My research seeks to understand how artificial intelligence (AI), data analytics, and instructional design frameworks can work together to foster self-directed, equitable, and high-performing learning ecosystems. I examine how students, teachers, and professionals develop agency and adaptability when interacting with AI systems and how these systems can, in turn, learn from human judgment to promote inclusion, transparency, and trust. At UT Austin, my long-term goal is to establish a Human–AI Learning Design Lab that advances theory-driven, data-informed, and equity-oriented research on the co-evolution of human and artificial learners.

## Current Research Trajectory

Across my doctoral studies at Purdue University and prior collaborations at Indiana University, I have built a program of research that links theory, measurement, and design. Two strands anchor this work. First, I reconceptualized self-directed learning for the generative-AI era and modeled the interaction among personal attributes, learning processes, and contexts (*IEEE Transactions on Learning Technologies*, 2024). Extending this theoretical foundation, I led the development and validation of the PA-SDA Scale (*System*, 2025), the first instrument to measure AI-integrated self-directed language learning. The scale earned the 2025 Global Smart Education Innovation – Research Innovation Prize and informs longitudinal studies of learner pathways.

Second, I synthesize emerging evidence on generative AI in education to identify gaps and practical levers. My systematic reviews map the first wave of ChatGPT scholarship in language education (*Computers & Education: Artificial Intelligence, 2024*), trace global trends in AI-integrated XR applications (*Education Sciences, 2025*), and examine teachers’ professional development needs in the GenAI era (*major revision, International Journal of Artificial Intelligence in Education*). These syntheses guide districts and universities as they design professional learning and policy responses.

## Collaborative and Applied Scholarship

I collaborate with interdisciplinary teams to connect research with practice. With Intel Labs I co-authored an award-winning investigation of collaborative problem-solving in conversational AI-mediated environments (*Computers & Education: Artificial Intelligence, 2025*). Within the NSF T3-CIDERS project (2023–2027), I serve as a student collaborator supporting research evaluation and instructional design to build AI-enabled cybersecurity training pathways. Additional NSF and Spencer proposals, spanning AI-supported workforce development, non-traditional student pathways, and language learning, illustrate my commitment to multi-institutional partnerships.

## Future Research Directions

My next phase of research will advance three directions:

1. Longitudinal learner modeling: Using latent transition analysis and experience sampling to examine how multilingual learners’ personal attributes and strategy use evolve as they engage with AI-enabled tools across formal and informal settings.
2. AI-augmented professional learning: Designing and evaluating coaching protocols, analytics dashboards, and reflective tools that help educators and instructional designers adopt AI responsibly while centering equity, ethics, and learner agency.
3. Cross-sector design partnerships: Extending collaborations with industry and community organizations (e.g., TicApp design-based research, ConnectEd global network, NSF cybersecurity initiatives) to create AI literacy frameworks and evaluation toolkits that translate beyond higher education.

My work bridges education, data science, and cognitive psychology to support UT Austin’s mission of “advancing education through discovery and design.” I anticipate collaborating with colleagues in the College of Education, the Texas Institute for Discovery Education in Science, and Computer Science’s AI and Society initiative. By connecting AI technologies with design-based research on human learning, my program will contribute to a future in which AI empowers rather than replaces human creativity, empathy, and agency.