THE UNIVERSITY OF TENNESSEE KNOXVILLE

Entry Points: K-12 Projects & Opportunities

University of Tennessee, Knoxville,

College of Education, Health, and Human Sciences (CEHHS)

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Executive summary

What opportunities are there to bring data science and AI education into K-12 classrooms, schools, and districts? This event highlighted models, curricula, and innovative projects that are making K-12 data and AI education a reality.

Beginning with an overview of existing curricular models and resources that educators can implement tomorrow, the event showcased ongoing initiatives in policy development, youth-centered data projects, and community-based AI applications. From district AI policies to student-led data visualization to environmental monitoring with Edge AI, these examples illustrated multiple entry points for schools and districts at different stages of their data science and AI education journey.

Guest Speakers

- **Mahmoud Harding,** Instructional Design Director, Data Science 4 Everyone
- **Dr. Lynn Hodge,** Professor and Head, Department of Theory and Practice in Teacher Education, University of Tennessee, Knoxville
- **Dr. Rachel Wong,** Assistant Professor, Department of Theory and Practice in Teacher Education, University of Tennessee, Knoxville
- **Dr. Kelly Boles,** Assistant Professor, Department of Theory and Practice in Teacher Education, University of Tennessee, Knoxville

Featured Programs & Resources

- **DS4E Content Partner Network** — https://ds4e-org.github.io/CPN_rubric/
- **DS4E Technology Tools for Data Science** — https://ds4e-org.github.io/technologytoolkit/
- **5 Basic Concepts for Teachers New to Data Science** — https://datasciencelearning.org/blog/five-basic-concepts-for-teachers-new-to-data-science https://www.mtsu.edu/program/administration-and-supervision-teaching-data-literacy-ed-s/
- **Data Science Starter Kit** — https://ds4e-org.github.io/onboardlearningprogressions/my-great-book.html
- Mathematicizing Visualizing Power (MVP) Project — https://mvp-project.com

Into Data Science & AI Education (DS4E)

Mahmoud Harding, Instructional Design Director at Data Science for Everyone (DS4E), presented an overview of strategies and resources designed to support the integration of data science and artificial intelligence education in K–12 settings. His work centers on helping educators and decision-makers build momentum and make a compelling case for incorporating data science into schools, districts, and state-level initiatives. Harding introduced the concept of "data skills" as a combination of data literacy—the ability to read, interpret, and communicate data—and data science, an interdisciplinary practice that draws on statistics, mathematics, and computer science to analyze and generate insights. He emphasized DS4E's mission to ensure that both data literacy and data science are embedded across K–12 education by 2030, highlighting the urgency of this goal through evidence of declining student performance in data analysis and statistics and the increasing demand for data-related competencies in the workforce. To address these challenges, Harding outlined three primary implementation models: standalone data science courses, modular integration within existing subjects, and full integration across curricula, noting that the latter provides the most comprehensive and sustainable approach. He further underscores the importance of "data-enabled instructional practices," in which educators intentionally and consistently incorporate data-related skills into their teaching. According to Harding, effective data science instruction should include iterative inquiry, the strategic use of technology, engagement with multivariate datasets, opportunities for mathematical modeling, and explicit attention to ethical considerations such as data privacy and governance. To support these efforts, he highlighted a suite of DS4E resources, including a content partner network offering courses, modules, and professional development materials; a data tool "tech match" system that helps educators identify appropriate technologies based on instructional needs; and a data science starter kit that introduces foundational concepts through guided activities and reflection. Collectively, these tools are designed to help educators recognize existing data-related practices, refine them into systematic instructional approaches, and implement scalable models that align with subject-area goals and student developmental levels, thereby advancing a cohesive vision for data science education in K–12 contexts.

