National Girls Collaborative Project

NGCP


# Building AI Literacy for Inclusion in STEM

## *A National Landscape Study of K-12 Educators*

Developed by the National Girls Collaborative Project in partnership with Ingenia Learning and STEM Next Opportunity Fund, made possible through the generous support of the AMD Foundation.

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# ACKNOWLEDGEMENTS

The National Girls Collaborative Project (NGCP) would like to acknowledge contributions from our project team, partners, funders, and Advisory Board members who made this work possible.

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**NGCP** brings together organizations committed to informing and encouraging girls to pursue careers in science, technology, engineering, and mathematics (STEM). NGCP connects, creates, and collaborates with advocates for transformative change to advance the agenda in gender equity and expand girls' participation in STEM.

**AMD** is the high performance and adaptive computing leader, powering the products and services that help solve the world's most important challenges. Their technologies advance the future of the data center, embedded, gaming and PC markets. Founded in 1969 as a Silicon Valley start-up, the AMD journey began with dozens of employees who were passionate about creating leading-edge semiconductor products. AMD has grown into a global company setting the standard for modern computing, with many important industry firsts and major technological achievements along the way.

**STEM Next Opportunity Fund** is a national nonprofit organization dedicated to making STEM learning more engaging, effective, and widely available to all youth across the nation through afterschool and summer programs. With more than a decade of experience and a network of afterschool leaders in every state, STEM Next has reached more than 15 million youth and supported more than 450,000 afterschool and summer program educators.

**Ingenia Learning** is an experiential learning design company—building programs, tools, and environments that make STEM relevant, applied, and actionable. From hands-on curriculum to digital learning platforms to full STEM lab design, Ingenia creates experiences that help students see how knowledge becomes impact.

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## PARTICIPANTS

We extend our gratitude to the education professionals across the country who completed the survey or participated in a focus group. Your voices, insights, and day-to-day experiences are the foundation of this report.

# EXECUTIVE SUMMARY

*Building AI Literacy for Inclusion in STEM: A National Landscape Study of K-12 Educators*

Artificial intelligence (AI) is reshaping how young people learn, play, and prepare for future careers. Yet the education field still lacks a clear picture of how prepared educators are to guide them. With support from the AMD Foundation, the National Girls Collaborative Project, in partnership with Ingenia Learning and STEM Next Opportunity Fund, launched *Building AI Literacy for Inclusion in STEM* to examine the current state of AI literacy across formal and informal K-12 learning environments. The study focused on the barriers educators face and the opportunities to expand equitable access.

This report presents findings from the initiative's national landscape study, launched in January 2026. The study used a mixed-methods design that combined a national survey of 552 education professionals working in formal K-12 and out-of-school time (OST) programs with eight focus groups involving 47 education professionals. Together, these findings show how educators currently use AI, what limits their adoption, what support they need, and how they view young people's readiness to engage with AI.

## WHAT WE LEARNED

AI use is already common, but most applications remain practical. About two-thirds of educators (67%) use AI at least several times each week in their professional lives. Chatbots are by far the most common tool, with 87% reporting that they use them. For most educators, AI has become a practical resource for finding quick answers, completing administrative tasks, and creating instructional materials. Student-centered and student-facing applications are much less common. Even so, the focus groups suggested that educators are beginning to think differently about AI's role in their work. Many of them described it as an emerging "thought partner" that helps with lesson planning, differentiation, and idea generation rather than just a tool for completing routine tasks.

Professional learning influences confidence and classroom practice. One of the clearest patterns in the data was the correlation between professional development and educators' readiness to use AI. Yet many respondents have had few opportunities to develop those skills. Thirty-seven percent of respondents reported no AI-related professional development, while only 11% had completed more than eight hours of training. The difference that training made was striking. Among educators with more than eight hours of professional learning, 74% reported frequent AI use in their work, compared with just 16% of those with no training. Confidence in teaching AI concepts followed a similar pattern. As educators became more familiar with AI, their interests also shifted. Rather than asking about introductory AI basics, they wanted practical strategies for implementation, better connections to STEM learning, and examples that linked AI to future careers.

Questions about ethics, privacy, and policy continue to slow adoption. The findings suggest that reluctance to use AI is driven less by a lack of interest than by uncertainty about how to use it responsibly. Concerns about student misuse, reported by 42% of respondents, were the most frequently cited barrier, followed by data privacy (38%) and AI's broader role in society (37%). Limited professional development and unclear organizational guidance added to that uncertainty. Across both the survey and focus groups, educators consistently asked for practical classroom examples, clearer guidance on student use and policy, and more advanced instructional strategies rather than introductory AI content.

Equity gaps remain evident across educator groups. While AI was widespread, access to training and confidence using AI were not evenly distributed. Educators in community-based OST programs, elementary educators, women, and those with limited professional training consistently reported lower levels of AI use and comfort. Nearly half of OST respondents (49%) reported receiving no AI-related training, compared with 37% across the full sample. Similar differences appeared by gender, with 41% of women reporting no training compared with 23% of men. At the same time, OST educators expressed the strongest interest in many of the topics that matter most for young people, including AI for STEM learning, ethics and bias, and career pathways.

Young people's enthusiasm for AI is outpacing their understanding of it. Educators consistently described students as curious about AI and eager to experiment with new tools. Nearly three-quarters of educators rated young people's interest in AI as moderately or very high. However, only about one-third rated youth AI literacy that highly, while one in five described it as very low. Focus group participants often described young people as confident users of AI tools but noted that many lacked the critical thinking, conceptual understanding, and ethical awareness needed to use those tools productively and responsibly.

## WHAT THE FIELD SHOULD DO

The findings make one point clear. No single organization can close AI literacy gaps alone. Schools, districts, OST programs, professional learning providers, researchers, funders, and policymakers all have a role to play. Drawing on the evidence from this study, the report offers six recommendations:

1. **Invest in sustained, tiered AI professional development for educators.**
2. **Develop clear AI guidance, policies, and decision-making tools for education settings.**
3. **Prioritize equity-focused supports for lower-access groups and settings.**
4. **Create practical, youth-centered AI literacy resources that support formal and informal STEM learning, future readiness, and responsible AI use.**
5. **Build a shared field-wide learning network to surface promising practices and reduce isolation.**
6. **Advance research to fill remaining evidence gaps and inform future practice.**

One message came through clearly across both the survey and the focus groups. Educators are not waiting on the sidelines for AI to become part of education. They are already experimenting, adapting their practice, and asking questions about how to use these tools well. What many need now is practical support that matches their enthusiasm. Pairing professional learning with clear guidance, accessible resources, and a commitment to equity is the field's clearest path to ensuring that all young people are prepared not only to use AI, but also to shape how it is used in the future.

# INTRODUCTION

With support from the AMD Foundation, NGCP partnered with Ingenia Learning and STEM Next Opportunity Fund to launch *Building AI Literacy for Inclusion in STEM*. The goal of this initiative is to better understand the current state of artificial intelligence (AI) literacy across formal and informal K-12 learning environments. By engaging educators, youth program leaders, and education networks across the country, the project examines how AI is being introduced, where gaps and challenges exist, and what support educators need to expand equitable access to AI learning for all young people.

This national initiative began with the landscape study presented in this report. This landscape study launched in January 2026 to surface gaps, barriers, opportunities, and promising practices influencing AI literacy across K-12 STEM learning environments. Efforts focused on AI literacy in K-12 education are expanding, including advancing the knowledge base through research, developing frameworks for AI use and teaching, and designing professional development for formal and informal educators. The findings presented here add to the growing body of knowledge while helping to inform future efforts and shared strategies that support educators and communities as AI becomes a common part of teaching, learning, and work.

### PURPOSE

The purpose of this landscape study was to build a detailed, field-wide understanding of educators' current AI knowledge, confidence, needs, and promising practices across formal and informal K-12 education settings, with a focus on barriers and opportunities for equitable access.

### TERMINOLOGY

The terms *education professionals, respondents*, and *educators* are used interchangeably throughout this report. The exception is the **Variations Based on Organization Type and Professional Role** section, where specific professional roles (e.g., educator, program director, etc.) are identified and referenced separately.

## LANDSCAPE STUDY COMPONENTS

Using a comprehensive national survey and semi-structured focus groups, this landscape study explored the following research questions:

- What do educators and youth currently know and understand about AI?
- What AI-related teaching practices, tools, and curricula are already in use?
- Where are the biggest gaps in knowledge, confidence, resources, and access?
- What concerns, motivations, or perceptions shape how AI is introduced to youth?
- How is AI currently positioned within existing STEM and computing priorities?
- What opportunities exist to build equitable and culturally responsive pathways into AI literacy?

Together, NGCP, Ingenia Learning, STEM Next Opportunity Fund, and the AMD Foundation are committed to strengthening both formal and informal STEM learning while ensuring that all young people are included in conversations and decisions about AI and other emerging technologies.

# LITERATURE REVIEW

Artificial intelligence is becoming part of everyday life for young people. Today, nearly all adults in the United States (95%) report being aware of AI, and roughly two-thirds of teenagers (64%) say they have already used an AI chatbot such as ChatGPT or Gemini (Faverio & Sidoti, 2025; Kennedy et al., 2025). As AI becomes more common in schools, workplaces, and daily life, educators face a growing responsibility to help students use AI technologies safely, effectively, and ethically. This literature review draws on a global body of evidence to reflect the international scope of AI research and development, while examining what current research reveals about AI literacy in K-12 education.

## AI LITERACY

AI literacy has been defined as "a set of competencies that enable individuals to critically evaluate AI technologies, communicate and collaborate effectively with AI, and use AI as a tool online, at home, and in the workplace" (Long & Magerko, 2020, p. 2). Biagini (2025) expands this definition by describing AI literacy as the "knowledge required to understand, the operative skills to engage with, [and] the awareness needed to critically evaluate AI technologies, including their ethical, societal, and practical implications" (p. 21).

In other words, AI literacy is a foundational capacity that empowers individuals not only to use these tools but to actively shape and advocate for their ethical application and "navigate and influence an AI-imbued society as informed citizens" (Biagini, 2025, p. 21). Preparing students for an AI-driven world begins during their K-12 years, when they first develop knowledge and habits that impact how they learn, solve problems, and engage with technology.

As interest in AI education has expanded, so has the number of instructional resources available to schools and youth programs. Several K-12 AI curricula now introduce foundational technical concepts while also fostering AI literacy more broadly. Many of these resources, highlighted in the Appendix, demonstrate a shift toward interdisciplinary application of AI in education. Alongside technical skills, these initiatives often incorporate creativity, entrepreneurial thinking, and civic engagement with the aim of empowering youth to apply AI to real-world community challenges across a variety of learning settings.

## AI LITERACY FRAMEWORKS AND LEGISLATIVE GUIDANCE

As of May 2026, many states have shifted from voluntary guidance to formal requirements for AI instruction. In 2026 alone, legislators introduced 134 AI-related education bills across 31 states, addressing topics such as data privacy, classroom use, and curriculum integration (Aaron, 2026). States such as Georgia and Mississippi have taken early steps by integrating AI instruction into high school graduation requirements through computer science credits that cover emerging technologies starting in the late 2020s (Aaron, 2026). More recent legislation, such as Idaho's SB 1227 and Maryland's HB 1057, establishes statewide AI literacy standards and promotes "human-in-the-loop" practices that position AI as a support for teaching rather than a replacement for human educators.

To support states in meeting these new requirements, various national and international organizations have developed frameworks and specialized resources to help schools, districts, and educators meet new expectations (examples of these resources are provided in the Appendix). Together, they provide a practical direction for integrating AI into K-12 education while prioritizing equity, safety, and human agency. The critical role of formalized policy is further underscored by recent empirical data from California. Lee (2026), for example, found that schools with an AI policy, whether developed locally or adopted at the district level, were 7.5 times more likely to provide AI literacy instruction.

## AI EDUCATION AND ISSUES OF EQUITY

While a growing number of AI-related educational resources are being developed, access to these resources and the ability to use them effectively remain uneven across schools and communities. Geographic disparities in AI capacity and adoption reflect broader structural inequalities in economic and technological development, technological infrastructure, broadband availability, and educational investment (Muro & Methkupally, 2025). Globally, research indicates that students from rural communities and economically disadvantaged backgrounds face significant barriers to using AI-driven educational tools because schools often lack reliable internet access, adequate digital devices, and the technical infrastructure needed to support AI-enabled instruction (UNESCO, 2019). In contrast, students attending urban and well-funded institutions are more likely to have access to AI applications, updated technology, and teachers with opportunities for AI-related professional learning, providing them with greater exposure to AI-enhanced learning experiences (UNESCO, 2019). The differences in access and instructional opportunities contribute to unequal development of AI knowledge and skills among students.

Similar disparities have been documented within the United States. Research conducted by the RAND Corporation found that teachers and principals in higher-poverty schools were less likely to report using AI tools or providing guidance on their use than educators working in more affluent schools (Kaufman et al., 2025). As a result, students attending higher-poverty schools may have fewer opportunities to develop AI literacy, learn responsible AI practices, or gain experience using AI technologies that are becoming increasingly common in education and the workforce. Beyond socioeconomic and geographic disparities, the intersection of gender and AI literacy in K-12 education also highlights a critical need to address systemic biases that discourage girls and women from pursuing advanced technological domains. Research conducted across K-12 education, higher education, and the workforce has shown that women report lower confidence in using AI technologies and lower AI-related performance than men (Dai et al., 2020). Women currently account for only 22% of the global AI workforce (Schneegans et al., 2021), and women are 20% less likely than men to engage directly with generative AI technologies (Otis et al., 2025). Kim and Kwon (2024) argue that persistent gender stereotypes portray computing and AI as male-dominated fields, discouraging girls from enrolling in AI-related courses, participating in technology activities, and pursuing careers involving artificial intelligence. Addressing these disparities during the K-12 years may increase girls' confidence, broaden participation in AI learning opportunities, and reduce gender gaps before they become more firmly established in higher education and the workforce.

## RESEARCH ON K-12 YOUTH AND AI

### *Middle and High School Students*

Integrating AI education into K-12 settings requires a multifaceted approach that balances technical knowledge with ethical reasoning. Recent research identifies adolescents as frequent users of AI technologies and future decision-makers who will shape how these technologies are developed and applied. As a result, researchers increasingly advocate for Responsible AI (RAI) frameworks that teach students concepts such as fairness, transparency, accountability, and responsible decision-making alongside technical AI skills (Solyst et al., 2025). Research also suggests that middle and high school students can learn complex AI concepts when instruction is supported by age-appropriate curricula, teacher guidance, and opportunities for hands-on application. For example, Lee et al. (2021) found that middle school students developed foundational AI literacy while also increasing their interest in AI-related careers and their understanding of ethical issues associated with AI technologies.

