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NSF Final Project Report

Cover

Federal Agency and Organization Element to
Which Report is Submitted: 4900

Federal Grant or Other Identify Number
Assigned by Agency: 1939762

Project Title: Collaborative Research: Workshop - BP in
STEM, Computer Science and Engineering
through improved Financial Literacy

PD/PI Name: Erick C. Jones, Principal Investigator

Recipient Organization: University of Texas at Arlington

Project/ Grant Period: 10/01/2019-09/30/2022

Reporting Period: 10/01/2019-09/30/2022

Submitting Official (if other than PD/PI): Erick C. Jones

Submission Date: 05/04/2023

Signature of Submitting Official: _____



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National Science Foundation Project Outcomes Report

Research Spending and Results

Award Detail

Awardee: University of Texas at Arlington

Doing Business As Name: University of Texas at Arlington

PD/PI: Erick Jones

Co-PD(s) co-PIs: N/A

Award Date: 10/1/2019

Estimated Total Award Amount: \$28,238

Funds Obligated to Date: \$28,132.55

Start Date: 10/1/2019

End Date: 9/30/2022

Type of Transaction: Standard Grant

Agency: NSF

Awarding Agency Code: 4900

Funding Agency Code: 4900

Primary Program Source: NSF Research & Related Activity

Award Title or Description: Project Title: Collaborative Research: Workshop - BP in STEM, Computer Science and Engineering through improved Financial Literacy

Federal Award ID Number: 1939762

Duns ID: 064234610

Parent Duns ID: 042000273

Program: Collaborative Research

Program Officer:

Jeffrey Forbes

jforbes@nsf.gov

703-292-5301

Awardee Location

Street: 701 S Nedderman Dr, Box 19145

City: Arlington

State: Texas

ZIP: 76019-0145

County: Tarrant

Country: US

Awardee Cong District: 06

Primary Place of Performance

Organization Name: University of Texas at Arlington

Street: 701 S Nedderman Dr, Box 19145

City: Arlington

State: Texas

ZIP: 76019-0145

County: Tarrant

Country: US

Awardee Cong District: 06

Project Outcome Report

Disclaimer

This Project Outcomes Report for the General Public is displayed verbatim as submitted by the Principal Investigator (PI) for this award. Any opinions, findings, and conclusions or recommendations expressed in this Report are those of the PI and do not necessarily reflect the views of the National Science Foundation; NSF has not approved or endorsed its content.

Significant Results:

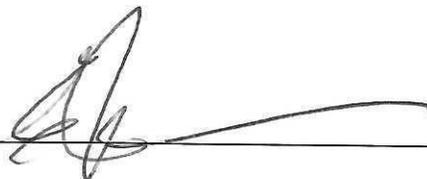
The results of this project led to the students/ participants gaining knowledge of Financial Literacy. Both pre and post surveys were provided to get results of the students/ participants. The results showed a positive outcome from this project.

Key outcomes or other achievements:

This project provided workshop session for students to apply to fellowship/ grant programs. This was so they could learn that there are other ways to support their education careers without taking out loans as the first decision. The students also were provided workshops that assisted them with making both professional and research resumes.

Submission Date: 05/04/2023

Signature of Submitting Official: _____



Accomplishments

What are the major goals of the project?

In order for the United States to maintain a global leadership role in the fields of and technology, it must increase the number of members from underrepresented groups (URGs) earning advanced degrees in STEM (The Council of Graduate Schools, 2007). Students from underrepresented groups, particularly racial minorities, face unique challenges at the level of graduate studies, including options for financing their graduate education, resulting in poor retention and success rates (Gonzales et al. 2003; Johnson 2007). The goal of this workshop is to investigate a framework that describes students' perceptions about financial options for graduate school and how they impact their decisions to enter graduate school and the STEM workforce. We anticipate participation of several partner groups reflective of populations including computer science students at the bachelor's and graduate (masters and doctoral) degree levels and those employed in the STEM workforce who utilized financial options, including student loans, to gain a greater understanding of the impact of financial literacy on graduate school and STEM workforce decisions. This project leverages relationships with select Historically Black Colleges and Universities (HBCUs), Hispanic-Serving Institutions (HSIs), and Predominantly White Institutions (PWIs) that were established from an earlier graduate recruitment program.

