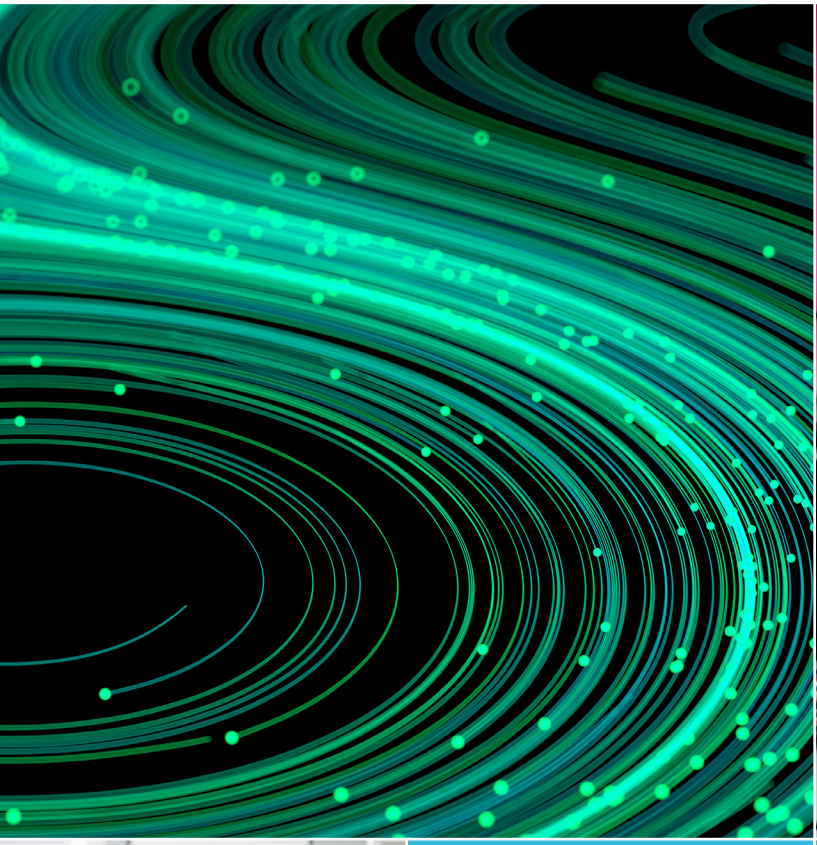
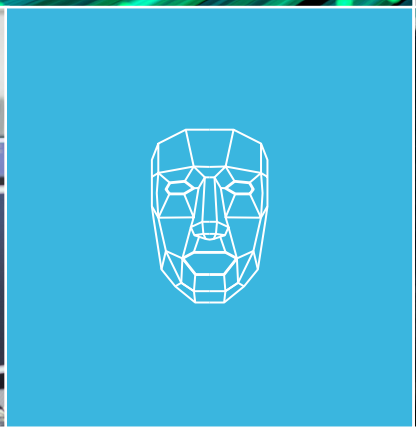
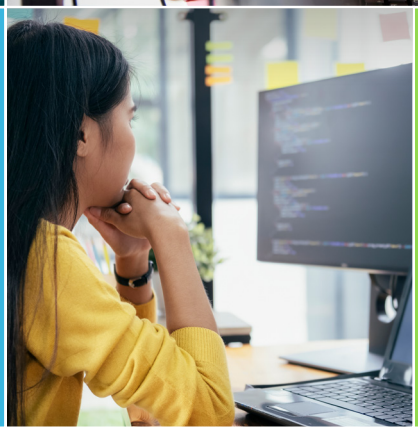
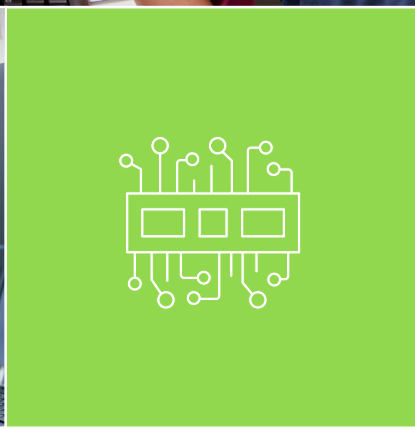
Artificial Intelligence and Learning:
NSF ITEST Projects At-A-Glance









