

AUGUST 2024

# COLORADO ROADMAP FOR AI IN K-12 EDUCATION:

GUIDANCE FOR INTEGRATING AI INTO TEACHING AND LEARNING

As our knowledge and understanding of AI continue to evolve, this roadmap and its guidance will be updated to reflect the latest advancements and insights. Always refer to Colorado Education Initiative's website for the most recent version!  
[coloradoedinitiative.org/ai-in-colorado-education](https://coloradoedinitiative.org/ai-in-colorado-education)



“AI is one of the next great frontiers. To maintain Colorado’s leadership in bringing new ideas and technologies to the world, it’s essential to establish a state-level strategy that integrates AI education into the curriculum for all students. The Gill Foundation has always viewed Colorado as a learning lab—a national hub of creativity and innovation. We are proud to support the development of Colorado’s AI Roadmap, ensuring the next generation of students has access to the knowledge that will not only define the jobs of tomorrow but also provide solutions to some of our greatest social challenges. Together, we can inspire and equip young minds to reach new heights and change the world.”

—Brad Clark, President & CEO, The Gill Foundation

“In the evolving landscape of AI in education, well-crafted state guidance is a first step in a long marathon that leads to the education transformation we seek for all students. Colorado has made that commitment and more with this roadmap.”

—Pat Yongpradit, Chief Academic Officer, Code.org, Lead of TeachAI



# DEAR COLORADO EDUCATORS, STAKEHOLDERS, AND COMMUNITY MEMBERS

We are pleased to introduce the Colorado Roadmap for AI in K-12 Education. Colorado has long been recognized as a beacon for innovation, not only in technology but also in education. Our state has never shied away from a chance to pilot new models of education, and we have a track record of stepping up to find improved ways to equip students with skills they will need for a complex future.

Our opportunity to meet the moment related to artificial intelligence (AI) comes at a time when Colorado’s focus on the future has led to recent investments in economic development through Colorado’s designation as a [Tech Hub with a focus on quantum technology](#). Collectively, we can ensure Colorado’s young people have what they will need to live, work, and lead in a future full of opportunity.

It is against this backdrop of innovation and progress that we release the Colorado Roadmap for AI in K-12 Education. This roadmap is the result of a distinctly Colorado process: over the past seven months, more than 100 educators, policymakers, industry leaders, community members, and students have come together to shape what we believe is one of the most collaboratively produced AI education roadmaps in the country.

This roadmap is a dynamic resource designed to support our local school districts as they develop their own approaches to integrating AI into teaching and learning. Recognizing the rapid pace of technological change, the roadmap emphasizes the importance of flexibility and adaptability. It calls on state-level organizations, including the Colorado Department of Education (CDE) and Colorado Education Initiative (CEI), to create the conditions necessary for school districts to rapidly learn from each other and from early adopters.

We acknowledge the challenges associated with the rapid spread of AI-enabled tools, including concerns


about data privacy, bias, and the role of human interaction in education. Similar concerns were raised when the internet first made its way into our schools, and while this is a different technology, we can ground some of our responses in lessons from that moment and from other technological leaps.

At this critical juncture, our schools must adapt and meet this moment with cautious optimism. The source of our optimism lies in the transformative potential of AI to enhance teaching and learning, empower educators, and ultimately improve educational outcomes for all students. CDE and CEI stand ready to support you with guidance, tools, and resources. This roadmap also acknowledges how a globally available technology can be piloted and embraced in our state’s unique context. Colorado’s essential skills include our commitment to fostering entrepreneurial competencies in every student, embracing Colorado’s commitment to ensure that our students are equipped with the skills necessary to not just work but lead and thrive in an ever-evolving world.


We deeply appreciate those who contributed to the development of this roadmap; the Gill Foundation who made the work possible through their financial support; and the leaders and educators who commit to moving this work forward.

We invite you to explore the Colorado Roadmap for AI in K-12 Education and join us in this exciting journey.