Informal learning environments also provide opportunities to strengthen AI literacy among adolescents in middle and high school. These settings often allow students to explore AI concepts through project-based activities, experimentation, and collaborative problem solving that may be more difficult to implement

during the traditional school day. For example, Rabinowitz et al. (2025) found that thoughtfully designed machine learning (a subdomain of AI) curricula implemented in informal learning settings increased high school students' confidence in using AI concepts and improved their conceptual understanding, with particularly positive outcomes among students from groups historically underrepresented in STEM fields.

### *Early Childhood and Elementary Students*

Research examining AI education in elementary settings remains limited. In a review of over 800 contemporary academic papers, Fesler et al. (2026) found that only 8% focused on elementary school populations. While the evidence base is relatively small, recent studies suggest that elementary-aged children can begin developing foundational AI literacy when instruction is designed to match their developmental level. For example, Su and Yang (2022) conducted a scoping review of 17 studies published between 1995 and 2021 and found that AI instruction improved children's understanding of artificial intelligence concepts, machine learning, computer science, and robotics while also supporting general outcomes, such as creativity, emotion control, collaborative inquiry, literacy development, and computational thinking.

In early childhood and elementary settings, research further suggests that AI instruction for young children is most effective when learning occurs through creative play, storytelling, and interactive activities that make abstract concepts more concrete. For instance, Kim et al. (2025) examined children between the ages of five and six and found that collaborative play and storytelling activities influenced how children interpreted and interacted with conversational AI systems. Similarly, Su and Yang (2024) reported that participation in an eight-week AI4KG curriculum improved early AI literacy and children's attitudes toward AI, although the authors concluded that further research is needed to develop age-appropriate assessment measures. In addition, Druga and Ko (2021) found that children became less likely to attribute intelligence directly to smart devices after instruction helped them recognize that AI systems are designed and programmed by people rather than acting independently.

## RESEARCH ON K-12 EDUCATORS AND AI

While a growing number of educators are using AI in their personal and professional lives, particularly for administrative tasks, many of them remain less confident *teaching* students how to use AI effectively and responsibly. A national survey of 336 educators across the United States conducted by Youngstown State University (2026) found that while 69% of teachers feel comfortable using AI for tasks like lesson planning and grading, only 53% feel comfortable teaching students how to use AI responsibly. This same study found that one in three teachers (34%) feel significant pressure to use AI in their teaching.

The fears and uncertainties experienced by educators are further complicated by a lack of institutional policies, training, and guidance. Recent research conducted by the Center for Education Policy Research (2025) found that only 22% of K-12 districts had implemented formal AI training for their staff. Without structured professional development, district policies, or instructional guidance, many teachers must independently determine how to integrate AI into classroom instruction while simultaneously addressing ethical concerns related to accuracy, bias, privacy, and academic integrity. Consequently, AI is used primarily to improve educator productivity rather than to support student learning because many educators lack the preparation needed to integrate AI into instruction confidently and responsibly.

# THE PRESENT RESEARCH

The rapid integration of AI into the fabric of daily life, including classroom and informal learning environments, has created new opportunities for teaching and learning while also raising questions regarding equitable access, instructional quality, and student well-being. Although research on AI literacy continues to expand, gaps remain regarding long-term learning outcomes, equitable participation across diverse student populations, and the social-emotional implications of AI use throughout the K-12 years. Furthermore, current scholarship predominantly focuses on formal classroom environments, leaving comparatively little evidence regarding how AI literacy is developed through informal STEM learning ecosystems.

The *Building AI Literacy for Inclusion in STEM* project was designed to directly address these gaps by conducting a national landscape study to explore the current state of AI literacy across both formal and informal STEM learning environments. The study gathered perspectives from educators, youth program leaders, administrators, and other education professionals to examine current AI literacy practices, identify barriers to implementation, and determine the resources and supports needed to ensure equitable access to AI learning opportunities. The specific research design, instrumentation, and analytical approaches used to address these objectives are detailed in the following sections.

## METHODS

This study employed a mixed-methods research design to examine K-12 formal and informal educators' knowledge, confidence, perceptions, and instructional practices regarding AI in STEM education. A quantitative landscape survey was administered to identify broad trends and systemic patterns across a geographically diverse sample of educators. To complement these findings and capture lived experiences, qualitative data were collected through a series of semi-structured focus groups to provide a detailed snapshot of educators' experiences, perceptions, and implementation challenges.

## SURVEY INSTRUMENT AND PROCESS

The *Building AI Literacy for Inclusion in STEM* Landscape Survey was developed between January and March 2026 and administered from March through May 2026. Survey development began with a review of recent literature and existing survey instruments aligned with the study's research questions and objectives. The final instrument incorporated selected items from existing surveys, adapted questions developed by STEM Next Opportunity Fund, RAND, and Youngstown State University, as well as newly developed items created specifically for this project.

The survey underwent both internal and external review before administration. External reviewers included representatives from project funders, project partners, and members of the project's Advisory Board. Feedback that aligned with the project's goals and intended audience was incorporated into subsequent revisions, improving the clarity, relevance, and overall quality of the instrument (see the Appendix for a complete copy of the *Building AI Literacy for Inclusion in STEM* Landscape Survey).

The survey was launched publicly on the NGCP website on March 27, 2026, in recognition of National AI Literacy Day, and remained open through May 2026. Recruitment occurred through NGCP electronic mailing lists, social media platforms, and NGCP's national newsletter. Additional distribution was further amplified through NGCP Collaborative regional networks, STEM Next Opportunity Fund mailing lists, project partners, and Advisory Board members. To complement these direct channels, a snowball sampling approach was employed, encouraging respondents to forward the survey within their professional circles. Finally, to increase participation and strengthen geographic representation, the project partnered with Centiment, a targeted research panel provider, to recruit additional verified K-12 educator participants.

The survey remained open for nine weeks and received a total of 589 responses. Responses that were flagged by the survey software as incomplete or low quality were reviewed individually. Surveys that failed embedded attention-check items or otherwise demonstrated poor response quality were excluded from the final dataset, resulting in an analytical sample of 552 responses.

## FOCUS GROUPS

Focus group sessions were conducted to complement the survey findings by providing qualitative insights into educators' experiences with AI. Ten 60-minute semi-structured focus groups, each consisting of five to seven participants, were conducted via Zoom to investigate K-12 formal and OST educators' knowledge, confidence, and instructional practices regarding use of AI. Participants were recruited through targeted email invitations and from survey respondents who had explicitly indicated their willingness to participate in follow-up research. To acknowledge their time, each participant received a $50 gift card upon completion of the focus group session.

Sessions were designed to foster open dialogue through facilitated discussion prompts related to AI tool adoption, systemic barriers, professional learning needs, and equitable access (see the Appendix for a copy of the Focus Group Protocol). Each session was facilitated by 2–3 researchers, including one discussion facilitator and 1–2 researchers responsible for taking notes and providing technical support. Participants were encouraged, but not required, to keep their cameras on to facilitate discussion and were invited to provide answers, ask questions, or share additional thoughts through the Zoom chat throughout each session.

A strict data cleaning phase was implemented prior to analyzing focus group responses to preserve the integrity of the findings. Transcripts and specific quotes were excluded when participants' professional credentials as educators could not be properly verified or when participation was insufficient to contribute authentic data. After applying these criteria, eight of the original ten focus groups representing 47 educators were retained for analysis.

## ANALYSIS

Survey responses were analyzed using descriptive statistics to summarize overall patterns and trends of AI use, perceptions, and professional learning experiences. Differences across demographic groups, training levels, organization types, and professional roles were examined using chi-square tests to identify statistically significant relationships. Throughout this report, statistically significant differences are reported using a significance level of $p < .05$. In addition, notable trends that did not meet this threshold are discussed only when they provide additional context for interpreting the findings or when statistical testing was not appropriate.

Focus group data were analyzed using a multi-step thematic analysis process. A researcher reviewed focus group transcripts and chat records to identify recurring ideas and develop an initial set of codes. Preliminary themes were developed through an iterative review process and then refined by a second researcher to ensure consistency and alignment across sessions. The final themes were used to explain survey findings, illustrate educators' experiences, and provide representative participant quotes.

# RESULTS

These findings integrate data from the national landscape survey (*N* = 552) and eight focus groups involving 47 educators to describe AI use across formal and informal K-12 learning environments. Results are organized around five themes: current AI use and comfort with AI-related tasks, barriers to adoption, professional training and support needs, perceptions of young people's experiences with AI, and examples of effective AI implementation. Where appropriate, findings are further compared across demographic characteristics, AI training experiences, organizational settings, and professional roles. Together, these findings describe both the opportunities and challenges educators face as AI becomes increasingly integrated into teaching, learning, and youth development.

## SURVEY RESPONDENTS

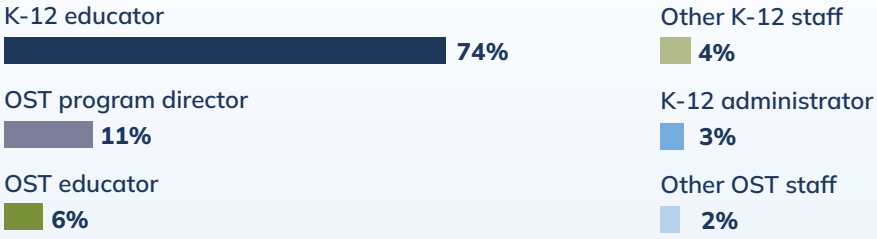
### *Respondent Demographics and Professional Background*

A total of 552 education professionals' responses to the *Building AI Literacy for Inclusion in STEM* Landscape Survey were included in the analysis. Respondents were predominantly women (76%), followed by men (21%) and nonbinary respondents (1%); 2% preferred not to provide their gender. In terms of race and ethnicity, most respondents identified as White (69%), followed by Black or African American (18%), Hispanic or Latino (11%), Asian or Asian American (6%), American Indian or Alaska Native (3%), and Middle Eastern or North African (1%). Eight percent of respondents selected more than one racial or ethnic identity, and 2% preferred not to disclose their race or ethnicity. Because respondents could select multiple identities, percentages exceed 100%.

Most respondents worked in formal K-12 education (76%), including public schools (61%), private schools (8%), and public charter schools (7%). Sixteen percent worked in OST programs, 2% worked in alternative education settings, and 6% represented other organizations such as museums and higher education institutions. Most respondents identified their primary role as K-12 educator (74%). Other roles included OST program directors (11%), OST educators (6%), other K-12 staff (4%), K-12 administrators (3%), and other OST staff (2%).

**Type of organization**


**Primary Role**



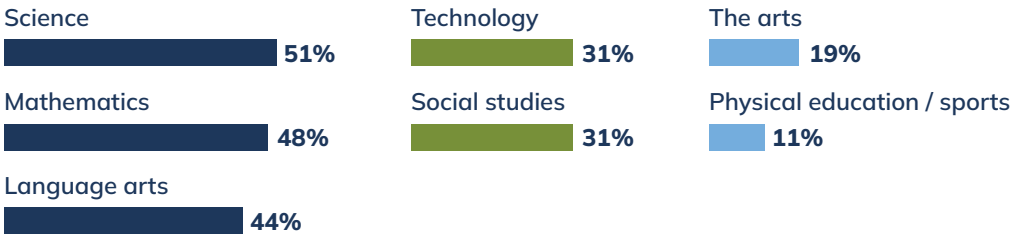

Respondents represented a broad range of professional experience. More than one-third (37%) had worked in their current role for 20 years or more, 45% reported between 5 and 19 years of experience, and 17% had less than five years of experience.

### *Professional Contexts and Communities Served*

Respondents worked across all grade levels. Slightly more than half served elementary students in kindergarten through Grade 5 (52%), while 43% worked with middle school or junior high school students in Grades 6–9 and 42% served high school students in Grades 9–12. Respondents also represented a wide range of subject areas. Science (51%) and mathematics (48%) were the most common teaching areas, followed by language arts (44%), technology (31%), social studies (31%), the arts (19%), and physical education or sports (11%).

**Grade levels served** (Respondents could select more than one grade band).


**Subject areas taught** (Respondents could select more than one subject area).




Because respondents could select multiple grade levels and subject areas (and Grade 9 is included in both the middle school/junior high and high school descriptions), percentages exceed 100%.

Respondents represented all major U.S. regions. The South accounted for the largest share (33%), followed by the Northeast (26%), West (20%), and Midwest (16%). An additional 2% worked in U.S. territories, and 3% served national audiences. Regarding community context, 51% served suburban communities, 41% served urban communities, and 27% served rural communities. Because respondents could select multiple community types, percentages exceed 100%. Respondents also served racially diverse student populations. Twenty-nine percent primarily served students of color, 41% served student populations with approximately equal proportions of students of color and White students, and 26% primarily served White students. Four percent of respondents were unsure or did not have this information. Communities also differed in socioeconomic composition. Thirty-three percent of respondents served communities in the mid-low poverty range, followed by the mid-high poverty range (24%), low poverty range (22%), and high poverty range (15%). Six percent of respondents reported that this information was unavailable or unknown.

## CURRENT USE OF AND COMFORT WITH AI

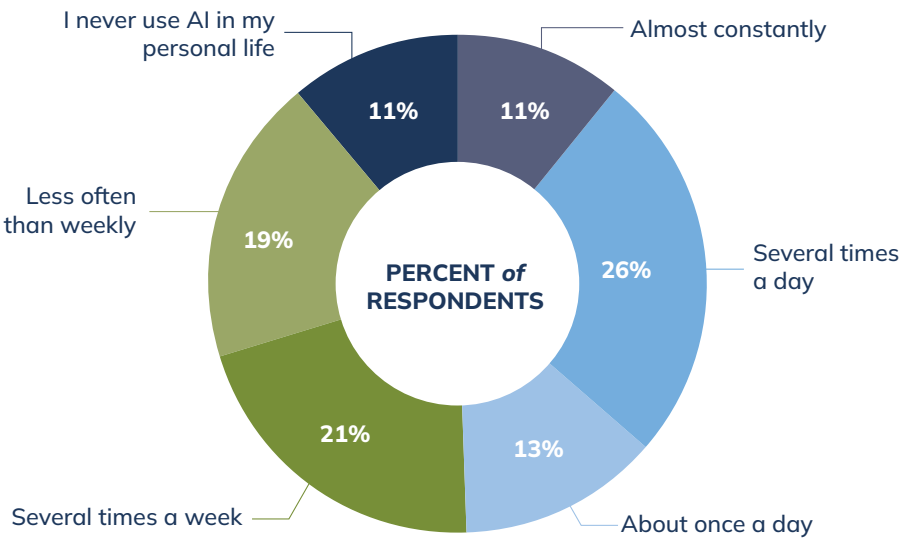
### *Frequency of Use*

Respondents were asked how often they interacted with AI in their personal and professional lives. For this survey, AI interaction was defined for respondents as either intentionally seeking out AI-powered tools to complete tasks or encountering AI through tools and systems that engage with them.

