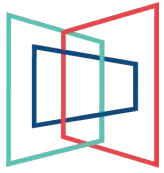


ARTIFICIAL INTELLIGENCE

& Extraordinary
Learning for All

August 2024 | V2



About Transcend

Transcend is a national nonprofit that supports school communities to create and spread extraordinary learning environments for all. The organization was founded on the belief that we must reimagine schooling, using a community-driven approach, so that *all* children can realize their infinite potential.

Transcend pursues its mission by partnering directly with schools on design journeys while also sharing powerful models, tools, and insights across the sector. Ultimately, Transcend strives to fuel significant [leaps in education](#) so *all* young people can thrive in and transform the world.

For more information, visit our [website](#) or follow us on [LinkedIn](#).

Help Us Continue to Improve This Resource



One of our [core values](#) at Transcend is Perpetual Beta—we are always looking to learn, grow, and improve. If you have comments or suggestions for our next iteration, please contact meaghan@transcendeducation.org.

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INTRODUCTION

Artificial Intelligence (AI) is not a new technology—in fact, it’s been around since the 1950s. However, the launch of generative AI tools like ChatGPT has revolutionized both the realized and potential impact of AI.

Industries and individuals have been using AI to augment their lives for years, but today’s AI presents a new level of opportunity. People have been using AI-powered GPS systems, voice assistants like Siri and Alexa, and music curation apps like Spotify to enhance their lives. Energy, weather, and medical industries have been using AI to augment the capabilities of humans, relying on it to draw insights and make predictions about earthquakes or weather patterns, as well as assist in decisions like what medication to prescribe a patient.¹ With the launch of generative AI tools like ChatGPT and Bard in late 2022, AI’s potential impact began to spread. While generative AI enables things like increased productivity and automation, eventually, AI may be able to help humans solve vexing problems like climate change, disease, and more.

Across many areas the potential is becoming clear, and industries have begun to invest more heavily in AI implementation.

In 2023, companies began to experiment with AI—exploring possibilities, learning about risks, creating policies, and more.² That period has offered proof of AI’s potential, and many feel ready to dive deeper. The most recent quarterly [analysis from Bain](#) found that, in 2024, surveyed companies began to shift towards delivering value and investing more in AI, “on average, about \$5 million annually, with an average of 100 employees dedicating at least some of their time to generative AI.” KPMG found that 83% of leaders at companies with \$1+ billion in revenue plan to increase their investment in AI over the next three years.³

However, it is not “all systems go.” Technology continues to advance, [risks](#) abound—biased outputs, misinformation, privacy concerns, and overreliance, to name a few—and [safeguards](#) are still being developed. Therefore, as AI becomes more widespread, it is wise to continue implementing cautiously and in the spirit of research and development.

Learn More

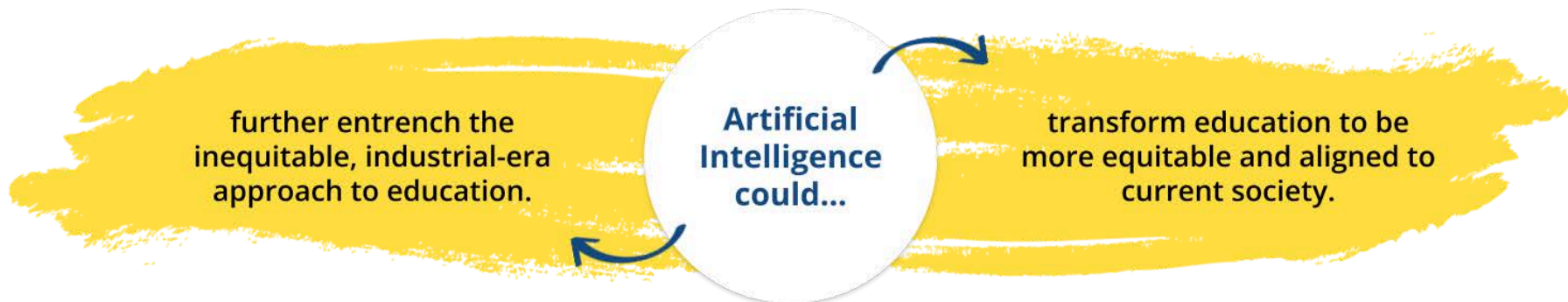
- [24 Top AI Statistics & Trends In 2024](#) | Forbes
- [The state of AI in early 2024: Gen AI adoption spikes and starts to generate value](#) | McKinsey
- [What GenAI’s Top Performers Do Differently](#) | BCG

AI has the potential to transform learning environments to be more supportive of all students. However, if not used intentionally, it also threatens to lock schools and school systems further into the current industrial-era approach to learning.

The potential uses for AI in learning environments are extensive. Within operations, AI holds the potential to make processes more efficient and data-driven. This includes student scheduling, parent communications, and transportation routing. AI can take on some of the workload for adults across the system and allow them to focus on their most important and complex responsibilities, as well as improve hiring and professional learning. The uses within curriculum, instruction, and assessment include supporting the development and modification of content, instructional plans, and student material as well as enabling more embedded and on-demand progress monitoring, feedback, and support. See more on these uses [here](#).

If these varied uses are applied to equitably transform student experiences for the 21st century, there could be an array of benefits. Doing this entails considering AI when establishing goals for learning to better prepare students to live alongside and work with AI after graduation. It also includes using AI to expand the range of opportunities available as well as make those opportunities far more rigorous, holistically focused, and tailored to students' identities, needs, interests, and goals.

However, if AI is used solely to operate the current system more efficiently, it could further entrench an industrial-era approach to education that is characterized by vast inequities as well as a lack of alignment to how young people learn and to the needs of contemporary society. For example, if AI is simply used to more quickly create plans for whole-group lessons, to develop an array of new assessments aligned to the same weak standards, or to create student schedules that optimize not for learning but for transportation and meal costs, then we're missing an enormous opportunity to serve students better.



The big question educational leaders must tackle is, “How do we capitalize on AI’s potential to transform our learning environment while mitigating risks?”

With AI, achieving extraordinary learning experiences and outcomes for all young people may be more possible than ever.

Already, there are many bold ideas—and, in some cases, tools—to make this inspiring vision a reality. A [recent study from Impact](#) found teachers are using AI to help with creativity, lesson planning, and assessments, and they feel strongly that AI is helping them and their students learn and grow. Mostly, however, teachers are experimenting on their own—the majority have not received training but would like to.

We’ve started this resource to help. Its primary purpose is to provide inspiring ideas for using AI in transformational, learner-centered ways. Because Transcend believes deeply that learning environments must consider both the *outcomes* students are working toward as well as the *experiences* students have, we’ve organized the ideas into those two sections:

Section 1: The Goals of Learning in the Age of AI




As AI continues to become more advanced and ubiquitous, students will need to develop the knowledge, skills, and mindsets to thrive alongside it. This section describes technical and adaptive abilities that will be critical to using AI in effective and moral ways, as well as uniquely human abilities that AI will never fully match. It also explores how AI may impact the development of new

knowledge, skills, and mindsets in both positive and negative ways so that communities can be proactive in their planning.

Section 2: AI and the Student Learning Experience

AI has the potential to dramatically transform the student experience in ways that make it more equitable and aligned to 21st-century needs. However, AI could also be used to further ingrain current practices, perpetuating the inequalities they have contributed to. This section provides examples, [links to tools](#), and notes on risks to shape the use of AI in positive ways.

Learning about AI’s potential to transform student outcomes and experiences is just part of a much larger process. This process should include gaining a deep understanding of a learning environment’s context and fit for using AI, creating structures and policies for oversight, building capacity, and fostering experimentation that can support long-term transformation. We’ve created a series of action guides to help you use this resource in support of that process:

- [System Leader Action Guide](#) 
- [School Leader Action Guide](#) 
- [Teacher Action Guide](#) 

The goal of engaging in this process is not to finalize how AI will be used or the products your system will embrace. Given the pace of change, this is not achievable. Instead, the goal is to develop key conditions that will help initiate and sustain safe, effective, and equitable innovation and transformation with AI at the core. Now let’s get inspired!

But first...

*Let's
Imagine*

... a bright future for
learning, powered
by AI!

Zahira sits down on a chair in her family's living room at about 8am and turns on her phone to explore her learning dashboard. Her parents approved a late arrival for her on Wednesdays and Fridays this quarter, and she starts her learning while she's at home. When she clicks into her dashboard, she sees reminders of what's due and what she needs to bring for the day's activities, as well as a weather report for her skateboarding meetup after school.



She decides to begin with an Emergency Medical Technician (EMT) training module because she's hoping to finish her certification next month. The university, a few hours away in the state capital, offers a course with simulations so she can get on-the-job training without leaving her local community. The university also provides the school with virtual reality headsets for students to use for these simulations. Today she is learning how to create a tourniquet. She struggles with positioning and an AI tutoring bot provides some in-the-moment feedback based on what it's seeing in her headset.