Warm Regards,



**Susana Córdova**  
Commissioner of  
Education  
Colorado Department  
of Education



**Rebecca Holmes**  
President and CEO  
Colorado Education  
Initiative

# CONTENTS

- Overview and Purpose ..... 5
- Working Group Recommendations ..... 6
  - Reshaping Teaching and Learning ..... 7
  - Advancing Equitable Access for All Learners ..... 14
  - Developing Policy for Transparent and Ethical Use ..... 17
- Next Steps ..... 20
- Resources ..... 22
- Acknowledgements ..... 24

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# OVERVIEW AND PURPOSE

Opportunities and risks. Promise and peril. Hope and skepticism. Not only is AI ushering in immense technological transformation, it brings with it the necessity of holding multiple truths simultaneously. AI offers unprecedented opportunities to reshape educational experiences and outcomes. It also brings significant risks that need to be carefully managed, with an eye to a national and global learning agenda and a grounding in context specific to Colorado. We have seen past technological innovations fall short of their promise to drive substantive improvement on some of education's most intractable challenges. With a thoughtful approach and shared effort across multiple organizations, this moment can be different.

Artificial intelligence, or AI, is technology that enables computers and machines to simulate (some) human intelligence and problem-solving capabilities (IBM). Further detail on AI Definitions can be found in [Stanford University's Human-Centered Artificial Intelligence Definitions](#).

While AI is impacting many fields, this roadmap is specifically designed for K-12 public education. It is the result of months of collaboration and work put forth by over 100 stakeholders from across Colorado. The AI in Education Steering Committee for Colorado launched in December 2023 to focus on AI advancements and opportunities and explore the future of education in Colorado. Recommendations from five different working groups and a student advisory panel informed the steering committee's overall guidance. Thought partners from national organizations provided insight and advice, yet the final set of recommendations are contextualized by Colorado's specific education landscape.

This roadmap provides practical insights for integrating AI into education, focusing on how it can enhance teaching, impact learning, and promote equity and inclusion, and how policy and tools can support these shifts. This is not a technical document, nor will it answer all of the questions on the minds of educators, families, and communities. While we cannot predict what the landscape of education infused

