

Advancements in technology have outpaced the ability of special educators to integrate those technologies into their practice in meaningful and innovative ways—this implementation gap limits instruction quality and potential benefits for students with high-incidence disabilities. Learners with exceptionalities stand to achieve greater success if we improve and increase teachers' effective use of off-the-shelf consumer and discipline-specific educational technologies. I address this issue as an applied technologist at the intersection of special education and innovation. My work is grounded in three complementary frameworks. Ethnocomputing emphasizes cultural relevance, ensuring technologies are meaningful for diverse learners. Human-centered design customizes tools to meet individual needs, prioritizing functionality for educators and students. Connectivism encourages collaboration, fostering an organic avenue for teachers to enhance their technological knowledge. Together, theories ensure that technology integration is culturally relevant, user-centered, and built on collaborative knowledge-sharing. By framing my research in these theories, I aim to help bridge the technology implementation gap and advance fair, impactful technology use in special education.

Guided by these foundations, my work converges on a central question: How does the integration of innovative, human-centered technology practices in special education impact in-service teachers' instructional effectiveness, and how do these changes subsequently influence student agency and personalized learning outcomes for students with disabilities?

First, I focus on empowering teachers through professional development to integrate technology effectively to improve their instructional practices. While measuring teacher outcomes, I simultaneously examine how the implemented technology can personalize learning for students, investigating impacts on student engagement and learning outcomes. Finally, I extend these insights to the student's agency and examine how, with training, technology can enable student-led Individualized Education Program (IEP) development. While these are large pieces in and of themselves, they build a cohesive scholarly trajectory that emphasizes enhancing teacher effectiveness to enrich student outcomes ultimately.

Professional Development for In-Service Special Educators

My first research line focuses on the first part of my guiding question by seeking to boost teachers' instructional effectiveness with technology. Here, I investigate using professional development (PD) to equip special educators with the knowledge to implement technology with their students. This mixed-method research examines the characteristics and strategies of effective technology-focused PD to improve special educator technology implementation.

Through this work, I aim to examine barriers and facilitators in teacher practice to inform systemic decision-making efforts to bridge the research-to-practice gap. This effort centers on developing evidence-based PD that enhances educators' technological knowledge and skills, equipping teachers to sustain and share technology practices within their professional communities.

I will collaborate with school districts to design and implement evidence-based PD for in-person and virtual delivery. I will collect quantitative data through surveys, interviews, focus groups, and observations to assess teacher learning, beliefs, and technology implementation in practice over time. This research will offer actionable insights into how PD can enhance teachers' ability to use technology meaningfully to improve educational outcomes for students with disabilities. The insights gained here are measured through teacher fidelity and by examining student outcomes as a secondary dependent variable, described below.

Innovative Tools for Personalized Learning

My second line of research investigates integrating emerging technologies with evidence-based practices to improve learning opportunities for students with disabilities. If teachers have been trained to implement these technologies with fidelity, research can determine the impact on students. This work examines how multimodal Artificial Intelligence (AI), machine learning, and data mining can help teachers to shrink the feedback loop to improve learning outcomes for students with executive functioning and motivation deficits.

I aim to explore AI's potential to assess student understanding, provide real-time feedback for teacher-student dyads, and help differentiate instruction to support self-regulated learning. Using quantitative survey data, I will investigate beliefs about AI's role in personalizing learning, its impact on teacher instruction and workload, and student executive functioning outcomes. Student outcomes will be analyzed as secondary dependent variables, directly reflecting fidelity levels observed in classroom implementation. These investigations will generate publications on AI-powered learning tools in special education and set up a foundation for future funding proposals and large-scale studies.

Next, I will use mixed methods to evaluate AI-embedded tools, such as scheduling apps, digital organizers, and social-emotional dashboards, with students with disabilities and their teachers. I will collect quantitative data on academic progress, task completion rates, tool usage, and qualitative insights through stakeholder interviews and focus groups to evaluate impact. This iterative human-centered process will involve collaboration with technology developers to refine researched tools based on student and teacher feedback. This will ensure tools hold space for the complexities of student executive functioning and motivation needs. This research aims to examine the impact and equity of bringing AI closer to the center of the educational system, rather than the status quo of technology at the periphery, in supporting diverse learner needs.

Technology to Foster Self-Determination in Student-Led IEP Development

The final area of my research agenda focuses on empowering students with high-incidence disabilities to use innovative technologies in the student-led Individualized Education Plan (IEP) process to assist teachers in improving their self-determination and active participation.

As a special educator, I often saw low student engagement and buy-in to IEPs. Innovative technologies could help address this challenge, but teachers need to have the skills to train students to use them. To build competence around their disability, a student could collaborate with their teacher to use multi-modal conversational AI to augment their involvement in IEP development. Digital video or audio creation software could modify a student's content delivery for the IEP meeting to foster student autonomy and suit their preference and interests. Augmented reality could redefine a student's involvement in their progress monitoring and help them to make sense of it through more authentic scenarios.

In any case, teachers need to have the technical knowledge to assist a student in learning the applicable technology so they can use it to its fullest. To evaluate the impact of these technologies, I will design studies that train teachers to implement these tools with fidelity and collect mixed-methods data to assess their effects. I will evaluate teacher fidelity using structured observation protocols and fidelity checklists developed through collaboration with participating teachers. Quantitative measures will include baseline and post-intervention data on IEP participation and progress monitoring. Qualitative data gathered through interviews, focus groups, and observations will capture IEP team perceptions of how technology fosters student self-determination and engagement.

This research aims to expand the body of work proving the power of student-led IEPs on agency and self-determination. It builds an evidence base for actively using technology to empower students with high-incidence disabilities to participate, collaborate, and take ownership in their educational development.

Research Aligned Goals During My Doctoral Studies

My doctoral goals include: (1) Gaining experience in recruitment and data collection for a professional development program focused on technology integration by Fall 2026; (2) Developing skills in mixed methods analysis, including statistical modeling and thematic coding, by Spring 2027; and (3) Publishing two peer-reviewed articles on technology-supported special education practices by Fall 2027. These goals are crucial for my emerging research on the technology implementation gap in special education. My work during my doctoral studies will refine my methods and build a foundation for future research.

Goals After Graduation

I aim to secure a tenure-track faculty position where I can focus on the interactions of ethnocomputing at the intersection of the culture of those with disabilities and technology. In this position, I would further advance my research agenda and work to prepare future educators to innovate in their practice. I also plan to collaborate with school districts and organizations to provide ongoing professional development and mentorship, fostering systemic change and strengthening connections between academia and practice through connectivism.