if other than PD\PI):	Yu-Ju Kuo Principal Investigator
Submission Date:	02/28/2020
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	Yu-Ju Kuo

Accomplishments

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

(1) increase numbers of students selecting STEM degrees, continuing successfully to graduation, and entering the STEM workforce or graduate study;

(2) implement and study models, effective practices, and strategies that enhance recruitment, retention, student success, workforce training, professional development, and graduation; and

(3) contribute to implementation and sustainability of such effective curricular and co-curricular activities.

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

Major Activities:

1. Linked Courses for Freshmen: All students registered for ECON 121, *Microeconomics* and MATH 125, *Calculus I*, or MATH 126, *Calculus II*, are scheduled to be in the same course section. These linked courses for cohort students builds cohesion and improves student-to-student networking.

2. For Freshmen: Incoming students met together with program mentors before the start of the fall semester. This meeting provided an opportunity to meet other new students and was design to introduce students to the expectations of the S-STEM program as well as to help them be ready for the university experience. New students also completed an online training activity which had them review TED talks on 'growth mindset' and 'grit' and share a written response and reaction to how these factors could aid them as new college students.

3. Peer-Led Team Learning Sessions (PLTL): Scholars that are in *Calculus I, Calculus II,* or *Linear Algebra* participated in PLTL session once a week. These sessions are lead by trained upperlevel undergraduates and feature exploration of applications and topics related to content covered in class. Activities are timed to emphasis content learned in class by exposing students to use of the mathematical content.

4. Engage Students in Research: In Spring 2019, 4 students submitted research proposals plans and 3 submited their progress reports. Three scholars applied and were accepted to participate in the IUP Research Experiences for Summer Scholars (RESS) program in 2019. A total of 6 submitted research proposals and reports in Fall 2019 (including three ongoing from their summer research activities). Students participated in the summer research program gave presentations about their research and experience in the August monthly meeting of the scholarship cohort.

5. Formalized Peer-Mentoring Program and Build Culturally Diverse Climate: A get-to-know all cohort members activity (formatted like rapid interview / speed-dating) is run during the first meeting of each semester. Students fill out a survey indicate their preferred small group members to jointly attend three activities across the semester. The groups are created based on students' preferences, mixing members across years and disciplines. Each group must have at least one graduate student or senior student as a mentor. Each group attends three activities with at least one on academic or social issues, like an IUP Six O'clock Series event.

6. Networking with Alumni: We had three alumni to talk about their careers and job opportunities in their fields during monthly meetings (either through video conference or physically coming to the cohort meeting) between Spring 2019 and Fall 2019. Another three alumni will travel to IUP and shared their career, research and graduate school experiences in March 2020. In addition, two graduate students also shared their internship experience and plans.

7. Pre-Semester Workshops for graduate students: 4-day long workshops were held during the week before the Fall semester started. Topics include review in Calculus, Linear Algebra, Proof Techniques, Mathematical Modeling using Matlab, Introduction to Probability and STatistics, Python. The workshops also open to all S-COAM undergraduates. Two undergraduates particpated two workshops.

8. SIAM Visiting Lecture, September 9, 2019
Dr. Stephanie Fitchett
Data Scientist, Transamerica

a) Open Session, Come and meet with Dr. Fitchett, 10:00–11:00 a.m.
b) Lunch with S-COAM scholars, 12-1
c) Meet with the dept chair and faculty members to discuss data science curriculum
d) Public Presentation: "Data Science, Machine Learning, and Some Examples from

Life Insurance Underwriting", 3:30–4:30 p.m.
e) Public Presentation: "What Could I Do in Industry? A handful of statistics and mathematics projects where science and business drive the questions", 6:30–7:30 p.m.