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Dear Colleagues:

The following paper is designed to provide a brief overview of the progress of National Science Foundation-funded ITEST projects exploring artificial intelligence (AI). The information featured has been collected and compiled by members of the STEM Learning and Resource (STELAR) Center, the resource center for the National Science Foundation's (NSF's) Innovative Technology Experiences for Students and Teachers (ITEST) Program, and informed by members of an AI-focused working group convened earlier this year.

Initially composed of current and past ITEST-funded projects, the AI Working Group quickly expanded to incorporate those interested in research on AI and the preparation of the next generation of the AI-informed workforce. The AI Working Group has grown to more than 20 projects, funded through a variety of NSF programs, including ITEST, AISL (Advancing Informal STEM Learning), Secure and Trustworthy Cyberspace, STEM+C, and others. The projects range from those early to exploring AI in K-12 education in 2016 to projects that are just beginning their work this year.

The goal of this publication is to provide an understanding of the ITEST portfolio—both what has already been accomplished and what is currently being explored to date, with the goal of inspiring others to consider joining these research efforts. As an organization-wide priority for NSF, program officers have expressed a desire for projects to explore new directions and research questions related to AI, encouraging the greatest impact on the preparation of youth for the future workforce.

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INTRODUCTION

Artificial Intelligence (AI) is permeating the world around us, changing the way we live, work, and learn. The rapid expansion of AI is having an unprecedented industrial and social impact, transforming our lives and our futures (Lee et al., 2021). In June of 2020, McKinsey surveyed 2,395 global organizations and found that 50 percent of them have adopted AI in at least one company function (McKinsey, 2020). As industry embraces this new technology, they need workers capable of working within AI environments—a need that is reflected in the surge of job postings that reference AI skills and terminology. However, this surge also demonstrates how AI has expanded into nearly every industry sector (Burning Glass, 2021). Furthermore, the alignment across the U.S. government and economic sectors stress AI as a strategic technology for our nation's economic future and competitiveness (National Artificial Intelligence Initiative Office). In 2017, China announced a development plan to surpass the United States as the world leader in AI by 2030. Therefore, there is a strong national interest in developing a skilled workforce of both AI developers and AI users.

The pervasiveness of this new technology demands that we, as consumers, have a fundamental knowledge of the power and limitations of AI. This knowledge of AI will become essential across disciplines, systems, and industries—in marketing, health care, finance, and cybersecurity as well as in the everyday technology applications in the world around us. As AI is gaining a foothold in the workplace, it is also permeating our personal lives, from how we access home mortgages, insurance, and health care to how we apply to schools; in our interactions with smart home devices; and even in the social media posts we are shown. To develop a broad and diverse citizenry that is well-prepared to meet the career and life demands of the age of AI, all youth must gain a fundamental understanding of how AI works and how it will impact their lives. We define this fundamental knowledge as *AI literacy*.

An AI-literate individual is an informed citizen and critical consumer of AI technology. "This individual can identify where AI systems are embedded in everyday life, assess both the potential for harm and the benefits of AI, and describe how AI systems are built using data" (Malyn-Smith et al., 2021). AI literacy promises to help youth develop the foundational knowledge and skills to understand how AI is used throughout different businesses and organizations. Furthermore, an AI-literate youth will know how to use, modify, and design AI systems as preparation for the future of work.