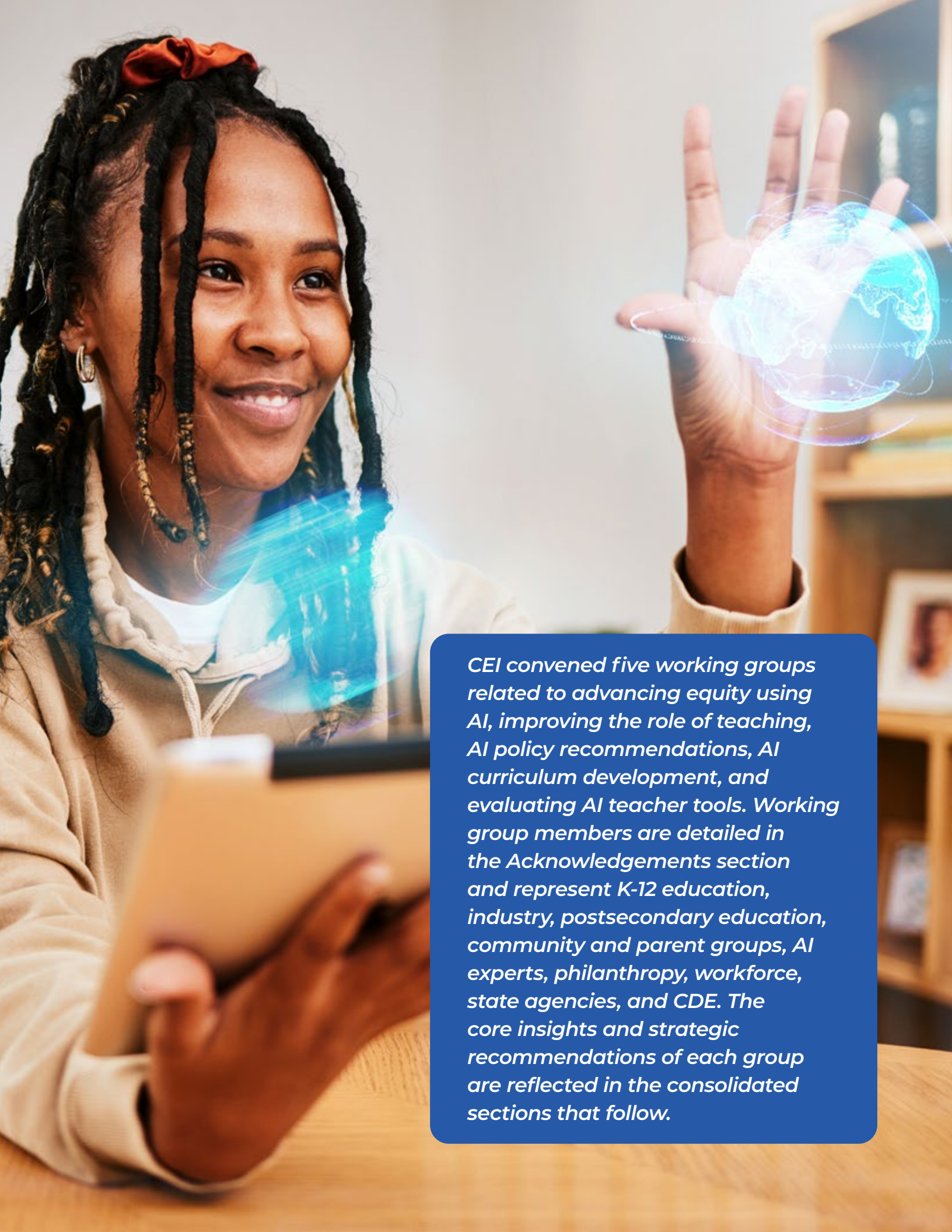
with AI will look like in a few years, we can use what we know to guide us. We know the usage of AI among students and educators has increased substantially in the past year.<sup>1</sup> We know that managing complex innovation requires clear vision, strong leadership, effective communication, stakeholder engagement, and continuous improvement. And we know that essential and deeply human skills such as collaboration, critical thinking, and creativity are only rising in importance. These key themes inform each working group and are embedded throughout their recommendations.

*"Technology has completely changed the way we live - and the way we think, behave, and relate to each other... Technology and its aftereffects - on culture, behavior, and attitudes - have broken the cycles of generations to form something novel."*  
—Jean M. Twenge, PhD, *Generations*

This technology has more potential than past innovations to reshape teaching and learning. By integrating AI thoughtfully and responsibly into the classroom, educators can enhance learning experiences, support diverse student needs, and prepare students for the future. The guidance in this roadmap aims to empower educators and policy makers with knowledge and tools to leverage AI effectively, fostering a more engaging, inclusive, and innovative educational environment. Most importantly, this is an invitation to reshape educational systems, giving Colorado's young people a competitive edge and engaging them in relevant learning experiences regardless of their zip code.

The roadmap is limited in that it can only provide guidance based on what we know now, more eloquently summed up by one of our working group members, John Sepich, *"I always call these kaleidoscope moments. A slight twist of what we know and a whole new world appears."* The value and benefit will be in the journey that we embark on together as stakeholders who care about learning in Colorado classrooms. Guidance will evolve as better understanding of opportunities and risks emerges in the near future.