Next Zahira jumps back into a physics lesson on friction that she started Monday with her STEM teacher. The lesson is connected to a project she's completing in her Project-Based Learning block, and she really needs to make sure she understands the concepts. Since she didn't master the lesson's objectives on her last checkpoint assessment, her teacher used an AI tool to create some different, more customized, examples and explanations to help her understand. She spends an hour on the lesson but still feels a little unclear and sends a request to meet with her teacher during Targeted Teaching and Learning Time (TTLT).



At 11am, a small school van picks her up, along with eight other students who have a late arrival that day and live in her area.

When she arrives, she goes straight to TTLT. During this time, students are working on various learning objectives across many subjects. She starts by checking her dashboard to see if there are any updates about her EMT module or physics lesson. She notices her STEM teacher added a check-in to her schedule for the end of TTLT today, which she feels relieved about since she needs to use this learning after she leaves the building today for her project.

Next, she turns to her persuasive essay. She completed the essay Monday and got feedback from an AI bot yesterday—while her points are strong, she needs to improve her ability to write in a persuasive tone. Today, she goes deeper on that feedback with her classmate David.

Working with David was a recommended next step based on an AI-powered analysis of students' various strengths and areas for growth. They work together for 30 minutes, and then Zahira resubmits her essay.

As she's finishing, she gets a reminder about her meeting with her teacher and heads to the STEM room.

Her teacher spends 15 minutes going over the physics work Zahira did that morning with her and corrects a few misunderstandings. They also spend some time checking in on how Zahira is adjusting to having a new baby brother at home, something her teacher noticed on her profile updates recently. Before leaving, Zahira's teacher adds a new checkpoint assessment to her learning dashboard, which is due by the end of the week.

On her way to the dining hall, Zahira receives an AI-powered suggestion

nudging her to call her mom. This is based on Zahira's reflection that she hasn't been able to connect with her mom as much since her new baby brother was born, which she logged in her Advisory journal last night. She decides to eat alone today and give her mom a call to check in, since it's her brother's naptime.

After lunch, Zahira has a Project-Based Learning block. This is on her schedule a lot more toward the end of the quarter because the class is getting ready to unveil their projects to the community. An AI tool helped Zahira and two of her peers identify a shared interest—skateboarding. Using their knowledge of their community, they identified a local skate park that lacked accommodations for

those with disabilities. The same tool then helped them align physical, math, and communications standards to their project idea. This includes the standards Zahira was just working to master with

her STEM teacher. Later today, they'll go to a local skate park and test their designs. In class, they learn about strategies to disseminate information and appeal to potential supporters, so they can scale their designs once they're effective.

During Advisory, Zahira has been working on positive identity development. She logs on to her dashboard, updates her progress, and receives some affirmations. The AI also recommends she read *The Hate U Give*, given its parallels to some of her recent life experiences. Her advisor checks in with her too. Then, her group puts the technology away and spends time outside on a nature walk and doing some fun connection activities.

Her last activity for the day is Computer Science. Zahira is learning about Large Language Models (LLMs) and how to train them on datasets that take bias into account. Yesterday, her

teachers and a Microsoft employee led a lesson where Zahira learned about the ubiquitousness of LLMs in our world. Over the next two days, she will identify two tools that use an LLM and compare how they acknowledge bias in their disclosures, evaluate the impact those models could have on different groups of people,



and make recommendations for how to mitigate bias at the programming level.

Time to leave school. On her way out she gets a ping on her watch that her heart rate has become a bit high—perhaps because she’s nervous about testing her skate-park designs in public. The notification suggests she takes a brain break, so she heads to the meditation room to sit quietly. She uses an app to guide her through some breathing exercises and positive visualizations.

Then Zahira meets up with her classmates in the parking lot. Since Zahira’s school operates in multiage grade bands and her partners are older, they are able to drive together to the skate park to test out the physics of some of the halfpipes they’ve designed. They spend 90 minutes skating, making observations and adjustments, and eventually uploading videos and notes of their experience, which AI will match to the relevant standards and her



schools credit requirements. Tomorrow, they’ll prompt an AI to build a similar design and either critique the results or maybe apply some new ideas.

On her way home, she gets a reminder from a college chatbot that

tomorrow she has a meeting with her virtual college tutor. They are going to go over the results of an algorithm that matched her interests to colleges to better understand the recommendation and identify a few best fit and match choices.

When Zahira gets home, her dad greets her and asks how the skate park assignment is coming along. He asks her if she and her group solved the problem with the angle of the wheelchair ramp. He knows exactly how the project is progressing, since the school’s AI chatbot sends daily updates so he can check in with her each day and support her learning at home.



Before bed, Zahira inputs some daily reflections into her Advisory journal app. The AI analyzes her day and shares some insights—like congratulating her on listening to her body by taking a 10-minute brain break, her longest yet. It also recommends a slightly later start tomorrow because of the long amount of time she spent at the skate park working after school and gives some lunch suggestions to build her energy for the rest of the week since she has a larger performance task on Friday.



AI & STUDENT OUTCOMES

Our schools are a critical formative environment where individuals build the skills they apply throughout their lives. If these environments are going to prepare young people to thrive alongside AI, the learning outcomes they focus on will need to evolve, as will some aspects of how they are developed.

Recent studies on the future of work say that, currently, AI can absorb tasks that make up 60%–70% of employees’ time and that nearly all occupations will be impacted by 2050.⁴ And while generative AI could affect many across sectors, displacement due to technological advancement is often offset by the creation of new jobs that will demand different skill sets.^{4,5} In this section, we explore the implications that AI might have for learning outcomes and offer some examples to help you consider the goals you have for your learners.

Experts are working to identify the knowledge, skills, and mindsets needed to thrive in a world where AI is ubiquitous. We reviewed six frameworks that identified a wide range of knowledge, skills, and mindsets that are important for working alongside AI. The figure on the next page outlines three categories of learning outcomes in those frameworks.

The *human core* consists of “unAI-able” skills and mindsets: those that cannot be automated because they are highly human skills.⁶ This level includes mindsets and skills such as emotional intelligence, interpersonal skills, and skills related to maintaining one’s physical health and personal well-being, to name but a few.

The *adaptive bridge* level consists of skills and mindsets that promote the ethical and effective integration of AI into our lives, like creativity, critical thinking, collaboration, and more.

And finally, the *technical edge* level includes the technical knowledge of how AI works and the concrete skills of how to use it. This level includes knowledge of AI techniques and computational thinking, as well as skills like design thinking, data literacy, and more.

These categories should be considered when determining the types of goals we set with and for young people.

Learn More

- [“5 Big Ideas”](#) | *AI4K12.org*
- [National Standards for Technology Integration](#) | *ISTE*
- [K–8 STEM Competencies](#) | *Education Development Center*
- [AI Competency Framework for Teachers and Students](#) | *UNESCO*
- [Work Trend Index](#) | *Microsoft*
- [Artificial Intelligence Competencies](#) | *Chief Human Capital Officers Council*

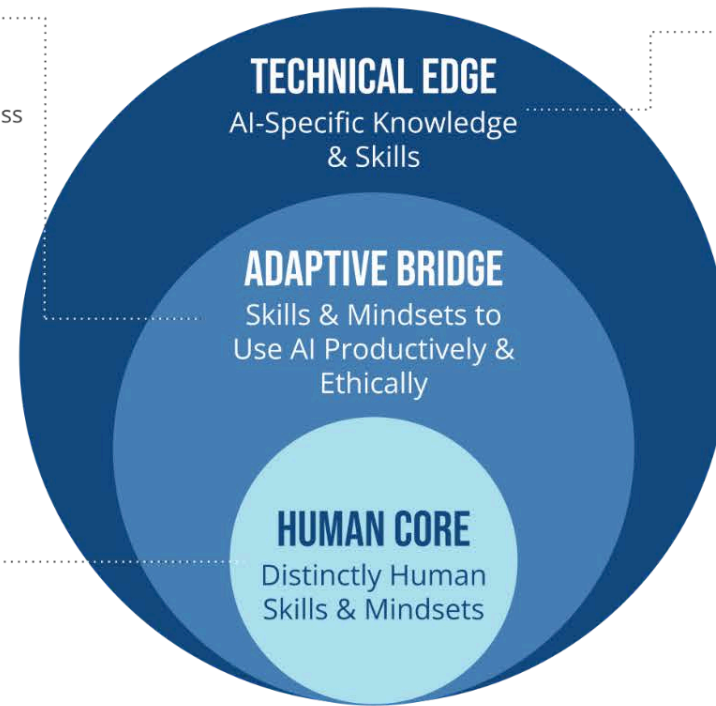
Implications of AI on Learning Outcomes

Skills and mindsets needed to work in an AI-powered world:

- Collaboration
- Communication
- Commitment to Equity
- Creativity
- Critical Thinking
- Curiosity
- Flexibility
- Global Consciousness
- Integrity
- Persistence
- Problem-Solving
- Reflection
- Resilience
- Tolerance