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

Major Activities:

The conference "Broadening Participation in Engineering through Improved Financial Literacy" was hosted from April 21-24, 2022, in Washington DC. The conference was funded by a National Science Foundation (NSF) Award to Dr. Erick C. Jones Sr. and NSF Award to Dr. Felicia Jefferson. The conference was a 3-day workshop, which focused on having experts participate in working sessions that will ultimately improve financial literacy outcomes for underrepresented minorities in computer science and engineering education. This conference hosted both Fort Valley State University with 12 students and University of Texas at Arlington with 9 students, totaling to 21 students in attendance. This workshop was designed to clearly identify the challenges, effective practices, and the best combination of accurately understanding funding education for future obtainment of successful computer science and engineering careers. The goal of the workshops will be to educate the student participants on financial literacy and how it will help them achieve financial independence and graduate without sinking in debt. This workshop convened a consortium of academia, industry, and government to seek understanding on how student financial literacy and related topics impact broadening participation in the computer and information sciences and engineering future workforce. These activities resulted in understanding motivations of students in considering financial options such as excessive student loan debt through the project's graduate financial options framework. We expected the workshop involvement of underrepresented minority student populations from Historically Black Colleges and Universities and Hispanic Serving Institutions at the associate, bachelor, masters, and doctoral degree levels in computer science and related convergent fields such as computational neuroscience, operations research, and data science to promote the breadth of computer and information sciences and engineering field.

Specific Objectives:

The intellectual merit of the proposed activity are the models investigated to support the graduate financial options framework. The broader impact of this workshop of supporting research that impacts recruitment, retention, and entry into the workforce of unrepresented students is significant. The workshop involvement of underrepresented minority student populations from Historically Black Colleges and Universities and Hispanic Serving Institutions at the associate, bachelor, masters and doctoral degree levels in computer science and related convergent fields such as computational neuroscience, operations research, and data science to promote the breadth of computer and

information sciences and engineering field. By addressing this important topic through this research, this project will support and provide understanding on how to increase America's role for innovation, excellence, and advancement in the contributions of underrepresented minority students to the US science, technology, engineering, and mathematics (STEM) workforce.

Significant Results:

The results of this project led to the students/ participants gaining knowledge of Financial Literacy. Both pre and post surveys were provided to get results of the students/ participants. The results showed a positive outcome from this project.

Financial Literacy is having the knowledge of various financial skills. One should also be able to apply these financial skills in life. Mental health financial literacy goes hand in hand when it comes to young adults. While in older adults' financial literacy can assist with retirement and financial planning. Han states that, "the acquiring of financial literacy can hypothetically be viewed as involving the coordination of two subprocess in the brain: the development of learned contextual knowledge (in this case financial knowledge), mediated through a network of posterior cortical (temporal-parietal) brain regions implicated in the Default Network; and the utilization and manipulation of that knowledge, primary mediated through a network of anterior cortical (front) brain regions.

The modern economy increasingly requires consumers to make many complex and sometimes bewildering financial choices. Almost daily, our students, colleagues, relatives, and even strangers on airplanes ask us difficult questions including: How many credit cards should I have, and how do I select them? Should I borrow for college, and how much is too much pay? How much should I save in my 401 (K) plan, and where do I invest it? Should I lease or buy a car? Should I rent or buy a place, and how much do I need to put down and what can I afford to pay? When can I afford to retire? The "Big Three" are questions have now been fielded in numerous other surveys including several representatives of the entire U.S. population, such as the American Life Panel and the National Financial Capability Study, and our findings widely confirmed. The "Big Three" Financial Literacy Questions are, 1) Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? 2) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? 3) Please tell me where this statement is true or false. "Buying a single company's stock usually provides a safer return than a stock mutual fund." In a financial crisis, it is important to be financially literate. It is also crucial that young adults be financially literate. Millennials now are beginning career with credit and student loan debt. If they had more knowledge in this area, it could assist them with saving and investment efficiency. Financial is low among high school students, even though these young people will soon need to make important decisions such as where to go to college and how to finance the education.