1 Impact Research, [AI Chatbots in Schools](#)



*CEI convened five working groups related to advancing equity using AI, improving the role of teaching, AI policy recommendations, AI curriculum development, and evaluating AI teacher tools. Working group members are detailed in the Acknowledgements section and represent K-12 education, industry, postsecondary education, community and parent groups, AI experts, philanthropy, workforce, state agencies, and CDE. The core insights and strategic recommendations of each group are reflected in the consolidated sections that follow.*

## WORKING GROUP RECOMMENDATIONS

# RESHAPING TEACHING AND LEARNING

*AI must serve to make the experience of teaching and learning more human, not less; to support students to build deeper critical thinking skills, not just stop at the easily accessible answer; and to allow us to leapfrog over long standing equity gaps related to the digital divide, empowering students in every community to be leaders in an AI-enhanced world.*



AI offers tremendous potential to enhance teaching and learning to make the educational experience more human, relevant, and meaningful. By focusing on *why* we choose to integrate AI before moving to how we do so, Colorado education leaders can ensure that it enriches the teaching and learning process to meet current and emerging goals to develop future-ready students.

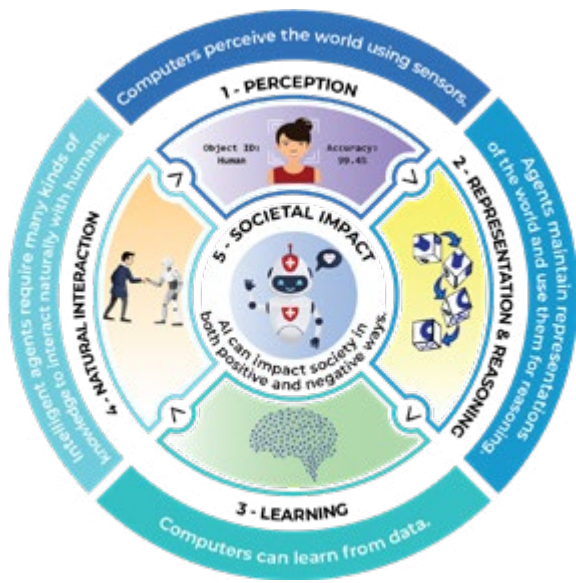
AI presents opportunities to elevate academic rigor, enhance learning environments, and provide individualized student support. Students and teachers can interact with AI to access personalized and localized approaches that make learning more engaging and align with research-based best practices for fostering deeper understanding and retention of material. AI can facilitate deeper learning by encouraging students to explore complex concepts and ask thoughtful questions, and can also tailor lesson content for a local context or individualized students' needs.

As educators, we aspire to prepare students for their future, which will be different from our past. The four Cs of digital literacy are core to a student navigating an AI-infused future: critical thinking, creativity, communication, and collaboration. It's crucial for students to grasp important concepts like AI "hallucinations," data privacy, and the potential for bias in AI. The challenge is multidimensional: educators need tools to evaluate AI-driven teaching resources and resources to simultaneously build understanding of AI in students for AI literacy. Students need to know how to use AI technology effectively and understand the ethical and safety considerations associated with it.

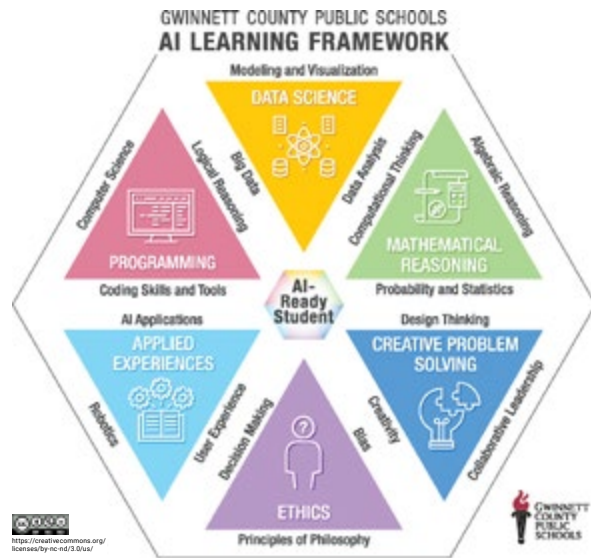
*“Even in entry level jobs we’re seeing that companies are expecting people to be able to understand and implement AI ... It’s becoming so critical that schools are teaching it for the future success of students.”*  
*—Colorado student*