Skills and mindsets that AI will not be able to automate:

- Conflict Resolution
- Contextual Awareness
- Emotional Intelligence
- Ethical Awareness
- Interpersonal Skills
- Personal Well-Being
- Physical Health



Knowledge and skills related to how AI works and how to use it:

- AI Literacy, including:
 - AI Techniques (i.e., use of classical AI, machine learning, deep learning, and more)
 - AI Technologies (i.e., use of chatbots, computer vision, natural language processing, and more)
- Algorithms
- Computational Thinking
- Data Literacy
- Design Thinking
- Digital and Media Literacy
- Digital Citizenship and Cybersecurity
- Ethical AI
- Programming
- STEM Career Planning and Development
- Systems Thinking

In addition to influencing *what* outcomes young people will need to learn, AI has the potential to impact *how* these outcomes develop. The table on the next page includes four examples of how AI use might impact the development of a wide range of student outcomes including traditional academic outcomes, as well as other cognitive, social, and emotional abilities. **Considering how AI may impact how young people learn will enable schools and systems to plan** and make intentional

decisions. So, like others,⁷ we believe every learning environment would benefit from examining how AI may impact the development of the learning outcomes they aspire to. This can lead to some interesting discoveries about the untapped potential of tools and resources, as well as the recognition of [risks](#) such as those related to inequitable access.

Sample AI Considerations for Student Outcomes

Areas of Learning	How AI Use Might Positively Impact Learning in This Area	How AI Use Might Negatively Impact Learning in This Area
<p>Mathematics Knowledge & Skills The content and processes required to master mathematical learning such as counting, operations, and reasoning across time and space.</p>	<p>AI tools can provide scaffolds, offer accessibility features, and identify learner misconceptions, all of which support rigorous math learning for more students. In addition—because AI can answer difficult math problems so quickly—it may help to shift the focus on math learning from getting correct answers to understanding the underlying concepts and processes. <i>How</i> a learner tackles a math problem will be a more telling sign of learning than a correct answer.</p>	<p>AI-automated calculations, while more efficient, may deter a learner's understanding of the logic behind foundational mathematics concepts. Leveraging AI solely for answers may do little to help learners understand the process behind getting the answers.</p>
<p>Positive Mindsets The beliefs and dispositions that support a learner in making the most of their time, energy, and circumstances to grow and thrive.</p>	<p>Learners may gain confidence in their abilities by using AI to get started on a difficult problem or to check their work. This can also diminish stress levels in some learners.</p>	<p>Learners may readily encounter inaccurate content and biases that negatively impact their self-image. Learners can also feel like working through productive challenges is futile when tasks can be automated, which can thwart curiosity and intrinsic motivation.</p>
<p>Relationship Skills The skills and mindsets that enable establishing and maintaining healthy and rewarding relationships with diverse individuals and groups.</p>	<p>The use of AI-powered machines may make social interactions and communication more efficient. Certain tools may provide feedback around writing, speech, and even affect or persuasiveness. Young people with diverse learning styles may be able to use these to strengthen their communication skills.</p>	<p>Learners could develop an overdependence on machine-driven networks instead of social networks and ties. This may hinder the development of social skills and the ability to make decisions, as well as increase social isolation.</p>
<p>Learning Strategies and Habits The skills and mindsets that support managing one's learning process effectively.</p>	<p>Self-directed learners can leverage AI to produce appropriately challenging problems that help them study, use AI as a tutor, or have an AI companion help them organize their responsibilities and routines. Students who have disabilities or learning differences may benefit from AI-powered self-management tools.</p>	<p>AI tools may support the self-management styles of some without considering the diverse needs of others. Learners without access to AI tools or companions will not reap the benefits of those for whom the tools are designed as a result of limited access or exposure.</p>

The following two activities can help learning environments apply this information in their contexts. Or try [this activity](#) from AI for Equity.

Application Activity 1:

AI-Responsive Learning Goals

This activity can help you prioritize which AI-related learning goals are right for your learning environment.

Suggested time: 1 hour

Materials and Preparation:

- *Implications of AI on Learning Outcomes* visual on page 11.
- A group of 4–5 stakeholders who bring in different perspectives (e.g., students, families, teachers, principal, department heads).

Steps

1. Individually, review the *Implications of AI on Learning Outcomes* visual and reflect on which outcomes—all, some, or just a few—students need to learn and develop.
2. Share reflections and note similarities and differences across your group.
3. Then, compare these reflections to your learning environment's *current* learning goals and consider:
 - What current learning outcomes support AI usage? Where are there overlaps or gaps?
 - What might you need to add, revise, or remove to best enable your learning outcomes to support AI usage in your context?
4. Synthesize reflections into a list of suggested changes to your learning environment's outcomes.
5. Begin considering how to develop these in learners and who may need to be involved beyond your current group.

Application Activity 2:

AI's Influence on Learning & Development

This activity can help you reflect on what role, if any, AI can begin to play in advancing learning outcomes.

Suggested time: 1 hour

Materials and Preparation:

- *Sample AI Considerations for Student Outcomes* table on page 12.
- *Risks of AI* table, and the *List of Safeguards* table in the appendix.
- A group of 4–5 stakeholders who bring in different perspectives (e.g., students, families, teachers, principal, department heads).

Steps

1. Identify at least three different areas of learning (e.g., integrated identity, practical life skills, language arts and literacy) that are high-priority areas for your students.
2. Split the group into smaller teams to work on one specific area. Educators with content knowledge and expertise should focus on an area of learning related to their discipline.
3. In this smaller group, discuss the following questions:
 - How might AI support students' learning within this area?
 - How might AI hinder students' learning within this area?
 - What other implications might AI have on this learning area?
 - What can we do to capitalize on the potential and mitigate the risks (consider using the *Risks* and *Safeguards* tables to spark ideas)?
4. Complete a table like *Sample AI Considerations for Student Outcomes* to keep track of and share your ideas.

See our Action Guides for more details on how to start transforming your learning environment with AI.

[System Leader Guide](#) 

[School Leader Guide](#) 

[Teacher Guide](#) 



AI & THE STUDENT EXPERIENCE

The potential uses for AI within learning environments are expansive. These uses span various areas of a school or school system’s overall work.

Uses within the area of curriculum, instruction, and assessment include teachers or other instructional designers using AI to create and modify instructional plans and materials based on target standards, desired learning modalities, student needs, and more. AI could also support formative assessment of student progress, making it much more streamlined and less disruptive to student learning and schedules. And, of course, students could also engage directly with AI to learn new concepts, receive feedback, and get targeted support.

Another area where AI has a range of uses is within adult roles, hiring, and learning. AI can support hiring processes by sourcing candidates, reviewing resumes, and more. It can also provide adults with feedback on their language and tone as well as support more targeted professional learning. AI also has the potential to supplement the adult support available to students in various ways,

giving students access to a wide range of support at more flexible times. Finally, it can decrease the workload of teachers by taking on tasks like planning, giving feedback, and doing administrative tasks.

The uses for AI in operations and logistics are also becoming increasingly clear. Many of these uses build on AI's growing flexibility and the options to train it on specific datasets and information sources. This could unlock opportunities to make schedules that are far more personalized and flexible to student and adult needs and interests. It could also make everything from planning student transportation to allocating resources to communicating with families more effective and efficient. Finally, AI has the power to fuel organizational learning by identifying areas for improvement based on large amounts of data, as well as analyzing possible causes and suggesting solutions.

Related Resources

- [Learning Systems: AI Use Cases](#) | Bellwether
- [AI Guidance for Schools Toolkit](#) | TeachAI

Curriculum, Instruction & Assessment	Adult Roles, Hiring & Learning	Operations & Logistics
<ul style="list-style-type: none"> • Develop instructional plans and materials • Deliver content • Provide targeted student support • Assess progress • Give feedback 	<ul style="list-style-type: none"> • Facilitate hiring processes • Support professional learning • Decrease workload • Give feedback • Supplement adult roles 	<ul style="list-style-type: none"> • Develop schedules • Support transportation • Allocate budget and resources • Analyze data and draw conclusions • Facilitate communications

Transcend’s [Leaps for Equitable 21st-Century Learning](#) describes the key ways we believe the student experience must change, so that schools can prepare all young people to thrive in and transform the world. The use of AI has the potential to transform the student experience in ways aligned to these Leaps, or further engrain industrial-era learning.

This section goes into more detail regarding what an AI-powered future might look and feel like for young people. The opening table provides a high-level overview. The pages that follow share more detail. Within them, you will find specific strategies and tools to help inspire action in your school or system. We also mention ways AI could actually perpetuate inequitable, industrial-era learning so you can safeguard against these.

