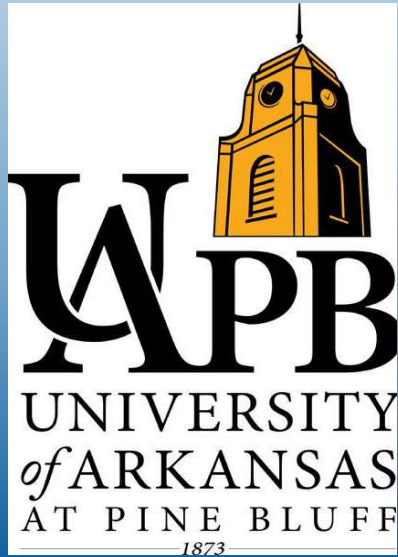




2021 Virtual HBCU-UP/CREST PI-PD Meeting



STEM Education Research

Targeted Infusion Project:

Infusion of cyber, project, and peer-led team learning (PLTL) to enhance minority STEM majors' Mathematics performance and coding experience

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This project is supported by the National Science Foundation grant **numbers: 2010292 & 1818440**
All findings and opinions are those of the authors, not necessarily of the funding agency or AAAS.

Project Overview

With the goals of increasing students' passing rates, retention rates, graduation rates and their ability to enter the STEM workforce, we have designed and implemented the following evidence-based learning instructions in Calculus I class:

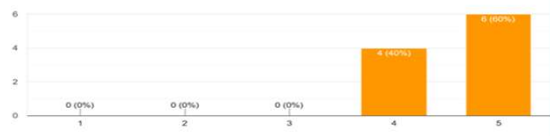
- **Cyber learning**
 - Trained students how to properly utilize WebAssign for online assignments and extra online resources
 - Collaborated with Cengage; so, students can have more time to purchase their access code and there will be no work disruption
- **Peer-led-team learning (PLTL)**
 - Trained PLTL leaders how to be an effective leader, what their duties and expectations, and basics of Julia coding
 - Created three PLTL study groups with 6 to 8 students per group
 - 5 hours per week PLTL study sessions are required
 - PLTL study sessions are offered in Zoom and/or In-Person
- **Research learning**
 - Beginning of the semester students are introduced to Julia coding and they downloaded Julia console to their computer
 - Julia console is used in class for evaluating functions and assigning variables and finding upper and lower sums
 - Julia Academy Introduction to Julia free online course is assigned as a major assignment
 - Julia coding semester project: students are assigned to write a function that can utilize Newton Method to find a solution of any given functions

Best Practices/Successes (1 – strongly disagree and 5 – strongly agree)

WebAssign Survey Results

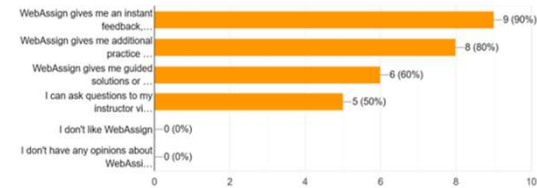
I like a web-based learning (WebAssign) in my Calculus I class

10 responses



I like a web-based learning (WebAssign) in my Calculus I class because ... Check all that apply.

10 responses



WebAssign helped me to learn math better

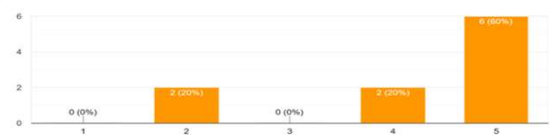
10 responses



PLTL Study Sessions Survey Results

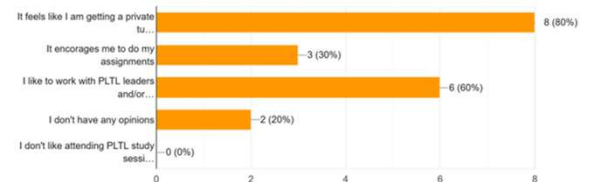
I like to attend Peer-Led-Team-Learning (PLTL) study sessions in my Calculus I class

10 responses



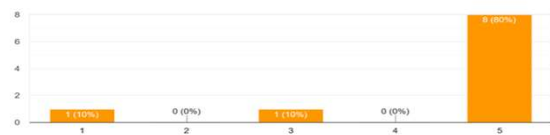
I like to attend Peer-Led-Team-Learning (PLTL) study sessions in my Calculus I class because ... Check that all apply.

