July 2026

One Size Does Not Fit All:

A Developmentally Appropriate Framework for AI in K–12 Education

Issue Brief

Jennifer Weber
Fellow
Manhattan Institute

Introduction

Since the early 20th century, many schools have enthusiastically embraced the use of emerging technologies in the classroom, long before educators, parents, or policymakers understood their effects on student learning and development.

The first of these new technologies were film and radio. In the 1920s and 1930s, technologists and progressive educators expected these tools to extend the reach of expert instruction and address teacher shortages. In 1922, famed inventor Thomas Edison even predicted: "The education of the future, as I see it, will be conducted through the medium of the motion picture … where it should be possible to obtain one hundred percent efficiency." However, neither film nor radio was widely used in classrooms, and neither produced evidence of improved student learning.[1]

Educational television attracted more investment. By 1971, the federal government had spent over $100 million on educational broadcasting but with no corresponding increase in student learning.[2]

Personal computers and computer labs entered schools in the 1980s and 1990s, at significant public expense. A 1999 study of Silicon Valley schools, among the most technology-rich in the country, found that fewer than 10% of teachers used computers even once a week for instruction, and there was no evidence that computer access improved student academic achievement.[3] After 2010, social media embedded into students' personal lives and educational environments long before large-scale research examined its effects. By the time studies began documenting increases in adolescent depression, anxiety, and suicide rates linked to new-media screen time, the technology was already deeply integrated into daily life.[4]

As described so far, the introduction of educational technology has followed a consistent pattern. A promising new technology enters the classroom prior to any long-term evidence or understanding of its effects on student learning, development, and data privacy. Crucially, each of these technologies left the cognitive work of learning to students. The way in which information was presented to students may have changed, but the medium could not complete their work for them.

Generative AI, the newest technology that has made its way into nearly every school in the U.S., is different in kind. Its ability to write essays, solve mathematics equations, and all other cogitative work demanded of students is a unique concern to American schools and schoolchildren. Like the technologies before it, generative AI was introduced into American classrooms with many theories but little to no research about how it would affect student outcomes.

Online learning primed schools for an AI boom. After Covid-related school closures forced instruction online in March 2020, a nationally representative EducationWeek Research Center survey found that 93% of teachers reported doing at least some online instruction (while 50% said that they were teaching online only), and 87% said that their ability to use educational technology had improved during the school building closures.[5] Then schools received $190 billion in federal emergency relief funding, which was used to finance the transformation to online learning environments, purchase devices, expand broadband, and embed digital platforms into the core of how schools operate.[6] By 2024, the average K–12 school district was using nearly 2,700 different educational technology tools annually, more than three times the number used before the pandemic.[7] Many of those tools incorporate algorithmic and machine-learning features, such as adjusting instructional pathways based on prior student responses or flagging students and recommending interventions based on diagnostic tests.

Within weeks of its public release in November 2022, ChatGPT had become the fastest-growing application in internet history.[8] In April 2025, Donald Trump signed an executive order directing federal agencies to expand AI instruction and teacher training in K–12 schools, leaving to states and districts the development of guidelines, age restrictions, and implementation decisions.[9]

States are responding to the rapid expansion of AI in education. By the end of 2025, more than 30 states had issued guidance or policy frameworks for AI use in K–12 schools, though most of these frameworks focus on implementation and ethics rather than questions of student development and learning.[10] Despite being one of the most populous states in the nation, New York has not yet established statewide guidelines governing when and how students should interact with AI in the classroom. This issue brief fills that gap and proposes a path forward for responsible integration of AI into classrooms that vary by grade level. It then considers other important areas of understanding that policymakers and educators must consider when implementing AI in education settings.

State Approaches to AI in Education

When ChatGPT opened to the public in November 2022, not a single state had a policy governing AI use in K–12 schools. States had to work rapidly to respond. Across the more than 30 new frameworks, states lay out their approaches to issues including data privacy, human oversight, and teacher training. The dimension that is most addressed and that appears in every guidance is teacher-facing AI, or how educators can use this technology. Student-facing AI, or what happens when students themselves interact with AI tools, is addressed by far fewer states. AI's utility in professional development for educators appears in the fewest state frameworks. There are significant blind spots in these guidance documents, however.

One of the most consequential dimensions for evaluating AI is developmental appropriateness, or whether AI use is appropriate for students at specific stages of cognitive development. However, these criteria are not an organizing principle in any state's guidance.[11] Instead, state frameworks have focused on how AI belongs in the classrooms and how it should be implemented. They have not systematically considered whether, and at what developmental stage, AI should be used with students at all.

In 2025, NYS lawmakers introduced a bill that would have created an AI working group to develop a model policy for school districts, but the bill failed to advance.[12] New York City released preliminary AI guidance for the city's public school system in March 2026.[13] The guidance prohibits AI from informing decisions about grading, discipline, placement, graduation, special education, or counseling, and requires all third-party tools to pass a data privacy review before use. The guidance acknowledges explicitly that grade-level developmental guidance is still being drafted and that "the long-term effects on how children learn, think, and develop in the era of AI are not fully understood."[14]

AI and the Learning Process

In the 1950s, B. F. Skinner developed what he called "teaching machines"—devices that presented academic material in small, carefully sequenced steps and required students to produce a response before advancing, preventing students from moving on until they had mastered the current material. These machines also provided immediate feedback on every student's attempt.[15] Skinner started from an understanding of what learning requires and built a tool that created those conditions. These conditions depend on an engaged student, immediate feedback, small steps that build, and continuous reinforcement. The design of these teaching machines reflected the approach that any tool introduced into a child's learning environment should be evaluated first by whether it supports these conditions.[16] Let's look into these conditions in more detail.

Learning requires a student to respond in some way. A student who watches, listens, or receives information passively without producing any type of response is not learning. Mere exposure does not result in learning.[17] Learning also requires opportunities, or practice, and feedback. If a student attempts a task, such as solving a math problem, and

makes an error, the student must receive feedback, learn from it, and acquire the skill being taught. If a student is given an answer without making any effort on his own, learning does not occur.[18] The conditions that make performance of a task or an assignment easy in the moment, such as reducing the difficulty of the problem, providing answers, and removing the student's cognitive effort, do not help a student retain a skill.[19]

Generative AI can produce complete academic work on a student's behalf. It can write a paragraph, solve a problem, answer a question, and explain a concept instantly and fluently, in a form that is increasingly difficult to distinguish from student work. Learning, however, requires students to respond: to think and deliberate, attempt the task, make errors, receive feedback, and adjust their performance over time.[20] When AI completes the task instead, the student's opportunity to respond is eliminated. Learning requires cognitive effort, the struggle to retrieve, reason, and work through difficulty.[21] Relying on AI is a form of "cognitive offloading," in which individuals rely on external systems to perform cognitive tasks, leaving the user less likely to engage in the processes required to perform those tasks independently.[22] Learning requires independence—the ability to perform without support.