Inequitable, Industrial-Era Learning	Extraordinary, 21st-Century Learning
Unequal Expectations & Opportunities	High Expectations with Unlimited Opportunities
AI could be accessible only to some students and educators and could be used to track students into lower-expectation pathways, further widening the opportunity gap.	AI could broaden the range of learning opportunities available to all students, promote high expectations, monitor against bias, and provide additional opportunities to learn when not successful the first time.
Narrow Focus	Whole-Child Focus
AI could be used to focus exclusively on accelerating the cognitive dimension of learning at the expense of other areas of student development.	AI could support learners’ cognitive, emotional, social, and physical well-being and enable targeted support that fosters health and holistic development.
Surface-Level Learning	Rigorous Learning
AI could do much of the work of remembering facts but also be used to do the work of deeper analysis, synthesis, and creation, limiting practice with higher-order skills.	AI could take on lower-order tasks like recalling information as well as provide scaffolds so all students could engage in higher-order thinking and challenging grade-level work.
Irrelevance	Relevance
AI could be woven into existing curricular resources without considering how content and tasks should be broadened and updated to better align with students’ day-to-day lives, interests and goals, as well as a larger purpose that matters to them	AI could broaden the scope of content and tasks students engage with and ensure learning supports young people’s interests and goals, builds on their prior knowledge, and enables them to tackle real-world activities.

Assimilation & Marginalization

AI could make decisions and present information based on algorithms that are biased and deficit-based, further rewarding students who conform with a common culture and widening inequalities felt by those who do not.

Maintaining the Status Quo

AI could maintain and deepen the challenges present in society and stifle change by generating information and decisions based on limited and dated information that reflects narrow perspectives on why the world is the way it is.

Isolation

AI could hinder relationships and make learning more solitary by tailoring content, tasks, and support to individual students and engaging them through 1:1 devices instead of through collaboration with peers and adults.

Inflexible Systems

AI could further systematize and uphold a one-size-fits-all approach with rigid structures like age-based grouping, whole-group instruction, and seat-time policies by making them easier and faster to set up and track.

Passive Compliance

AI could disseminate knowledge that learners passively absorb and shape decision-making through a system of punitive consequences and extrinsic rewards that is upheld by increasingly complex systems of monitoring and surveillance.

Siloed Schooling

AI could further restrict many learning activities to a single, physical space with a fixed schedule because it's the only way to ensure equitable access to learning applications, the security of student data, and responsible use.

Affirmation of Self & Others

AI could support content creation, planning, and decision-making that celebrates, nurtures, and incorporates each learner's unique identities in ways that promote understanding and respect.

Social Responsibility & Action

AI could help learners transform their community and larger society by bringing students closer to the problems that need addressing, as well as the resources and ideas needed to solve them.

Connection & Community

AI could take on an increasing array of tasks, freeing up time for deep relationship building and collaboration, while also providing support for communicating across lines of difference like language and culture.

Customization

AI could tailor the focus, pace, and sequence of learning—as well as the support provided—to ensure all learners get exactly what they need to be successful.

Active Self-Direction

AI could broaden the options available to students, enabling them to have more choice in how, when, where, and what they learn in meaningful and developmentally appropriate ways.

Anytime, Anywhere Learning

AI could support learning happening at any place or time, valuing the various people, contexts, and experiences that together play important educational roles in young people's lives.

Artificial Intelligence & **HIGH EXPECTATIONS WITH UNLIMITED OPPORTUNITIES**

The expectations learning environments hold for young people, and the opportunities they provide, can influence motivation, cognitive engagement, and learning. Holding high expectations and having the opportunities needed to achieve them can help learners feel more confident in their ability to succeed and helps ensure that all learners, including our most marginalized, are prepared to thrive.⁸

AI could broaden the range of learning opportunities available to students, promote high expectations, monitor against bias, and provide additional opportunities to learn when not successful the first time.

AI Could...

Expand Access to Opportunities

Imagine if learners were matched with diverse opportunities across their school, surrounding community, and beyond such as workforce learning opportunities, courses at local universities, and online learning.

 [Hubbedin](#)

AI Could...

Support College Planning

Imagine if every student received customized college planning support through AI chatbots and tools. This could include everything from learning about schools, to help with the application and aid processes, to alumni support.

 [Let's Get Ready](#) |  [CollegeVine](#)

AI Could...

Monitor for Equity

Imagine if AI ensured all students had equitable access to opportunities by checking student schedules, placements, expectations, and more.

AI Could...

Make Progress More Visible

Imagine if AI reviewed all student work to monitor progress, tracked this progress against competencies and standards, and shared detailed and cumulative reports on a learner's strengths and growth over time.⁹

 [Magic School](#) |  [Boost Reading](#) |  [Boost Lectura](#) |  [PowerBuddy](#)

Artificial Intelligence & **Inequitable Expectations & Opportunities**

Without careful application, AI could create more inequity in the expectations and opportunities learners experience. Unequal access to AI tools and the infrastructure needed to run them would result in new opportunities for only some communities. In addition, if AI is not built cautiously, it may perpetuate bias and inequality.

Click to learn more about potential [risks](#) and [safeguards](#).

Artificial Intelligence & **WHOLE-CHILD FOCUS**

A whole-child focus builds the knowledge, skills, and mindsets that are critical for successfully navigating one's path after high school, personal relationships, and health. It also recognizes that learning and development are complex processes influenced not only by how we cognitively process information but also by how we are feeling physically and emotionally, by our knowledge of ourselves, and by our interpersonal and intrapersonal skills and mindsets.¹⁰

AI could support learners' cognitive, emotional, social, and physical well-being and provide and enable targeted support that fosters health and holistic development.

AI Could...

Be a Tool to Practice Holistic Skills

Imagine if young people practiced crucial social-emotional skills in low-stakes, simulated environments before trying them in the real world.

 [Moxie](#)

AI Could...

Partner with Counselors

Imagine if AI managed administrative tasks and provided support and resources to students with less acute needs so counselors could spend more time with students who need them most.

 [Woebot](#) |  [Cass](#) |  [Edsights](#)

AI Could...

Nudge toward Healthier Habits

Imagine if AI read learners' physical and verbal cues and sent reminders to move their bodies or have a snack, or guided them through mindfulness and coping activities, helping learners become more aware of and responsive to their needs.¹¹

 [SleepScore](#) |  [WaterMinder](#)

AI Could...

Catch Early Warning Signs

Imagine if AI monitored for patterns, trends, and warning signs in student behavior so that support could be delivered before students acted out in potentially harmful ways.

 [Alongside](#) |  [Securly Aware](#)

Artificial Intelligence & **Narrow Focus**

There is a risk that AI could be used solely to focus on the same narrow learning objectives and activities that characterized industrial-era learning, just more efficiently. This may come at the expense of other important areas of student development. In addition, AI may drive students to spend more time using technology, which could impact their mental health as well as their physical bodies.¹²

Click to learn more about potential [risks](#) and [safeguards](#).

Artificial Intelligence & **RIGOROUS LEARNING**

Rigorous learning involves using a range of thinking skills to make meaning of complex ideas and assessments that determine learners' ability to recall and explain information as well as to apply, analyze, evaluate, and create with it across contexts. This promotes deeper, longer-lasting learning because it helps to more meaningfully encode or embed learning into long-term memory.¹³

AI could take on lower-order tasks like recalling information as well as provide scaffolds, so that all students could engage in higher-order thinking and challenging grade-level work.

AI Could...

Manage Lower-Order Tasks

Imagine if learners leveraged AI for lower-order learning tasks such as recalling and explaining facts, allowing time with peers and adults to focus on more complex, higher-order tasks involving analysis, evaluation, and creation.^{14,15}

 [ChatGPT](#) |  [Gemini](#) |  [Flexi 2.0](#)

AI Could...

Clarify Misconceptions

Imagine if AI monitored student work and/or discussion to identify evidence of misunderstandings, gaps in factual, conceptual or procedural knowledge, and computational errors, as well as provided real time correction to enable higher-order thinking.⁹

 [Enlighten AI](#) |  [Class Companion](#) |  [Sorcerer](#)  [Snorkl](#)

AI Could...

Support "Peer" Teaching

Imagine if learners engaged with AI-powered chatbots programmed to be curious about a topic or course—learners would teach the bot about a particular topic, including answering its clarifying questions when it gets confused.⁹

 [Revyze](#) |  [PeerTeach](#)

AI Could...

Generate Complex Tasks

Imagine if AI could create increasingly challenging tasks for students to engage in as they master new concepts and skills.

 [Cognii](#) |  [NXTLVL](#)

Artificial Intelligence & **Surface-Level Learning**

Without adjustments to teaching practices and policies, AI could go beyond just *supporting* learning to fully *doing* the learning too. AI could limit higher-order thinking, decrease productive struggle, and stifle creativity by making it easier to find answers and plagiarize. Furthermore, because information generated by an AI is not always accurate and reliable, it can hold back learners who may rely on faulty AI-generated information to scaffold their access to more complex knowledge.

Click to learn more about potential [risks](#) and [safeguards](#).