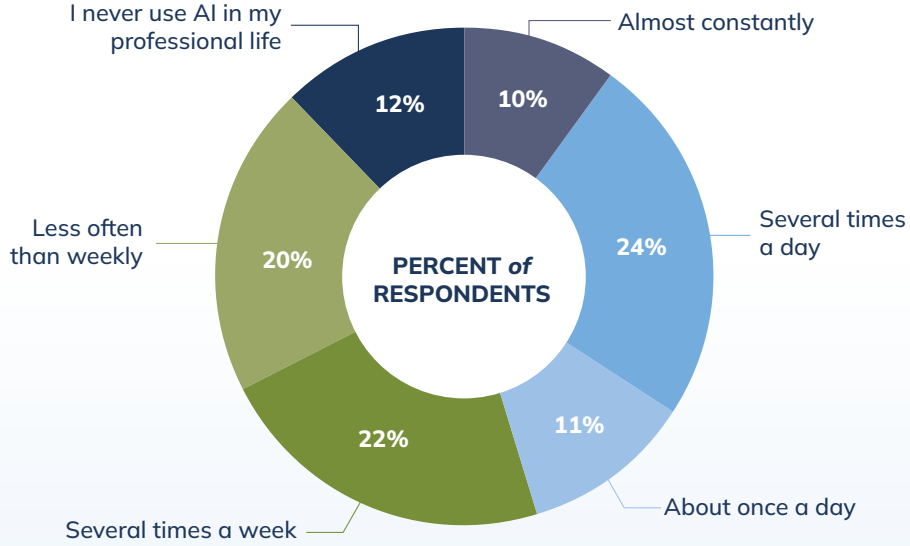
Overall, AI use was common in both personal and professional contexts. Seventy-one percent of respondents reported using AI in their personal lives at least several times each week. More than one-third (37%) reported using AI several times each day or almost constantly, while 11% reported never using AI in their personal lives[1].

[1] Percentages may not sum to 100% due to rounding.

### Frequency of AI Interaction in Personal Life




### Frequency of AI Interaction in Professional Life



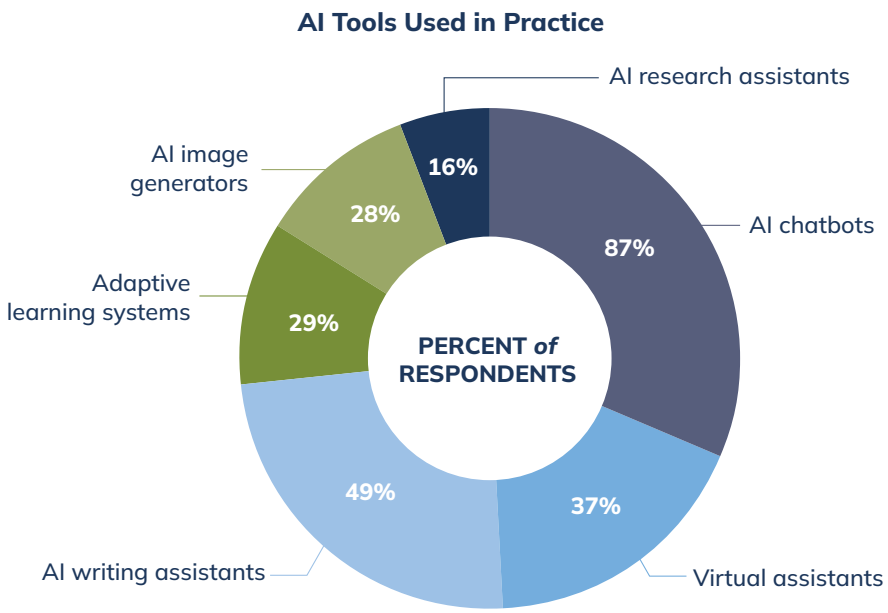

## KEY DEMOGRAPHIC DIFFERENCES: AI USAGE

- **Elementary educators** reported using AI less frequently in both their personal and professional lives than middle and high school educators.
- **Educators with 5–19 years of experience** were more likely to report using AI almost constantly in their professional lives than educators with fewer than 5 years or 20 or more years of experience.
- **Men** reported more frequent AI use than women in both their personal and professional lives.
  - In their personal lives, 68% of men reported using AI at least once per day compared with 45% of women.
  - In their professional lives, 57% of men reported using AI at least once a day compared with 42% of women.

AI use was similarly common in professional settings. Two-thirds of respondents (67%) reported interacting with AI at least several times per week at work, including 34% who used AI several times per day or almost constantly. Only 12% reported never using AI in their professional lives.

## AI Tools Used in Practice

Respondents identified the types of AI tools they use in their professional practice from six categories, selecting all that applied. AI chatbots were by far the most commonly used tool, reported by 87% of respondents. Nearly half also reported using virtual assistants (49%), followed by AI writing assistants (37%). Smaller shares reported using adaptive learning systems (29%), AI image generators (28%), and AI research assistants (16%).

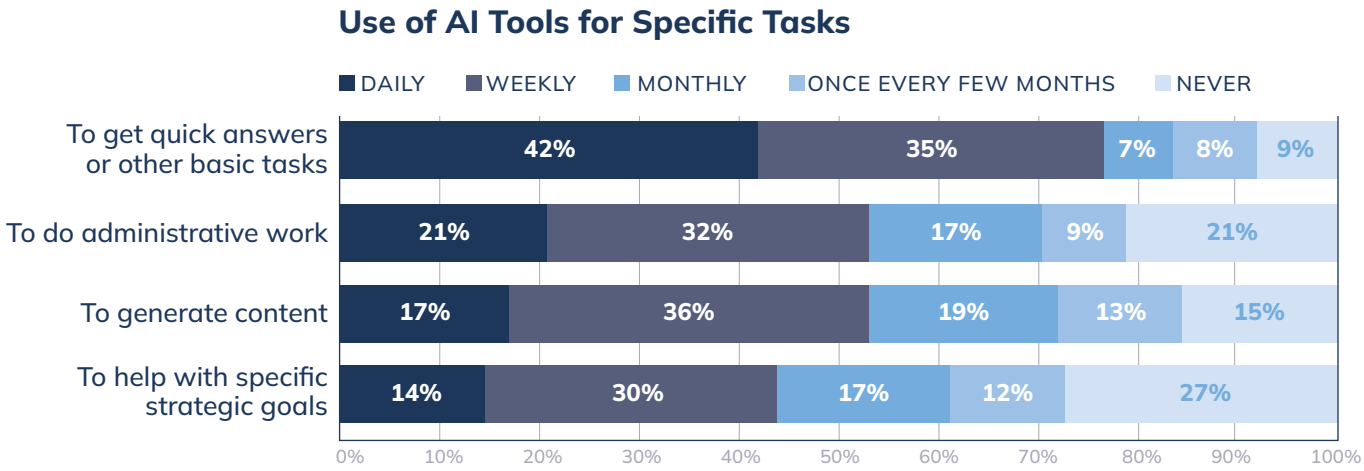



## *Use of AI Tools for Specific Tasks*

Respondents also reported how often they used AI tools for common professional tasks. AI was used most often for obtaining quick answers and completing other basic tasks, with 42% reporting daily use and another 35% reporting weekly use. Only 9% reported never using AI for these purposes.

Administrative work and content generation were also common uses, although somewhat less frequent. Twenty-one percent reported using AI daily for administrative work, while 32% used it weekly. For content generation, weekly use (36%) was more common than monthly (19%) or daily use (17%), and 15% of respondents reported never using AI for content creation.

Strategic applications were less common. Thirty percent of respondents reported using AI weekly to support strategic goals, 17% used it monthly, and 27% reported never using AI in this way. Overall, educators primarily used AI to improve efficiency and complete routine tasks rather than to support broader planning or strategic decision-making.



## KEY DEMOGRAPHIC DIFFERENCES: SPECIFIC AI TOOLS AND TASKS

- **Technology educators** reported the highest levels of AI use in their professional lives overall (45% reporting they use AI several times a day or almost constantly), compared with educators in other academic disciplines.
- **Elementary educators** were significantly less likely than middle and high school educators to use specific AI tools, including AI image generators (24% vs. 33–34%) and adaptive learning systems (21% vs. 31–35%).
- **Elementary educators** were significantly more likely (34%) to report never using AI to help meet specific strategic goals than high school educators (24%).
- **Men** were significantly more likely than women to use AI at least weekly to help with specific strategic goals (43% vs. 26%) and to use AI research assistants (27% vs. 11%).

## FOCUS GROUP INSIGHTS

### *How AI is Shifting the Way Educators Think and Work*

The focus group discussions expanded on the survey findings by showing how educators are using AI in their daily work. Beyond describing AI as a tool for completing routine tasks, many participants viewed it as a resource for generating ideas, refining instructional materials, and supporting lesson and program planning. Several educators described AI as a "thought partner" during the early stages of brainstorming, lesson planning, and program development.

Consistent with the survey findings, participants reported using AI tools such as Gemini and ChatGPT for administrative tasks, including writing concise emails and preparing polished program materials. Educators also described using AI to differentiate grade levels and developmental needs. In addition, several participants explained that AI supported data analysis by reducing the time spent organizing and summarizing student or program data, allowing them to spend more time interpreting results and planning lesson improvements.

**"I use Gemini kind of as a thought partner... give me good sentence starters for this lesson, or ideas to make a hands-on activity for this project."**

—FOCUS GROUP EDUCATOR

**"It's really, really been helpful with differentiation and scaffolding, and then as well as extension. So, how can we take the same lesson and make it even more meaningful and impactful for our youngest students, and likewise for the oldest students."**

—FOCUS GROUP EDUCATOR

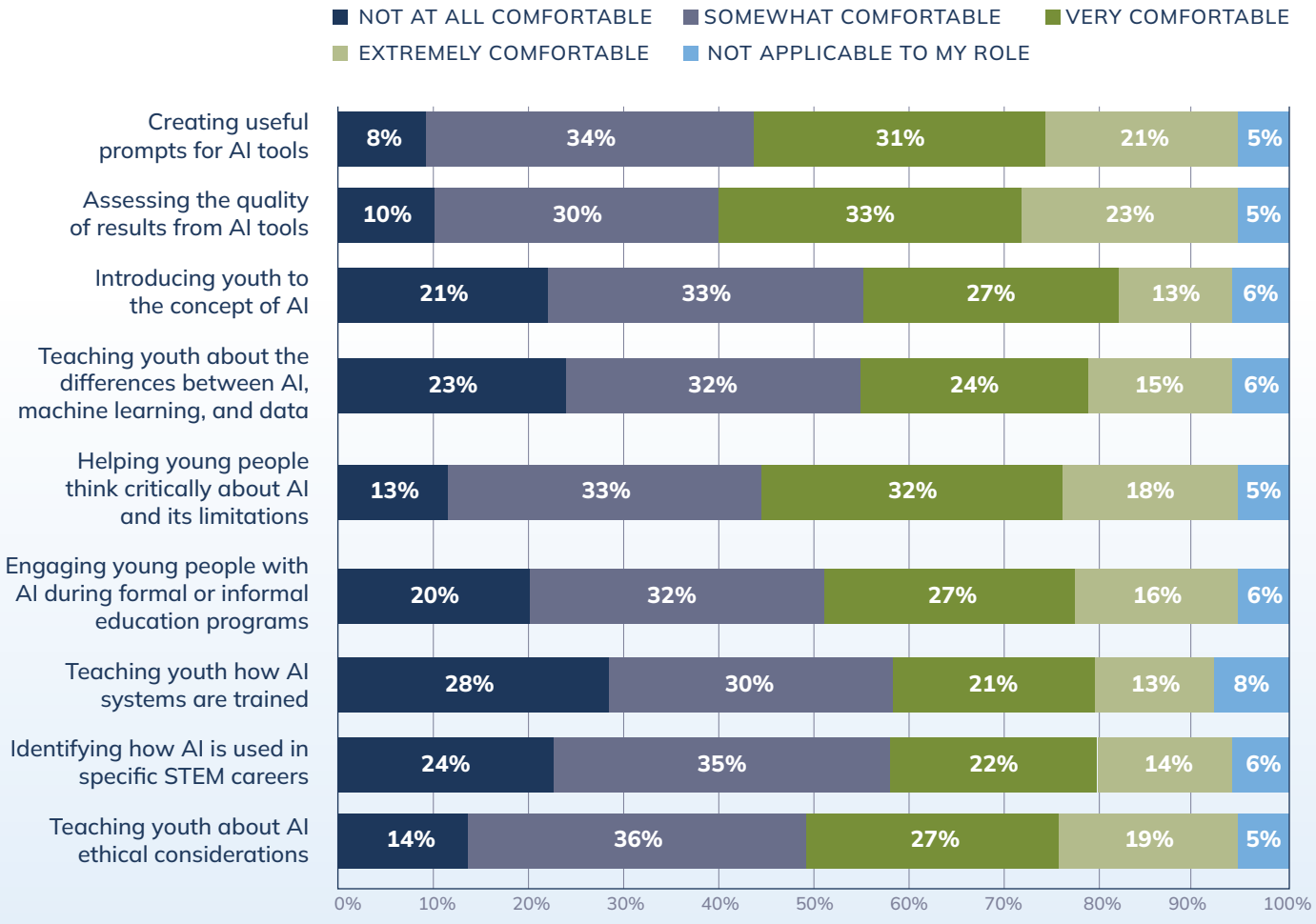
## *Comfort Level With AI*

**Respondents were asked how comfortable they felt performing a range of AI-related tasks, including:**

- Creating useful prompts for an AI tool to execute
- Assessing results from AI tools for their quality
- Introducing youth to the concept of AI
- Teaching youth about the differences between AI, machine learning, and data
- Helping young people think critically about AI and its limitations
- Engaging young people with AI during class or in OST programs
- Teaching youth how AI systems are trained
- Identifying how AI is used in specific STEM careers
- Teaching youth about AI ethical considerations (bias, fairness, privacy)

Overall, most respondents reported at least some comfort across the tasks presented; however, a notable share reported not being comfortable at all with more technical or specialized AI-related activities.