Growing up in an AI-driven society is insufficient to bring up an AI-literate society. By including AI education in grades K–12, an already digital native youth can grow up with the adequate knowledge and abilities to understand the world around them. However, K–12 education has yet to largely adopt an integration of AI with other subjects to reflect today's uses of AI and the future of work. The rapid expansion of AI demands that it's not only studied as a tool, but also studied in the contexts of history, language arts, and STEM. Children are exposed to AI before they enter kindergarten. Having access to information about how these technologies work and their consequences will allow them to become the critical thinkers and innovators we need.

AI literacy interventions are designed to have a low barrier to entry. The initial phases of an AI-literacy curriculum do not require a background in computer science or mathematics, thereby making it accessible for early grades and easy to integrate with different subjects (Malyn-Smith et al., 2021). This adaptability to different contexts makes it possible to connect AI to differing student interests. However, as students progress in their desire to further explore the topic, mathematics is essential to a deeper conceptual understanding of how AI works. Thus, after students achieve AI literacy, they can learn the stronger mathematical foundations that all students can achieve when given the opportunity and proper exposure.

As such, it is important that we prepare all students to engage with AI, and that we ensure this learning is made available broadly to include students from diverse locales, cultures, and socioeconomic backgrounds. We predict that AI literacy will be necessary in order for youth to compete successfully for the jobs of the future. Therefore, broadening participation in AI to all is not only a social justice issue, providing access to in-demand careers cross-industry, but it is also required to ensure a diversity of ideas, approaches, and perspectives are included in AI design to create, innovate, and ensure future leadership in AI. Furthermore, diverse technology teams will create products and services more sensitive to a wider variety of people and will help to avoid unanticipated ethical issues.

In the last five years, the National Science Foundation (NSF) has increased its efforts to raise an AI-literate workforce. In 2017, the NSF announced its 10 Big Ideas, describing the areas identified for investments in bold research. While only a couple of the big ideas explicitly investigate the impact of AI in our lives and career, all 10 Big Ideas require using AI tools and models to achieve its objectives (National Science Foundation, n.d.). Between 2020 and 2021, the NSF announced $360 million investments in partnerships with other government entities and private companies to develop 18 NSF-led National Artificial Intelligence Research Institutes, which will reach 40 states and the District of Columbia. In the 2022 Budget Request to Congress, the NSF highlighted the goal of the Innovative Technology Experiences for Students and Teachers (ITEST) program to support promising K–12 educational research projects to inspire and prepare learners from diverse backgrounds for computationally intensive new industries (National Science Foundation, 2021).

The ITEST program is unique among NSF programs in that it is focused on workforce development, innovative technologies, and both formal and informal learning experiences for youth in grades pre-K–12. The program is funded in part through revenue collected by the Federal H-1B Visa Program, which is issued to overseas workers highly trained in specialty occupations that cannot be filled by U.S. workers. The aim is to encourage and inspire youth through engagement with authentic STEM experiences, preparing them to pursue careers in STEM fields.

As the resource center for the NSF ITEST Program, the STEM Learning and Research Center (STELAR), led by Education Development Center (EDC), works with NSF program officers and awardees of the program to deepen the impact of the program by building capacity and magnifying the results of ITEST projects. This report, *Artificial Intelligence and Learning: NSF ITEST Projects At-A-Glance,* brings the ITEST community together to summarize ITEST's current efforts in AI education and illustrate its reach. The projects included in this report either investigate ways to teach AI or study the use of AI tools to support learning in STEM—both necessary in their own right. The hope is that this report is a starting point for other researchers interested in advancing AI education in K–12.

ITEST AI PROJECTS: AREAS OF EXPLORATION

The AI projects reviewed for this report are exploring research questions to better understand how and under what conditions students develop skills, knowledge, and interests in artificial intelligence. Research questions fall into nine broad areas: national guidelines, learning environments/designs, student perception, student skills/knowledge, ethics in AI, teacher preparation, disciplinary subject matters, broadening participation, and AI's role in assessment.

Following is an overview of what these AI projects are exploring as well as a sampling of some of their research questions, illustrating both the range of inquiry and the level of specificity addressed through this research.