9. Alumni Day, March 16, 2020
Asheligh Craig (Department of Defense),
Derek Hanely (Ph.D. student in University of Kentucky),
Lisa Vatavuk (DevOps Engineer, Risk Focus)

a) Ashleigh Craig and Derek Hanely will have lunch with S-COAM students
b) Asheligh Craig and Derek Hanely will give individual talks on their work and resesarch between 3:30pm-4:30pm
c) Ashleigh Craig, Derek Hanely, and Lisa Vatavuk be the panelist for the career panel between 6:30-7:30pm

10. Two workshops on 3D printing were held in Fall 2019 and two Mathematica workshops were held in Feb. 2020.

Specific Objectives:

- Improve retention of undergraduate and graduate students majoring in mathematical areas at IUP
- Enhance diversity of STEM students at IUP through targeted recruitment initiatives
- Increase recruitment for the M.S program in Applied Mathematics at IUP through efforts focused on state universities in Pennsylvania, regional colleges, and regional conferences
- Create a pipeline for recruitment of STEM undergraduates from regional community colleges
- Increase numbers of science undergraduates pursuing a mathematics minor and taking advanced applied mathematics courses to enhance their preparation for the workforce & further studies
- Enhance the academic environment, student culture, and research opportunities
- Strengthen students' leadership abilities, technical skills, and aptitude for life-long learning

Significant Results:

1. Among 30 S-COAM recipients in Spring 2019, there were 5 Black or African, 2 American Indian or Alaska Native, 2 Hispanic or Latino, and 8 females. There are 23 undergraduates (6 math and 17 science majors) and 7 graduate students in Applied Mathematics.

2. Among 23 undergraduate students awarded in Spring 2019, 3 didn't continue participating the program activities because of no need for Fall 2019. The remaining 20 students, except 2 (CGPA 2.5 and 2.85), met GPA requirements of 3.0 for Fall 2019 renewal. One graduated in May. Among the remaining 19 students, three continued participating the program's cohort activities even though they didn't receive scholarship funds due to lack of financial need.

3. Among 7 students in the M.S. in Applied program in Spring 2019, all met GPA requirements of 3.2 for Fall 2019 renewal. Two had internships and graduated in Summer 2019-- both obtained job offers before graduation.

4. In Fall 2019, there were 34 S-COAM recipients (8 in M.S. in Applied Math and 26 undergraduates). Among them, 7 are Black or African, 2 are American Indian or Alaska Native, 3 Hispanic or Latino, and 9 females. One freshman left the program because of changing into a non-science degree program. All remaining undergraduate students, except two (with CGPA 2.84 and 2.91), met GPA requirement of 3.0 for renewal for Spring 2020. All graduate students met GPA requirement of 3.2 for renewal for Spring 2020. One graduate student had internship in Fall 2019 and graduated in December.

5. In Spring 2020, two new students joined S-COAM, one is freshman and one is a graduate student. Now program's 34 recipients include 7 Black or African, 2 are

American Indian or Alaska Native, 4 Hispanic or Latino, 8 females, and 6 first-generation college students.

Key outcomes or Other achievements:

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

Professional Development Activities During Monthly Cohort Meetings:

1. Resume Building and Improvement Activity: During a spring monthly meeting students participated in a included discussion of what makes a good resume, students brought copies of their current resume and were given ideas on how to improve their resumes. Subsequently cohort students submitted improved resumes to co-PIs who removed identifying information and sensitive material. During May 1st meeting, resumes were hung on walls of meeting room and small groups of students rotated through reviewing all the resumes. Students then used colored Post-It notes to 'vote' for their top choices. We had a discussion about why these resumes were especially effective and prizes were given to the best resumes.

2. Creative Oral Communication Challenge: Cohort students were divided into small groups and given a set of cards with unusual line drawings. One group member was tasked with giving an oral description of the figure and others were to draw a replica based on the description. Students were given a time limit and were thus challeged to provide enough details to allow reproduction but in an efficient way. This was repeated as group members took turns being the "describer". The overall best "describers" were then given a chance to have the entire cohort create a drawings based on their descriptions.