More than half of respondents reported being very or extremely comfortable assessing the quality of AI-generated results (56%) and creating useful prompts (52%), while half reported being very or extremely comfortable helping youth think critically about AI and its limitations (50%). By contrast, respondents were most likely to report being not at all comfortable with more technical or specialized tasks, including teaching youth how AI systems are trained (28%), identifying how AI is used in specific STEM careers (24%), and teaching youth about the differences between AI, machine learning, and data (23%). A small percentage of the sample (5%–8%) reported that these questions were not applicable to their role.



### KEY DEMOGRAPHIC DIFFERENCES: COMFORT WITH AI

- **Men** were significantly more likely than women to be extremely comfortable with AI-related teaching tasks like introducing AI to youth (44% vs. 22%), teaching youth about the differences between AI, machine learning, and data (35% vs. 20%), and helping youth think critically about AI and its limitations (42% vs. 30%).
- **Mid-career educators (5–10 years of experience)** reported the highest comfort across AI-related teaching tasks. In contrast, veteran educators (20+ years of experience) reported the lowest comfort with most AI-related teaching tasks.
    - Note: Mid-career educators were also significantly more likely to have had more than 2 hours of AI-related training.
- **Educators working with students in mid-high and mid-low poverty ranges** tended to be more comfortable using AI than other groups, especially with tasks related to teaching AI to youth.
- **Respondents working with an even mix of White students and students of color** were more likely than other groups, especially respondents working with a majority of White students, to use AI more often and to be very or extremely comfortable using it for certain professional tasks.
- **Educators from the Northeast and South** stood out in a few places related to AI comfort. Respondents from the Northeast were significantly more likely to report being extremely comfortable (30%) creating useful AI prompts than those from the Midwest (14%) or West (16%). In addition, respondents from both the Northeast (28%) and South (30%) were significantly more likely to report being very comfortable teaching youth about the differences among AI, machine learning, and data than those from the Midwest (14%) or the West (16%).

## BARRIERS TO USING AI
## *What is Holding Educators Back?*

Respondents identified up to five factors (from a list of 13 options plus an "Other" category) limiting their use of AI tools in educational settings. Ethical concerns, institutional barriers, and practical challenges emerged as the most frequently reported obstacles. The leading barriers were concerns about student misuse of AI (42%), data privacy (38%), and AI's broader role in society (37%). Approximately one-third also cited lack of professional development for using AI tools and products (31%), concerns about potential bias in AI tools and products (30%), lack of school, district, or organizational guidance (28%), and concerns that increased AI use could diminish student-teacher or student-staff relationships (28%). Other less-frequently cited barriers included concerns that AI could reduce respondents' autonomy and decision-making (25%), lack of time (20%), concerns that AI could widen gaps between high- and low-resource students (19%), and concerns about their own ability to use AI tools competently (18%).

Respondents were least likely to report that available AI products and tools do not meaningfully support their instruction (14%) or that a lack of technology at their school, district, or organization (14%) is holding back their AI use.

Ten percent of respondents selected "Other" and provided additional information. The most common themes, many of which aligned with the existing response options, included lack of trust in AI, concerns about AI's environmental impact, concerns that AI may inhibit creativity and critical thinking, limited relevance to respondents' roles, lack of time, and cost.

## What is Holding Back AI Use


### KEY DEMOGRAPHIC DIFFERENCES: BARRIERS TO AI USAGE

- **Women** were significantly more likely than men to cite concerns about potential bias in AI tools and products as a barrier to their usage (33% vs. 17%). Women were also significantly more likely to cite a lack of professional development for using AI tools as a barrier compared with men (34% vs. 21%).
- **Rural respondents** were significantly more likely than urban respondents to express concern about students misusing AI (47% vs. 36%).
- **Social studies educators** were more likely than educators from other disciplines to identify concerns about AI's broader role in society as a barrier to use.
- **Advanced career educators** were more likely to focus on institutional support as a top barrier, while early career educators were more concerned with broader societal and ethical issues.

## FOCUS GROUP INSIGHTS
### *Barriers to Educators' AI Usage*

The focus group discussions provided additional context for the survey findings related to barriers to AI usage. While participants echoed many of the barriers identified in the survey, their discussions further revealed how these challenges intersect in practice. Educators frequently described feeling unprepared to effectively use or teach AI due to limited training, uncertainty about appropriate applications, and a lack of organizational support. Participants also highlighted the absence of clear policies and guidance, which created additional challenges when determining how AI should be used with youth. Beyond these practical concerns, many educators expressed hesitation about AI because of ethical concerns related to student misuse, data privacy, and the broader implications of AI, while a smaller number raised concerns about AI's environmental impacts.

**"Teachers need to be trained on how to use it, and the kids need to be trained, and our staff needs to be trained."**

—FOCUS GROUP EDUCATOR

**"One of the barriers that our organization is facing is that we don't have an AI governance policy."**

—FOCUS GROUP EDUCATOR

## *Restrictions for Staff and Youth*

Respondents were also asked whether AI tools were restricted for staff or youth in their professional settings. Overall, respondents reported higher levels of restrictions for youth than for staff. Minimal restrictions were the most common response for both groups, reported by 47% of respondents for staff and 38% for youth. However, youth were more likely than staff to be subject to several restrictions (35% compared with 21%), while staff were more likely than youth to have no restrictions (21% compared with 12%). Twelve percent of the respondents reported that the questions about staff restrictions were not applicable to their role, and 16% reported the same for youth restrictions.

### KEY DEMOGRAPHIC DIFFERENCES: RESTRICTIONS ON USAGE

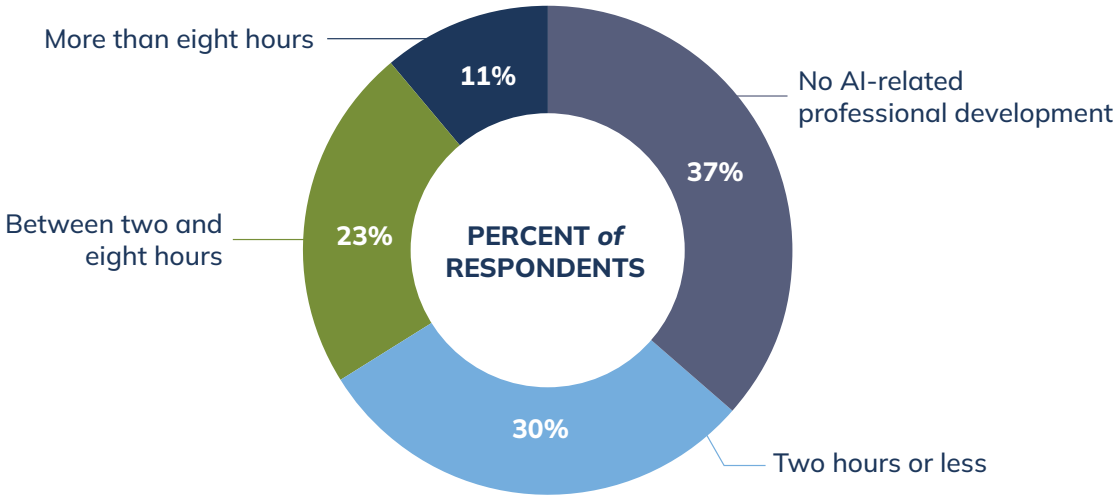
- **Urban respondents** report having more staff restrictions on AI tools:
  - Urban educators were significantly more likely to report several restrictions (26%) than suburban respondents (17%).
  - Suburban educators were significantly more likely to report minimal restrictions (52%) than urban respondents (43%).
  - Rural respondents fall between these two groups with 20% citing several restrictions and 47% citing minimal restrictions.
- **Arts (30%)**, **technology (27%)**, and **science (25%) educators** were more likely to say there were no staff restrictions compared with educators from other disciplines (18%-19%).

## AI TRAINING AND SUPPORT

### *Amount of AI-related training*

Respondents were asked whether they had received any AI-related professional development or support in their current role. Overall, respondents reported relatively limited exposure to AI-related training. More than one-third of respondents (37%) reported receiving no AI-related professional training in their current role, while another 30% had received two hours or less. Another 23% had received between two and eight hours of training, and only 11% reported receiving more than eight hours of training.

**Amount of AI-Related Professional Development Received**




### *Desired Outcomes*

**In addition to identifying concerns about AI, respondents were asked which of the following outcomes related to AI use in education were most important to them:**

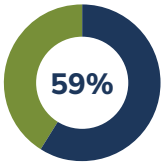
- Help me save time
- Improve the quality of my work
- Improve student outcomes
- Prepare youth for future careers
- Reduce my stress
- Increase youth engagement
- Build youth AI literacy

Overall, respondents prioritized practical benefits, particularly saving time (59%) and improving the quality of their work (49%). Student-centered outcomes were also important, with 40% choosing improving student outcomes and 39% choosing preparing students for future careers. Reducing stress was selected by 38% of respondents, followed by increasing youth engagement (34%), and building youth AI literacy (32%). Seven percent selected "Other," with most comments indicating either a lack of interest in using AI or reiterated concerns about its use.

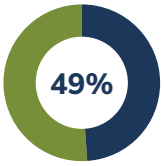
### KEY DEMOGRAPHIC DIFFERENCES: TRAINING & SUPPORT RECEIVED

- **Men** were significantly more likely (38%) than women (19%) to have had between 2 and 8 hours of AI-related training. **Women** were significantly more likely (41%) than men (23%) to have received no AI-related professional development at all.
- **Technology educators** were most likely to have received more than 8 hours of AI training (15%), significantly more than science (8%), language arts (6%), social studies (8%), and arts educators (3%).
- **Elementary educators** were significantly more likely (41%) to have received no AI-related professional development at all compared with high school educators (32%).

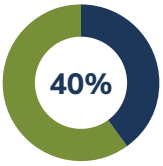
## Desired Outcomes



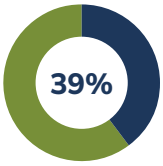

Help me save time



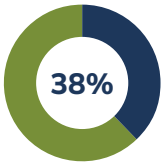

Improve the quality of my work



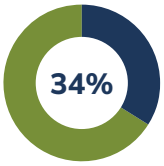

Improve student outcomes



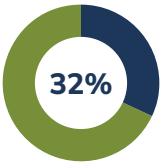

Prepare youth for future careers



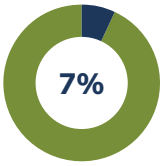

Reduce my stress




Increase youth engagement




Build youth AI literacy




Other

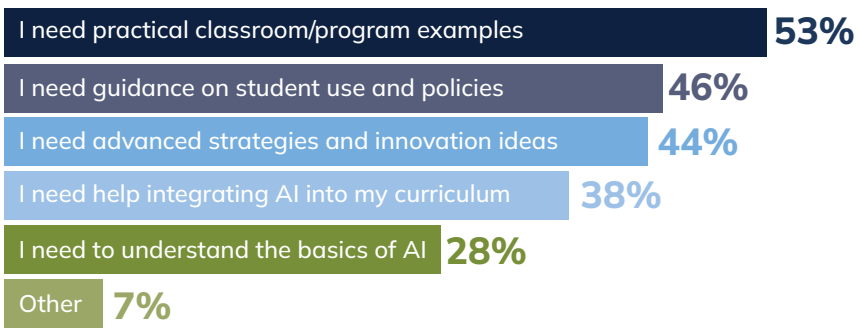
### KEY DEMOGRAPHIC DIFFERENCES: DESIRED OUTCOMES

- **Women (62%)** were significantly more likely than men (51%) to identify saving time as an important outcome of using AI.
- **Technology educators** were significantly more likely to prioritize building youth AI literacy (52%) and preparing youth for future careers (56%) than mathematics (34%, 41%), language arts (26%, 38%), and social studies (28%, 35%) educators.

## *Preferred Types of Training and Support*

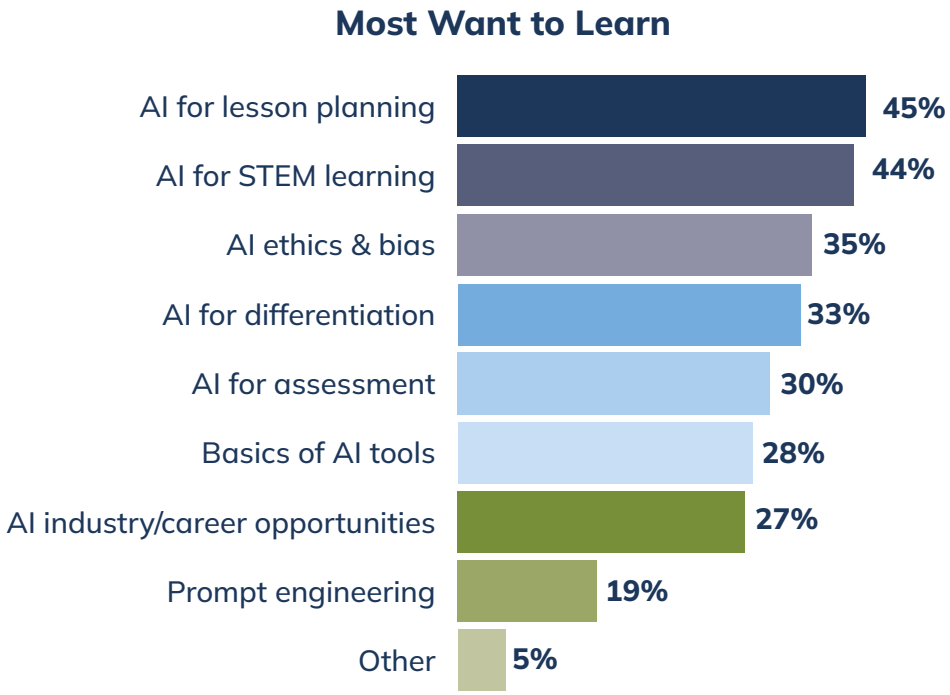
Building on respondents' reported barriers to AI use and the outcomes they hope to achieve, the survey asked which types of AI-related support or training would be most helpful, as well as what topics respondents would most like to learn about.

Respondents most commonly identified a need for practical classroom or program examples (53%), followed by guidance on student use and policies (46%), and advanced strategies and innovation ideas (44%). Fewer respondents reported needing support with integrating AI into their curriculum (38%) or understanding the basics of AI (28%). Seven percent of respondents selected "Other," with most comments again indicating either no interest in AI training or reiterated concerns about its educational use.