TeachAI has developed six [Principles for AI in Education](#) to support schools in developing AI guidance, including promoting AI literacy. **AI literacy** refers to the knowledge, skills, and attitudes associated with how AI works, including its principles, concepts, and applications, as well as how to use AI, such as its limitations, implications, and ethical considerations. Examples in practice include:

- The [AI4K12 Five Big Ideas in AI](#) describe what every K-12 student should know about AI and what they should be able to do with it.
- Gwinnett County Public Schools’ [AI Learning Framework](#) clearly defines the skills required to become AI Ready and embeds AI-Ready learning across content areas.



Source: [The Artificial Intelligence \(AI\) for K-12 Initiative \(AI4K12\)](#)



Source: [Gwinnett County Public Schools](#)





As AI continues to evolve, it will be important to update local graduation requirements to include AI literacy, data literacy, and ethical AI use, promoting responsible AI use as part of digital citizenship education, building on the recent updates to [Colorado's Computer Science Standards](#). By providing basic AI literacy education and connecting it to data literacy and related fields, we can prepare students to navigate and succeed in an AI-driven world.

### Enhancing the Teaching Profession

AI creates new possibilities to enhance the teaching profession by supporting increased time on activities that lead to improved student outcomes and improved teacher efficacy and satisfaction, and decreased time on activities that could be automated using technology<sup>2</sup>. In Colorado, like many states across the country, we are experiencing a shortage of teachers. Fewer people are pursuing the teaching profession and retention rates have dropped. The promising ways that AI will reshape teaching and learning can ground us in a hopeful future for the profession. Keeping in mind that educators are the experts, and expertise is essential for effective AI usage, AI technology may provide one way to rethink the role of teachers. AI technology can provide teachers opportunities to focus more on engaging with students, refining pedagogical strategies, and collaborating with colleagues.

While some speculate that educators will be replaced by AI technology, it is important to remember that teaching is fundamentally human and that the learning that comes through human interaction is of utmost importance. Students recognize this value.

For new teachers or those considering entering the profession, the use of generative technology might be a draw, positioning the profession as forward-thinking and dynamic. AI's assistance in lesson planning and curriculum development can make the transition into teaching smoother for novices. This support can help mitigate overwhelming aspects of the early years in teaching.

Educators can leverage AI to support diverse learning needs, implementing tools that align with the [Universal Design for Learning \(UDL\) framework](#). This approach helps create inclusive learning environments where every student has the opportunity to succeed. Assistive technologies powered by AI, such as screen readers and text-to-speech devices, can accommodate diverse learning needs and preferences, making education accessible to all students, including those with disabilities.

*“I think the key thing that teachers need to understand is that although AI has the capability to ... do a lot of what teachers do, and it has the capabilities to teach in a very efficient way, I think teachers still need to understand that there is no such thing as replacing that human interaction between students and teachers.”*  
—Colorado student

2 McKinsey & Company, [McKinsey Global Teacher and Student Survey](#)

The following outlines some potential uses and limitations of AI for students and teachers, providing a balanced view of how AI can enhance educational practices while emphasizing areas where it cannot replace human capabilities. As AI changes, the use and limitations will change.