Cognitive offloading undermines students in different ways, depending on their age and ability level. Early elementary students are at a foundational stage of cognitive development. They are building the foundation on which all future learning depends,[23] including the habit of intellectual and emotional resilience by improving through repeated practice.[24] Middle school and high school students with strong foundational skills face a different risk. For them, AI reduces the ability to engage in the very thinking that secondary education is designed to develop, such as analysis, synthesis, and problem-solving. AI is a dramatic extension of cognitive offloading because it enables the outsourcing of entire academic tasks. If a tool completes the task, the student does not engage in the thinking that the task was designed to develop, eliminating the foundation and preventing any cognitive advancement as the student ages. This means that it is critical to think about how AI is used in education so that it facilitates thinking rather than replaces it.

Schools need to be careful about how they integrate AI into their classrooms. Adaptive learning platforms are widely used in classrooms and are often marketed as tools to personalize learning and reduce teacher workload. A Stanford meta-analysis of edtech interventions for early reading found that effectiveness varied across products and that school districts adopted tools without evaluating whether those tools followed the principles of effective practice for the skills that they were targeting.[25] Research examining AI and edtech found that most school leaders could not identify the basic edtech tools already in use in their own schools, that procurement was frequently done at the level of individual teachers without systematic oversight, and that marketing claims did not reliably reflect how tools functioned in practice.[26] The edtech market, therefore, has not been a reliable guide to what works in classrooms.

A systematic review of 95 studies identified the primary categories of AI use in education as conversational AI, learning and assessment, and teaching analytics.[27] Educational technology alone does not consistently improve student outcomes; its effectiveness depends largely on how it is integrated into instruction and whether it supports evidence-based teaching practices.[28] However, that integration requires strong school leadership and prepared teachers. It also requires institutional bandwidth to support ongoing evaluation of whether the tools are producing favorable outcomes.

What Went Wrong Before

Previous waves of educational technology did not fundamentally change how students engaged with material, produced responses, or received feedback, but still produced little improvement in student learning outcomes. At times, however, these technologies did produce significant controversy.

In 2005, the One Laptop per Child initiative distributed millions of devices to children in developing countries with the explicit promise that access to technology would transform learning. Randomized controlled trials found no improvement in academic achievement.[29] In 2013, the Los Angeles Unified School District (LAUSD) launched a $1.3 billion initiative to provide iPads to all 640,000 students, the largest educational technology procurement in U.S. history at the time.[30] Students bypassed security filters within days of receiving the devices, teachers found the contracted curriculum software inadequate for classroom use, and the district faced federal fraud investigations into the procurement process. There was no evidence that student learning improved.

A federal class action lawsuit filed in December 2025 against Curriculum Associates, the maker of i-Ready, one of the most widely used diagnostic platforms, alleges that the platform collected and shared sensitive student data with third-party vendors for years without parental consent in practices that were never subject to public scrutiny before the tool was embedded into millions of students' learning environments.[31]

In April 2026, responding to pressure from parents who claimed that school-mandated technology created unhealthy habits in their children,[32] LAUSD became the first major school district to require screen time limits, passing a resolution that prohibits device use for students in first grade and below and restricts elementary and middle school students' device access.

Today, the technology-in-the-classroom debate cannot be separated from the widespread concern over social-media and smartphone use outside (and inside) of instructional time. Smartphones and social media have reshaped the environments in which students think and learn. By the time research began documenting their effects on attention, mental health, and behavior, these technologies were already deeply embedded into students' daily lives. Frequent social-media use is associated with increased multitasking, attention fragmentation, and reduced sustained engagement, all of which can interfere with academic learning.[33] Jonathan Haidt has argued that the shift to a phone-based childhood has altered patterns of socialization, attention, and risk exposure, particularly for adolescents.[34] The lesson from the past is that technology has consistently been introduced to children without being evaluated for its impact on learning and development. By the time the effects are understood, they are already embedded into students' daily environments.

AI in Education: A Recommended Framework

The following framework for integrating AI within education is grounded in developmental psychology, cognitive science, and the conditions needed for durable learning. Instead of organizing AI policy around technological capabilities alone, this system proposes that AI use in schools should be governed by students' readiness for development and the preservation of independent cognitive performance. The framework, summarized in **Table 1**, progresses developmentally from teacher-facing AI in early elementary school to teacher-mediated critique in upper elementary and middle school, to more independent and responsible AI engagement in high school.

Lower Elementary School: Grades K–2

Children in kindergarten through second grade are building the foundational skills on which all subsequent learning depends. Research shows that phonemic awareness (the ability to hear, identify, and manipulate individual sounds) assessed in kindergarten predicts reading achievement in grades 3–4 more reliably than IQ or family socioeconomic status.[35] Early reading trajectories are among the most consistent predictors in all of educational research.[36] A student who struggles to read in first grade is more likely to struggle later on. Research also shows that early number sense in kindergarten predicts fifth-grade math achievement.[37]

The conditions that K–2 learning requires, such as student response, cognitive effort, and independent practice, are what generative AI eliminates through cognitive offloading.[38] Therefore, providing young students with a solid academic and cognitive foundation will be the strongest predictor of their success later. Generative AI does not have an appropriate role in student-facing instruction during this period.

In K–2 classrooms, AI is most appropriately directed toward the teacher rather than the student. Tools that support teachers in planning systematic phonics instruction, differentiating practice materials across skill levels, analyzing assessment data to identify students who need intervention, and tracking foundational skill development can strengthen instruction without displacing the cognitive work that students must do themselves.[39] AI can increase efficiency in these areas but cannot substitute for the direct, responsive instruction that early learners require. Any use of AI at this level should adhere to strict student data privacy protections, particularly when systems collect and analyze individual student performance data.