## *What Educators Most Want to Learn*

When asked what they would most like to learn about AI, respondents were most interested in AI for lesson planning (45%) and AI for STEM learning (44%). Respondents also expressed interest in AI ethics and bias (35%), AI for differentiation (33%), AI for assessment (30%), the basics of AI tools (28%), and AI-related industry and career opportunities (27%). Prompt engineering was the least commonly selected topic, identified by 19% of respondents. Five percent of respondents selected "Other" and provided additional information. About half indicated they were not interested in learning about AI, while others suggested topics related to addressing concerns, such as how to use AI safely and appropriately.




### KEY DEMOGRAPHIC DIFFERENCES: TRAINING, SUPPORT, AND CONTENT EDUCATORS WANT

- **Women** were more likely than men to report needing guidance on students' use of AI and policies (49% vs. 36%).
- **Technology educators** were more likely to need guidance on student use and policies, and **math educators** were less likely than educators in other subject areas to report needing instruction on AI basics. **Technology, science, and physical education/sports educators** were also more likely to seek advanced strategies and innovation ideas than educators from other disciplines.
- **High school educators** were significantly more likely to express a need for advanced strategies and innovative instructional ideas than elementary educators (54% vs. 44%).
- Interest in STEM-related AI learning also differed by discipline and grade level:
  - **Science and technology educators** were more likely to be interested in AI for STEM learning and AI-related career opportunities than educators in other disciplines.
  - Likewise, **high school and middle school educators** were significantly more likely to want to learn about AI for STEM learning (53% for both) than elementary educators (43%).

## FOCUS GROUP INSIGHTS

### *The Training Educators Want*

The focus group discussions added context to the survey findings by clarifying that when educators ask for "classroom or program examples," they are often looking for practical ways to integrate AI into instruction. Focus group participants shared that it would be highly beneficial to have access to concrete best practices and real-world examples that demonstrate how AI can be incorporated into lessons and programs across different educational environments. They also expressed a strong need for practical, tool-focused training that introduces commonly used AI platforms and explains how to use them appropriately in educational settings.

Focus group participants also emphasized the need for targeted training and resources that help them implement AI in ways that promote critical thinking and foster deep learning among young people while strictly upholding ethical standards. Additionally, educators wanted guidance on selecting appropriate AI tools, understanding their capabilities and limitations, and determining when AI is appropriate for different educational tasks.

Across the focus groups, educators generally favored interactive, applied, and practice-based training formats over passive or purely informational approaches. Educators preferred workshops that included hands-on activities, classroom examples, and opportunities to practice using AI tools. Some educators also expressed interest in ongoing, human-supported formats, such as one-on-one coaching, peer sharing, and discussion-based sessions (e.g., roundtables and collaborative exchanges) that would help educators integrate AI into their specific learning context.

Notably, across all focus group conversations, participants placed less emphasis on how training should be delivered than on the quality and relevance of the content. Few discussed preferences for online versus in-person formats or training length. Instead, they emphasized the need for training that is practical, immediately applicable, and connected to their day-to-day work.

**"Examples of how AI has been successfully integrated in the classroom would be helpful."**

—FOCUS GROUP EDUCATOR

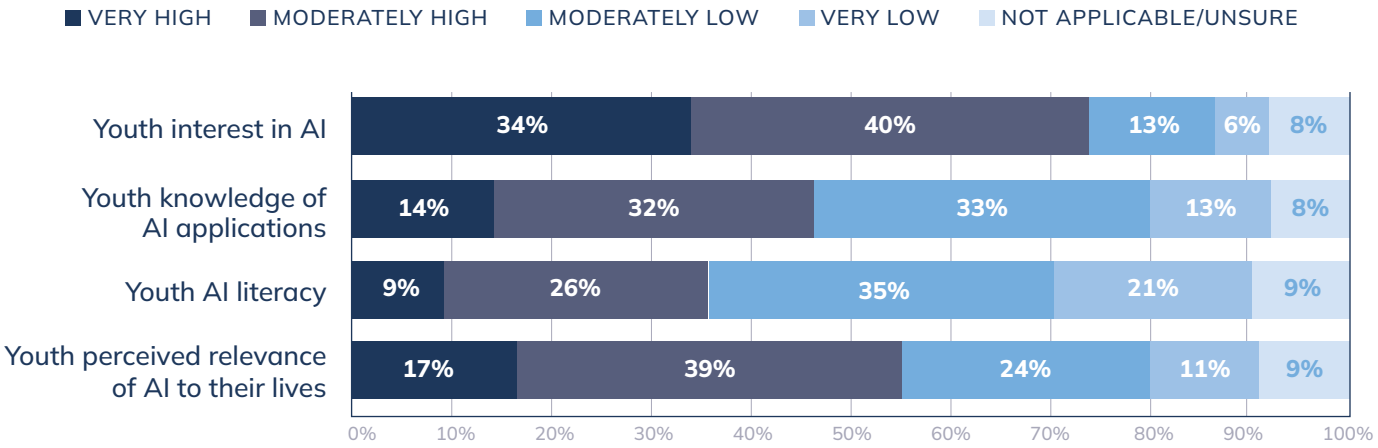
**"I think it's just really those strong examples of use cases. So, how do we take the ideas presented in those [AI] frameworks, and what do they look like in action? Like, what are best practices around engaging different types of audiences..."**

—FOCUS GROUP EDUCATOR

## PERCEPTIONS OF YOUTH EXPERIENCES WITH AI

Respondents were asked to assess youth experiences with AI by rating their perceptions of youth interest, knowledge, AI literacy, and the relevance of AI to young people's lives. Overall, respondents viewed youth as highly interested in AI, while perceiving youth knowledge and AI literacy as comparatively lower. Most respondents rated youth interest in AI as moderately high (40%) or very high (34%). They also rated the perceived relevance of AI to youths' lives relatively highly, with 39% selecting moderately high and 17% selecting very high. By comparison, fewer respondents rated youth knowledge of AI applications as moderately high (32%) or very high (14%). Youth AI literacy received the lowest ratings, with 26% rating it moderately high, 9% rating it very high, and 21% rating it very low. A small percentage of the sample (8%–9%) reported that these questions were not applicable to them or that they were unsure.

## PERCEPTIONS OF YOUTH EXPERIENCES WITH AI




### KEY DEMOGRAPHIC DIFFERENCES: PERCEPTIONS OF YOUTH EXPERIENCES WITH AI

- **Respondents working in high poverty environments** were less likely than other respondents to rate youth knowledge about AI, AI literacy, and perceived relevance as moderately high.
- **High school educators (38%)** were significantly more likely than elementary educators (28%) to rate student interest in AI as very high.
- **Elementary educators (14%)** were significantly more likely than either middle (8%) or high school educators (8%) to rate the perceived relevance of AI to youths' lives as very low.

### FOCUS GROUP INSIGHTS

#### *Youth Immersion with AI vs. Youth AI Literacy*

While the survey findings show a gap between high youth interest in AI and comparatively lower AI literacy, the qualitative focus group findings provided additional context. Educators consistently described young people as highly interested in AI and often quick to adopt new technologies. However, participants heavily emphasized that many students have only a limited understanding of how AI works, how to evaluate AI-generated information, and when AI should or should not be used. Several educators worried that young people may utilize AI as a shortcut to bypass learning goals rather than as an aid to enhance original thought. To address this, some educators felt the need to shift toward collaborative, transparent dialogues that foster data literacy, critical media consumption, and human agency, ensuring the next generation evolves from passive consumers into critical, responsible producers of technology.

**"I see more of reliance [on AI]... Now, AI is found almost on every web page, and when they use it, I don't think they use it smartly."**

—FOCUS GROUP EDUCATOR

**"Letting them understand that it's not everything they get from AI that they would submit...you should be able to cross-check, to go [through] whatever information you have gotten from AI, and be able to break it down, narrow it down, and filter it."**

—FOCUS GROUP EDUCATOR

## EFFECTIVE EXAMPLES IN PRACTICE

In addition to the quantitative questions summarized above, respondents were asked two open-ended questions about their experience with and thoughts about AI, both of which were optional.

First, respondents were asked to describe one task, activity, or practice they had found effective in their professional role. About half of respondents provided a response to this question. Most shared a range of effective AI-related tasks, activities, or practices, and overall sentiment was positive. Many highlighted lesson planning, content creation, and student assessment. Some also discussed ethical considerations, while a few raised concerns about AI's societal impacts or indicated that they were reluctant to use AI. Overall, most respondents found AI tools helpful for streamlining tasks and enhancing productivity, while a small minority voiced caution or skepticism about broader implications or adoption in their work environments.

> **"One thing that I've seen that's been kind of a cool way with AI is showing students pathways and careers and giving them advice on what they could potentially do in the future."**
>
> —FOCUS GROUP EDUCATOR

> **"There is an app which I found effective [which] is, like, showing them the mistakes that it [AI] can make. When they're seeing incorrect or incomplete answers, it shifts their mindset, because they just stop saying, yeah, [AI is] something that is always right. And start engaging with it more critically."**
>
> —FOCUS GROUP EDUCATOR

Second, respondents were asked to share any additional thoughts about their use of AI or the role of AI in education. Their responses reflected a mix of optimism, caution, and uncertainty. Some saw AI as a valuable tool for enhancing learning and preparing students for the future, while others expressed concerns about misuse, dependency, ethics, and environmental impacts. A few respondents also highlighted the need for age-appropriate use and better training for both students and educators. Overall, these responses underscore the importance of responsible integration, ongoing education, and addressing risks as AI becomes more prevalent in educational settings.

## VARIATIONS BASED ON AMOUNT OF AI-RELATED TRAINING

This section examines how respondents' experiences with AI differed based on the amount of AI-related training they have received. Across measures of current AI use, comfort with AI-related tasks, perceived barriers, desired supports, and perceptions of youth experiences with AI, respondents with more AI-related professional development generally reported more frequent use, higher levels of comfort, and stronger interest in integrating AI into educational practice.

**Respondents were asked if they had received any AI-related training and, if yes, how much, choosing from the following options:**

- More than 8 hours of AI-related professional development
- 2–8 hours of AI-related professional development
- Up to 2 hours of AI-related professional development
- No AI-related professional development

## *Current Use of and Comfort with AI*

Respondents' current use of AI varied by the amount of AI-related training they had received. In professional settings, frequent AI use (defined as using AI almost constantly or several times per day) was highest among respondents with more than 8 hours of AI-related training (74%), followed by those with 2–8 hours (48%), up to 2 hours (32%), and no training (16%). **Respondents with more than 8 hours of training were significantly more likely than all other groups to use AI almost constantly (29% vs. 5%–12%).** Respondents with more than 8 hours or 2–8 hours of training were also significantly more likely than those with up to 2 hours or no training to use AI several times per day in their professional lives (45% and 36% vs. 24% and 11%).

Respondents' use of AI for various purposes also varied by the amount of AI-related professional development they had received. Respondents with more than 8 hours of AI-related training were significantly more likely than other groups to use AI tools daily across all four options: 68% reported using AI daily for quick answers or other basic tasks, 47% for administrative work, 40% for content generation, and 36% for support with specific strategic goals.

Respondents with 2–8 hours of AI-related training were also significantly more likely than those with less training to use AI daily for three of the four purposes: administrative work (28%), content generation (23%), and support with specific strategic goals (18%). By contrast, respondents with no AI-related training were more likely to report never using AI for these purposes, particularly administrative work, content generation, and support with specific strategic goals.

Respondents' comfort with AI-related tasks also varied by the amount of AI-related professional development they had received**.**

**Those with more than 8 hours of AI-related training were more likely than respondents overall to report being very or extremely comfortable with several foundational AI-use skills:**

Assessing the quality of results generated by AI tools

**83%**, compared with **56%** of all respondents

Creating effective prompts for AI tools

**84%**, compared with **52%** of all respondents

Helping young people think critically about AI and its limitations

**79%**, compared with **50%** of all respondents

**Respondents with more than 8 hours of AI-related training were also less likely than respondents overall to report being not at all comfortable with more technical or specialized AI-related tasks:**

- Teaching youth how AI systems are trained (10%, compared with 28% of all respondents)
- Identifying how AI is used in specific STEM careers (11%, compared with 24% of all respondents)
- Teaching youth about the differences between AI, machine learning, and data (7%, compared with 23% of all respondents)

Respondents with 2–8 hours of AI-related training were also significantly more likely than those with less training to report being extremely comfortable with several tasks, including creating useful prompts for AI tools (27% vs. 16% and 13%), assessing the quality of AI-generated results (31% vs. 19% and 15%), teaching youth about the differences between AI, machine learning, and data (21% vs. 11% and 10%), engaging young people with AI during education programs (21% vs. 11% and 10%), and teaching youth how AI systems are trained (20% vs. 9% and 8%).

> **74%** of respondents who received more than 8 hours of AI-related training use AI almost constantly or several times per day in their professional lives, compared with **34%** of all respondents

## *Barriers to Using AI*

Reported barriers to using AI differed somewhat by the amount of AI-related professional development respondents had received. As with respondents overall, those with more than 8 hours of AI-related training were most likely to cite concerns about students misusing AI (42%), data privacy (37%), and the broader role of AI in society (32%). Respondents with no AI-related training also most frequently cited concerns about students misusing AI (39%), followed closely by a lack of professional development for using AI tools and products (38%) and concerns about data privacy (37%).

**The barriers with the largest differences by amount of AI-related professional development were:**

- **Lack of professional development for using AI tools and products:** Respondents with no AI-related training (38%) and those with up to 2 hours of training (36%) were significantly more likely to cite lack of professional development for using AI tools and products as a barrier than those with 2–8 hours of training (23%) and more than 8 hours of training (11%).
- **Concerns about their ability to use AI tools and products competently:** Respondents with no AI-related training (21%) and those with up to 2 hours of training (19%) were significantly more likely to cite concerns about their ability to use AI tools and products competently as a barrier than those with more than 8 hours of training (7%).

Respondents with no AI-related training reported fewer restrictions on AI use for both staff and youth than other respondents. They were more likely to report having no staff restrictions on AI tools at their professional location (28%), significantly more so than respondents with 2–8 hours of training (16%) and those with more than 8 hours of training (13%). They were also significantly less likely than all other groups to report minimal or several restrictions for youth (28% vs. 42%–45%). In addition, respondents with no AI-related training were more likely than other respondents to indicate that the question about restrictions for youth was not applicable to them.