Artificial Intelligence & **RELEVANCE**

When learning is truly relevant, it takes into account students' day-to-day lives, interests, and who they want to become. Relevance supports learning and development by increasing motivation. Students see more value in learning about topics connected to their interests and goals and, as a result, are more engaged and invested. Relevance also makes learning more memorable because young people can connect new ideas to prior knowledge and experiences.¹⁶

AI could broaden the scope of content and tasks students engage with and ensure learning supports young people's interests and goals, builds on their prior knowledge, and enables them to tackle real-world activities.

AI Could...

Design Interest-Aligned Courses

Imagine if entirely new courses were easily designed "on demand" in response to students' goals and interests.

 [Unschooler](#) |  [Mojo](#)

AI Could...

Support Self-Exploration

Imagine if AI supported students in learning more about their interests and who they want to become by helping them identify their strengths and passions, recommending resources and experiences to go deeper, and helping to make it happen.

 [CareerCoach](#) |  [CareerDekho](#) |  [SchoolJoy](#)

AI Could...

Connect Learning to the Real World

Imagine if AI enabled students to apply existing and developing skill sets to their local community and beyond by connecting them with personally meaningful, real-world activities.

 [Project Leo](#) |  [CommonGood \[Ed\]](#)

AI Could...

Integrate Concepts into Simulations

Imagine if AI simulated real-world applications of learning that invited students to apply their knowledge, experiment with outcomes, and see the impact of their learning in a dynamic, interactive environment.

 [Gizmos](#) |  [Labster](#)

Artificial Intelligence & **Irrelevance**

AI that lacks context around young people's day-to-day lives, interests, and goals could continue to separate learners from content and opportunities that motivate and promote deep learning. If AI is woven into existing curricula without giving consideration to each learner's goals, we run the risk of not preparing learners for their personal futures.¹⁷

Click to learn more about potential [risks](#) and [safeguards](#).

Artificial Intelligence & **AFFIRMATION OF SELF & OTHERS**

Seeing one’s community, values, beliefs, traditions, stories, and languages reflected in the learning environment can increase a sense of belonging and support dialogue across lines of difference. This helps all students—especially those with identities that have traditionally been marginalized by school—recognize that intelligence and worthiness come from every corner and background and prepares them to enter an increasingly diverse world.¹⁸

AI could support content creation, planning, and decision-making that celebrates, nurtures, and leverages each learner’s unique identity in meaningful and anti-oppressive ways.

AI Could...

Create Culturally Relevant Materials

Imagine if texts and examples were quickly modified or created to be culturally relevant, inclusive, and affirming to learners from a diversity of backgrounds.

 [LitLab.ai](#) |  [Reconstruction Onyx](#) |  [Planning Period](#)

AI Could...

Decrease Bias

Imagine if instances of unconscious bias could be mitigated throughout the school as AI detected patterns in the classroom, student performance data, teacher evaluations, and discipline data.²⁰

 [Relativity](#)

AI Could...

Reduce Test Anxiety

Imagine if embedded and other varied assessment forms helped reduce stereotype threat and test-taking anxiety, enabling learners to truly demonstrate what they know and can do.¹⁹

 [Rosalyn](#) |  [StudyHall](#) |  [Quizizz](#)

AI Could...

Expand Equity

Imagine if teachers could ask questions and seek advice on demand in service of instructional design and delivery that nurtures and celebrates every learner’s identity.

 [Gladys](#)

Artificial Intelligence & **Assimilation & Marginalization**

When AI is trained on biased datasets and by programmers who lack the diversity of the nation, it can perpetuate inequality. This can lead to biased hiring decisions and resource recommendations, and make it easier to scale practices that don’t serve learners. Also, making decisions and presenting information based on biased and deficit-based algorithms may further reward students who conform and widen the inequity felt by those who do not.

Click to learn more about potential [risks](#) and [safeguards](#).

Artificial Intelligence & **SOCIAL RESPONSIBILITY & ACTION**

Ensuring that learners have opportunities to examine and tackle the complex issues around them can increase motivation, engagement, sense of belonging, and feelings of empowerment, and more. This is because these opportunities are relevant to learners' lives and, as a result, bring value to learning. They also provide learners with real opportunities to impact change and, in doing this, foster agency and a sense of control.²¹

AI could help learners transform their community and larger society by bringing students closer to the problems that need addressing, as well as the resources and ideas needed to solve them.

AI Could...

Raise Awareness

Imagine if AI made learners aware of issues connected to their community and the world and helped them surface important facts and nuances around those issues.

 [The Juice](#)

AI Could...

Fuel Change-Making

Imagine if AI were used to analyze massive amounts of data quickly and provide insights on how to “mobilize supporters, shape public opinion, and drive political change.”²³

 [Model UN Prompt](#)

AI Could...

Promote Service Learning

Imagine if AI matched learners' goals and passions to service learning projects in the community and even facilitated those experiences.²²

 [Helper Helper](#)

AI Could...

Support Discourse

Imagine if AI could help those with opposing viewpoints to find common ground and, together, forge a path forward.

 [Common Good AI](#) |  [Conflict Resolution Role-Play Prompt](#)

Artificial Intelligence & **Maintaining the Status Quo**

AI could maintain and deepen the challenges present in society and stifle change by generating information and decisions based on limited data and dated information that reflect narrow perspectives about why the world is the way it is. Furthermore, if young people aren't taught to be critical consumers of AI and how to wield it for good, young people may become disengaged citizens or disseminate misinformation.¹²

Click to learn more about potential [risks](#) and [safeguards](#).

Artificial Intelligence & CONNECTION & COMMUNITY

Relationships flourish in environments that prioritize connection and community. This can increase cognitive outcomes and academic performance, buffer against stress and trauma, boost engagement, and contribute to positive emotions and mindsets. It also helps young people see value in the experiences they have at school, provides a critical scaffold that makes learning more manageable, creates opportunities for discussion and higher-order meaning making, and allows learners to give and receive feedback.²⁴

AI could take on an increasing array of tasks, freeing up time for deep relationship building and collaboration, while also providing support for communication across lines of difference like language and culture.

AI Could...

Facilitate Cooperative Learning

Imagine if students worked in cooperative groups facilitated by an AI that offered ideas, prompted discussion questions, and even ensured each member was contributing in meaningful ways.^{25,9}

 [Okol](#) |  [Active Peers](#)

AI Could...

Support New Social Connections

Imagine if learners were matched to in-school and extracurricular activities that aligned with their interests—and enabled them to meet with like-minded peers.²⁶

 [AYO](#)

AI Could...

Make Instruction Interactive

Imagine if AI took any topic, material, or lesson plan and offered suggestions as to how it could become a jigsaw, a role play, a debate, a group discussion, or even an immersive experience.^{25,9}

 [NOLEJ](#) |  [Teaching Tools](#) |  [Classcraft](#)

AI Could...

Foster Relationships

Imagine if AI took on routine but time-consuming administrative and reporting tasks so teachers had more time to connect with students on a personal level.

 [AudioPen](#) |  [Brisk](#) |  [Goblin Tools](#) |  [TIVA](#) |  [Almanack](#)

Artificial Intelligence & Isolation

The use of AI could perpetuate isolation in schools and make it more difficult to form meaningful relationships. Learning could become even more solitary by tailoring content, tasks, and support to individual students and engaging them through one-to-one devices instead of through collaboration with peers and adults. The absence of strong relationships may pave the way for decreased well-being, or increased bullying and harassment.

Click to learn more about potential [risks](#) and [safeguards](#).

Artificial Intelligence & **CUSTOMIZATION**

Modifying young people’s learning experiences in response to the ways in which young people vary can increase motivation, engagement, agency, and learning. By increasing customization, more learners can receive personalized academic and social experiences that support their developmental needs; educators can become masterful interventionists and relay just-in-time supports to every child; and classrooms can become safe places that promote continuous progress while also fostering a respect for differences.²⁷

AI could tailor the focus, pace, and sequence of learning—as well as the support provided—to ensure all learners get exactly what they need.

AI Could...

Develop Individual Learning Plans

Imagine if all students could receive individualized learning plans each day, which included content and tasks connected to their development and needs and based on their successes and challenges the previous day.

 [Fishtree](#)

AI Could...

Offer Real-Time Insights

Imagine if AI offered actionable insights about students’ learning experience (e.g. Taryn is engaging at a high-level; consider asking her to be a peer teacher) to enable more personalization.

 [SchoolAI](#)

AI Could...

Provide Scaffolds and Modification

Imagine if customized scaffolds and modifications were immediately available based on students’ levels of mastery, learning needs, and home language, to ensure everyone could engage in rigorous, grade-level content.

 [Diffit](#) |  [LessonLab](#) |  [Twee](#) |  [Coteach.ai](#)

AI Could...

Deliver Academic Support

Imagine if access to intelligent tutoring were made available to all learners so they had additional support beyond their teachers, parents, and peers.