Student outcomes are at stake. In 2024, NYS fourth-grade students had an average score of 215 (out of 500) in reading, a 9-point decrease from a decade ago, with only 31% of students scoring at or above proficiency and 59% reaching at least the basic level. In math, fourth-grade students scored an average of 234, a 6-point decrease from 2013, with 37% at or above proficiency.[40] New York's fourth-graders are missing the foundational skills that subsequent learning depends on. Building this foundation is the prerequisite for everything else that follows.

Upper Elementary School: Grades 3–5

This stage reflects the transition from protecting students' acquisition of foundational skills to introducing structured evaluation and critique. Third grade is when students begin the transition from "learning to read" to "reading to learn." This is where literacy and numeracy shift from objects of instruction to tools to acquire knowledge.[41] At this stage of learning and development, students are expected to make inferences, expand their vocabulary, and show comprehension of more complex texts. Core academic tasks for students, including writing paragraphs, constructing arguments, retrieving information from texts, and organizing ideas, are now tasks that AI systems can perform on the student's behalf—but should not.

AI use across grades 3–5 should remain teacher-directed, with AI serving as an opportunity for students to analyze and evaluate content rather than as a tool for producing academic work. AI engagement at this level should be presented by the teacher. For example, teachers may incorporate AI into instruction by presenting AI-generated responses to tasks that students have already completed independently and guiding students through structured evaluation of those responses. This can include identifying inaccuracies, omissions, or weak reasoning, and comparing AI output with student-generated work. Research on instructional practices that incorporate a critique of writing that is a good model vs. writing that is a poor model shows that structured comparison and evaluation strengthen students' analytical and writing skills.[42] Early studies of AI-integrated instruction suggest that when students evaluate and question AI-generated content in structured contexts, critical thinking and evaluative abilities can improve.[43]

A more teacher-led approach preserves the integrity of academic work, reinforces the role of effort in learning, and ensures that students develop the independent thinking skills necessary for later success. Establishing these boundaries in upper elementary school creates the conditions for more advanced engagement with AI in later grades.

Many opportunities exist for teachers who teach these grade levels to utilize AI. As in lower elementary school, AI can support lesson planning, differentiated reading materials, assessment analysis, and monitoring student progress. Students who are not proficient in reading or mathematics by upper elementary school face difficulty accessing grade-level content in later years. One of the most effective and well-established approaches for addressing gaps at this stage is high-quality tutoring, which has been shown to accelerate learning for struggling students while also extending learning for those already on track. In principle, AI tutoring systems could provide immediate feedback, individualized practice, and increased access to academic support. However, the effectiveness of AI tutoring depends significantly on how it is designed and implemented.

Many digital learning platforms have attempted to operationalize personalized instruction over the past decade. While these systems often incorporate adaptive pathways and real-time feedback, they have not consistently produced the expected level of improvement in student outcomes.[44] One reason is that personalization alone does not guarantee that students are learning. In many cases, these platforms reduce the cognitive demand placed on students by providing excessive scaffolding, cues, or partially completed responses, allowing students to progress through tasks without fully engaging in the underlying thinking. Students may demonstrate performance within the system without developing the independent skills required for transfer to new contexts.

Personalized systems require sustained cognitive effort, active responding, and meaningful feedback for the system to be effective. AI-based tutoring systems have the potential to address this issue, helping students catch up and accelerate their learning when implemented well. But in practice, the systems are not yet there.

Middle School: Grades 6–8

Middle school represents a critical transition point in which students move from primarily acquiring foundational skills to applying them through increasingly abstract, independent thinking. This stage builds directly on the instructional guardrails established in upper elementary school, where AI exposure is limited and tightly controlled to protect the development of independent thinking. Students at this stage can engage with AI as a subject of critical study, evaluating its outputs, identifying its limitations, and questioning its assumptions. However, they lack the maturity to reliably self-regulate their use of AI when completing independent academic work.[45]

For grades 6–8, student production of work should always come first. AI must not be the starting point for any academic task, as students at this age need to learn critical thinking. Students must write the paragraph, construct the argument, solve the problem, and develop the analysis independently. Only then, under teacher direction, can students engage with AI output as a secondary object of comparison and critique. Reversing this sequence, using AI first and reviewing afterward, eliminates the effortful practice essential to learning.

A formal AI literacy curriculum should become a required component of middle school instruction. Research on AI literacy in K–12 settings identifies three consistent components: conceptual knowledge of how AI systems work; critical skills for evaluating AI outputs; and ethical understanding of AI's societal implications.[46] Researchers have identified critical thinking as the single most important AI literacy competency, with technical understanding identified as its prerequisite.[47]

Studies implementing structured AI literacy curricula with middle school students have found statistically significant gains in students' ability to recognize algorithmic bias, critically evaluate AI-generated content, and develop informed perspectives on AI ethics.[48] Students should leave eighth grade able to use AI tools critically, explain how they work conceptually, and demonstrate through independent performance that their own thinking has not been displaced by them.

No exam or assessment in grades 6–8 should allow for AI use. The purpose of assessment is to measure what students have learned and what they can do independently, without assistance. Allowing AI on summative assessments produces no valid information about student learning.

The same conditions that govern AI tutoring in grades 4–5 apply in middle school, with one important addition. Middle school students are developmentally capable of more direct engagement with AI tools than upper elementary students, but research shows that they are also more vulnerable to the illusion that AI interaction constitutes learning.[49] A randomized controlled trial found that students given unrestricted access to a large language model during practice performed worse than control-group students on subsequent assessments, while students given a constrained AI tutor providing hints rather than answers showed neither negative effects nor any gains over students who used no AI at all.[50]

Where AI tutoring tools are used in grades 6–8, student independent work must always come first; the tool must be constrained to prompt student thinking; and use must occur under teacher direction rather than student initiation.

High School

High school is the appropriate stage for greater engagement with AI. Students who have developed strong foundational skills, metacognitive awareness, and a structured AI literacy curriculum have the cognitive capacity to engage with AI as critical users. Not all students will arrive at grade 9 having completed that preparation, which is why the earlier stages of this framework are critical. The goal of the high school shifts from protection to preparation, but preparation cannot begin without the necessary preconditions and ingredients.