Developing Partnerships with Local Communities (UTK)

Dr. Lynn Hodge, Professor of Mathematics Education and Department Head in the Department of Theory and Practice in Teacher Education at the University of Tennessee, Knoxville, and Dr. Rachel Wong, Assistant Professor in Learning Design and Technology in STEM Education and coordinator of the Instructional Technology Master's program, present a series of collaborative and complementary projects focused on advancing data science and artificial intelligence education through community-engaged partnerships in East Tennessee. Dr. Wong's work highlights the "Partner AI" initiative, a National Science Foundation–funded partnership development project designed to strengthen and expand research–practice partnerships with teachers, school leaders, students, and families, with particular attention to including often underrepresented stakeholder voices such as parents and students in conversations about AI integration. Through a multi-phase process involving value mapping activities, visioning exercises, surveys, interviews, and focus groups, the project co-constructed community-informed mission and vision statements that emphasized critical thinking, ethical AI use, transparency, and responsible innovation, while findings revealed both optimism about AI's potential as a supportive educational tool and concerns regarding overreliance, unclear policies, and impacts on student thinking. These insights informed ongoing efforts to co-design professional development and AI-related

curricula with local school partners. Complementing this work, Dr. Hodge's "Mathematicizing, Visualizing, Power" (MVP) project, also supported by the National Science Foundation, explores community-centered data engagement by positioning youth as "data artists" who create data visualizations grounded in personal and community experiences. Through iterative, design-based research cycles involving after-school programs and community learning events, students produced multimodal visualizations—such as representations of school transitions, family relationships, and sleep patterns—that integrate data analysis with artistic expression, fostering identity development, meaning-making, and dialogue between youth and community members. Together, these initiatives emphasize participatory, community-driven approaches to data science and AI education that prioritize equity, agency, and real-world relevance. Dr. Wong further extends this work through participation in the 2025 AI Presidential Challenge, a national initiative engaging K–12 educators and students in designing AI-driven solutions to local problems; in collaboration with university partners, Dr. Yukyeong Song and teachers from Roane County Schools, this effort resulted in the development of "Math Mysteries," an interdisciplinary, AI-supported learning platform that integrates storytelling and mathematics to address student confidence and engagement in STEM. Collectively, the work of Dr. Hodge and Dr. Wong demonstrates how sustained partnerships, community voice, and innovative, interdisciplinary design can support meaningful and contextually responsive integration of data science and AI in K–12 education.

Data Science and AI Education within Community Contexts (UTK)

Dr. Kelly Boles, Assistant Professor of Educational Data Science at the University of Tennessee, Knoxville, presented two complementary initiatives that reflect her broader focus on addressing geographic differences in STEM learning opportunities. The first project, Appalachian AI Corps, a collaboration with Dr. Sukanya Moudgalya and Dr. Sai Swaminathan, is grounded in the premise that students who meaningfully engage with artificial intelligence in authentic, community-based contexts are better positioned to make informed decisions about its use and to apply it for the benefit of their communities. This pilot initiative, currently in its first year, partners with a local high school agriscience program to co-design a series of six curriculum-aligned workshops that integrate data science, computational thinking, and machine learning concepts into existing career and technical education structures. Central to the project is the use of "Smoky Buoy," a university-developed data collection tool that enables students to monitor local water quality using embedded sensors, cameras, and solar-powered systems, generating continuous datasets for analysis. Through these workshops, students engage in activities ranging from foundational statistics and neural networks to physical computing with microcontrollers, culminating in data analysis and presentation of findings grounded in real environmental conditions. Designed as a modular approach to data science integration, the project emphasizes alignment with AgScience disciplinary standards while fostering hands-on, inquiry-driven learning, with plans to refine and expand the model to additional schools. The second initiative, Community Data Libraries, funded by the BelleJAR Foundation, addresses a critical gap in access to locally relevant datasets for both educators and community members, particularly in rural or under-resourced areas where large-scale open data infrastructures are not feasible. This project aims to develop a scalable, user-friendly platform that aggregates publicly available datasets—such as census and public health data—and organizes them into community-specific repositories that can support instruction and local inquiry. By prioritizing data that is contextually relevant and proximate to learners, the initiative supports more meaningful, local engagement with data science concepts while reducing the time and technical barriers associated with sourcing appropriate datasets. Together, Dr. Boles's projects

illustrate a cohesive approach to data science and AI education that integrates technical skill development with community relevance, interdisciplinary application, and equitable access to resources.