Teaching AI with the Hands-On AI Projects
for the Classroom Series

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Abstract

The *Hands-On AI Projects for the Classroom series*, a collection of five guides, includes interactive projects that can be used by teachers across grade levels and subject areas to teach K-12 students about artificial intelligence (AI).

Artificial intelligence (AI) technologies pervade modern society, embedded in smart home devices, social media platforms, and even educational applications. Yet, while AI has become more ubiquitous, AI education for K-12 students remains a new frontier for educators and curriculum providers, even in the area of computer science.

The International Society for Technology in Education (ISTE) has been working to address this issue through their *Artificial Intelligence Explorations and Their Practical Use in School Environments* program. Funded by a grant from General Motors, the AI Explorations program provides professional learning opportunities and leading-edge resources that support educators in their efforts to facilitate student-driven AI education.

In 2020 and 2021, the ISTE AI Explorations program published a total of five open educational resource guides to assist educators in teaching AI - the *Hands-On AI Projects for the Classroom* series. Available in English, Spanish, and Arabic, each guide includes introductory information for educators, four comprehensive student projects, and resource appendices. The first four guides include projects for a specific educator audience: elementary, secondary, elective, or computer science teachers. The fifth guide, released a year later, included four projects for audiences across K-12, which all focus on AI and ethics.

The *Hands-On AI Projects for the Classroom* series contains a total of twenty projects, which aim to teach foundational understandings about what AI is, how AI works, and how AI impacts society through projects that can be integrated across K-12 curricula. In order to achieve this aim, the projects were built on several research-based instructional design approaches, including student-driven learning methods as well as alignment with frameworks like the Five Big Ideas in AI, the ISTE Standards for Students, the ISTE Computational Thinking Competencies for Educators, and, when appropriate, the CSTA K-12 Computer Science Standards.

Each of the projects provides an entry point for educators and students to expand their understanding of the field of AI while also addressing cross-curricular subject area content. The projects use a scaffolded instructional approach. Getting Started and Take a Closer Look activities provide an opportunity to activate prior knowledge and develop systemic perspectives of AI concepts and their connections across curricular areas. Culminating Performances challenge students to synthesize learning through meaningful performance tasks. As students engage with projects in the five guides, they discover not only how AI is being used in the world around them, but also how AI can be used to solve problems in their daily life, community, and world.

Since the first release in 2020, K-12 educators have implemented the *Hands-On AI Projects for the Classroom* in schools across the United States and around the world. In 2021, the ISTE AI Explorations program also provided a professional development workshop series to support the implementation of the projects for teachers and coaches.

Early anecdotal feedback from educators who have implemented these projects reveals high student engagement, successful learning outcomes, and increased interest in AI topics by both students and teachers. As more structured data is collected and analyzed by the ISTE AI Explorations program or other researchers, the AI education community will be able to use lessons learned from the development and implementation of these resources to inform future iterations of the *Hands-On AI Projects* guides, as well as the development of other effective K-12 AI curricular resources.