Writing must remain a component of high school instruction across all disciplines. Writing is an observable expression of thinking.[51] Studies comparing students who engage in writing-based instruction with those who do not engage find that the writing group shows significantly greater gains in critical thinking—specifically, in analysis and inference.[52] Student-produced writing must remain the foundation of instruction in grades 9–12.

AI tutoring systems have greater potential at the high school level than in earlier grades. At this stage, AI tutoring can support both remediation and acceleration, providing targeted practice and feedback for students who need to strengthen foundational skills, while also offering opportunities for students to extend their learning beyond grade-level expectations.

Whether the AI tool can support learning depends entirely on the design. A randomized controlled trial of nearly 1,000 high school math students found that students given unrestricted access to a large language model performed worse on independent assessments after access was removed, while students given a constrained AI tutor designed to safeguard learning largely avoided those negative effects and performed better during tutoring sessions than students using the unconstrained tool.[53]

Recent research also found an inverse correlation between confidence in AI and critical thinking; the more users trusted AI to handle tasks, the less independent analytical effort they applied.[54] The same mechanism documented among younger students operates here, in a context where high schoolers have both greater access to AI and a stronger social incentive to use it for efficiency rather than learning.[55] In ideal practice, students produce independent work first; they then use AI to surface what they may have missed—gaps in an argument, relevant counterarguments, additional sources—and then evaluate and respond to those suggestions themselves.

High school graduates will enter labor markets and professional and civic environments where AI is already embedded. The U.S. Department of Labor's AI Literacy Framework identifies five foundational workforce competencies: understanding AI principles; exploring AI applications; directing AI effectively; evaluating AI outputs; and using AI responsibly.[56] Students who are at this stage, having developed independent reasoning, sustained writing, and critical evaluation through the earlier tiers of this framework, are better positioned to meet these workforce demands than students who have learned to outsource that thinking to AI. Therefore, the developmental protections in grades K–8 are prerequisites.

At the high school level, summative assessments should avoid AI use. College admissions, professional certification, and the workforce assume independent competence. If students rely on AI during assessments, schools are no longer measuring what students can do independently. Students should be able to demonstrate their writing, reasoning, and problem-solving skills independent of technology. One exception may be classes specifically focused on AI literacy or responsible AI use. In those settings, students may be asked to demonstrate how they used AI during a project, explain why they accepted or rejected certain outputs and document prompts, and reflect on how AI influenced the final product.

These recommendations are summarized in Table 1 below. This brief will then move on to other essential topics concerning AI in education settings.

TABLE 1

Summary of Recommended Framework for AI Use in K–12 Education

Grades	Student Use of AI	Teacher Use of AI	Summative Assessment
K–2	Not appropriate.	Lesson planning, evidence-based phonics and math instruction support, differentiation of materials, assessment data analysis, progress monitoring. All tools must meet student data privacy standards. Teacher-facing AI must support evidence-based instructional practices.	No AI involvement.
3–5	Limited to teacher-directed contexts. Students complete all work independently before any AI engagement. AI may be used to present outputs for structured student critique and comparison but not for student production. No AI-generated assistance on assignments, writing, or problem-solving. AI tutoring tools permitted only when designed to require student-generated responses and independent cognitive effort, never to provide answers or reduce cognitive demand.	Lesson planning, differentiation of reading and math materials, assessment analysis, and progress monitoring. Tools must align with evidence-based instructional practices and meet strict student data privacy standards.	No AI permitted.

6–8	Student produces all work independently before any AI interaction. AI may be used as a secondary object of comparison and critique under direct teacher direction. AI tutoring tools permitted when constrained to prompt student thinking rather than produce answers; student independent work must always precede tool use. AI literacy curriculum required as a mandatory component of instruction. No student-initiated AI use.	Lesson and curriculum planning, progress monitoring, intervention support, and differentiation. All tools must align with evidence-based instructional practices and meet strict student data privacy standards.	No AI permitted.
9–12	Expanded engagement with governing conditions. Student produces independent work first. AI is used to identify gaps in reasoning, relevant counterarguments, and additional sources, but student evaluates and responds to all AI outputs independently. AI tutoring permitted for remediation and acceleration when designed to promote thinking.	Full range of teacher-facing tools for planning, differentiation, assessment analysis, progress monitoring, and professional development. All tools must align with evidence-based instructional practices and meet strict student data privacy standards.	No AI permitted. Exception may be if it is an AI literacy class.

A Richer Definition of AI Literacy

The term "AI literacy" is used inconsistently. In many contexts, it has come to mean proficiency with tools, including writing effective prompts, navigating AI platforms, and generating outputs efficiently. But a student who can produce an AI output is not necessarily AI-literate.

If AI literacy is defined as tool proficiency, it belongs in a technology class, which is measured by what students can produce with AI assistance. If it is defined as a critical thinking competency, it belongs across the curriculum. The education nonprofit Digital Promise defines AI literacy as the knowledge and skills that enable humans to critically understand, evaluate, and use AI systems and tools to safely and ethically participate in an increasingly digital world.[57] Internationally, AI literacy has been framed around four domains—engage with AI; create with AI; manage AI; and design with AI—and explicitly sets benchmarks for policy, curriculum, teaching, and assessment.[58] Across these frameworks, the consistent emphasis is on understanding AI systems well enough to evaluate, question, and govern their use.

Researchers developing AI literacy curricula have identified a limitation of tool-focused approaches: if the curriculum teaches students skills on the newest tools, that knowledge may be obsolete by the time they enter the workforce.[59] The capacities of critical evaluation, independent reasoning, ethical judgment, and the ability to identify when AI outputs are plausible but wrong are the capacities that this framework's developmental protections are designed to build across all grade levels, and will then apply to any AI advances that come along the way.

Drawing on already-established frameworks, AI literacy in K–12 should comprise six components addressed across grades:[60]

1. Conceptual understanding: The knowledge of what AI systems are, how machine learning works, what training data are, and the difference between retrieval of information and production

2. Output evaluation: The ability to assess AI-generated content for accuracy, recognize bias, and verify claims against primary sources

3. Ethical and societal understanding: The understanding of how AI systems affect individuals and communities, what data privacy means, how algorithmic bias operates, and economic implications

4. Critical consumption: Recognition of AI as a designed system with specific capabilities and limitations, along with the ability to make informed judgments about when and whether to use it

5. Responsible use: The understanding of data security, consent, academic integrity, and ethical obligations within AI systems

6. Independent judgment: The capacity to think, write, and reason independently of AI

Independent judgment connects AI literacy to a broader problem in K–12 education. Reading comprehension is the ability to construct meaning from text: to hold an argument in mind, evaluate its logic, identify what is missing, and form a response. These are the capacities that AI can now simulate on a student's behalf. A student who can prompt an AI to summarize a text, identify its main argument, and generate a critical response has not demonstrated reading comprehension. Defining AI literacy in terms of independent judgment is just as important as being a proficient reader.

