UF IFAS Extension UNIVERSITY of FLORIDA

UF/IFAS PEER REVIEWED 4H456
https://doi.org/10.32473/EDIS-4H456-2026

Teaching AI Literacy to Youth[1]

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There is a growing need for youth to learn how to use artificial intelligence (AI) in a way that will positively impact their careers and their everyday lives. To effectively use AI, familiarizing oneself with AI is crucial. This is known as AI literacy. Researchers propose that learning more about AI and building a foundational understanding assist users in developing the ability to properly use it and identify potential threats, thus leading to more responsible use (Gnoth & Novak, 2025). This publication provides background for educators to increase their understanding of AI in youth educational settings and offers practical tools to better prepare themselves and their youth for responsible AI use.

Why Should We Teach AI to Youth?

Youth are exposed to AI regularly; it is an integral part of today's society. They may see smart cars on the road, unlock their phones with facial recognition, track their fitness with smart watches, or get recommendations from streaming services. They are naturally curious and explore additional uses and applications on their own.

Youth know they need more assistance in understanding AI, including how to use it successfully, confidently, and ethically (National 4-H Council, 2024). Youth also realize that there are ethical issues surrounding the use of AI, such as its potential to negatively influence users by fostering addictive behaviors, creating dependence on technology, promoting hateful behaviors, and spreading misinformation (Durall Gazulla et al., 2025).

Understanding and using AI tools efficiently and effectively are essential skills that should be integral to education today (Sanusi et al., 2024). As many jobs in the future will be transformed by AI, there is a growing need for youth to learn how to use AI properly.

Educators, in both non-formal and formal settings, are key players in creating safe and productive environments where learning about AI can take place. Educators' opinions toward AI can affect their ability to teach it (Sanusi et al., 2024), which means educators need opportunities to learn how to use AI effectively. Learning opportunities that increase familiarity with AI improve educator confidence (Tatar et al., 2025). Programs that teach AI should emphasize a balanced approach by sharing the benefits (social good), risks (human bias), and ethics in using AI (Sanusi et al., 2024; Uygun, 2024). Educators are responsible for supporting opportunities that provide guidance and a safe space for youth to learn about new technologies.

The Basics of AI

Artificial intelligence simulates human intelligence processes using machines or computer systems (Coursera, 2025). It is a general term in which "systems use hardware, algorithms, and data to create 'intelligence' to make decisions, discover patterns, and perform some sort of action" (Ruiz & Fusco, 2024). As the development and training of AI systems depend on human ingenuity and input, their outcomes share similar qualities to human thought, including both positive and negative aspects.

AI Applications

Many AI tools and apps are commonplace and used every day in our lives. Oftentimes, people may not realize they use AI regularly for daily tasks. Table 1 illustrates some of these commonly used tools and apps.

Common AI Types and Subfields

AI is an all-encompassing term that includes many categories, applications, processes, techniques, and additional components (U.S. Department of Education, Office of Educational Technology, 2023). The following list explains some of the more common terms that may be useful for educators. For more detailed information, refer to the CIRCLS Glossary of Artificial Intelligence Terms for Educators and Coursera's Artificial Intelligence Glossary.

- **Generative AI—**a type of AI that can create new content, such as text, images, and so forth, based on patterns it has learned from existing data. An example of this is ChatGPT creating a story from a prompt.
- **Predictive AI—**a type of AI that uses data to predict what will happen next. It uses past patterns and current information to make decisions about the future. An example of this is a business forecast of revenue growth.
- **Machine Learning—**a subfield of AI involving algorithms that allow systems to learn from and make predictions or decisions based on data. It enables a

machine to continue learning beyond the training phase.
- **Deep Learning—**a subset of machine learning that allows processing of more complex tasks. This type of AI has many, often hidden, layers of complexity from the input to the output.
- **Robotics—**an application of AI that uses machines/robots capable of doing physical tasks. They may collect information through sensors and make autonomous decisions about completing tasks, even in a changing environment.
- **Natural Language Processing—**an application of AI in which text or speech is understood and used as input.

Here are some of the most used terms and their definitions:

- **Algorithm—**a set of instructions that computers translate into steps to accomplish a task.
- **Loop—**a sequence of instructions that are continually repeated until a condition is met.
- **Autonomous—**having the capacity to act independently or without external control.

Exploring the Role of AI in Education

Artificial intelligence is transforming the educational landscape, offering promising opportunities and notable challenges. From enhancing personalized learning experiences to streamlining administrative tasks, AI has the potential to support educators and empower youth in meaningful ways. However, considerations must be taken regarding ethical use and reliability. Based on best practices outlined by the U.S. Department of Education (2023) and the University of Florida (McCallister et al., 2024), the following lists highlight the pros, cons, and recommendations for responsible use of AI in educational settings.

What Are the Pros of AI in Education?