Workshops offered by S-SCOAM for cohort and open to Univerisity Community:

1. Workshop: 3D Printing Basic, October 16, 6:30–8:00 p.m., Stright 220, Presenter: Dr. John Chrispell
Abstract: This workshop included a basic introduction to using 3D printers. Demonstrations of both 3D model creation and printing will be shown using standard software tools. Workshop participants will have the opportunity to create 3D models that could be printed using standard 3D printers.

2. Workshop: 3D Printing from a Mathematical Perspective, October 23, 6:30–8:00 p.m., Stright 220, Presenter: Dr. John Chrispell
Abstract: This workshop used a hands-on approach to creating models for 3D printing. Participants used notebooks to create 3D geometries that can be converted to file types that are acceptable for 3D printing. The focus of this workshop will be more on the *mathematics* needed for 3D printing, rather than the creation of complicated 3D printable models.

3. Workshop: Introduction to MathematicaFeb. 10, 6:30-8:00pm, STRGT 220, Presenter: Dr. Gary Stoudt
Abstract: This hands-on session will familiarize participants with the basic capabilities of Mathematica, including experience with Mathematica's notebook interface and syntax. Topics will include algebra, calculus, 2D, 3D, and parametric graphing.

4. Workshop--Image Processing with Mathematica, Feb. 17, 6:30pm-8:00pm, STRGT 220, Presenter: Dr. Ed Donley
Abstract: Participants will use Mathematica and basic concepts from algebra, calculus, and linear algebra to enhance and analyze photographs. We will use simple algebraic functions to restore old faded photographs and poorly light photographs. We will use histograms to separate the foreground and background of an image. We will use derivatives and matrix operations to blur images and to detect edges of objects within images. Prerequisites: Understanding of basic matrix operations and derivatives, and some familiarity with Mathematica. Knowledge of partial derivatives would be useful, but not necessary.

*** How have the results been disseminated to communities of interest?**

Program Activities and PLTL curriculum modules are posted on the website:

www.iup.edu/math/scholarships

In addition, as events are scheduled, email listservs are used to promote attendance and participation by target audiences.

*** What do you plan to do during the next reporting period to accomplish the goals?**

The S-COAM project intends to continue implementing our planned activities. Below are some details on specific items:

Recruiting: We started reaching out to Fall 2020 NSM applicants to IUP in November 2019 and set the first deadline as Jan. 10, 2020. Compared to last year, there is a significant number of potential incoming students who began the application process (over 150). We reach out to students starting the application and encourage them to complete it, resulting in more complete applications. We have selected the first group of freshmen recipients and sent out their award letters mid-February. A second application review deadline is now set at the end of March 30. We expect to receive at least twice amount of completed applications compared to previous years. We will follow the similar timeline to recruit Fall 2021 freshmen applicants. We are continuing leverage support from IUP's Office of Admissions staff to disseminate information about the S-COAM program and encourage applications across diverse groups of minority, under-represented, women, and general math and science student applicants.

Research involvement: We have been cultivating interest among our current scholarship cohort for them to engage in summer research activities. This includes sharing information about REUs and other outside opportunities as well as IUP's internal RESS (Research Experiences for Summer Scholars) program. We also encourage students who have participated in the IUP RESS program to apply for external REU programs in the following summer. So far, one student won a coveted summer research experience internship and will go to the Pacific Northwest National Lab to do research in Summer 2020. We also will implement activities in monthly meetings to help students investigate their research interests and develop research proposals.

Planning monthly meetings: We will be creating content, planning activities, and arranging for external speakers for our 8 monthly scholarship meetings across the year. Starting Spring 2020, senior scholars will lead 30 minutes of each meeting on a professional development topic. This also helps upper-level students to practice their presentation skills. Other content and activities for meetings include resume reviews, video conferencing with alumni, problem solving techniques, communication skills, and more.

PLTL materials and publically posting tested materials: We have been developing, testing, and refining our Pear-Led-Team-Learning materials for Calculus I, Calculus II and Linear Algebra. We are making adjustments based on observations and student feedback and intend to continue expanding and refining these materials as we continue to use these across the upcoming year. We will be posting updated PLTL curriculum modules on the web for distribution and are planning for conference presentations to discuss their usage and evaluation and to encourage others to make use of the materials and review our results.