Ethics and Equal Access

Every stakeholder in this discussion about the role of AI has an obligation to protect the healthy and appropriate development of children. Like other educational technologies, AI systems will shape a child's learning environment. When the best interests of children conflict with the interests of technology vendors, school system efficiency, or other agendas, children must be the first priority.

Children cannot meaningfully consent to data collection or the use of their learning histories to train commercial AI systems. Current federal protections under the Family Educational Rights and Privacy Act (FERPA) and the Children's Online Privacy Protection Act (COPPA) were designed before generative AI, and AI exposes these gaps. FERPA's definition of education records does not extend to the behavioral and interaction data that AI platforms generate as students use them, particularly when those data are then held by third-party vendors and used to train other AI models.[61] New York State should require any AI platform used in K–12 education to meet a standard of data protection appropriate for all children.

AI systems produce outputs based on the data on which they were trained. When those training data reflect historical patterns of racial or socioeconomic inequality, AI systems can reproduce and amplify those patterns at scale. Predictive analytic tools, used by districts to identify students for intervention or support, have been shown to rate black and Latino students as less likely to succeed academically—not because of their actual ability but because the historical data used to train those systems reflect decades of unequal access and opportunities to resources.[62]

AI also presents a social and emotional risk: the risk that children form attachments to AI systems that they cannot distinguish from human relationships. These dynamics are particularly concerning in early elementary settings, where children are simultaneously developing the capacity to form healthy human relationships, regulate emotions, and distinguish fantasy from reality.

Accountability and Parental Rights

AI policy affecting children must be set through transparent public processes. Decisions about which AI platforms are used in schools, how they interact with students, and what data they collect are decisions about children's development, privacy, and educational opportunity. School boards, parent communities, and the broader public must have input into these decisions before they are made, not after platforms are already embedded into classroom practice.

School districts should publicly disclose all AI platforms in use, including the name of each platform, the vendor, the grade levels and subject areas involved, and the nature of student interaction. This disclosure should be updated whenever a new platform is adopted and must be accessible to parents without requiring a formal public records request. Districts should specify the level of student interaction with each platform and whether it involves the generation of student data. A teacher using AI to generate a worksheet is categorically different from a student using an AI tutoring platform that records every response, tracks patterns over time, and sends that information to a third-party vendor.

Districts should disclose what student data are collected, how the data are stored, who has access to this information, whether it is used to train underlying AI models, and how long it is retained. In 2022, research found that 96% of educational technology applications used in K–12 schools share student data with third parties, without the knowledge or consent of parents or students.[63]

Parents have a right to know what technologies are interacting with their children in school and to have meaningful input into AI adoption decisions before those decisions are finalized. This means notice of proposed adoptions with sufficient time for public comment, plain-language summaries of vendor data practices, and clear processes for parents to raise concerns and receive substantive responses. Parents who do not wish their children to interact with specific AI platforms should have that right respected, with equivalent educational opportunities provided.

NYS should establish a centralized registry of AI platforms approved for use in K–12 schools, with public documentation of each platform's compliance with developmental standards, data protection requirements, and bias auditing. This registry would relieve

individual districts of the burden of independently vetting every tool while ensuring that statewide standards are consistently applied. Vendors that cannot or will not meet those standards should not have access to New York's students.

NYS should develop guidance for families on how to support healthy technology habits at home, including age-appropriate limits on AI use and resources to help families understand which AI tools their children are using and what data those tools collect. The state has an obligation to ensure that it has the information and tools to make informed decisions.

The urgency of this framework stems from the fact that we know what happens in its absence. In July 2025, a $23 million agreement between AI companies and teachers' unions, including the American Federation of Teachers and the United Federation of Teachers, established infrastructure for AI integration in schools outside any state or federal policy framework.[64] It is an example of what happens without state standards: decisions that shape how AI reaches students, what data it collects, and how it influences instruction get made without the transparency, bias auditing, or developmental review that a state framework would require, and are now falling to the teachers' unions. NYS has the obligation to ensure that those standards are set in the developmental interests of children.

Financial Considerations and Procurement

A 2025 RAND survey found that 25% of teachers used AI tools for instructional planning or teaching during the 2023–24 school year, and 60% of principals reported using AI tools for their work.[65] As mentioned earlier, the edtech market has failed to be a reliable guide to what works in classrooms.[66] Research has found that most school leaders cannot identify the basic technology tools already in use in their own schools and that procurement routinely occurs at the individual teacher level without systematic oversight.[67]

AI tools are entering schools even faster, at a greater scale, and with higher stakes for student learning and data privacy. As the number of AI platforms and applications grows daily, accountability is critical to protect children. Vendors contracting with school districts must be required to demonstrate a positive impact. Districts must have the capacity to monitor what they are investing in, evaluate whether tools are producing measurable gains in student learning, and move away from platforms that do not meet developmental, privacy, or efficacy standards. In 2024, K–12 schools nationwide spent $30 billion on educational technology.[68] Without a strong framework that defines those standards and enforces them, districts will spend public dollars on tools whose effects on children remain unknown.

Federal funding already supports educational technology in classrooms across the nation. First, Title IV-A of the Every Student Succeeds Act, the Student Support and Academic Enrichment grant, explicitly authorizes the use of funds for well-rounded educational opportunities and effective use of technology, including professional development for educators and the purchase of instructional tools.[69] Second, the Federal Communications Commission's E-Rate program, which subsidizes telecommunications and internet infrastructure for schools and libraries, supports the connectivity requirements that AI

tool deployment demands, particularly in rural and lower-income districts.[70] And third, Title I funding, directed to districts serving high concentrations of low-income students, can also support the instructional technology and tutoring applications described in this framework when those tools meet evidence-based criteria.