1. National Guidelines

Carnegie Mellon is funded to develop national guidelines for teaching and learning AI in K–12 settings and a research agenda for AI education. Research questions focus on the following:

- What should K–12 students know about artificial intelligence?
- What should they be able to do?

These national guidelines are modeled after the Computer Science Teaching Association (CSTA) Computing Standards and address four grade bands: K–2, 3–5, 6–8, and 9–12.

2. Learning Environments and Designs

Projects focused on formal and informal learning environments and designs are seeking to understand the following:

- How the design of learning environments impact the learning of core AI concepts and reduce misconceptions about AI among teachers and students
- How learning environments influence the development of AI awareness, interest, and identity; encourage collaborative AI learning; increase engagement; and increase performance

Examples of research questions include the following:

- How can learning environments be designed to help students understand core AI concepts, including the structures in "unstructured data" and the roles of human insight in the development of AI technologies?
- How can learning environments be designed to help students develop awareness and interest in careers that are centered on text-mining practices broadly powered by AI technologies?

3. Student Perception and Interest

Projects focused on student perception are exploring the following:

- Knowledge, interest, comfort, and attitudes toward AI and AI-related careers
- Types of learning experiences that increase interest in AI
- Science identity and self-efficacy

Examples of research questions include the following:

- What are students' perceptions of AI and how do they change?
- What connections do students make, if any, between the skills they learn and the application of those skills in various STEM and computer science careers and fields?
- How do students approach STEM learning using a novice "tool" of computational cameras?

- Does science identity change as a result of participation in the intervention?

4. Skills/Knowledge

Projects focused on student skills and knowledge are exploring what K–12 students need to know about AI and what they need to be able to do in an AI learning trajectory , including:

- AI knowledge, skills, self-efficacy, and collaboration
- Integration of AI into prior learning
- Connecting AI skills and their applications in STEM

National guidelines are also being developed to define more clearly what students need to know about AI and be able to do.

A sampling of research questions include the following:

- What AI knowledge and skills are developmentally appropriate for middle school students?
- In what ways can a summer development experience around spoken conversational apps foster middle school students' cognitive outcomes around computing and social-emotional outcomes of interest and identity formation related to STEM careers?
- How do middle school students engage in learning AI, and what types of learning outcomes are achievable?

5. AI, Ethics, and Society

Some projects are exploring ethics, including the following:

- AI's role in society and related ethical dilemmas
- Students' ethical thinking
- Integrating AI ethics into curriculum
- Features of an ethics-centered pedagogy

Examples of research questions follow:

- What do underrepresented youth understand about AI and its role in society?
- What teaching practices are effective in supporting students' learning of AI and related ethics and career issues?

6. Teacher Preparation and Professional Development

Projects focused on teacher preparation and professional development are exploring these areas:

- The supports teachers need for AI curriculum implementation and modification of pedagogy
- The effects of teaching practices on student's knowledge and interest
- Teachers' perceptions, attitudes, and self-efficacy
- The integration of AI with sciences

Examples of research questions include the following:

- How can we best prepare a variety of teachers to use an innovative AI curriculum?
- How do teachers work collaboratively to create experiential learning activities that incorporate visual media resulting from computational cameras?

7. Disciplinary Subject Matter

AI projects also focus on a range of subject areas, including mathematics, engineering, computational thinking, computer programming, language arts, and science.

Projects focused on mathematics are exploring AI and learning, attitudes toward mathematics, and the relationship of AI learning and mathematics learning.

Other projects are focused on exploring:

- Student learning of STEM concepts and practices
- How to create engaging learning experiences that integrate AI and life sciences
- The ability of human-technology interactive learning environments to frame the learning of mathematics and its integration with computational thinking

8. Focus on Broadening Participation

While broadening participation is at the heart of many projects' work, some projects have specifically designed their programming to encourage and support those who might otherwise be excluded.

