Developing Transdisciplinary Transportation Curriculum for K12 Students: Integrating Augmented Reality with Hands-on Activities.

Recipient/Grant (Contract) Number: 69A3552348321

Center Name: Rural Safe Efficient Advanced Transportation (R-SEAT) Center

Research Priority: Workforce Development

Principal Investigator(s): Josiah Owusu-Danquah, Emmanuel Kidando, Angela Akitali, Jeff Walters

Project Partners: Portable Innovation Lab

Research Project Funding: $84,996.47 (Federal request) and $39,890.73 (non-federal cost-share)

Project Start and End Date: 02/27/2026 – 02/26/2027

Project Description: Modern intelligent transportation systems (ITS) increasingly rely on automation, artificial intelligence, and advanced data analytics to improve safety, efficiency, and mobility. As these technologies mature, the transportation sector faces a growing demand for a workforce that combines strong technical foundations with transdisciplinary skills that integrate engineering, data science, planning, and human factors. Building on this need, prior work titled *"Bridging Silos: A Vision for a Transdisciplinary Transportation Engineering Workforce"* documented persistent gaps in workforce integration across the transportation field. Findings from a survey of transportation experts revealed limited collaboration among civil engineering, artificial intelligence, and planning disciplines, despite widespread recognition of its importance.

Transdisciplinary education is essential for preparing future professionals to address complex, real-world transportation challenges, as it promotes systems thinking, collaboration, and adaptive problem-solving beyond traditional disciplinary boundaries. Traditional educational pathways have struggled to respond to these needs due to slow curricular change and institutional barriers, resulting in a misalignment between academic preparation and the rapidly evolving expectations of the transportation industry. This project addresses these challenges through early, proactive intervention at the K–12 level. By developing an innovative curriculum that combines augmented reality (AR) technologies with hands-on, experiential learning activities, the project introduces students to foundational concepts in transdisciplinary transportation systems. The curriculum is designed to spark curiosity, strengthen technological literacy, and cultivate systems thinking at an early age, thereby creating a pipeline of future learners better prepared to engage with the technological, societal, and interdisciplinary demands of modern transportation engineering.

US DOT Priorities*:

Objectives: This project aims to design, implement, and evaluate a scalable, transdisciplinary K–12 transportation engineering curriculum that integrates emerging technologies and real-world mobility concepts. Through age-appropriate, hands-on activities and immersive virtual reality modules, the curriculum will introduce students to key topics such as connected and autonomous vehicles and smart traffic systems, while being deployed across diverse educational settings to assess student engagement and learning outcomes. Furthermore, the project will produce journal articles to be published in highly reputable journals and conference proceedings.

Outcomes/Impacts: The anticipated outcomes of this project include increased student interest in

transportation and STEM careers, improved understanding of emerging mobility technologies, and strengthened systems-thinking and problem-solving skills among K–12 learners. In addition to a scalable, transdisciplinary curriculum, the project will produce a hands-on, student-centered augmented reality (AR) tool that allows learners to interact directly with transportation systems and concepts. Together, these outcomes will provide meaningful experiential learning opportunities and support the development of a diverse, future-ready transportation workforce..

Final Research Report: N/A

* Section left blank until USDOT's new priorities and RD&T strategic goals are available in Spring 2026.