The end of Covid-era Elementary and Secondary School Emergency Relief (ESSER) funding, which was distributed through the American Rescue Plan and largely obligated by September 2024, created a fiscal change for which many districts have not prepared.[71] Districts that used ESSER funds to expand edtech infrastructure, but failed to build those costs into recurring budgets, may face a funding gap. A framework that establishes clear criteria for which tools qualify for continued investment under existing federal authorities would help districts make fiscal decisions about which expenditures to sustain and which to discontinue.

The model most consistent with fiscal responsibility and local control is a voluntary statewide procurement consortium. Under this model, rather than each of New York's districts independently evaluating and negotiating AI education vendor contracts, the state conducts that evaluation, negotiates pricing and contract terms, and makes those contracts available to any district that chooses to use them. No district is required to participate. NYS already operates exactly this kind of centralized procurement through the Office of General Services, which maintains pre-negotiated statewide contracts for technology hardware, software, and IT services that school districts can access without running their own competitive procurement process.[72]

A small rural district negotiating an AI vendor contract without dedicated IT staff, legal counsel, or instructional technology expertise is not equipped to exercise meaningful local control. A wealthier district with more resources will negotiate better terms, secure stronger data protections, and pay lower prices. Without a state framework, AI procurement will follow the same inequitable pattern: better-resourced districts will adopt with greater oversight, while under-resourced districts will adopt with less oversight, or be excluded from the market entirely. A voluntary statewide procurement consortium addresses this disparity by redistributing capacity. Every district, regardless of size or wealth, would have access to the same vetted vendors, negotiated pricing, and contract protections that only the largest districts can obtain on their own today.

The framework proposed in this brief applies directly to New York's public school districts. Charter schools are publicly funded and already eligible to participate in New York's centralized procurement infrastructure through the Office of General Services. The AI platform registry and voluntary procurement consortium proposed here extend that existing relationship; charter schools may participate on the same terms as public districts.

Private schools and homeschooling families operate outside that framework, but the registry, as a public resource documenting which AI platforms meet New York's developmental, privacy, and efficacy standards, should be freely accessible to any school or family that chooses to consult it. Making these resources available across all education settings reflects a commitment to the developmental interests of all children in New York, regardless of where or how they are educated.

Implications and Recommendations

The following recommendations summarize the major conclusions of this brief and are intended to set minimum standards for student protection and public transparency. The state's role should be to establish guardrails that protect students' learning and development, require disclosure, and ensure that vendors can demonstrate that their tools are safe and effective for students.

1. Establish developmentally based statewide guidelines for student AI use.

AI is entering classrooms without clear standards governing when and how students should interact with it. Current state guidance across the country focuses primarily on implementation, ethics, and access but does not systematically address whether AI use is appropriate at various stages of cognitive development.

Skill acquisition requires active student response, practice opportunities, error correction, and feedback. Research in behavioral science and cognitive psychology has established these conditions for over five decades.[73] Generative AI systems can perform these tasks on behalf of students. When these tools are introduced without developmental safeguards, they risk replacing, rather than supporting, student cognition.

These gaps fall disproportionately on black, Latino, and low-income students—the same students most likely to enter later grades without the foundational skills that responsible AI use requires. The state should establish enforceable grade-band guidelines governing student interaction with AI tools. Independent school associations, charter management organizations, and other nongovernmental education bodies should be encouraged to voluntarily adopt equivalent standards, and the registry and family guidance resources established by this framework are available to support them in doing so. These guidelines should prohibit student-facing AI use in grades K–2, limit use to structured, teacher-directed contexts in grades 3–5, require formal AI literacy instruction and constrained use in grades 6–8, and permit expanded but pedagogically governed use in grades 9–12.

NYS should develop guidance for families on age-appropriate AI use outside school to ensure consistency between home and school. This can include expectations aligned to the grade-band framework and resources to help families understand which AI tools their children are using and how to support independence at home. School-based protections cannot fully achieve their purpose if students return home to unrestricted access to technology and AI. We already know that this is a problem. A RAND survey conducted in December 2025 found that 62% of middle school students used AI to help with homework.[74]

2. Strengthen foundational instruction in K–2 to reduce later AI dependence.

Students who do not develop foundational skills in reading and mathematics are more likely to rely on external systems to perform tasks that they cannot complete independently. Research has shown that early literacy and numeracy skills are among the strongest predictors of long-term academic success.[75] AI introduces a new risk. Students who lack

foundational skills are the most likely to use AI as a substitute for thinking, rather than as a tool to extend it. Without strong early instruction, AI may accelerate dependency rather than support learning.

NYS should require districts to adopt evidence-based instructional practices in K–2 reading and mathematics, with clear expectations for systematic instruction, progress monitoring, and intervention. Strengthening foundational skills at this stage reduces the likelihood that students will depend on AI to perform core academic tasks in later grades.

3. Require AI-free assessments at all grade levels.

The purpose of summative assessment is to measure what students can do independently. When individuals rely on external systems to perform cognitive tasks, their ability to perform those tasks independently declines over time.[76] Allowing AI use on assessments accelerates this process by removing the requirement for independent performance. NYS should establish a clear prohibition on the use of AI in all summative assessments. Districts should implement assessment conditions that prevent the use of AI, such as oral exams, monitored environments, and appropriate device restrictions. One exception applies to classes specifically focused on AI literacy or responsible AI use, where demonstrating how students engage with, evaluate, and critically reflect on AI outputs may be appropriate, provided that assessment measures student judgment about AI rather than AI-assisted student performance.

The consequences extend beyond K–12 education. Students who are not required to demonstrate independent performance on assessments enter college admissions, professional certification, and workforce environments without having developed the capacity that those contexts assume. The U.S. Department of Labor's AI Literacy Framework identifies judgment, problem-solving, and independent reasoning as foundational workforce competencies, capacities that cannot be evaluated through AI-assisted work.[77]

4. Require public transparency and parental disclosure for AI use in schools.

AI systems shape how students think, respond, and learn. Research shows that a large majority of educational technology applications share student data with third parties, often without full awareness at the district level. Parents currently have limited visibility into which AI tools their children interact with, what data are collected, and how those data are used. Without transparency, families cannot meaningfully participate in decisions that affect their children's learning and development.

The state should require all districts to publicly disclose AI platforms in use, including the vendor, grade levels, nature of student interaction, and data collection practices. Parents should be informed prior to adoption and provided with clear mechanisms to opt out where appropriate. Transparency is necessary to ensure accountability and align AI use with students' developmental interests.