Examples of research questions for these projects include the following:

- How does the use of bilingual curricula support teachers' interactions with Latinx students?
- Whether and how does the curricula support emergent bilingual students' mathematics learning?
- What types of technology-driven and innovative learning experiences are effective in increasing rural, Black, and Latinx middle school students' AI interest, knowledge, skills, self-efficacy, and interest in AI careers?
- In what ways does the project-based curriculum that ties AI learning with real-world applications in a collaborative, hands-on, interdisciplinary manner impact female students' motivation and interest in 21st century STEM/ICT careers?
- Do students (generally) and girls (specifically) find some topics more engaging than others? If so, what makes them more appealing?

9. AI as a Tool for Assessment

Some projects are also exploring the use of AI tools in student assessment and the role of AI in assessing learning. These include exploring the use and impact of computational cameras, audio analytics/computer-assisted video analysis, and eye-tracking data.

Examples of research questions include the following:

- How do students approach STEM learning using computational cameras?
- How can we analyze student learning behaviors and strategies as they engage in model-building, model-debugging, and problem-solving tasks?

ITEST AI PROJECTS AT-A-GLANCE

The projects featured below have received funding from the NSF ITEST Program to explore incorporating AI into K–12 education. The following table provides information about the projects, partners, and participants who are engaged in this work as well as a glimpse of what each project is exploring.

Broadening Participation of Latina/o Students in Engineering Using an Integrated Mathematics, Engineering and Computing Curriculum in Authentic, Out-of-School Environments		
NSF Program(s)	STEM+Computing, ITEST, DRK-12	**Short Description**
Award Number	NSF # 1613637	AOLME[1] provides authentic bilingual (Spanish and English) experiences for primarily Latinx middle school students that include: • Object detection in digital videos using color histograms • Autonomous robotics performing collision avoidance • Autonomous robotic navigation to escape a maze and to detect and navigate toward a colored object using real-time video analysis
Start—End Year	2016–2021	
Principal Investigators	Sylvia Celedón-Pattichis, Marios Pattichis, and Carlos LópezLeiva, University of New Mexico	
Project Partners	Albuquerque Public Schools	
State	New Mexico	
Participants	Educators, students	
Number of students	135	
Grades	6-8	
Subject areas	Mathematics & computer science	
Locale	Urban, Rural	
Setting	Informal (out-of-school)	
Project Profile	stelar.edc.org/projects/20172/profile/broadening-participation-latinao-students-engineering-using-integrated	
Developing K–12 Education Guidelines for Artificial Intelligence		
NSF Program(s)	Accelerating Discovery in Ed, ITEST, ECR-EHR	**Short Description**
Award Number	NSF # 1846073	

[1] *AOLME* means "Advancing Out-of-School Learning in Mathematics and Engineering."

Start—End Year	2019–2021	This project brings together K–12 educators and AI subject matter experts are developing national guidelines for teaching AI in grades K–12. The project is compiling a curated directory of AI education resources appropriate for K–12 and building a community of educators, researchers, and resource developers focused on teaching AI in K–12. State education officials and school system administrators are working with the project to develop plans for introducing AI education into their state's curriculum standards.
Principal Investigator	David Touretzky, Carnegie-Mellon University	
Project Partners	Computer Science Teachers Association (CSTA) Association for the Advancement of Artificial Intelligence (AAAI) ReadyAI (industry)	
State	Pennsylvania & Florida, national	
Participants	Educators, state education officials, and school system administrators	
Number of students	n/a	
Grades	K-12	
Subject areas	All	
Locale	n/a	
Setting	Virtual	
Project Profile	stelar.edc.org/projects/22569/profile/developing-k-12-education-guidelines-artificial-intelligence	