Having a high level of financial literacy is considered as conditioning sensible financial decisions. People who are financially literate should be able to plan and control their personal financial matters, to avoid debt, and to provide for their old age by securing their personal financial prosperity. It is said that men perform better than women in financial literacy test. Men are more likely to be part of groups with finance-related interest and therefore less motivated to learn about financial contents. The financial literacy of women is positively and significantly affected by having books at home. One's financial literacy level can be affected by their background/environment. If there is a lack of financial education at home, the influence of other sources of information, such as advertising and peers, increases accordingly. Financial literacy can also increase with age. As one gets older, they get wiser when it comes to financial literacy. Education plays a big part in financial literacy as well. People with a higher level of education, such as a masters or PhD degree, appear to have higher financial literacy.

Disparities in financial literacy by gender seem present across the world. Wives invest in less in education, occupation, and financial knowledge may partly explain women's lower financial literacy. In Japan, men and those with higher education and income tend to have higher financial literacy; moreover, financial literacy is positively correlated with participation in investment activities and retirement plans. For decades in Japan gender roles have restricted women's participation education

and occupation. With this, gender inequality in socioeconomic status may be significant in contribution to the male-female disparities in financial literacy, considering that socioeconomic factors, such as education and occupation, are important determinants of financial literacy.

Financial literacy denotes not merely financial understanding, but also practical management of financial assets, which is considered helpful for individuals in accumulation assets. There are three important components of financial literacy that focus on understanding the following: 1) numeracy, or the capacity to calculate a simple compound interest rate; 2) understanding inflation; and 3) knowledge about stocks, stock mutual funds, and risk diversification. The variables, individual demographic, and socioeconomic factors, affect financial literacy. This done by age, educational attainment, occupation, financial education, household income, and financial assets.

A lack of financial knowledge makes it difficult to identify and understand information about returns, risks, and financial products and to process such information. This difficulty explains household financial decision-making behaviors such as assets allocation, retirement planning, and limited participation in the stock market. The entrepreneurial behavioral of households includes the states of identifying entrepreneurial opportunities, integrating entrepreneurial resources, and operating a business. These steps involve financial issues. So, entrepreneurs need to be financially literate, this will have a positive effect on the entrepreneurs' business. There is a positive link between social capital and entrepreneurship. Social capital assists in developing entrepreneurial motivation, identifying business opportunities, and accessing entrepreneurial resources. Social capital is an important resource for rural households, and how rural households use social capital to start their own businesses has been popular in research. Financial literacy has a positive impact on entrepreneurship. Social capital can affect household financial literacy in two ways, peer effect and Matthew effect. Peer effect exists in special networks. Individuals usually imitate and learn from the behavior of other individuals in the social network, and the larger the social network in which the family is located, the more financial information it receives passively and actively. The Matthew effect also exist in social networks. When financial events, occur, households will actively learn from the logic and analytical skills of financially literate individuals in social networks to form their own opinions.

Key outcomes or other achievements:

This project provided workshop session for students to apply to fellowship/ grant programs. This was so they could learn that there are other ways to support their education careers without taking out loans as the first decision. The students also were provided workshops that assisted them with making both professional and research resumes.

What opportunities for training and professional development has the project provided? This project provided a training in financial management in STEM fields.

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

Details of this information has been shared through a written textbook providing additional information of Financial Literacy in CISE and other STEM fields, as well as results of the impact of and content shared at the Financial Literacy conference.

Products

Books

Jones, Erick; Reed, Rheygan; Jefferson, Felicia (2022). Broadening Participation of Financial Literacy in Science, Technology, Engineering, and Math (STEM) Status = Awaiting_Publication; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes ; ISBN:

Book Chapters

Inventions

Journals or Juried Conference Papers

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.

Hassoun, Soha and Jefferson, Felicia and Shi, Xinghua and Stucky, Brian and Wang, Jin and Rosa, Epaminondas. (2021). Artificial Intelligence for Biology. Integrative and Comparative Biology. Status = Added in NSF-PAR

Federal Government's License = Acknowledged. (Completed by Jefferson, Jin on 09/04/2021) Full text Citation details

Paul, Jasmine and Jefferson, Felicia. (2019). A Comparative Analysis of Student Performance in an Online vs. Face-to-Face Environmental Science Course From 2009 to 2016. Frontiers in Computer Science. 1. Status = Added in NSF-PAR

Federal Government's License = Acknowledged. (Completed by Jefferson, Felicia on 01/08/2020) Full text Citation details

Soha Hassoun, Felicia Jefferson, Xinghua Shi, Brian Stucky, Jin Wang, Epaminondas Rosa, Jr, Artificial Intelligence for Biology, Integrative and Comparative Biology, 2021; icab188, <https://doi.org/10.1093/icb/icab188>. Status = PUBLISHED.