 [Khanmigo](#) |  [Studdy.ai](#) |  [Thinkster](#)

Artificial Intelligence & **Inflexible Systems**

Using AI to more efficiently operate the current education system—including its inflexible approaches to teaching and learning—could further systematize and uphold rigid structures like age-based grouping, the overuse of whole-group instruction, and seat time policies by making them easier to set up and track.

Click to learn more about potential [risks](#) and [safeguards](#).

Artificial Intelligence & **ACTIVE SELF-DIRECTION**

When young people participate in decisions about how, when, where, and what they learn in meaningful and developmentally appropriate ways, it increases their motivation, ownership, and thoughtfulness about their learning. They have a sense of control and are able to shape learning to be relevant to their interests, needs, and goals. In addition, active learning helps to more meaningfully encode knowledge, skills, and mindsets into long-term memory, which makes learning last longer.²⁸

AI could broaden the options available to students, enabling them to choose what and how they learn while providing a greater range of support, so students can take on tasks with greater independence and build agency.

AI Could...

Drive Learner-Led Skill Building

Imagine if AI empowered students to own their learning journey by allowing them to choose content and personalize pathways to the skills they are passionate about.

 [CodeSignal Learn](#)

AI Could...

Elevate Student Voice

Imagine if AI analyzed insights shared by students (e.g. chatbots, interviews, focus groups, etc.) to ensure the learning environment is aligned to their hopes and dreams—and, if not, to spur change.

 [Speak](#) |  [LessonLoop](#)

AI Could...

Deliver On-Demand Feedback

Imagine if students requested real-time, process-oriented feedback on their writing and problem-solving, enabling them to improve immediately and without waiting for a teacher.

 [Class Companion](#) |  [Grammarly](#)

AI Could...

Foster Creativity

AI could support learners in wondering, pursuing their curiosities, brainstorming, having Socratic discussions, and bringing ideas to life through a variety of creative mediums.

 [HelloWonder](#) |  [SocratiQ](#) |  [Visla](#) |  [Mojo](#)

Artificial Intelligence & **Passive Compliance**

AI could prevent learners from becoming active drivers of their learning, making it difficult to grow agency and build on their interests and goals. It could disseminate knowledge that learners passively absorb and shape decision-making through a system of punitive consequences and extrinsic rewards that is upheld by increasingly complex systems of monitoring and surveillance. Overreliance and excessive monitoring could hinder students from exploring their curiosities and wonderings.

Click to learn more about potential [risks](#) and [safeguards](#).

Artificial Intelligence & **ANYTIME, ANYWHERE LEARNING**

Anytime, anywhere learning can help meet the unique needs of learners. It means that learners who need or want to dedicate additional time to a task are able to do so. It also means learners can choose to work at times or in places where they can be most engaged, learn in real-world contexts through hands-on activities, receive additional support, or attend to personal responsibilities. In many ways, anytime, anywhere learning—and the freedom and responsibility it provides—helps prepare young people for life beyond graduation as it can build their self-directed executive functioning skills, self-concept, self-efficacy, resilience, and social and collaborative skills, and more.²⁹

AI could support learning happening anywhere and at any time, with various people and places playing important roles in the experiences of young people.

AI Could...

Power Virtual Learning

Imagine if AI powered virtual, immersive learning experiences—like getting an Occupational Health and Safety Administration certification—regardless of location.²⁶

 [Interplay Learning](#)

AI Could...

Bridge In- and Out-of-School Learning

Imagine if learners shared evidence of learning outside of the school—like learning a traditional family recipe or building a bicycle with their neighbor—with AI for analysis and alignment with learning standards, so they could receive school credit for those experiences.

AI Could...

Extend Learning

Imagine if AI extended learning beyond school walls by offering next steps at home and in the real world, as well as keeping families in the loop so they can further support learning.

 [Talking Points](#) | [Paloma](#)

AI Could...

Make Learning Available 24/7

Imagine if AI engaged students in content outside of class, so they could learn when it works best for them and spend in-person time applying knowledge and receiving 1:1 support.

 [Mindjoy](#) |  [EdPuzzle](#) |  [Kinnu](#) |  [Pressto](#)

Artificial Intelligence & **Siloed Schooling**

AI has the potential to further restrict many learning activities to a fixed school space and specific schedule if it's the only way to ensure equitable access to learning applications, the security of student data, and responsible use.

Click to learn more about potential [risks](#) and [safeguards](#).

Application Activity 3:

Gain Inspiration

This activity can help you learn about different uses of AI and gain inspiration as to how you might use it in your classroom. *Suggested time: 1 hour*

Participants

A group of 3–5 other teachers

Materials

- *Let's Imagine...* story on pages 6–8*
- Inspiring ideas aligned to each Leap on pages 16–27*
- Risks table on pages 40–41
- Safeguards table on pages 42–44
- Highlighter (if activity is not done on computer)

*We suggest having one copy of the selected pages for each participant, whether that is printed copies or laptops with the virtual resource opened.

Steps

1. Read through the story together, taking turns reading different sections.
2. Individually, highlight parts of the story that excite you, meet a need of learners in your community, and/or make you interested in learning more.
 - *For example, you might highlight the sentence, “The same tool then helped them align standards to their project idea, and even recommended some action steps”—or even the whole section on Project-Based Learning.*
3. Discuss with your colleagues and find ~5 places of overlap or highest interest.
4. Divide the Leaps on pages 16–27 up amongst your group. Each teacher will read through the table and identify uses of AI that align with the areas of interest you highlighted in the story.
5. Select 1–2 uses that hold the most potential for learners in your community.
6. If there is a tool associated with the use of AI, spend some time learning more about that tool by clicking the links or doing a search of your own.
7. With your group, read through the risks and safeguards tables.
8. Together, discuss which risks are relevant to the 1–2 uses of AI selected. Then, consider how you might safeguard against those risks. For example, how might you ensure there is a “human in the loop” when engaging with recommendations made by AI?
9. Finally, consider ways to pilot the tool in your classroom(s). When could you do the pilot? With whom?

See our Action Guides for more details on how to start transforming your learning environment with AI.

[System Leader Guide](#) 

[School Leader Guide](#) 

[Teacher Guide](#) 



More to Explore

SNAPSHOTS OF AI-RESPONSIVE OUTCOME FRAMEWORKS

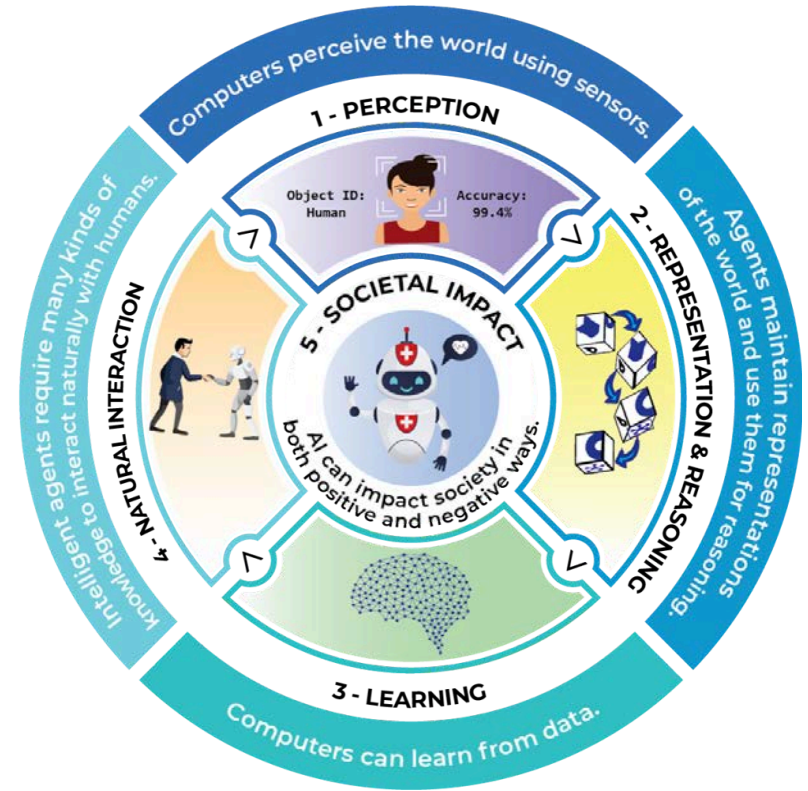
5 Big Ideas in AI | AI4K12.org

“The initiative is developing (1) national guidelines for AI education for K-12, (2) an online, curated resource Directory to facilitate AI instruction, and (3) a community of practitioners, researchers, and resource and tool developers focused on the AI for K-12 audience. Check out the following information to learn about this initiative.

“The AI for K-12 guidelines are organized around the 5 Big Ideas in AI. The guidelines will serve as a framework to assist standards writers and curricula developers on AI concepts, essential knowledge, and skills by grade band.