Innovative Approaches to Informal Education in Artificial Intelligence

NSF Program(s)	AISL, ITEST	**Short Description**
Award Number	NSF #s: 1906636, 1906895	Teens and young adults from historically marginalized communities, ranging in age from 14–24, participate in free after-school classes and/or work shifts at YR Media to do the following: • Engage in AI-literacy workshops • Interview AI leaders • Review AI-based consumer products
Start—End Year	2019–2022	
Principal Investigators	Elisabeth Soep, YR Media Harold Abelson, Massachusetts Institute of Technology	
Project Partners	MIT App Inventor Stanford d.school Radiotopia	
Participants	High school students, college instructors, educators in out-of-school settings	
Number of students	250 per year direct service	

Grades	High school through age 24	• Produce podcast segments on AI in society • Develop apps and interactive news content related to AI • Conduct journalistic investigations of ethical issues in machine learning MIT partners create tutorials for students and educators nationwide to build mobile apps with AI features.
Subject areas	Media arts, STEM, computer science, English, & language arts	
State	California & national	
Locale	Urban	
Setting	Informal (out-of-school)	
Project Profile	informalscience.org/innovative-approaches-informal-education-artificial-intelligence	

Narrative Modeling with StoryQ: Integrating Mathematics, Language Arts, and Computing to Create Pathways to Artificial Intelligence Careers

NSF Program(s)	ITEST	**Short Description**
Award Number	NSF # 1949110	In Massachusetts and Maryland, 580 students in grades 9–12 will learn to design, build, test, and iteratively improve machine learning models of narratives, sourced from student- and teacher-selected literature and also students' own writings. Beginning with core narrative concepts, students will: • Engage in development cycles that lead them to explore their own writing • Annotate models by hand • Observe a trained text-mining model at work • Become familiar with error analysis • Build their own AI model and evaluation process
Start—End Year	2020–2023	
Principal Investigators	Jie Chao, Concord Consortium	
Project Partners	Concord Consortium Carnegie Mellon University North Carolina State University	
Participants	Educators & students	
Number of students	580	
Grades	9–12	
Subject areas	English language arts, mathematics, & computer sciences	
State	Massachusetts & Maryland	
Locale	Urban, suburban, & rural	
Setting	Formal (in-school)	
Project Profile	stelar.edc.org/projects/22920/profile/narrative-modeling-storyq-integrating-mathematics-language-arts-and-computing	

Developing and Testing Bilingual Curricula That Infuse Authentic Computer Programming Experiences into Middle School Mathematics for Latinx Youth		
NSF Program(s)	ITEST	**Short Description**
Award Number	1949230	Building on previous work (NSF # 1613637), ESTRELLA will extend the curriculum from AOLME to support online learning focused on video games of autonomous robots for collision avoidance and autonomous robotic simulations detecting color objects and navigating toward them. Bilingual mathematics teachers will adapt and implement the AOLME curriculum to meet the needs of their students and report findings through action research projects.
Start—End Year	2020–2025	
Principal Investigators	Sylvia Celedón-Pattichis, The University of Texas at Austin Marios S. Pattichis & Carlos A. LópezLeiva, University of New Mexico	
Project Partners	Albuquerque Public Schools	
Participants	Educators & students	
Number of students	160	
Grades	6–8	
Subject areas	Mathematics & computer programming	
State	New Mexico	
Locale	Urban & rural	
Setting	Informal (out-of-school)	
Project Profile	stelar.edc.org/projects/23092/profile/developing-and-testing-bilingual-curricula-infuse-authentic-computer	

Middle School Teacher and Student's Experiences with Artificial Intelligence via Computational Cameras		
NSF Program(s)	ITEST	**Short Description**
Award Number	1949384, 1949493	During summer imageSTEAM workshops, 120 middle school youth (grades 6–8) will integrate computer science, math, and design thinking as they use computational cameras to learn visual AI concepts about
Start—End Year	2020–2024	
Principal Investigators	Suren Jayasuriya, Arizona State University (ASU) Ramana Pidaparti, University of Georgia	
Project Partners	ASU's Digital Culture Summer Institute Girls Who Code (GWC)	