5. Establish a statewide registry and procurement framework for AI tools.

Many school leaders cannot identify the tools in use in their own districts, and adoption decisions are often made at the classroom level without systematic evaluation.[78] Without a framework for evaluating AI tools before they reach students, districts will continue to invest in products whose effects on learning, development, and data privacy are unknown.

NYS should establish a centralized registry of approved AI platforms that meet defined standards for developmental appropriateness, data protection, bias auditing, and demonstrated impact on student learning. This registry can be paired with a voluntary statewide procurement consortium that allows districts to access pre-vetted vendors and negotiated contracts. Such a model would reduce duplication, improve oversight, and ensure that all districts have access to tools that meet consistent standards. The voluntary procurement consortium should operate through the Office of General Services, which already maintains centralized technology contracts available to school districts statewide.

Conclusion

Fewer than one-third of New York fourth-graders scored at or above proficiency in reading on the most recent Nation's Report Card (NAEP) assessment. Just 17% of black students, 22% of Hispanic students, and 21% of economically disadvantaged students reached proficiency. Most New York children entering fourth grade cannot read or do math at grade level. These are the students AI is most likely to harm. They are also the students whose schools are least prepared to protect them.

Thirty-four states have issued AI guidance. None has addressed developmental appropriateness as an organizing principle. New York has not issued any guidance. Older technologies introduced into the education setting changed how information reached students. Generative AI does something different: it can do the work that students are supposed to do themselves. Every decision made now about when and how AI reaches children will determine whether students develop the independent thinking that school is designed to build, or whether AI builds it for them.

The students entering fourth grade without grade-level reading and math skills are the same students most likely to use AI to complete the work that they cannot do independently. To deal with this problem, New York State must adopt a framework that ensures a commitment to children's developmental interests and uses that framework as a guide for determining when and how AI is introduced into classrooms.

Endnotes

1 Larry Cuban, *Teachers and Machines the Classroom Use of Technology Since 1920* (New York: Teachers College Press, 1986).

2 Robert A. Reiser, "A History of Instructional Design and Technology: Part I: A History of Instructional Media," *Development* 49 (March 2001).

3 Larry Cuban, *Oversold and Underused: Computers in the Classroom* (Cambridge: Harvard University Press, 2001).

4 Jean M. Twenge et al., "Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time," *Clinical Psychological Science* 6, no. 1 (2018).

5 Kevin Bushweller, "How COVID-19 Is Shaping Tech Use. What That Means When Schools Reopen," *EducationWeek*, June 2, 2020.

6 Matt Barnum, "School Got $190 Billion in COVID Relief from the Feds. What's Happened to It?" *Chalkbeat*, February 2022.

7 Laura Ascione, "Edtech Top 40 Reveals Increase in Unique Digital Tool Use," *eSchool News*, July 9, 2024.

8 Dan Milmo, "ChatGPT Reaches 100 Million Users Two Months After Launch," *Guardian*, Feb. 2, 2023.

9 The White House, "Advancing Artificial Intelligence Education for American Youth," Executive Order, Apr. 23, 2025.

10 AI for Education, "State AI Guidance for K–12 Schools."

11 Ibid.

12 Lynelle K. Bosworth and Deborah L. Stevens, "New York Poised to Be at the Forefront of AI Regulation; Five Bills Await Gov. Hochul's Action," Greenberg Traurig, Oct. 23, 2025.

13 Cayla Bamberger, "New York City Public Schools Unveil Guidelines for AI Use," *New York Daily* News, Mar. 24, 2026.

14 NYC Public Schools, "Guidance on Artificial Intelligence," March 2026.

15 B. F. Skinner, "Teaching Machines," *Science*, Oct. 24, 1958.

16 Ibid.; idem, *The Technology of Teaching* (Cambridge, MA: B. F. Skinner Foundation, 1968.

17 Barak Rosenshine, "Principles of Instruction: Research-Based Strategies That All Teachers Should Know," *American Educator* 36, no. 1 (2012).

18 John Hattie and Helen Timperley, "The Power of Feedback," *Review of Educational Research* 77, no. 1 (2007).

19 Nicholas C. Soderstrom and Robert A. Rjork, "Learning Versus Performance: An Integrative Review," *Perspective Psychology Science* 10, no. 2 (March 2015).

20 Hattie and Timperley, "The Power of Feedback."

21 Rosenshine, "Principles of Instruction."

22 Evan F. Risko and Sam J. Gilbert, "Cognitive Offloading," *Trends in Cognitive Sciences* 20, no. 9 (August 2016).

23 National Research Co*uncil, How People Learn: Brain, Mind, Experience, and School* (Washington, DC: National Academies Press, 2000).

24 Rosenshine, "Principles of Instruction."

25 Carrie Spector, "New Study Explores What Makes Digital Learning Products More or Less Effective," Stanford Accelerator for Learning, Aug. 6, 2024.

26 Velislava Hillman et al., "AIED and EdTech Procurement: Challenges for Policy and Governance," London School of Economics, Dept. of Social Policy, October 2024.

27 Xiao Tan, Gary Cheng, and Man Ho Ling, "Artificial Intelligence in Teaching and Teacher Professional Development," *Computers and Education: Artificial Intelligence* 8 (June 2025).

28 John F. Pane et al., "Informing Progress: Insights on Personalized Learning Implementation and Its Effects," RAND, July 11, 2017.

29 Julian Cristia et al., "Technology and Child Development: Evidence from the One Laptop per Child Program," *American Economic Journal* 9, no. 3 (July 2017).

30 Tod Newcombe, "What Went Wrong with L.A. Unified's iPad Program?" Center for Digital Education, May 14, 2015.

31 *M.C. v. Curriculum Associates*, Dec. 22, 2025.

32 Howard Blume, "LAUSD to Restrict Screen Time After Years of Encouraging Classroom Use," *Los Angeles Times*, Apr. 21, 2026.

33 Beata Jungselius, "A Scoping Review of Current Research on Social Media Use Among Children and Adolescents," *Discover Psychology* 4, no. 116 (2024).

34 Jonathan Haidt, *The Anxious Generation* (New York: Penguin, 2024).

35 National Reading Panel, "Teaching Children to Read: An Evidence-Based Assessment of the Scientific Research Literature on Reading and Its Implications for Reading Instruction," 2000.