Dissemination: 1. Dr. Yu-Ju Kuo (PI) will be a panelist in a Mathfest Panel Session in late July and early August in Philadelphia PA. The title of the panel session is "NSF S-STEM Initiatives with Mathematics Connections".

2. Dr. Edel Reilly (co-PI, Education researcher) is working on the following items:
a) Conference proposals to:

- S-STEM Symposium—(assuming last year's schedule) presentation/poster—due summer
- American Education Research Association (AREA) Annual Conference—due early July
- Annual Conference of the Research Council on Mathematics Learning (RCML)—due early fall
- New England Educational Research Organization—due in fall

b) Planning on submitting a paper to:

- The Journal of the Scholarship of Teaching and Learning—open submissions
- Educational Studies in Mathematics Journal

Supporting Files

Filename	Description	Uploaded By	Uploaded On
SCOAM_AnnualReport_Feb2020.pdf	This is the annual report prepared by the external evaluator, Dr. Debra Moore.	Yu-Ju Kuo	02/25/2020
Planets.pdf	PLTL Material--Calculus 2	Yu-Ju Kuo	02/25/2020

Filename	Description	Uploaded By	Uploaded On
PLTL-LinearAlgebra-Sample.pdf	PLTL-Material-Linear Algebra	Yu-Ju Kuo	02/28/2020

Products

Books

Book Chapters

Inventions

Journals or Juried Conference Papers

View all journal publications currently available in the NSF Public Access Repository for this award.

The results in the NSF Public Access Repository will include a comprehensive listing of all journal publications recorded to date that are associated with this award.

Smith-Sherwood, Dawn and Rhodes, Sean. (2019). Introduction to Hispanic Literatures" and the Impact of IPA-Informed Instruction on Student Writing Proficiency in the Presentational Mode: Findings from a Pilot SoTL Study. *MIFLC review*. 19 . Status = Deposited in NSF-PAR Federal Government's License = Acknowledged. (Completed by Kuo, Yu-Ju on 02/11/2020) Full text Citation details

Berg, Alvyn P. and Fang, Ting-An and Tang, Hao L.. (2018). Variability of residual chlorine in swimming pool water and determination of chlorine consumption for maintaining hygienic safety of bathers with a simple mass balance model. *Journal of Water and Health*. . Status = Deposited in NSF-PAR doi:10.2166/wh.2018.217 ; Federal Government's License = Acknowledged. (Completed by Kuo, null on 02/22/2019) Full text Citation details

Licenses

Other Conference Presentations / Papers

David Cowher, Brennan Dumm, and Philip Okoth (2019). *An Analysis of Stock and REIT Portfolio Management*. IUP 2019 Scholars Forum. Indiana, PA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Patrick Cone (2020). *Climbing the Branches of Graceful Tree Conjecture*. JMM2020--AMS Undergraduate Poster Session. Denver, CO. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Rachelle Bouchat and Patrick Cone (2019). *Climbing the Branches of the Graceful Tree Conjecture --Electronic Proceedings*. University of Dayton--Undergraduate Mathematics Day 2019. University of Dayton. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Kevin Powell, Cassandra Pray, and Sean Rhodes (2019). *Discrete Event Simulation of Hospital Patient Flow Using Arena Simulation Software*. IUP 2019 Scholars Forum. Indiana, PA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Patrick Cone (2019). *Graceful Tree Conjecture*. 2019 MAA Allegheny Mtn. Section Meeting. Shepherd University. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Kevin Powell and Sean Rhodes (2019). *Improving ARMIA Time-Series Forecasting of STock Prices with Extra-Model Financial Data from SEC Filings*. IUP 2019 Scholars Forum. Indiana, PA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Noah Garret (2019). *The Effect of Substituent Positions on Ru-Based Bimetallic Complexes*. IUP Research Experiences for Summer Scholars Poster Presentation. Indiana, PA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Other Products

