University of Pittsburgh | School of Computing and Information

Dissertation Defense

Doctor of Philosophy in Information Science

"***Human-AI Collaboration in Educational Recommender Systems***" by **Jordan Barria-Pineda**

Date: November 21, 2025
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Place: Room 502, Information Sciences Building, 135 N. Bellefield Ave, Pittsburgh PA 15260

Committee:

- Dr. Peter Brusilovsky, Advisor and Professor, Department of Informatics and Networked Systems, School of Computing and Information
- Dr. Erin Walker, Co-Advisor and Professor, Department of Computer Science, School of Computing and Information
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Abstract:

Over the past decade, research on Human–AI Collaboration has increasingly focused on empowering users to take a more active role in shaping AI-driven recommendations, with the goal of improving both trust and user experience. However, these advances have rarely been applied to the educational domain, where recommender systems play a critical role in supporting learning. Unlike commercial systems, educational recommender systems must balance students' interests with pedagogical considerations such as their current knowledge level, prior progress, and learning goals. This complexity highlights an important research gap: understanding how interactive and collaborative approaches between students and AI can foster engagement and enhance the overall learning experience.

To address this gap, my research examined how enabling Human–AI Collaboration within an educational recommender system for programming learning can influence students' learning outcomes and attitudes toward learning. Using a user-centered design approach, I iteratively developed and implemented an interface that allowed students to (1) specify their learning goals to guide the recommendation algorithm, (2) edit their learner model to improve the accuracy of system inputs, and (3) understand the rationale behind recommendations by linking them to their goals and updated learner profile. The design process actively involved students as co-designers through a series of focus groups and integrated insights from relevant learning theories, including Zimmerman's Self-Regulated Learning framework, along with established principles for explainable intelligent systems. The resulting system was evaluated using a user-centered evaluation framework through a classroom study conducted in a college-level introductory programming course, providing evidence of how Human–AI Collaboration could enhance students' sense of agency and engagement while interacting with adaptive learning technologies.