## HOW AI CAN SUPPORT STUDENTS:

- 1. Personalized Learning:** Tailor educational content to match each student's learning pace and style, helping students learn more efficiently by offering individualized resources and strategies that align with their learning goals, styles, and needs.
- 2. Comprehensive Learning Support:** Act as a thinking partner for students by providing instant help with homework and assignments, assisting in creating study schedules, flashcards, and practice quizzes, and serving as a real-time tutor.
- 3. Critical Thinking and Skill Development:** Help students develop critical thinking skills by providing feedback and coaching, fostering the ability to evaluate AI-generated outputs critically. Offer interactive exercises and tutorials to build specific skills, such as coding, writing, or math, catering to students' unique needs and interests.
- 4. Collaboration and Creation Tools:** Enable group projects and peer learning through collaboration platforms and tools that allow students to work together effectively, and even remotely. Foster creativity and innovation through art, music, and other projects by providing inspiration, suggesting improvements, and helping bring students' imaginative ideas to life.
- 5. Language Learning:** Facilitate language acquisition through conversation practice, vocabulary building, and grammar correction.
- 6. Accessibility:** Enhance access to learning materials for students with disabilities through real-time translation, wearable technology, emotional recognition software, communication assistive technology, and more.
- 7. Career Exploration:** Provide information about various career paths, suggest courses and skills to develop, and help students explore their individual interests and future opportunities.
- 8. Engagement and Motivation:** Use interactive content and personalized feedback to make learning more engaging and motivate students. Track progress and adjust difficulty levels to keep students challenged and interested, promoting a sustained love for learning.

*"I have found AI to be very helpful for learning inside and outside of school. I use it to help learn languages by having a back and forth verbal conversation with the AI in a foreign language, asking lots of questions to nurture curiosity, explain things in a simpler manner, etc." —Colorado student*

## HOW AI CAN SUPPORT TEACHERS:

- 1. Curriculum Development and Lesson Planning:** Assist in generating ideas, creating templates, and unpacking standards to align with educational requirements.
- 2. Personalized/Individualized Learning:** Identify differentiation strategies, adjust readability levels, translate materials, and aid in adapting the curriculum to diverse student needs.
- 3. Enhance Instruction:** Generate diverse content in various modalities, facilitate UDL, and help teachers deliver content in engaging ways.
- 4. Grading and Assessment:** Create rubrics, assist with grading assignments based on provided criteria, and support students in self-evaluation.
- 5. Data Analysis:** Assist with progress monitoring and analyzing student performance data to inform teaching and enhance communication with families regarding student progress.
- 6. Administrative Tasks:** Support record keeping and routine communications, reducing administrative burdens.
- 7. Professional Growth and Development:** Provide information on emerging pedagogical strategies, analyze teaching practices, and offer individualized feedback and coaching.

## WHERE AI FALLS SHORT:

- 1. Emotional and Cultural Nuances:** AI is limited in the ability to read emotional cues, understand cultural contexts fully, or establish genuine human connections with students.
- 2. Complex Decision-Making:** AI cannot yet handle tasks that require nuanced human judgment or emotional intelligence.
- 3. Personalized Interaction:** While AI can generate communication materials, it cannot replicate the personal touch, discretion, nor empathy of human communication. Nor can it stand in for peer to peer exchange that is key to the development of interpersonal competencies.
- 4. Contextual Adaptation:** AI may not effectively handle current events or the subtle nuances of language and culture, potentially leading to biased, inappropriate responses.
- 5. Human Oversight:** AI-generated content and assessments still require teacher review to ensure accuracy, fairness, and alignment with educational goals.

*“I think a key part of using AI as a student is using it as a tool ... creating things like flashcards based off your notes ... sort of helping you be more efficient at a particular task.” —Colorado student*

**The [Framework for Improving the Role of Teaching with AI](#) was created collaboratively with working group members to support the use of effective AI strategies to enhance educators' instructional, supportive, and administrative roles.**

AI can generate individualized feedback on student assignments quickly and accurately, saving educators valuable time. This allows teachers to focus more on engaging with students and providing meaningful, personalized instruction. Additionally, AI enables the creation of innovative and engaging learning experiences that were previously unimaginable. Educators can use AI to design personalized learning experiences, create interactive simulations, and provide diverse perspectives from historical events.