10 responses



PLTL study sessions helped me to learn math better

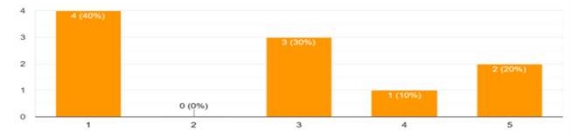
10 responses



Julia Coding Survey Results

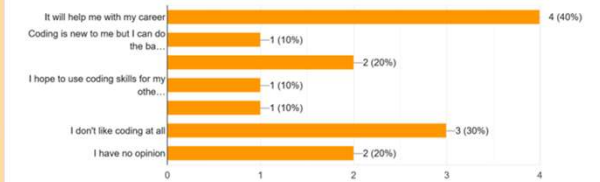
I like to use Julia coding (project-based learning) in my Calculus I class

10 responses



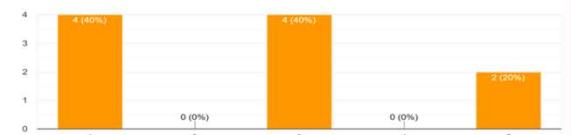
I like to use Julia coding (project-based learning) in my Calculus I class because ... Check all that apply.

10 responses

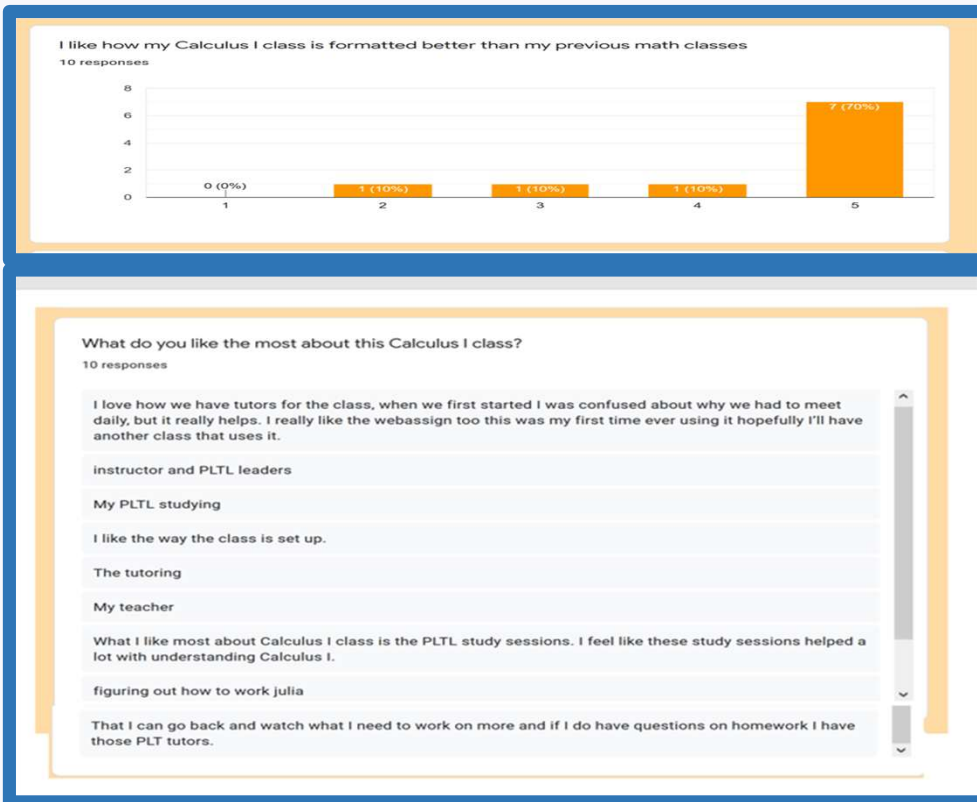


Julia coding helped me to learn math better

10 responses



Implications



- Currently we have 58.11% passing rate in Fall 2020 Calculus I class, including students who have not attended since the 11th day Census (without them: 65.38%).
- Students like evidence-based learning instructions and they are properly utilizing all the resources
- Despite COVID-19 Fall 2020 Calculus I class passing rate is increased and students are satisfied with the class

Identified Gap(s) for Future Collaboration or Enhancement

- **Julia coding learning is the least favor evidence-based learning instruction according the students' survey feedback.**
- **We need to assign more time learning Julia in class and in PLTL study sessions.**
- **Julia coding is important not just for learning Calculus, but it is very useful for other STEM subjects and STEM careers.**
- **Coding skill is one of the most sought-after skills in STEM careers**

What component(s) of this class would you like to change so you can learn better?

10 responses

Nothing

I don't like how we move so fast even though I'm passing I feel like more time is needed but maybe it's that way because we have less.

Not sure

Taking the lessons a little slower

N/A

The Julia coding is a good thing to know, but I wish we had more time to really learn the basics of it to understand it better.

More understanding with Julia

Any comments or questions?

6 responses

I never came to an in class session

None

I really enjoyed this class. Dr. Harris is a great professor and all the resources she provided to us made Calculus I very easy to understand and will benefit us in the future.

no comments

Hopefully you're teaching Calculus II next semester.