> Respondents with less AI-related training are more likely to cite lack of professional development and concerns about their ability to use AI tools competently as barriers than respondents with more AI-related training

## *AI Training and Support*

Respondents' desired outcomes and support needs also varied by training level, suggesting that AI-related training may shape both how respondents use AI and what they want next.

Regardless of the amount of AI-related training received, respondents most often identified saving time as their top desired outcome, followed by improving the quality of their work. Interest in building youth AI literacy showed the greatest variation by training level.

**Respondents with more than 8 hours of AI-related training (50%) and those with 2–8 hours of training (39%) were significantly more likely to prioritize building youth AI literacy than respondents with up to 2 hours of training (27%) or no training (25%).**

When asked what types of AI support or training would be most helpful, respondents with very little or no AI-related training most often selected practical classroom or program examples, followed by guidance on student use and policies. Respondents with no prior AI-related training were also significantly more likely than other groups to report needing to understand the basics of AI (37% vs. 18%–24%).

**Respondents with more than 2 hours of AI-related training were most likely to identify advanced strategies and innovation ideas as helpful supports, and they were significantly more likely to do so than those with less training.** This was reported by 61% of respondents with more than 8 hours of training and 55% of those with 2–8 hours, compared with 43% of respondents with up to 2 hours of training and 33% of those with no training.


Learning priorities also differed by training level. Respondents with more than 8 hours of AI-related training were most likely to want to learn about AI for STEM learning (57%) and were significantly more likely to choose this option than respondents with up to 2 hours of training (47%) and those with no training (36%). They were also significantly more likely to want to learn about AI-related industry and career opportunities (47%) than respondents with up to 2 hours of training (24%) and those with no training (20%).

Respondents with up to 2 hours of AI-related training (48%) and those with 2–8 hours of training (47%) were most likely to want to learn about using AI for lesson planning, significantly more so than respondents with more than 8 hours of training (31%). Both groups also expressed strong interest in learning about AI for STEM learning.

Respondents with no AI-related training were also most interested in AI for lesson planning (45%) and were significantly more likely than other respondents to want to learn the basics of AI tools (37% vs. 19%–25%).

## *Perceptions of Youth Experiences with AI*

Overall, respondents with more AI-related training were more likely to rate youth interest in AI, youth knowledge of AI applications, youth AI literacy, and the perceived relevance of AI to youths' lives highly. **Respondents with more than 8 hours of AI-related training were significantly more likely than other respondents to rate youth interest in AI as very high (54% vs. 29%–36%), while those with 2–8 hours of training were significantly more likely than other groups to rate youth interest as moderately high (55% vs. 33%–39%).**

A similar pattern emerged for youth knowledge of AI applications, youth AI literacy, and the perceived relevance of AI to youths' lives. Respondents with at least 2 hours of AI-related training were significantly more likely to rate these items as very high than those with less training, whereas respondents with up to 2 hours or no training were more likely to rate them as very low. Respondents with no AI-related training were also more likely to indicate that these questions were not applicable or that they were unsure, with 16% to 18% selecting one of these responses across the items.

## *Summary*

These findings suggest that AI-related professional development is closely associated with how respondents use, understand, and envision AI in educational settings. Respondents with more training reported greater AI use, higher comfort with AI-related tasks, and stronger perceptions of youth interest and readiness. In contrast, respondents with less or no training were more likely to identify foundational knowledge, professional development, and practical implementation support as ongoing needs.

## VARIATIONS BASED ON ORGANIZATION TYPE AND PROFESSIONAL ROLE

This section examines how AI use, comfort, perceived barriers, training needs, and perceptions of youth experiences with AI varied across organization types and professional roles. Findings are reported through three comparisons: 1) OST respondents compared with the full sample; 2) organization type (private, public, and charter formal K-12 settings and OST programs based in a community-based organization (CBO) or school[2]; and 3) professional role (K-12 educators, administrators, and other staff, and OST educators, program directors, and other staff).

### *Current Use of and Comfort with AI*

Respondents reported using AI in their personal and professional lives at similar rates across organization types and roles, but frequency of use for specific purposes differed, with K-12 respondents using AI more often than OST respondents.

Compared with the full sample, OST respondents were less likely to report using AI daily or weekly for all four purposes examined: getting quick answers or other basic tasks, doing administrative work, generating content, and helping with specific strategic goals. They were also more likely to report never using AI for these purposes. For example, 50% of OST respondents reported never using AI to help with specific strategic goals, compared with 27% of the full sample.

The same pattern appeared across organization type and professional role. Respondents in CBO-based OST programs were less likely to use AI daily or weekly across all four purposes and more likely to report never using it (see Table 1). Similarly, OST program directors and OST educators were significantly more likely than K-12 educators to report never using AI for quick answers or other basic tasks, administrative work, or strategic goals.

**TABLE 1**

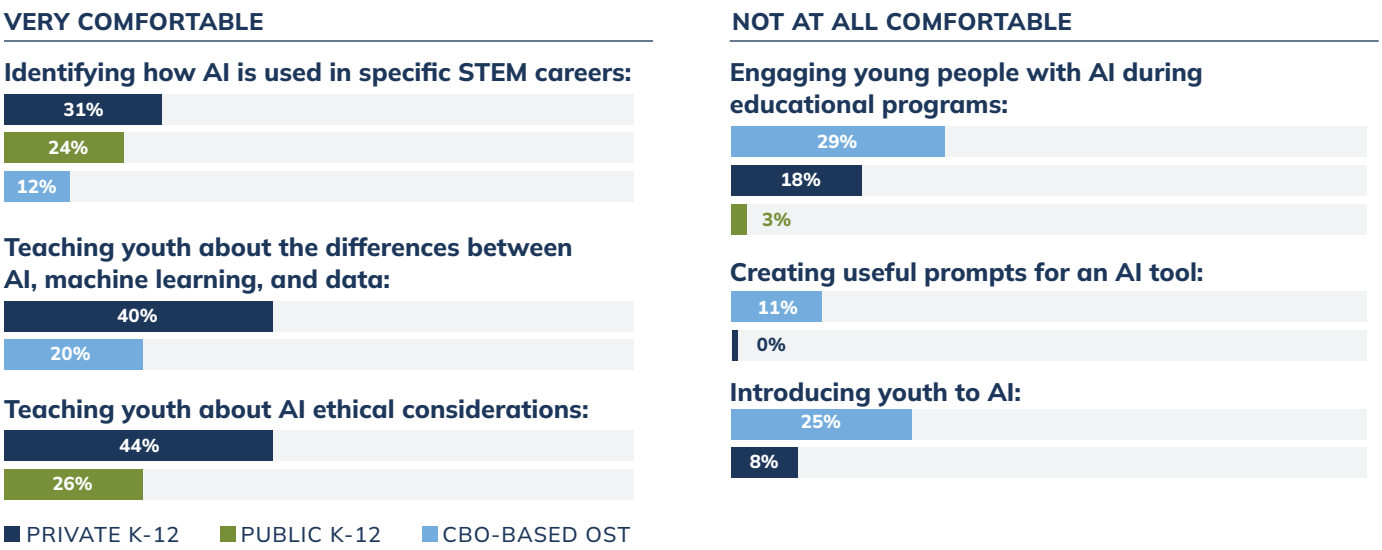
***Significant Differences by Organization Type for AI Tasks***

| TASK | SIGNIFICANT DIFFERENCES |
|---|---|
| Use AI daily for quick answers or other basic tasks | Private K-12 (60%) > public K-12 (42%) and CBO-based OST (33%) |
| Use AI daily to generate content | Private K-12 (26%) > CBO-based OST (11%) |
| Use AI daily to help with specific strategic goals | Charter K-12 (31%) and private K-12 (24%) > CBO-based OST (8%) |

OST respondents reported slightly lower comfort than respondents overall across most AI-related tasks. The largest gaps were observed for introducing youth to AI, engaging young people with AI during class or OST programming, teaching youth how AI systems are trained, and identifying how AI is used in specific STEM careers.

Across organization types, K-12 respondents, particularly those in private settings, generally reported higher comfort using and teaching about AI. In contrast, respondents in CBO-based OST programs were more likely to report being not at all comfortable with several AI-related tasks. Significant differences included:

[2]Respondents at school-based OST programs show similar trends as CBO-based OST programs throughout the data but are not highlighted due to lack of significance because of low sample size.




By professional role, K-12 respondents generally reported higher comfort than OST respondents, with the most significant differences observed between K-12 educators and OST program directors (see Table 2).

## TABLE 2

### *Comfort with AI-Related Tasks: OST Program Directors vs. K-12 Educators*

| TASK | COMFORT LEVEL | OST PROGRAM DIRECTORS | K-12 EDUCATORS |
|---|---|---|---|
| Introducing youth to the concept of AI | Very comfortable | **10%** | **30%** |
| Identifying how AI is used in specific STEM careers | Very comfortable | **11%** | **25%** |
| Engaging young people with AI during education programs | Not at all comfortable | **34%** | **16%** |
| Teaching youth how AI systems are trained | Not at all comfortable | **45%** | **25%** |
| Identifying how AI is used in specific STEM careers | Not at all comfortable | **36%** | **22%** |
| Teaching youth about AI ethical considerations | Not at all comfortable | **25%** | **12%** |

## *Barriers to Using AI*

Like the full sample, OST respondents expressed high concern about data privacy (57%) and the role of AI in society (56%). However, they were less likely than respondents overall to report concerns about students misusing AI (32%) and more likely to express concern about potential bias in AI tools and products (48%) and the possibility that increased AI use could diminish their autonomy and decision-making (46%).

By organization type, CBO-based OST respondents were significantly more likely than most K-12 groups to express concerns about AI's broader role in society, data privacy, potential bias, and reduced autonomy. In contrast,

charter K-12 respondents were most likely to cite concerns about student misuse, while public K-12 respondents were most likely to identify limited technology access as a barrier (see Table 3).

**TABLE 3**

***Significant Differences in Concerns by Organization Type***

| CONCERN | SIGNIFICANT DIFFERENCES |
|---|---|
| Role of AI in society | CBO-based OST > private and public K-12 |
| Data privacy; bias in AI tools and products | CBO-based OST > public and charter K-12 |
| Reduced autonomy and decision-making | CBO-based OST > all K-12 settings |
| Students misusing AI | Charter K-12 > CBO-based OST |
| Limited technology access | Public K-12 > charter K-12 |

By role, K-12 educators were significantly less likely than OST educators and program directors to report concerns about AI's role in society, bias in AI tools and products, and diminished autonomy and decision-making. OST educators were also significantly more likely than K-12 educators to report that available AI products and tools did not meaningfully support their instruction.

OST respondents were more likely than respondents overall to report having no AI-use restrictions for either staff or youth and less likely to report minimal or several restrictions for either group. CBO-based OST programs reported fewer restrictions than K-12 settings for both staff and youth (see Table 4). They were also significantly more likely than K-12 respondents to indicate that the question about youth restrictions did not apply to them. Public K-12 respondents were the most likely to report several restrictions on youth AI use.

**TABLE 4**

***Significant Differences in AI-Use Restrictions by Organization Type***

| GROUP | SIGNIFICANT DIFFERENCES |
|---|---|
| Staff restrictions | No restrictions: CBO-based OST (44%) > K-12 settings (15%–23%)<br>Minimal restrictions: public K-12 (50%) > CBO-based OST (35%) |
| Youth restrictions | No restrictions: CBO-based OST > public K-12<br>Minimal restrictions: public and private K-12 > CBO-based OST |

Role-level differences mirrored these findings. OST program directors most often reported no staff restrictions (43% vs. 17% of K-12 educators), while K-12 educators more often reported minimal staff restrictions (50% vs. 33% of OST program directors). For youth, OST educators most often reported no restrictions (23%, significantly more than K-12 educators), whereas K-12 educators more often than OST program directors reported minimal (42% vs. 25%) or several (37% vs. 23%) restrictions.

## *AI Training and Support*

OST respondents reported receiving less AI-related professional development than respondents overall. Nearly half (49%) reported no AI-related training, compared with 37% of the full sample. K-12 respondents were more likely to report receiving two or more hours of training, and CBO-based OST respondents (47%) were significantly more likely than public K-12 respondents (32%) to report no training at all.

By role, educators reported more professional development than OST program directors. K-12 educators (11%) and OST educators (10%) were significantly more likely than OST program directors (0%) to report more than eight hours of professional development, and OST program directors (54%) were significantly more likely than K-12 educators (34%) to report receiving none. K-12 administrators reported the highest participation, although the small sample size limits interpretation.

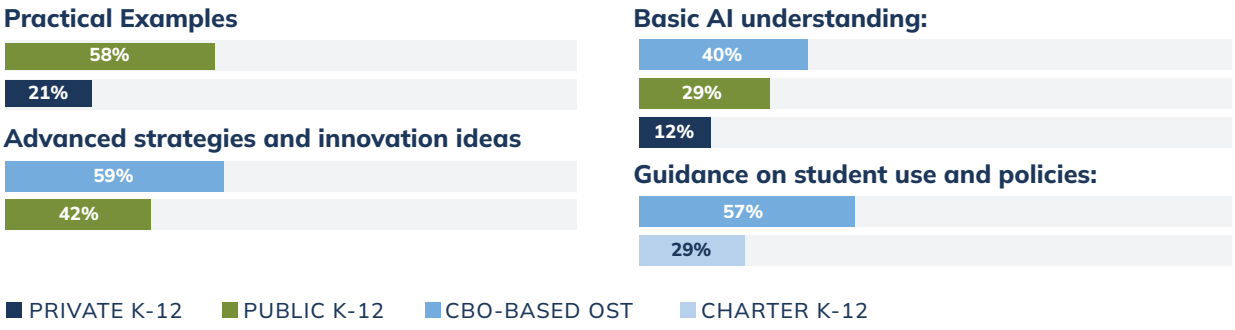
Like respondents overall, OST respondents most often prioritized saving time (63%) and improving the quality of their work (54%) as desired outcomes of AI use. However, they were more likely than the full sample to prioritize preparing youth for future careers (56%) and building youth AI literacy (46%).

CBO-based OST respondents were significantly more likely than private K-12 respondents to prioritize youth engagement (41% vs. 21%). They were also significantly more likely than public K-12 respondents to prioritize building youth AI literacy (49% vs. 27%) and preparing youth for future careers (57% vs. 35%).

By role, K-12 educators were significantly more likely than OST program directors to prioritize improving student outcomes (43% vs. 26%). In contrast, OST program directors were significantly more likely to prioritize improving the quality of their work (60% vs. 45%) and building youth AI literacy (41% vs. 27%).