The 5 Big Ideas in AI—What every student should know about AI:

1. Perception: Computers perceive the world using sensors.
2. Representation and Reasoning: Computers maintain representations of the world and use them for reasoning.
3. Learning: Computers can learn from data.
4. Natural Interactions: Intelligent agents require many types of knowledge to interact naturally with humans.
5. Social Impact: AI can impact society in both positive and negative ways.”



AI4K12.org has made progression charts for grades K–8 AI standards available for free. Explore those on the website.

National Standards for Technology Integration in the Classroom | ISTE, accessed 2023

“The ISTE Standards are a framework that guides educators, leaders, and coaches in using technology to create high-impact, sustainable, scalable, and equitable learning experiences. They have been adopted by all U.S. states and many countries worldwide.

“These standards provide the competencies for learning, teaching, and leading with technology, and are a comprehensive road map for the effective use of technology in schools worldwide.



“At a high-level, these competencies include:

- **Empowered Learner:** Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals.
- **Digital Citizen:** Students recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they act and model in ways that are safe, legal, and ethical.
- **Knowledge Constructor:** Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts, and make meaningful learning experiences for themselves and others.
- **Innovative Designer:** Students use a variety of technologies within a design process to identify and solve problems by creating new, useful, or imaginative solutions.
- **Computational Thinker:** Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.
- **Creative Communicator:** Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals.
- **Global Collaborator:** Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.”

K-8 STEM Career Competencies | Education Development Center, 2021

“This K-8 STEM Career Competencies framework identifies 10 foundational career competency areas correlated to characteristics of future work at the ‘human technology frontier,’ incorporating what thought leaders in the field believe that successful workers in these environments need to know and be able to do:

- AI Literacy
- Computational Thinking
- Digital and Media Literacy
- Cybersecurity and Digital Citizenship
- Data Literacy

- Dynamic Interdisciplinary Teaming
- Design Thinking
- Systems Thinking
- STEM Career Development
- Lifelong and Flexible Learning

“Note: Many of the suggested competencies may already be included in the curriculum or pedagogy in K-8 classrooms. In those cases, this framework may simply reinforce what teachers are already doing to prepare their students for success in future work.”

Grade-Appropriate AI Skills		
K-2	3-5	6-8
<p>Students:</p> <ul style="list-style-type: none"> • Are regularly exposed to AI (i.e., they hear about it in children’s TV shows, movies, and books) • Have opportunities to interact with AI systems 	<p>Students:</p> <ul style="list-style-type: none"> • Explore interactions with AI in daily life • Differentiate between what AI is and is not • Investigate how to use AI systems to make predictions • Explore how to use AI systems to generate new artifacts 	<p>Students:</p> <ul style="list-style-type: none"> • Explain that AI systems are programs written by humans that perform tasks that normally require intelligence • Explain that machine learning is an AI technique that allows computers to acquire new behaviors without being explicitly programmed • Identify characteristics of AI that are different from human intelligence • Describe the kinds of predictions that AI systems make • Illustrate the kinds of creations that AI systems make

AI Competency Frameworks for Students | UNESCO, 2024 [DRAFT]

UNESCO is currently developing AI competency frameworks for teachers and school students. The two frameworks will be released in September 2024. The current iteration is a pre-release draft of the framework for students. It was created using five guiding principles:

1. Fostering critical thinking on the proportionality of AI for the real-world challenges
2. Prioritizing competencies to make human-centered collaboration with AI
3. Steering the design and use of more climate-friendly AI
4. Facilitating a transferable AI foundation for lifelong learning
5. Promoting inclusivity in AI competency development

Below is the framework, which develops along a continuum:

Competency Aspects	Progression Levels		
	Understand	Apply	Create
Human-centered mindset	Human agency	Human accountability	AI society citizenship
Ethics of AI	Embodied ethics	Safe and responsible use	Ethics by design
AI techniques and applications	AI foundations	Application skills	Creating AI tools
AI system design	Problem scoping	Architecture design	Iteration and feedback loops

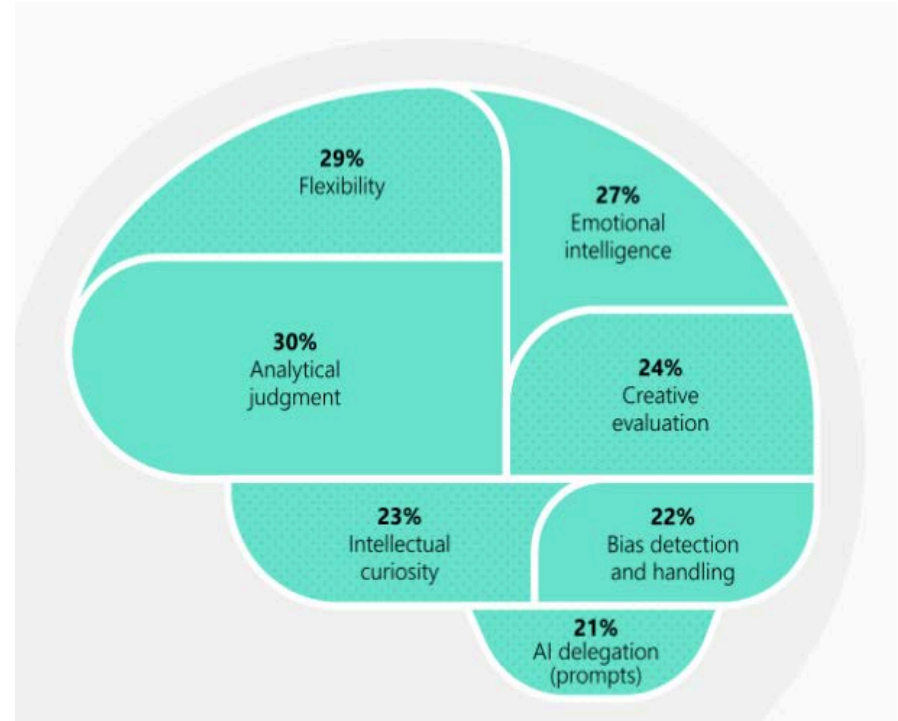
Work Trend Index | Microsoft WorkLab, 2023

Finding: Every employee needs AI aptitude.

“The paradigm shift to AI as copilot requires a whole new way of working—and a new AI aptitude. Working alongside AI—using natural language—will be as inherent to how we work as the internet and the PC. As AI reshapes work, human-AI collaboration will be the next transformational work pattern—and the ability to work iteratively with AI will be a key skill for every employee.”

Essential AI-compatible skills and competencies include:

- Analytical judgment (30%)
- Flexibility (29%)
- Emotional intelligence (27%)
- Creative evaluation (24%)
- Intellectual curiosity (23%)
- Bias detection and handling (22%)
- AI delegation (prompts) (21%)



Artificial Intelligence Competencies | Chief Human Resources Officers Council, 2023

The U.S. Office of Personnel Management (OPM) in collaboration with the Office of Science and Technology Policy (OSTP) identified key skills and competencies needed for positions related to Artificial Intelligence (AI). In support of this effort, OPM conducted an environmental scan of AI work, issued a government-wide AI workforce survey, held focus groups with technical and human resources subject matter experts to identify federal AI key skills and competencies governmentwide, and analyzed all results. OPM's study was also informed by data collected from academia, the private sector, federal agencies, and other credible sources. The following tables present the 43 general competencies and 14 technical competencies that have been identified through an environmental scan for Artificial Intelligence work.

General Competencies:

- Accountability
- Attention to detail
- Computer skills
- Conflict management
- Contracting/procurement
- Creativity and innovation
- Customer service
- Decisiveness
- Design
- Digital collaboration
- Emotional intelligence
- External awareness
- Flexibility
- Influencing/negotiation
- Information management
- Honesty/integrity
- Interpersonal skills
- Learning
- Mathematical reasoning
- Memory
- Mental visualization
- Oral communication
- Organizational awareness
- Partnering
- Perceptual speed
- Planning and evaluating
- Political savvy
- Problem solving
- Project management
- Reading
- Reading comprehension
- Reasoning
- Resilience
- Self-management
- Strategic thinking
- Stress tolerance
- Supporting diversity
- Teaching others
- Teamwork
- Technical competence
- Technology application
- Technology awareness
- Written communication

Technical Competencies:

- Application development
- Artificial Intelligence/machine learning
- Communicating results
- Data analysis
- Data extraction and transformation
- Data visualization
- Mathematics and statistics
- Modeling and simulation
- Monitoring
- Sociotechnical systems
- Software engineering
- Systems design
- Testing and validation
- Values-driven design

AI RISKS

Many risks of using AI technologies, in education and beyond, are yet to be revealed. However, many are also already well known and are a major part of any conversation involving AI. Considering risks feels especially prudent for schools and school systems as they have the potential to impact the safety, well-being, and even life trajectories of our young people.