Other Publications

Williem Rizer (2019). *A New Approach to Counting Domino Tilings*. Poster Presentation to IUP College of NSM Advancement Council. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Patents

Technologies or Techniques

Thesis/Dissertations

Websites

Participants/Organizations

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Kuo, Yu-Ju	PD/PI	2
Adkins, Frederick	Co PD/PI	1
Burkett, Daniel	Co PD/PI	0
Norwood, Michele	Co PD/PI	0
Reilly, Edel	Co PD/PI	1
Bouchat, Rachelle	Faculty	1
Radelet, Daniel	Faculty	1
Moore, Debra	Consultant	1

Full details of individuals who have worked on the project:

Yu-Ju Kuo
Email: yjkuo@iup.edu
Most Senior Project Role: PD/PI
Nearest Person Month Worked: 2

Contribution to the Project: Involved in overseeing the entire project, working with the Financial Aid Office, soliciting and reviewing applications, disbursing scholarships, coordinating workshops and external speakers, submitting the required data every semester, submitting annual reports, maintaining the program web pages, planning for the monthly meetings, and more. Mentoring and advising students -- including reviewing students' progress every semester for their renewal eligibility.

Funding Support: IUP, NSF

International Collaboration: No
International Travel: No

Frederick A Adkins
Email: fadkins@iup.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 1

Contribution to the Project: Reviewing applications, disbursing the scholarship, working on annual reports, planning for the monthly meetings, reviewing students' progress and their renewal eligibility, assisting with website content, working with admission office, recruiting students, connecting with high schools and community colleges

Funding Support: IUP, NSF

International Collaboration: No
International Travel: No

Daniel A Burkett
Email: dburkett@grove.iup.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 0

Contribution to the Project: Dean's Associate in the College of NSM, oversees all students' progress in the college, reaches out to College of NSM advisors and has them encourage students to apply to scholarship and participate in PLTL program. Assists with overrides for course registration and placement testing.

Funding Support: IUP

International Collaboration: No
International Travel: No

Michele Norwood
Email: mnorwood@iup.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 0

Contribution to the Project: Coordinates student success initiatives including Freshman Orientation and the Academic Success Center, Acts as a facilitator with other IUP colleges in organizing linked courses, and with the IUP Office of Admissions to determine the best strategies to recruit students.

Funding Support: IUP

International Collaboration: No
International Travel: No

Edel Reilly
Email: E.Reilly@iup.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 1

Contribution to the Project: Develops and uses our systematic survey tool to assess professional math identity and beliefs for our cohort of math and science students, conducts research using our data from evaluation and assessment of progress on project outcomes by studying student development through existing validated tools related to networking, faculty interaction, project ownership, and persistence.

Funding Support: IUP, NSF

International Collaboration: No
International Travel: No

Rachelle Bouchat
Email: rbouchat@iup.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Recruits, trains, and supervises PLTL program's peer-leaders. Creates, documents, and revises materials for calculus and linear algebra PLTL sessions.

Funding Support: NSF, IUP

International Collaboration: No
International Travel: No

Daniel Radelet
Email: dradelet@iup.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Recruits, trains, and supervises PLTL program's peer-leaders. Organizes and schedules PLTL sessions, oversees student PLTL participation, recruits students to participate PLTL. Creates, documents, and revises materials for calculus PLTL sessions.

Funding Support: NSF, IUP

International Collaboration: No
International Travel: No

Debra Moore
Email: dwm9@pitt.edu
Most Senior Project Role: Consultant
Nearest Person Month Worked: 1

Contribution to the Project: Provide annual report that includes a summative evaluation, assesses project alignment with overall S-COAM program goals that includes both descriptive and chi squared analyses for comparisons between relevant subgroups (e.g., peer leaders, minorities, women) when cell sizes are sufficient for identification of trends.