Like the full sample, OST respondents most often identified needs for guidance on student use and policies (56%), advanced strategies and innovation ideas (54%), and practical classroom or program examples (49%).

By organization type, public K-12 (58%) and charter K-12 (45%) respondents most often wanted practical examples, whereas private K-12 (45%) and CBO-based OST (59%) respondents most often wanted advanced strategies and innovation ideas. Significant differences included:




By role, K-12 administrators and OST program directors most often wanted advanced strategies and innovation ideas, while educators and other staff in both settings most often wanted practical examples. OST educators reported equal interest in both topics. The only significant role-based difference was that OST program directors (59%) were more likely than K-12 educators (39%) to want advanced strategies and innovation ideas.

OST respondents' learning priorities also differed somewhat from those of the full sample. The topics identified most often were AI for STEM learning (61%), AI ethics and bias (53%), AI industry and career opportunities (42%), and prompt engineering (36%). CBO-based OST respondents were significantly more likely than all K-12 groups to want to learn about prompt engineering, AI ethics and bias, and AI industry or career opportunities. They were also more likely than public and private K-12 respondents to want to learn about AI for STEM learning. Significant differences between K-12 educators and OST program directors appear in Table 5.

**TABLE 5**

***AI Learning Priorities: OST Program Directors vs. K-12 Educators***

| TOPIC | OST PROGRAM DIRECTORS | K-12 EDUCATORS |
|---|---|---|
| Prompt engineering | **27%** | **14%** |
| AI ethics & bias | **46%** | **29%** |
| AI for STEM learning | **54%** | **39%** |
| AI industry/career opportunities | **48%** | **19%** |
| AI for lesson planning | **33%** | **52%** |
| AI for differentiation | **13%** | **38%** |

## *Perceptions of Youth Experiences with AI*

Respondents from OST organizations consistently rated young people's AI experiences lower than respondents overall. They were especially less likely to rate youth knowledge of AI applications (30% vs. 46%) and youth AI literacy (18% vs. 35%) as moderately or very high, and more likely to indicate that these questions were not applicable to their role or setting.

Differences were also apparent by role. Overall, educators were more likely to rate youth measures highly. OST educators and K-12 educators were most likely to rate youth interest as moderately or very high (80%, 76%) and youth knowledge of AI applications as moderately or very high (40%, 49%). K-12 staff and educators were most likely to rate youth literacy as moderately or very high (40%, 39%), while K-12 administrators and OST educators were most likely to rate perceived relevance of AI as moderately or very high (79%, 63%). In general, OST program directors were less likely to rate young people's AI experiences as moderately or very high: 63% for youth interest, 30% for youth knowledge of AI applications, 12% for youth AI literacy, and 40% for perceived relevance of AI.

## *Summary*

Interest in AI was evident across both K-12 and OST settings, but respondents' experiences, concerns, and support needs varied meaningfully by organization type and professional role. K-12 respondents reported more frequent AI use, greater comfort with AI-related tasks, and more AI-related professional development. OST respondents reported lower levels of use and training, stronger concerns about privacy, bias, autonomy, and AI's broader role in society, and stronger interest in youth-centered priorities such as STEM, ethics, AI literacy, and career pathways.

# KEY FINDINGS

The following key findings emerged from the *Building AI Literacy for Inclusion in STEM* Landscape Survey and focus group data, providing insight into how K-12 formal and informal educators are currently engaging with AI and identifying priorities for future support and implementation.

## 1. AI use is already common among education professionals, but it remains largely practical and task-oriented.

Most respondents reported using AI regularly, particularly for practical tasks such as finding information, managing administrative responsibilities, and generating content. Chatbots were the most commonly used AI tool, while writing assistants, image generators, and other specialized tools were used less frequently. Although AI adoption was widespread, educators relied on it mainly to improve efficiency and productivity rather than to support more strategic or transformative work. Survey findings also suggest that many educators are still developing foundational AI knowledge and would benefit from additional support in understanding AI tools and capabilities.

## 2. AI-related professional development is strongly associated with education professionals' confidence, use, and readiness to teach AI concepts.

Professional learning plays a critical role in helping education professionals move from awareness and experimentation to confident, purposeful, and student-centered AI use. Respondents who received more than eight hours of AI-related training were significantly more likely to use AI frequently, feel comfortable incorporating it into their work, and report greater confidence in teaching AI-related concepts. Training also strengthened education professionals' ability to teach more advanced topics, such as how AI systems are trained, distinctions between AI and machine learning, and connections between AI and STEM careers. In addition, respondents with more training were more likely to prioritize AI literacy, responsible AI use, and career readiness for youth. As education professionals gained experience, their needs shifted from foundational AI knowledge toward more advanced implementation strategies, innovative applications, and career-connected learning opportunities.

## 3. Ethical concerns, privacy issues, and limited institutional support continue to slow AI adoption.

The most frequently cited barriers to AI use among education professionals included concerns about student misuse, data privacy, AI's broader societal impact, potential bias in AI tools, limited professional development opportunities, and unclear school or organizational guidance. Focus group participants described similar concerns, noting uncertainty about appropriate AI use and a lack of clear policies. Respondents also reported that AI use is often more restricted for youth than for staff, reflecting a cautious approach to implementation. Together, these findings suggest that stronger governance, clearer policies, and expanded professional learning opportunities are essential to supporting responsible AI adoption in education.

## 4. Education professionals are seeking practical, hands-on implementation support rather than introductory information about AI.

Respondents expressed great interest in learning how AI can improve their day-to-day work, enhance student outcomes, save time, reduce stress, and prepare young people for future careers. The most requested forms of support included real-world classroom and program examples, guidance on student use and AI policies, and advanced implementation strategies. Lesson planning, STEM learning, ethics and bias, differentiation, assessment, and career exploration were the topics of greatest interest. Focus group participants also

emphasized the importance of interactive, practice-based learning experiences that provide opportunities to apply AI tools in authentic educational settings. Overall, educators valued training that was relevant, actionable, and tailored to their specific contexts.

### 5. Meaningful equity and access gaps exist across types of education professionals and learning environments.

Significant differences in AI use, confidence, and access to professional learning were evident across education professional type and learning environment. Education professionals working in OST programs, elementary educators, women respondents, and those with limited AI training often reported lower levels of AI use and confidence than other groups. These findings suggest that future learning and implementation support should prioritize groups with fewer opportunities to develop AI knowledge and skills.

### 6. Youth interest in AI is high, but AI literacy and critical understanding remain limited.

Respondents consistently reported strong interest in AI among youth, but rated students' understanding of AI concepts, AI literacy, and responsible AI use much lower. Focus group participants noted that many students experiment with new AI technologies but often lack an understanding of how AI systems work, when they should be used, and the ethical considerations surrounding privacy, bias, and information quality. These findings point to a significant opportunity for intentional AI literacy programming that helps youth develop both the technical knowledge and critical thinking skills needed to engage with AI responsibly in school, careers, and everyday life.

# LIMITATIONS

While this landscape study provides valuable insights into the current state of K-12 AI literacy, several limitations should be considered when interpreting the results. First, although the overall sample size was robust, a larger and more expansive participant pool would allow for deeper regional and demographic cross-analyses. Second, the reliance on organic network outreach and self-selection introduced a potential response bias, as educators who chose to participate may have had a higher baseline interest in or motivation toward AI technologies than the general educator population. Finally, the final sample contained a disproportionate representation of formal K-12 classroom teachers compared with informal and OST educators. Consequently, the findings may more closely reflect traditional schooling environments than the full ecosystem of youth K-12 STEM learning.

# RECOMMENDATIONS TO THE FIELD

Educators across formal and informal K-12 learning environments are actively engaging with AI and recognize its value for teaching, learning, and preparing young people for future careers. At the same time, many face real challenges with training, guidance, confidence, ethics, and equitable access. No single organization can address these alone. Schools, districts, OST programs, youth-serving organizations, professional learning providers, researchers, funders, and policymakers each have a role to play, and the six recommendations that follow are written for all of them to guide strategy, partnership, and collaboration across the K-12 education ecosystem.

## 1. Invest in sustained, tiered AI professional development for educators.

Training made a bigger difference than any other factor in this study: educators with more than eight hours of professional development were more than four times as likely to use AI frequently as those with none (74% compared with 16%). Educators need professional learning that matches their experience level. Reserve introductory "AI basics" for those with little or no prior exposure. Everyone else is asking for more: practical classroom and program examples, guidance on responsible use and policy, help evaluating AI outputs, prompt design, and applications of AI in STEM learning. Whatever the tier, deliver training in the formats educators said they prefer: coaching, peer exchange, and applied workshops.

## 2. Develop clear AI guidance, policies, and decision-making tools for education settings.

Educators need practical guidance on appropriate AI use with youth, data privacy, student misuse, bias, and ethics. That guidance should address a gap this study documented: AI use is more restricted for youth than for staff, with 35% of educators reporting several restrictions on youth use compared with 21% for staff. Schools, districts, OST programs, and networks can help by creating adaptable policy templates, family-facing guidance, and educator decision trees that clarify when and how AI can be used responsibly. Good policy calibrates youth access instead of uniformly restricting it. Otherwise, the rules written to protect young people will work against the AI literacy goals in Recommendation 4.

## 3. Prioritize equity-focused supports for lower-access groups and settings.

Targeted investments should focus on CBO-based OST programs, elementary educators, women educators, educators with limited AI training, and other groups reporting lower comfort or less access. Useful supports include stipends, accessible professional learning formats, peer learning cohorts, curated AI resources, and implementation assistance tailored to informal learning environments and early-grade settings. The field should also establish measurable goals and track progress against the baseline findings in this study. For example, efforts could focus on reducing disparities in comfort with youth-facing AI activities between CBO-based OST educators and their K-12 counterparts. In this study, 29% of CBO-based OST respondents reported being not at all comfortable engaging young people with AI, compared with 3% to 18% of K-12 respondents. Additional research is needed to understand developmentally appropriate uses of AI in elementary settings and to explore the factors contributing to differences in AI-related confidence and engagement between women and men educators. Such work can inform more effective training, resources, and support systems for these groups.

## 4. Create practical, youth-centered AI literacy resources that support formal and informal STEM learning, future readiness, and responsible AI use.

Educators want classroom and program examples (reported by 53% of educators), not just conceptual guidance. Funders, content developers, OST organizations, and education partners should invest in age appropriate resources that help young people understand how AI works, evaluate it critically, recognize bias

and privacy issues, and connect it to STEM pathways and careers. The best of these resources will also give young people the chance to apply AI to real problems in their communities. Because this study captured educators' perspectives rather than young people's, resource development should build in youth input through co-design, pilot testing, and usability studies. The aim is not just young people who can use AI tools, but young people who can question them and help shape how they are used.

### 5. Build a shared field-wide learning network to surface promising practices and reduce isolation.

Right now, many educators are learning about AI on their own or through informal conversations with colleagues. They use AI regularly, but primarily for basic, practical tasks. Only 44% of educators report using AI at least weekly to help with strategic goals and about a quarter report not being comfortable at all teaching youth how AI systems are trained (28%) and identifying how AI is used in specific STEM careers (24%). Schools, districts, OST organizations, and professional learning networks should give them something better: structured opportunities to exchange lesson ideas, compare policies, and work through implementation challenges across settings. These networks should make room for elementary educators and community-based OST organizations, whose experiences are often missing from AI initiatives. When educators can see what has worked somewhere else, they spend less time reinventing it.

### 6. Advance research to fill remaining evidence gaps and inform future practice.

Future research should pick up where this study's limitations leave off. Larger, more geographically representative samples would allow stronger comparisons across educator groups and regions. In particular, more research is needed in OST and other informal learning environments, which are often underrepresented in AI-related studies and were similarly underrepresented in this sample, with only 16% of respondents reporting that they work in an OST program. Future studies should also reduce reliance on self-selected participants and incorporate the perspectives of young people directly rather than relying solely on educator reports. Finally, longitudinal research is needed to examine how AI knowledge, instructional practices, and professional learning needs evolve over time.

# CALL TO COLLECTIVE ACTION

AI is no longer a future consideration; it is actively transforming how young people learn, play, and prepare for tomorrow's workforce. Overcoming systemic barriers to AI literacy demands collective action across schools, districts, OST networks, and research communities. The findings from this study suggest that meaningful progress will depend on supporting educators through professional learning, providing practical resources, establishing clear guidance, and creating collaborative networks, while maintaining a strong focus on equity and responsible use. Expanding AI literacy will require coordinated efforts among schools, districts, OST organizations, researchers, funders, and policymakers to reduce barriers and improve equitable access to high-quality learning opportunities. Continued investment in educators, evidence-informed resources, and collaborative partnerships can help ensure that all young people have opportunities to develop the knowledge and skills needed to engage with AI thoughtfully, responsibly, and confidently.

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# APPENDICES

## Appendix A.
## Building AI Literacy for Inclusion in STEM Landscape Study Survey

### INTRODUCTION

Thank you for taking the time to complete this survey and share your experiences and perspectives on Artificial Intelligence (AI). This survey is part of a larger study examining how educators use AI in formal and informal K-12 learning environments in an effort to surface gaps, barriers, and promising practices. The study is part of *Building AI Literacy for Inclusion in STEM*, a new national initiative developed by the National Girls Collaborative Project in partnership with Ingenia Learning and STEM Next Opportunity Fund and made possible through the generous support of the AMD Foundation. We encourage you to share this survey with colleagues in your network who may be interested in participating, as broader participation will strengthen the study's findings. By sharing your insights, you are helping us build a clearer picture of the AI landscape in education and supporting the development of future resources.

### DEFINITION OF ARTIFICIAL INTELLIGENCE

For this survey, Artificial Intelligence (AI) refers to any digital tool or system that can perform tasks or make decisions on its own, without an explicit step-by-step command from a human. AI systems are machine-based computer programs designed to recognize patterns in large amounts of data and use this information to make decisions, predictions, or carry out actions in ways that may resemble how people think or act. AI is created by humans, trained using data collected by people, and ultimately reflects human choices and values.

### Interaction with and Perceptions of Artificial Intelligence

**1. How often do you interact with artificial intelligence in your personal life?**

By interact with, we mean ways you intentionally seek out AI tools for tasks, or ways you understand AI is engaging with you.