Though not specific to learning environments, the potential harm that could be wrought from the loss of privacy and security is top of mind for leaders. Many AI technologies have been built for commercial use and not for education, meaning they are not likely to comply with state and federal privacy legislation or data privacy laws¹⁴, potentially exposing student data. There is the additional threat to learners and teachers that they may become subject to greater surveillance, and punishment, with increased data flow. An overreliance on AI may pose a threat to well-being. It has the potential to minimize the social aspects of learning as well as be demotivating to certain groups of young people. Another much talked about risk is AI's potential to perpetuate bias. If left unchecked, it can negatively influence hiring decisions, the expectations teachers hold for learners, and the type of work learners are assigned. Lastly, AI has been known to disseminate misinformation. Unreliable and even false information impedes the learning process by harming school culture and preventing students from accessing reliable information.

General Risks

Loss of Privacy

Generative AI is exacerbating the security issues that have long plagued the technology industry. Access to personal data makes individuals more easily identifiable, putting them at risk of a variety of malicious acts. We must remember that the goal of AI technology is to extract data—to learn about and shape our attention, behaviors, and interests—often for the profit of the company. This makes us vulnerable to constant monitoring and “data colonialism” and may have negative consequences on relationships, equity, well-being, and even democracy.³⁰

These Risks in the Education Context

Many AI technologies have been built for commercial use and not for education, meaning many tools—like ChatGPT—are not likely to comply with state and federal privacy legislation or state student data privacy laws.¹⁴ Even technologies created for educational use have issues, in that they are meant to extract data from young people so the technologies can make more intelligent decisions and suggestions. What happens to that data is still a big question mark and sets students up for future issues with safety and discrimination.¹⁴ There are also issues with how data is used in the school building. With increased access to data, students and teachers may become subject to greater surveillance, which could be used against them, within and outside the school community.

Overreliance

The use of AI provides numerous advantages, but it is damaging to rely on it for things that are better performed by a human—at least for now. AI is still limited in what it can do, so depending on it is risky. Furthermore, there are potential cognitive impacts such as weakening memory and attention spans. It may also impact us socially and emotionally by threatening human connection and relationships. There is already evidence that overuse of any technology can increase addiction and loneliness as well as depression and anxiety.¹²

Bias

AI researchers, practitioners, and designers are predominantly white and male.^{30,33} Furthermore, AI technologies “learn” by applying algorithms to large datasets, which contain information culled from the vast archives of the internet, including biased articles and non-representative media. This can serve to engrain bias directly into AI tools and the information they generate, further perpetuating societal inequities.^{14,31}

Misinformation

There are two layered issues with AI and misinformation. The first is that AI’s frontier of competence, or what it can do well, is still evolving. At the moment, it confidently offers information that appears authentic but is sometimes inaccurate or unsubstantiated.³¹ Second, AI isn’t transparent. We can’t see how the technology arrived at a particular conclusion, making it difficult to put faith in its claims. If we take content put forth by AI at face value, we run the risk of false media, amplified outrage, bad actors, and reduced empathy, “destroying our information ecosystem” and “eroding shared consensus” within our democracy.¹²

Current AI technology is deficit-based, focuses mainly on the cognitive aspects of learning, and is designed for neurotypical learners as well as the completion of fixed tasks. Using this technology for open-ended creative tasks or with neurodiverse learners, for example, could be harmful. An overreliance on AI can also decrease agency and motivation, both for teachers and students, as AI takes over tasks that once gave meaning and purpose to humans.

Biased algorithms and data can result in “systematic unfairness in the learning opportunities or resources recommended to some populations of students.”³¹ Examples include “a voice recognition system that doesn’t work as well with regional dialects or an exam monitoring system that may unfairly identify some groups of students for disciplinary action.”³¹ Furthermore, algorithms may be biased in which type of work (e.g., content, complexity, pace) is being assigned to learners, and how often, creating predictive ceilings and lowering expectations for certain students. Bias in AI systems doesn’t only impact students; it can influence who gets hired, how families are communicated with, or which community partners are selected.

Misinformation impedes the learning process. AI makes it easier for this to happen at scale and can impact young people’s future trajectories. It may also do this in a discriminatory way. Some learners will rely on AI as a scaffold—for example, they may use it to help them remember facts—so they can engage in complex grade-level work. False information will prevent them from being able to do this successfully and may exacerbate learning gaps. The spread of misinformation may also be detrimental to school culture. False information like deepfakes and artificially altered content can lead to bullying and harassment.

AI SAFEGUARDS

The risks of using AI can be mitigated if learning environments critically consider them and employ safeguards when implementing AI initiatives and using AI-powered products and tools. Many organizations offer [frameworks](#) to help with this. In general, it is essential to listen to your community to understand their hopes and fears for AI use and to build their capacity to support initiatives and responsibly engage with AI. It is also important to protect student data through anonymization and careful vetting AI tools and products, in addition to creating use guidance and policies. Lastly, learning environments should explore the real value that can be delivered by AI, like those mentioned in this resource, rather than simply using AI to make existing processes more efficient. Carefully employing safeguards and slowly implementing AI (e.g., piloting ideas before a larger roll-out) can support districts in capitalizing on AI’s potential while preventing potential harms.

Keep “Humans in the Loop”	Have “humans in the loop”, so they can oversee the recommendations made by AI and ensure they are evidence-based and equitable. ³¹	For example: <ul style="list-style-type: none">• Teachers should read AI-generated feedback to check the accuracy, quality, and tone. This will require reading at least some of the work submitted in full.• Run AI analyses multiple times and consider using different AI tools and prompts to ensure the same results are achieved.
Anonymize Data	Anonymize student-, staff-, and family-level data used by AI, and use Application Programming Interfaces (APIs) with strong privacy protections.	For example: <ul style="list-style-type: none">• School staff must anonymize personal identifying information (e.g., label students 1–30 in alphabetical order instead of using names) before inputting it into an AI tool.
Create AI Use Policies	Create policies, processes, and procedures on the responsible use of AI, including how students and teachers should use it as well as how data obtained from AI will be used.	For example: <ul style="list-style-type: none">• Teacher performance data analyzed by AI should be used to foster growth (rather than punish) so teachers don’t feel threatened by additional oversight.• AI use policies should stipulate teachers use of AI for support tasks like lesson planning and assessment creation but must not rely on it entirely.³⁴
Vet AI Products and Tools	Vet all AI-powered products and tools to ensure they comply with state, federal, and local regulations and align with your vision for AI.	For example: <ul style="list-style-type: none">• A cross-functional team, assembled to address AI-related topics, should use a framework like the Emerging Technology Adoption Framework: For PK-12 Education or the AI Ratings Tool to ensure products are in compliance.

<p>Promote a Balanced Approach</p>	<p>Balance time spent on technology with time connecting with one another, nature, and culture.</p>	<p>For example:</p> <ul style="list-style-type: none"> • Staff should be required to include time on and off technology in their lesson plans each day—or at least to give learners the option. • Each day begins and ends with a short, guided mindfulness meditation.
<p>Support Teachers</p>	<p>Build teachers’ AI literacy so they can optimize use and determine when AI recommendations are fair and evidence-based, while ensuring not to overburden them with new tasks.</p>	<p>For example:</p> <ul style="list-style-type: none"> • Staff can be offered a variety of PD engagements (e.g., personalized playlists, in-school offerings, and virtual trainings), so they build AI literacy in ways that work with their lives and learning styles.
<p>Equip Learners with Requisite Skills</p>	<p>Equip learners with the skills to have a healthy and balanced relationship with AI and to be critical creators and consumers, and ensure learners still build critical “unAI-able” skills, like conflict resolution, contextual awareness, empathy, and more.</p>	<p>For example:</p> <ul style="list-style-type: none"> • In Advisory and throughout the school day, learners experience free play where they develop important skills like sharing and conflict resolution both independently and through in-the-moment coaching from a teacher. • Across content areas, learners receive explicit guidance around how AI works and how to engage with it productively, and have ample opportunity to practice those skills across contexts.
<p>Listen to the Community</p>	<p>Create processes and structures that enable community members to voice their hopes, fears, and questions regarding AI—and give them the option to opt out of the use of AI but to still have their voices heard.</p>	<p>For example:</p> <ul style="list-style-type: none"> • Monthly focus groups centered around AI-related topics give various stakeholders an opportunity to share their thoughts and wonderings about how AI is being or will be used in the learning environment. • Families are given the option to engage with a two-way chatbot to answer routine correspondence or to use a direct line to speak to a human.
<p>Push Beyond Efficiency</p>	<p>Ensure that AI is not just used to power business as usual more efficiently—or worse, to scale practices that don’t serve teachers and learners—but rather to transform the learning experience in meaningful ways.</p>	<p>For example:</p> <ul style="list-style-type: none"> • After staff members experience success piloting a lesson planning tool, they use the freed-up time to plan 1:1 conversations with learners about their progress and their well-being. • An AI tool that aligns student work to competencies and standards is used outside of the school, so that learners get credit for learning that happens in their homes, communities, and beyond.

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