Evaluating Student Exposure to AI and Introducing Programming in Applied Physics

Sujata Krishna, PhD, Department of Physics, Jennifer Parker, Ed.D, Center for Teaching Excellence, and Ryan Rushing, College of Education

UF UNIVERSITY of FLORIDA

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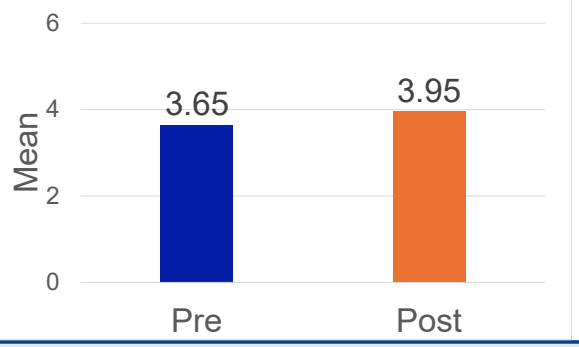
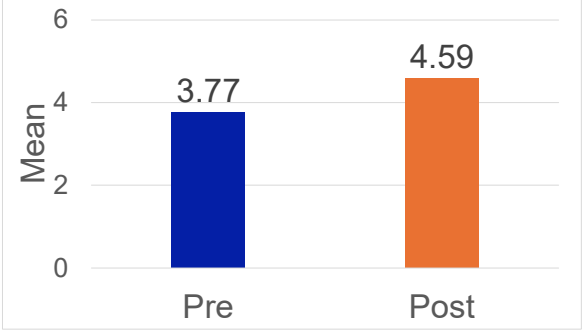
Impact of AI Module in Physics on Intrinsic Motivation, Self-Efficacy, and Knowledge About AI

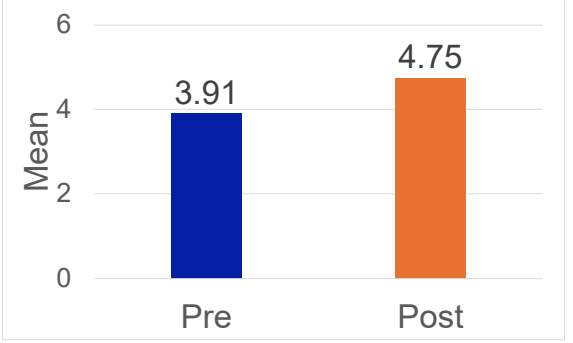
INTRINSIC MOTIVATION TO USE AI



SELF-EFFICACY IN AI USE



KNOWLEDGE & UNDERSTANDING OF AI TOOLS



Research Questions

I. **Motivation**: How relevant do students perceive AI in their life?
II. **Self-Efficacy**: How confident are students in doing AI-related tasks?
III. **Knowledge**: What do students know about AI tools?
IV. **Instructional Impact:** Does an introduction to a new skill with the help of AI boost student interest?

-""I learned how to prompt Copilot more efficiently to generate code in Python. ...I got better at having a conversation with Copilot to fix the errors and get the code needed" - Anonymous Student

"I have learned more about how to apply AI to real-world concepts like physics and how to better teach and help other people" - Anonymous Student

Rationale

- Students are using AI outside the classroom
- Here we attempt to get students to use AI in class to learn about AI and learn a new skill
- Coding is an established part of physics[1]. We need to include it on our curriculum to:
  - ➢ Modernize courses
  - ➢ Make the curriculum for non-majors feel exciting and relevant to their life

Method

- Mixed Methods
- Instrument:[2] "Design and validation of AI literacy questionnaire"
  55 students in an Applied Physics II Course
- Pre-survey administered online
- Students worked in small groups supported by Learning Assistants [3]. The module consisted of 4 in-class hands-on Python programming sessions, each with a physics worksheet.
- The AI Tool was Microsoft CoPilot
- Post-survey administered online

Conclusions

I. **Motivation:** Academic use of AI enabled students to see its relevance in their life
II. **Self-Efficacy:** While students had some understanding of AI tools coming in, their agency increased after the module
III. **Knowledge:** Students learned how to use AI to learn a new skill
IV. **Instructional Impact**: Students have had an introduction to python using AI.

- **Next Steps**: extend the use of this type of module to both courses in the Applied Physics sequence.

References

1.P. Heron, L. McNeil, et al. (editors), Phys21: Preparing Physics Students for 21st-Century Careers, *American Physical Society* (2016).
2.Ng, D. T. K., Wu, W., Leung, J. K. L., & Chiu, T. K. F. (2023). Design and validation of the AI literacy questionnaire: The affective, behavioral, cognitive and ethical approach. *British Journal of Educational Technology*. Advance online publication. https://doi.org/10.1111/bjet.13411
3.The Learning Assistant Alliance, https://learningassistantalliance,org, accessed April 8, 2025