- AI can create real-world scenarios that prepare youth for opportunities in today's changing environment.
- Educators can increase course preparation and delivery efficiency, such as designing custom content, aligning learning objectives, or providing assessment feedback.
- Assistive technology may benefit individuals with disabilities (e.g., voice-to-text for individuals with limited physical mobility and personalized support for neurodiverse learners). It may also help reduce language barriers (e.g., translation apps).

What Are the Cons of AI in Education?

- Like other technologies, AI is rapidly changing, and it can be difficult for youth and educators to keep up with these changes.
- The potential exists for unethical use (generating writing assignments, creating falsified media content, etc.).
- Access to AI tools and competency in using them may vary within groups of people.
- Bias may impact AI responses. If AI is given information that is false, incorrect, or limited in sources or perspectives, it can lead to the generation of similarly flawed or deceptive information.

Recommendations for Responsible Use

- Keeping humans in the loop is a key recommendation for all levels of AI use in education. Humans should be verifying, checking, revising, and actively participating in the processes concerning the inputs and the outputs.
- Individuals should be transparent about their AI use. Educators should have clear policies and guidelines on permissible use (i.e., research prompts, idea generation, document editing, presentation design, etc.), and youth should properly document use.
- Assess outputs and apply judgment. Adult and youth users should review sources, check for accuracy and biases, and use their learning to adapt AI-generated materials.
- Training on the proper use of AI tools for youth and educators should be provided, and access should be assured for all participants.

How Can Educators Incorporate AI in Their Lessons?

Recommendations in teaching AI literacy include experiential techniques that provide hands-on learning and elements of enjoyment (Gnoth & Novak, 2025). For youth, processing should consist of time for group and individual reflection to help them overcome barriers to improving AI literacy skills (Gnoth & Novak, 2025). Education on AI should include not only the basics of AI, but also introduce the pros, cons, biases, and risks associated with using AI.

While educators should always consider the age and developmental level of youth, the following suggestions for teaching topics on AI can apply across various settings.

- Use everyday activities to illustrate AI principles and terms. Consider these examples:
    - Have the youth instruct a robot to make a sandwich or perform other everyday tasks to understand algorithms and loops.
    - Explore bias and misinformation through a game. Youth can play the telephone game by

whispering a secret phrase from person to person, or they can do a dance relay by teaching dance moves from person to person. Both activities show how misinformation can spread and alter the original intent.
    - Ask the youth to identify where AI is used at home or school.
    - View weather forecasts to illustrate the use of predictive AI.
- Showcase how different industries are using AI. Invite industry partners, professionals, researchers, college students, or others working on AI projects to share how they use it. Examples are as follows:
    - Agriculture—Robots help pick crops, drones help identify weeds or diseased plants, robotic milkers automate dairy farm production, and autonomous tractors increase precision in planting for higher yield (Choi et al., 2023; Her et al., 2024).
    - Transportation—Car features such as lane assist, automatic braking for hazards, and adaptive cruise control provide increased safety measures for drivers.
    - Healthcare—Diagnosis, image detection, robotic surgery, and personalized recommendations provide higher precision and faster access to results.
- Explore available resources for educators and youth. Numerous options span content areas and ability levels, featuring ready-to-use lessons, curricula, or training for educators or families. Some examples include the following:
    - Day of AI, Family Resources
    - Code.org, Artificial Intelligence Foundations, Explore AI Education
    - National 4-H Council, Welcome to CLOVER
    - Purdue Extension 4-H Youth Development, "Navigating AI in 4-H: What's Acceptable?"
    - Google, Teachable Machine
    - Minecraft Education, AI Foundations
    - Science Buddies, STEM Activities, "Teach a Computer to Recognize Road Signs"
    - Micro:bit Educational Foundation, Lessons
    - Coursera, "Generative AI vs. Predictive AI: What's the Difference?"

Giving youth opportunities to explore, experiment, and ask questions in safe, well-informed environments enables them to build foundational knowledge of artificial intelligence. Through these experiences, educators can support the development of strategies that prepare youth to engage with AI both as current users and as future developers of emerging technologies.

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Table 1. Everyday Uses of AI

Application	Task/example
Virtual assistants	Ask assistants such as Google, Alexa, or Siri questions and receive a response.
ChatGPT or OpenAI	Generates text for an essay or a document.
Self-driving cars	Use AI algorithms to process data from sensors, cameras, and radars to navigate roads without human intervention.
Image recognition	Identifies objects in photos or videos or unlocks a smartphone/tablet.
Chatbots	Provide virtual customer support 24/7.
Language translation	Translates speech or text from one language to another.
Personalized recommendation systems	Recommend music, videos, or products to an individual or market directly to customers based on past preferences and browser history.
Robotics	Help with tasks like assembly in factories, deliveries, etc.

[1] This document is 4H456, one of a series of the Florida 4-H Youth Development Program, UF/IFAS Extension. Original publication date April 2026. Visit the Ask IFAS website at https://ask.ifas.ufl.edu/ for the currently supported version of this publication.

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