[36] Anne E. Cunningham and Keith E. Stanovich, "Early Reading Acquisition and Its Relation to Reading Experience and Ability 10 Years Later," *Developmental Psychology* 33, no. 6 (1997).

[37] Tutrang Nguyen et al., "Which Preschool Mathematics Competencies Are Most Predictive of Fifth Grade Achievement?" *Early Child Research Quarterly* 36 (2016).

[38] Risko and Gilbert, "Cognitive Offloading."

[39] Yizhou Fan et al., "Beware of Metacognitive Laziness: Effects of Generative Artificial Intelligence on Learning Motivation, Processes, and Performance," *British Journal of Educational Technology* 56, no. 2 (September 2024).

[40] The Nation's Report Card, "State Profiles: New York."

[41] Jeanne S. Chall, *Stages of Reading Development* (New York: McGraw-Hill, 1983).

[42] Steve Graham and Dolores Perin, "Effective Strategies to Improve Writing of Adolescents in Middle and High Schools," Carnegie Corporation, 2007.

[43] Yan Zhao et al., "Does Generative Artificial Intelligence Improve Students' Higher-Order Thinking? A Meta-Analysis Based on 29 Experiments and Quasi-Experiments," *J Intell* 13, no. 12 (2025).

[44] Spector, "New Study Explores What Makes Digital Learning Products More or Less Effective."

[45] Madeline E. Moses-Payne et al., "I Know Better! Emerging Metacognition Allows Adolescents to Ignore False Advice," *Developmental Science* 24, no. 5 (2021).

[46] Xingjian Gu and Barbara J. Ericson, "AI Literacy in K–12 and Higher Education in the Wake of Generative AI," August 2025.

[47] Jonas Hallström et al., "AI Literacy for K–12 Education: An International Delphi Study," *Interactive Learning Environments* (2026).

[48] Ming Ma et al., "Fostering Responsible AI Literacy: A Systematic Review of K–12 AI Ethics Education," *Computers and Education Artificial Intelligence* 8 (June 2025).

[49] Drew Turney, "The More That People Use AI, the More Likely They Are to Overestimate Their Own Abilities," *Live Science*, Nov. 17, 2025.

[50] Timothy Cook, "Teaching Students to Question the Machine," *Social Science Space*, Nov. 5, 2025.

[51] B. F. Skinner, *Verbal Behavior* (Cambridge, MA: B. F. Skinner Foundation, 1992).

[52] Ian J. Quitadamo and Martha J. Kurtz, "Learning to Improve: Using Writing to Increase Critical Thinking Performance in General Education Biology," *Life Sciences Education* (2017).

[53] Hamsa Bastani et al., "Generative AI Without Guardrails Can Harm Learning: Evidence from High School Mathematics," *PNAS* 122, no. 26 (July 2025).

54 Hao-Ping Lee et al., "The Impact of Generative AI on Critical Thinking: Self-Reported Reductions in Cognitive Effort and Confidence Effects from a Survey of Knowledge Workers," *CHI Conference on Human Factors in Computer Systems*, no. 1121 (April 2025).

55 Michael Gerlich, "AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking," *Center for Strategic Corporate Foresight and Sustainability* 15, no. 1 (January 2025).

56 U.S. Dept. of Labor, "US Department of Labor Releases AI Literacy Framework Providing Foundational Content Areas, Delivery Principles to Guide Nationwide Efforts," Feb. 13, 2026.

57 Kelly Mills et al., "AI Literacy: A Framework to Understand, Evaluate, and Use Emerging Technology," Digital Promise, June 2024.

58 European Cooperation and the Organisation for Economic Co-operation and Development (OECD), "Empowering Learners for the Age of AI," May 2025.

59 Alexandra Shimalla, "AI Literacy for K–12 Students: A Guide for Educators," *EdTech*, Oct. 2, 2025.

60 Mills et al., "AI Literacy"; OECD, "Empowering Learners for the Age of AI."

61 David Sallay, "Vetting Generative AI Tools for Use in Schools," Future of Privacy Forum, April 2024.

62 Hoang Pham et al., "How Will AI Impact Racial Disparities in Education?" Stanford Center for Racial Justice, June 29, 2024.

63 Internet Safety, "2022: K–12 EdTech Safety Benchmark: National Findings," December 2022.

64 Education Healthcare Public Services, "AFT to Launch National Academy for AI Instruction with Microsoft, OpenAI, Anthropic, and United Federation of Teachers," July 2025.

65 Julia H. Kaufman et al., "Uneven Adoption of Artificial Intelligence Tools Among U.S. Teachers and Principals in the 2023–2024 School Year," RAND, Feb. 11, 2025.

66 "Ed Tech Is Profitable. It Is Also Mostly Useless," *The Economist*, Jan. 22, 2026.

67 Hillman et al., "AIED and EdTech Procurement."

68 Arianna Prothero, "School Spends $30 Billion on Tech. How Can They Invest in It More Wisely?" *EducationWeek*, Oct. 10, 2025.

69 New York State Education Dept., "Title IV, Part A: Student Support and Academic Enrichment Fact Sheet."

70 NYS Education Dept., "E-Rate."

71 "Education Stabilization Fund: Expenditures for Elementary and Secondary Education," Nov. 5, 2024.

72 NYS Office of General Services, "School Districts."

73 Skinner, T*he Technology of Teaching*; Carl Binder, "Behavioral Fluency: Evolution of a New Paradigm," *Behavior Analyst* 19, no. 2 (Fall 1996); Siegfried Engelmann and Douglas Carnine, *Theory of Instruction: Principles and Applications* (New York: NIFDI Press, 1982).

74 Heather L. Schwartz and Melissa Kay Diliberti, "More Students Use AI for Homework, and More Believe It Harms Critical Thinking," RAND, Mar. 17, 2026.

75 Greg J. Duncan et al., "School Readiness and Later Achievement," *Developmental Psychology* 43, no. 6 (2007).

76 Risko and Gilbert, "Cognitive Offloading."

77 U.S. Dept. of Labor, "US Department of Labor Releases AI Literacy Framework Providing Foundational Content Areas, Delivery Principles to Guide Nationwide Efforts," Feb. 13, 2026.

78 Hillman et al., "AIED and EdTech Procurement."