Participants	Educators & students	computer vision and machine learning. To understand the interface between the physical world and image sensing, students will explore color and lighting for physics-based vision. They will learn about: • Image classification pipelines that teach the basics of visual feature extraction • Machine learning classification and the collection and training of data • The use of machine learning for synthetically generated visual media
Number of students	120	
Grades	6–8	
Subject areas	Science, math, English, & language arts	
State	Arizona, Georgia	
Locale	Urban, suburban, & rural	
Setting	Formal (in-school), Informal (out-of-school)	
Project Profile	stelar.edc.org/projects/22929/profile/middle-school-teacher-and-students-experiences-artificial-intelligence	

Beyond CS Principles: Engaging Female High School Students in New Frontiers of Computing

NSF Program(s)	ITEST	**Short Description**
Award Number	1949472, 1949488, 1949492	In summer camps and in-school classes, 200 high school students from Tennessee and North Carolina will participate in the Computer Science Frontiers open-access curriculum using NetsBlox. The project will introduce AI and machine learning along with other advanced topics, such as distributed computing, the internet of things and cybersecurity, through activities designed specifically to interest and engage female students. The curricula are piloted in summer camps run by high school CS teacher partners who
Start—End Year	2020–2023	
Principal Investigators	Akos Ledeczi, Vanderbilt University Tiffany Barnes, North Carolina State University Shuchi Grover, Looking Glass Ventures	
Project Partners	CISCO Amazon Future Engineer Program Vanderbilt Nursing School IBM Global Universities team Metamorph Nashville	
Participants	Educators & students	
Number of students	200	
Grades	9–12	
Subject areas	Computer science	
State	North Carolina & Tennessee	

Locale	Urban & suburban	also participate in teacher professional development (PD) sessions and provide feedback for curricular refinement.
Setting	Formal (in-school) & informal (out-of-school)	
Project Profile	stelar.edc.org/projects/22935/profile/beyond-cs-principles-engaging-female-high-school-students-new-frontiers	

Developing AI Literacy Interventions to Teach Fundamental Concepts in AI (DAILy)

NSF Program(s)	EAGER: ITEST	**Short Description**
Award Number	2022502	Following the 30-hour DAILy AI Literacy curriculum, 130 middle school students from diverse backgrounds, including Hispanic/Latinx and Black/African American learners, attend summer camps where they do the following: • Engage in learning AI concepts • Investigate ethics and AI and AI's impact on society • Increase their awareness of AI-enhanced fields and careers
Start—End Year	2020–2021	
Principal Investigators	Irene Lee & Cynthia Breazeal, MIT Helen Zhang, Boston College	
Project Partners	MIT STEP Lab and Personal Robots Group Boston College STEAM Ahead Boston College's College Bound Program Waltham Public Schools	
Participants	Educators & students	
Number of students	130	
Grades	6–8	
Subject areas	All	
State	Massachusetts	
Locale	Urban & suburban	
Setting	Informal (out-of-school)	
Project Profile	stelar.edc.org/projects/22924/profile/developing-ai-literacy-interventions-teach-fundamental-concepts-ai	

Fostering Computer Science and AI Learning through Youth-Led Conversational App Development Experiences

NSF Program(s)	ITEST	**Short Description**
Award Number	2048480	

Start—End Year	2021–2025	Two hundred ten students from diverse underserved middle schools with limited access to AI and computer science will participate in two-week summer experiences to learn computer science and conversational AI. In Camp DIALOGS, students will use natural language processing tools to learn the basics of artificial intelligence, machine learning, and computer science/programming to design their own spoken dialogue applications, including speech assistants, question-answering systems, and games.
Principal Investigators	Kristy Boyer & Maya Israel, University of Florida	
Project Partners	Alachua County Reichert House	
Participants	Students	
Number of students	210	
Grades	6–8	
Subject areas	Computer science & artificial intelligence	
State	Florida	
Locale	Urban & suburban	
Setting	Informal (out-of-school)	
Project Profile	stelar.edc.org/projects/23422/profile/fostering-computer-science-and-ai-learning-through-youth-led-conversational	