Funding Support: NSF

International Collaboration: No
International Travel: No

What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
Society for Industrial and Applied Mathematics	Other Nonprofits	Philadelphia, Pennsylvania

Full details of organizations that have been involved as partners:

Society for Industrial and Applied Mathematics

Organization Type: Other Nonprofits
Organization Location: Philadelphia, Pennsylvania

Partner's Contribution to the Project:
Other: Coordination of visiting lecture series speakers, and professional connection for student organization

More Detail on Partner and Contribution: Coordination of visiting lecture series speakers: Dr. Stephanie Fitchett gave several presentations to the campus community on various application in Data Science, met students about data science career and faculty about data science curriculum. Professional connection for student organization: IUP SIAM Student Chapter is officially established in Fall 2019. Faculty Advisor: Herve Nganguia

What other collaborators or contacts have been involved?

Alisa DeStefano: Assisting with students' financial need information

Becky Hilditch: providing clerical support, such as pulling students' transcripts and verifying students' course registration

Francisco Alarcon: Assisting with course registration, overrides, and allocating office space for scholars

Marketing and Recruiting including website updates: Amber Dworek, Shawn Jones, Simon Stuchlik, Nikki Knox, Molly Russel, and Gary Stoudt

Student Research Advisors: Avijita Jain, Gregory Kenning, Rachelle Bouchat, Xin Wu

Establishing SIAM Student Chapter: Herve Nganguia, John Chrispell

Workshop offerings: John Chrispell, Gary Stoudt, and Ed Donley

Assisting with review of applications: Gary Stoudt, Herve Nganguia, Kimberly Burch, Brian Sharp, Tim Flowers, John Chrispell, and Valerie Long

Community College Contacts for recruiting transferred students: Community College of Allegheny County(Stuart Blacklaw, Suzanne McHenry, Heather Murphy), Bucks County Community College (Debra Geoghan, Debora Bergen, Lisa Angelo), Butler County Community College (Madhu Motha)

Impacts

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

1. PLTL session for Calculus courses and Linear Algebra: Materials are being developed, modified, and tested for Calculus I, Calculus II, and Introduction to Linear Algebra. The goal is to show students connection of the course content with broader science applications. Outcomes from the last three semesters show the impact that all students who regularly participated in PLTL session did well in their courses. The peer-leaders also found their work to be more challenging and interesting than typical tutoring or lab monitoring. Impact spans improved STEM degree program retention of students participating in sessions as well as their deeper understanding of related course content. Access to the pubically available PLTL materials enables the broader impact of use by other institutions and affect on better preparing their students.

2. Software Workshops: Two workshops on 3D Printing were offered in Fall 2019 and two Mathematica workshops were offered in Spring 2020. Announcements were sent to students and faculty across campus. Workshops were attended by students and faculty as well as community members. Impact includes additional training and connecting university with larger community.

3. Alumni Day and SIAM Visiting Lecture: Dr. Stephanie Fitchett came as a SIAM Visiting Lecturer and gave two talks in how mathematics is used in data science. She also had an open session and lunch with students. Three S-COAM alumni will come to share their research/graduate school experiences and career paths in Spring 2020. These opportunities include the impact of connecting students with working professionals which improves their awareness of career paths and enhances their motivation to work towards STEM degree completion.

What is the impact on other disciplines?

1. 3D Printing workshops and Mathematica workshops received a lot of interest across campus. Faculty members and graduate students from other colleges showed interests in learning both topics.

2. SIAM Visiting Lecture: Dr. Stephanie Fitchett's talks were announced across the campus. Connecting students from various academic departments across the university with working STEM professionals has the impact of improving their understanding of recent STEM developments and usage of data science, mathematics, and statistics.

What is the impact on the development of human resources?

3D Printing workshops and Mathematica workshops provide training for students and faculty to learn the most popular software in the science and mathematics field.

In the current program of 34 scholars, we have 7 Black or African, 2 are American Indian or Alaska Native, 4 Hispanic or Latino, and 6 are first generation college students. This indicated our success in recruiting minority students to the program in comparing to prior years.

Students taking a leadership role in the newly created IUP SIAM Student Chapter build organizational skills helpful to their career preparation.