- ☐ Almost constantly
- ☐ About once a day
- ☐ Less often than weekly
- ☐ Several times a day
- ☐ Several times a week
- ☐ I never use AI in my personal life

**2. How often do you interact with artificial intelligence in your professional life?**

- ☐ Almost constantly
- ☐ About once a day
- ☐ Less often than weekly
- ☐ Several times a day
- ☐ Several times a week
- ☐ I never use AI in my professional life

**3. What AI Tools do you use in your practice?** (Select all that apply)

- ☐ AI Chatbots (e.g., ChatGPT, Google Gemini, Microsoft CoPilot, Anthropic Claude AI)
- ☐ AI writing assistants (e.g., Grammarly, QuillBot, NotebookLM)
- ☐ AI research assistants (e.g., Perplexity AI, Comet AI)
- ☐ AI image generators (e.g., DALL·E, Midjourney, Canva)
- ☐ Adaptive learning systems (e.g., Khan Academy)
- ☐ Virtual assistants (e.g., Amazon Alexa, Apple Siri, Google Assistant)
- ☐ Other, please describe _____

_____

**4. How often do you use AI tools to do the following?**
(Daily, Weekly, Monthly, Once every few months, Never)

- ☐ To get quick answers or other basic tasks (e.g., asking a factual question)
- ☐ To do administrative work (e.g., paperwork, emails, reports, grading, feedback)
- ☐ To generate content (e.g., to help with lesson planning or curriculum design, to assist with making worksheets and materials)
- ☐ To help with specific strategic goals (e.g., to provide personalized learning or tutoring support, to help analyze patterns in student learning)

**5. Please rate how comfortable you feel right now doing each of the following things**
(Not at all comfortable, Somewhat comfortable, Very comfortable, Extremely comfortable, Not applicable to my role)

- ☐ Creating useful prompts for an AI tool to execute
- ☐ Assessing results from AI tools for their quality
- ☐ Introducing youth to the concept of AI
- ☐ Teaching youth about the differences between AI, machine learning, and data
- ☐ Helping young people think critically about AI and its limitations
- ☐ Engaging young people with AI during class or in OST programs
- ☐ Teaching youth how AI systems are trained
- ☐ Identifying how AI is used in specific STEM careers
- ☐ Teaching youth about AI ethical considerations (bias, fairness, privacy)

**6. Have you received any AI-related professional development or support in your current role?**

- ☐ Yes, a lot (More than 8 hours of PD)
- ☐ Yes, a little (Up to 8 hours of PD, at once or spread over sessions)
- ☐ Yes, but very little (Up to 2 hours of PD)
- ☐ No, none at all

**7. What is holding you back from using AI tools more in your work?** (Select top 5 responses)

- ☐ Concerns regarding the role of AI in society as a whole
- ☐ Lack of school/district/organization guidance on using AI tools and products
- ☐ Concerns about data privacy
- ☐ Lack of time
- ☐ Concerns about potential bias in AI tools and products
- ☐ Lack of professional development for using AI tools and products
- ☐ Concerns about my ability to use AI tools and products competently
- ☐ Concerns that increased use of AI will diminish student-teacher/student-staff relationships
- ☐ The AI products and tools available to me do not meaningfully support my instruction
- ☐ Concerns that increased use of AI will diminish my autonomy and decision-making
- ☐ Lack of technology at my school/district/organization to use AI tools and products
- ☐ Concerns about students misusing AI
- ☐ AI widening gaps between high- and low-resource students
- ☐ Other, please describe _____

_____

_____

**8. What outcomes related to using AI within the educational context are important to you?** (Select all that apply)

- ☐ Help me save time
- ☐ Improve student outcomes
- ☐ Improve quality of my work
- ☐ Increase youth engagement
- ☐ Reduce my stress
- ☐ Build youth AI literacy
- ☐ Prepare youth for future careers
- ☐ Other, please describe _____

**9. What types of AI support or training would be most helpful to you?** (Select all that apply)

- ☐ I need to understand the basics of AI
- ☐ I need practical classroom/program examples
- ☐ I need help integrating AI into my curriculum
- ☐ I need guidance on student use and policies
- ☐ I need advanced strategies and innovation ideas
- ☐ Other, please describe _____

**10. What would you most like to learn?** (Select top 3 responses)

- ☐ Basics of AI tools
- ☐ Prompt engineering
- ☐ AI for lesson planning
- ☐ AI for assessment
- ☐ AI for differentiation
- ☐ AI ethics & bias
- ☐ AI for STEM learning
- ☐ AI industry/career opportunities
- ☐ Other, please describe _____

**11. In your experience working with youth, how would you rate the following?** (Very high, Moderately high, Moderately low, Very low, Not applicable/not sure)

- ☐ Youth interest in AI
- ☐ Youth knowledge of AI applications
- ☐ Youth AI literacy
- ☐ Youth perceived relevance of AI to their lives

**12. To what extent, if any, are AI tools restricted at your professional location for staff? For youth?** (No restrictions, Minimal restrictions, Several restrictions, Not applicable)

**Please share one task, activity, or practice related to AI you have found effective in your professional role?** (Optional)

**Is there anything else you would like to share regarding your use of AI or the role of AI in education?** (Optional)

**If you are willing to participate in a follow-up interview, please share your name and contact information** (Optional)

## Demographic information

### Organization type

- ☐ Formal K-12 Education (Public)
- ☐ Formal K-12 Education (Public – Charter)
- ☐ Formal K-12 Education (Private)
- ☐ Out-of-School Time program based at a school
- ☐ Out-of-School Time program based at a Community-Based Organization (youth-serving organization, library, museum, etc.)
- ☐ Alternative education programs (homeschool, virtual)
- ☐ Other (please describe) _____

**Gender** (optional/prefer not to answer)**:** _____

**Race/ethnicity** (optional/prefer not to answer)**:** _____

### Professional Role

- ☐ K-12 Administrator
- ☐ K-12 Educator
- ☐ Other K-12 Staff
- ☐ Out-of-School Time Program Director
- ☐ Out-of-School Time Program Educator
- ☐ Other Out-of-School Time Program Staff

### Years of experience in professional role/education

- ☐ Less than 5
- ☐ 5–10
- ☐ 11–19
- ☐ 20+

### Subject/Program Focus (Select all that apply)

- ☐ Science
- ☐ Technology
- ☐ Math
- ☐ Language Arts
- ☐ Social Studies
- ☐ Physical Education/Sports
- ☐ Arts
- ☐ Other

### Grade level/s you work with (Select all that apply)

- ☐ Elementary
- ☐ Middle School/Jr. High School
- ☐ High School

### How would you classify your school/organization in the following categories:

- **Regional location**
  - ☐ Northeast
  - ☐ South
  - ☐ Midwest
  - ☐ West
  - ☐ U.S. Territories
- **Community type**
  - ☐ Urban
  - ☐ Suburban
  - ☐ Rural
- **Socioeconomic status**
  - ☐ Low Poverty (0%–25% of students qualify for Free/Reduced-Price Lunch)
  - ☐ Mid-Low Poverty (26%–50% of students qualify for Free/Reduced-Price Lunch)
  - ☐ Mid-High Poverty (51%–75% of students qualify for Free/Reduced-Price Lunch)
  - ☐ High Poverty (76%–100% of students qualify for Free/Reduced-Price Lunch)
  - ☐ Unsure/Information Unavailable

- **Race/ethnicity of youth**

☐ Majority students of color
☐ Even mix of students of color and white students
☐ Majority white students
☐ Unsure/Information unavailable

## Appendix B.
## Focus Group Protocol

***Note:*** Not every question was asked in every session based on time, group size, background of participants, etc.

### INTRODUCTION

We'd love for you all to introduce yourselves. Please share:

- **Your Name**
- **Organization and role**
- **How long have you been at your organization/role**
- **Type of programs you facilitate/subjects you teach**
- **Age/grade levels you typically work with**
- **Describe the youth population you work with in ways that are meaningful/appropriate to you.** (Examples: socio-economic status, race/ethnicity, etc. advanced' students for teachers).

### ZOOM POLL

**Poll Question:** How often do you interact with artificial intelligence in your professional life?

☐ Almost constantly
☐ About once a day
☐ Less often than weekly
☐ Several times a day
☐ Several times a week
☐ I never use AI in my professional life.

**Question 1:** How, if at all, have AI or AI tools changed the way you approach your work?

**Question 2:** What are the central barriers to expanding your use of AI tools in your work?

**Question 3:** What training, support, or types of resources would be helpful to you in your work to use AI effectively and confidently?

**Question 4:** When you think about introducing AI to your students/youth, what are the first thoughts or reactions that come to mind?

**Question 5:** How does (or doesn't) AI fit in with your teaching approach and/or instructional goals?

**Question 6:** Reflecting on the youth you work with, how would you characterize their interest and usage of AI?

**Question 7:** Continuing to think about youth and meeting their needs and interests, what have you seen as especially effective ways, useful practices, or approaches to teach youth about AI?

**Question 8:** From your perspective, how is AI integrated into educational standards or program goals at your school/district/state or OST program?

**Question 9:** Are there opportunities for all youth to learn about and engage with AI in productive and effective ways?

**Question 10:** How are you learning about AI via the media, and what are you learning about? And what type(s) of media?

### Final Thoughts

Does anyone have any final thoughts they would like to share?

## Appendix C.
## AI Literacy Curriculum Resources

The resources included in the table below were selected to provide illustrative examples of AI literacy curricula relevant to formal and informal K-12 learning environments and aligned with the study's focus on equitable access to AI learning opportunities. This list is intended to highlight a sample of resources currently available to educators and youth-serving organizations; it is not exhaustive and inclusion does not constitute endorsement by the National Girls Collaborative Project, Ingenia Learning, STEM Next Opportunity Fund, or the AMD Foundation.

| CURRICULUM | DEVELOPED BY | DESCRIPTION |
|---|---|---|
| AI in Action Curriculum | Technovation | Technovation's AI in Action curriculum (50+ hours; ages 8–18) guides students through identifying a problem in their community, building an AI-powered app to address that problem, and developing an entrepreneurial plan to bring their solution to market. |
| AI Education Curricular Resources | The AI Education Project | Classroom resources, curriculum, activities, and more tailored to elementary through high school-aged students. |
| Artificial Intelligence Foundations | Code.org | A collection of curriculum (elementary, middle, and high school), professional learning, ready-to-use tools, and engaging videos to support educators' AI teaching journey. |
| AI Literacy Units | Common Sense Media | Quick, grab-and-go lessons to help educators support their students to think critically about AI and its impact. This collection of quick lessons (20 minutes or less) provides an introduction to AI and helps address its social and ethical impacts. |
| Day of AI | MIT RAISE | Free, ready-to-teach units and educator resources for ages 5–18. |
| Experience AI | Raspberry Pi Foundation & Google DeepMind | Free AI literacy curriculum and classroom resources for middle and secondary students. Lessons help young people understand how AI systems work, explore machine learning concepts, and examine ethical issues such as bias, fairness, and responsible AI use. |
| Machine Learning for Kids | Dale Lane / IBM-supported project | A free educational platform that enables young people to train machine learning models and connect them to projects built with Scratch, Python, and App Inventor. The platform supports hands-on learning about AI through creating and testing real machine learning applications. |

| | | |
|---|---|---|
| RAISE Playground | MIT RAISE | The RAISE Playground is a block-based programming platform that lets anyone use machine learning models, robotics, and AI engines to make projects. |
| Student Voices in AI | Daniella DiPaola (MIT Media Lab) & John Masla (MIT RAISE) | A mentor guide for leading an extracurricular club for teenage student AI leaders. Over 12 weeks, students build confidence in navigating AI in their school lives, engage their community to understand local perspectives, and propose school guidelines or policies. |

## Appendix D.
## Examples of AI Literacy Frameworks and Guidance Resources

The resources included in the table below were selected to provide illustrative examples of AI literacy frameworks and high-level guidance relevant to formal and informal K-12 learning environments and aligned with the study's focus on equitable access to AI learning opportunities. This list is intended to highlight a sample of resources currently available to educators and youth-serving organizations; it is not exhaustive and inclusion does not constitute endorsement by the National Girls Collaborative Project, Ingenia Learning, STEM Next Opportunity Fund, or the AMD Foundation.

| RESOURCE | DEVELOPED BY | DESCRIPTION |
|---|---|---|
| A Competency Framework for AI Literacy: Variations by Different Learner Groups and an Implied Learning Pathway | Chee and colleagues | Widely cited academic article detailing a comprehensive AI literacy competency framework consisting of 8 competencies and 18 sub-competencies. |
| AI Learning Priorities for All K-12 Students | CSTA and AI4K12 | AI learning priorities within CS education. |
| AI Readiness Framework | aiEDU | Readiness guidance and rubrics. |
| AI4K12: Five Big Ideas in AI | AI4K12 (AAAI and CSTA) | Foundational K-12 AI framework with five Big Ideas and grade-banded progressions. |
| AILit Framework | OECD and European Commission | International framework: Engage, Create, Manage and Design AI. |

| | | |
|---|---|---|
| Designing for Education with AI | U.S. Department of Education | Responsible AI development guidance. |
| Digital Promise AI Literacy Framework | Digital Promise | Understand, Evaluate, and Use modes of engagement. |
| ETS AI Literacy Framework and Skills Progression | ETS | AI literacy progression connecting instruction and assessment. |
| Guidance on the Future of CS Education in an Age of AI | TeachAI and CSTA | Guidance for evolving CS education. |
| ISTE Standards and AI Resources | ISTE+ASCD | Standards and implementation resources. |
| K-12 Generative AI Maturity Tool | CoSN and CGCS | District readiness assessment tool. |
| K-12 AI Curricula: A Mapping of Government-Endorsed AI Curricula | UNESCO | A global mapping of government-endorsed AI curricula that includes competencies. |
| PISA 2029 Media and AI Literacy Assessment Framework | OECD | Assessment framework. |
| SAFE Benchmarks Framework | EDSAFE AI Alliance | Safety, Accountability, Fairness, Transparency and Efficacy framework. |
| State AI Guidance for K-12 Education | State Education Agencies | A collection of state-developed AI guidance resources addressing AI literacy, instructional use, privacy, equity, academic integrity, and responsible implementation in K-12 schools. |
| TeachAI: AI Guidance for Schools Toolkit | TeachAI Coalition | Guidance for AI policy and implementation. |
| U.S. DOL AI Literacy Framework | U.S. Department of Labor | Workforce-focused framework. |

| | | |
|---|---|---|
| UNESCO AI Competency Framework for Students | UNESCO | Student knowledge, skills, values, ethics, human rights and societal impacts. |
| UNESCO AI Competency Framework for Teachers | UNESCO | Teacher competencies for responsible AI use and AI-enhanced pedagogy. |
| What is AI Literacy? Competencies and Design Considerations | Long & Magerko | Widely cited academic paper on AI literacy competencies. |

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