Everyday AI for Youth: Investigating Middle School Teacher Education, Classroom Implementation, and the Associated Student Learning Outcomes of an Innovative AI Curriculum (EdAI)

NSF Program(s)	ITEST	**Short Description**
Award Number	2048746	EdAI is working with 1,200 students, primarily Hispanic/Latinx and Black/African American to develop their AI literacy and foster interest in AI intensive industries of the future. Educators in out-of-school time settings will engage in a PD model, which will include the following: • Book club • Practicum • Teacher network • Make-a-thon to explore what it takes to learn, adopt,
Start—End Year	2021–2023	
Principal Investigators	Irene Lee & Cynthia Breazeal, MIT Helen Zhang, Boston College	
Project Partners	Broward County Public Schools Chicago Public Schools Richmond Public Schools) Cornell Tech CSforALL STEAM Ahead Boston College's College Bound CS Alliance Justice Code CodeVA	

Participants	Educators & students	modify, and teach the DAILy AI Literacy curriculum The DAILy curriculum includes: • Learning artificial AI concepts • Investigating ethics and AI and AI's impact on society • Increasing student awareness of AI-enhanced fields and careers
Number of students	1,200	
Grades	6–8	
Subject areas	All	
State	Florida, Illinois, Virginia, New Jersey, Maryland, New York, New Mexico, & Massachusetts	
Locale	Urban, suburban, & rural	
Setting	Formal (in-school), Informal (out-of-school)	
Project Profile	stelar.edc.org/projects/23421/profile/everyday-ai-youth-investigating-middle-school-teacher-education-classroom	

Preparing High School Students for Careers in Machine Learning through Mentored Scientific Research

NSF Program(s)	**ITEST**	**Short Description**
Award Number	2049022	Recruited from organizations that primarily serve Black, Hispanic/Latinx, and first-generation college-bound students, 120 youth will participate in a summer institute to develop their skills and understanding of machine learning applications and career. Facilitators will be a team of science educators, scientists, AI experts, and program alumni from the Museum of Natural History (NY). Following the institute, 30 of these students will work in research labs during the academic year with scientists who use machine learning.
Start—End Year	2021–2024	
Principal Investigators	Mark Weckel, American Museum of Natural History Irene Lee, MIT	
Project Partners	Several NYC schools (public, parochial, and charter)	
Participants	Students	
Number of students	120	
Grades	11–12	
Subject areas	Natural sciences & machine learning	
State	New York	
Locale	Urban	
Setting	Informal (out-of-school)	

Project Profile	stelar.edc.org/projects/23413/profile/preparing-high-school-students-careers-machine-learning-through-mentored	

AI4GA – Developing Artificial Intelligence Competencies, Career Awareness, and Interest in Georgia Middle School Teachers and Students

NSF Program(s)	**ITEST**	**Short Description**
Award Number	2049029, 2048502	In a nine-week elective course titled "Living and Working with Artificial Intelligence," 1,700 middle school students will: • Explore how AI technologies contribute to our daily lives • Create their own AI applications • Explore career pathways related to AI or robotics The project is also developing an online teacher PD course to train additional teachers to deliver the elective.
Start—End Year	2021–2024	
Principal Investigators	David Touretzky, Carnegie-Mellon University Christina Gardner-McCune, University of Florida	
Project Partners	Georgia Department of Education	
Participants	Educators & Students	
Number of students	1,700	
Grades	6–8	
Subject areas	Artificial intelligence	
State	Pennsylvania, Florida, & Georgia	
Locale	Urban, suburban, & rural	
Setting	Formal (in-school)	
Project Profile	stelar.edc.org/projects/23575/profile/ai4ga-developing-artificial-intelligence-competencies-career-awareness-and	

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