External Speakers: Our colloquia sessions are attended by STEM students from across the university -- exposure to these professionals has the impact of improving their understanding of use mathematics, statistics and computing across STEM developments and in STEM careers.

What is the impact on physical resources that form infrastructure?
Nothing to report.

What is the impact on institutional resources that form infrastructure?

The new IUP SIAM Student Chapter was officially approved by SIAM in Fall 2019.

The current officers are Shane Peterson, **President,** and Williem Rizer, **Secretary.**

The next step is registering the chapter as an official IUP university organization. The faculty mentor, Herve Nganguia, is working with one of the student members to create a two-page newsletter highlighting various applications of mathematics. This should help boost interest in membership and participation with students in other academic departments.

What is the impact on information resources that form infrastructure?

The S-COAM scholarship program maintains a website that provides access to information resources created during the grant period. This website maintains information about participants, program activities, program annual reports, and links to related publications. This website covers the current NSF grant support as well as maintaining information resources from the prior NSF funding.

What is the impact on technology transfer?
Nothing to report.

What is the impact on society beyond science and technology?

Each semester, S-COAM students are required to attend at least one social issue related event with their group members. Their participation in this activity will hopefully generate interest in broader aspects of societal engagement and improve understanding that what they do can have a big impact in community development

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Changes/Problems

Changes in approach and reason for change

1. Increase funding for graduate students
As a result of IUP's internal budget, the allocation for graduate assistantships is declining for next year. To continue to enhance recruiting for new students in the M.S. in Applied Mathematics program and retain current students to degree completion, we will in Fall 2020 increase the maximum annual award for graduate students to $7000 (from $4500) for 1st year graduate students and $8500 (from $6000) for 2nd year graduate students, provided students show sufficient need on their FAFSA. We are able to cover this additional cost by leveraging funds remaining from students completing their graduate degree in less than 2 years and by using funds remaining from the Spring 2018 semester.

2. Recruit Freshmen:
While recruiting Fall 2019 freshmen, we had difficulty in getting students to fully complete the scholarship application in spring

and early summer. Combining with a regional demographic change resulting in a drop in IUP freshman enrollment, we only matriculated 1 new transfer and 7 new freshmen students. In addition to enhanced coordination with IUP's Undergraduate Admissions Office and providing additional recruiting materials, we will continue to move the application deadlines earlier and accelerate the awarding time line to provide a greater incentive to attract more highly qualified STEM-interested students who elect to attend IUP. We initiated a earlier recruiting plan this year which has already shown to be effective in increasing number of complete applications-- we have sent out 8 award letters and expect to make additional rounds of scholarship award notices in late March and early April.

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

A regional demographic change in college-age students has resulted in a drop in enrollment at IUP and also impacted S-COAM's freshman recruitment. This can be seen in lower numbers of enrolled high school students in Western Pennsylvania over the recent years. The IUP Undergraduate Admissions Office has implemented several changes: waiving application fee, hiring a regional recruiter based in Philadelphia, expanding recruitment travel to northern VA, MD, NJ, OH, NY, and WV, providing exploratory options for students who have not decided on their majors (entry to the University College as exploratory students of one of the 6 academic colleges), adopting changes in application campaign and financial aid packages with partnering with other enrollment and marketing support companies (e.g. EAB and Ruffalo Noel Levitz). IUP's retention effort includes implemention by our college of a 1-credit course to help STEM students explore their interests; it includes intrusive advising, mentorships, and academic programming especially targeted for those who are admitted to the University College-STEM major exploratory program. These changes will help address recruitment issues, but do not require expendature of NSF funds.

As we have enhanced our marketing, moved the incoming scholarship application deadlines earlier, and accelerated the awarding time line, we anticipate the S-COAM program will continue to have a positive impact on IUP's ability to recruit and retain more high quality STEM students.

Changes that have a 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.

Special Requirements

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

We have complied with submission of data requirements in every semester regarding scholarship cohort membership demographics and their academic progress.