Licenses

Other Conference Presentations/Papers

Other Products

Other Publications

Patent Applications

Technologies or Techniques

Thesis/Dissertations

Websites or Other Internet Sites

Participants/Organizations

What individuals have worked on the project?

Erick C. Jones

Full detail of individuals who have worked on the project:

Name: Erick C. Jones

Email: erick.jones@uta.edu

Most Senior Project Role: PI

Nearest Person Month Worked: 1

Contribution to the project: Organized Workshop, Develop Itinerary, Invited Guest, participated as a Speaker, Produced Products, Conducted and Analyzed Post Program Survey

Funding Support: NSF

Change in active other support: No

International Collaboration: No

International Travel: No

What other organizations have been involved as partners?

New Mexico Institute of Mining and Technology

New Mexico State University

Prairie View A&M University

The University of New Mexico

Fort Valley State University

University of Texas El Paso

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

Nothing to report.

Impacts

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

This project leverages the knowledge of Financial Literacy with select Historically Black Colleges and Universities (HBCU), Hispanic-Serving Institutions (HSI), and Predominantly White Institutions (PWI) in the South and Southwestern United States. This project was to enhance students' knowledge on the topic of Financial Literacy in STEM. The partnering colleges of this project included Fort Valley State University and University of Texas at Arlington.

What is the impact on other disciplines?

Many graduate schools in the United States describe the benefits for attaining a graduate degree in computer science, mathematics, or engineering as extensive, including more enjoyable work, career advancement, and higher salaries than the median income level. Others believe the society benefits with a more educated workforce and a more globally competitive economy. However, the challenges of pursuing an academic career are intimidating and many do not believe that graduate school is a realistic option. One of the results from this project included a Financial Literacy in STEM book. This book talks about the advantages of how one's financial literacy level can have a positive impact on a person. This project overall addresses the concerns of students that are currently enrolled or plan enrolling financial needs.

What is the impact on the development of human resources?

The resulted book from this project addresses the concerns that students and parents may have when it comes to their financial needs. Majority of the information in the book, individuals have not even thought about because it is not taught to them as being a priority. This book encourages individuals to enhance their financial literacy level. The higher an individual's financial literacy and knowledge will also result in a better lifestyle financially.

What was the impact on teaching and educational experiences?

The financial capability and wellness "tool kit" components were incorporated into several exercises during the Financial Literacy conference as an incentive to encourage students to gain or increase their financial management knowledge and understanding of the impact of student loans for careers in computer science, mathematics, and engineering.

What is the impact on physical resources that form infrastructure?

This project assists in knowledge enhancement of Financial Literacy for students enrolled/enrolling into college. The research taken from this project is to show that student loans are not the only option when it comes to education payment. The research also shows that there are other options that will not affect an individual negatively in their future. Both Fort Valley State University and the University of Texas at Arlington students were exposed to this information.

What is the impact on institutional resources that form infrastructure?

Our conference has expanded the participants financial education and capability research. We are planning for the submission of a Financial Literacy Book to educate students with computer science, mathematics, data science, supply chain, and engineering majors.

What is the impact on information resources that form infrastructure?

We have submitted a Financial Literacy Book for publication to educate students with computer science, mathematics, data science, supply chain, and engineering majors.

What is the impact on technology transfer?

Several commercial debt solution companies offer financial literacy workshops on a rolling basis. The National Financial Educators Council also offers financial literacy workshops from time to time. <https://www.financialeducatorsCouncil.org/financial-literacy-workshop/>. This project allowed for the creation of financial tools tailored to our students during this academic year (2021 - 2022).

What is the impact on society beyond science and technology?

This project assists in retaining skilled workers and expertise in America's STEM workforce. By providing the knowledge and tools to reduce the financial burdens of attending college and graduate school, particularly for American students underrepresented in these fields, we are ensuring

knowledge-based skills needed for future innovation and competitiveness is achieved for our nation by our nation.

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

Nothing to report.

Changes/Problems

Changes in approach and reason for change: Nothing to report

Actual or Anticipated problems or delays and actions or plans to resolve them: Nothing to report

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

Change in primary performance site location: Nothing to report