AI has the potential to tailor learning experiences to each student's unique needs and progress, both during normal school hours and outside of them, ensuring that every student receives the support and challenges they need to thrive. AI-driven platforms can adapt to learners' strengths and weaknesses, offering customized pathways that promote curiosity and critical thinking, helping them master subjects at their own pace. Furthermore, educators can access a wealth of resources and templates that can be customized to fit their classroom needs, ensuring that lessons are well-planned and impactful. An AI-powered lesson planning tool can also suggest activities and assessments that align with Colorado state standards and curriculum objectives.

AI is a valuable tool that can significantly enhance educational efficiency and effectiveness by handling repetitive and data-intensive tasks. However, AI must be used judiciously, with teachers maintaining the final oversight to ensure that the educational experiences are personalized, culturally relevant, and emotionally supportive.

## **Teacher Support and Professional Learning**

Professional learning and support are paramount to the successful implementation of AI in education. Educators need dedicated time and space to build their own knowledge and explore the possibilities AI can offer, fostering an environment where curiosity and collaboration are encouraged. Providing clear guidance and coaching allows teachers to experiment with AI in low-risk ways, enhancing their understanding and confidence in using these tools. Ongoing professional development is crucial as AI technologies evolve, ensuring that educators remain informed about new tools and their applications.

By offering continuous coaching and training, teachers can better understand AI's role in the classroom, including its benefits, potential biases, and responsible use. This preparation helps educators integrate AI effectively, enhancing their teaching methods and equipping students with essential skills for future careers. It is vital that teachers have the opportunity to explore and learn about AI both individually and collectively. Without sufficient time dedicated to AI professional learning, teachers may be hesitant to incorporate these technologies into their classrooms, ultimately depriving students of important opportunities and skills. Continued focus on robust teacher support and professional learning will be essential to maximize the positive impact of AI on student learning.

## **Integrating Tools for Instruction and Curriculum**

The working groups investigated the use of AI tools and strategies to help reduce the digital divide, close equity gaps, and deliver content in more relevant ways. For a resource to be usable, it must be safe and aligned with policies and practices. Evaluation of resources for use in education could happen at the classroom level, the school level, or the district level. While safety and privacy are crucial considerations provided by many companies, they constitute only a part of the broader decision-making process when choosing a resource. Ongoing research and evaluation are important to determine the effectiveness of these new learning methods as they evolve.



Working group members collaborated to create the following tools to these ends, developed through the lens of educators and with students at the center. These resources are intended to provide educators and leaders with tools they can take and use as is, or revise and tailor for use in their own classrooms, schools, and districts. While curriculum, resources, and apps will continue to evolve, having a way to evaluate them or a set of criteria against which to consider their effectiveness might be helpful.

1. The *If and How Checklist*, which provides a guide to “if and how” for AI usage in the classroom



2. An *AI Resource Evaluation Tool*, based on International Society for Technology in Education’s (ISTE) Teacher Ready Evaluation Tool



## WORKING GROUP RECOMMENDATIONS

# ADVANCING EQUITABLE ACCESS FOR ALL LEARNERS



AI offers significant potential to increase educational access for those who have been furthest from opportunity. School districts should explicitly connect district equity priorities to their AI implementation efforts, giving specific attention to ways that AI can either perpetuate or break through the patterns that have emerged in past efforts related to digital divides and STEM (Science, Technology, Engineering, and Math) access and success. In addition to Colorado’s unique rural context—with the vast majority of school districts being rural or small rural—demographics are shifting in many Colorado school districts toward an increasing number of multilingual students. Therefore, AI efforts in Colorado can and should pay special attention to opportunities to reach and

engage emerging bilingual learners. The emergence of AI is just one more accelerant of the global nature of the economy in which today’s students will work and lead, making comfort working in technology-enhanced ways across lines of cultural and ideological difference ever more important.

### **Student, Family, and Community Engagement**

As school districts consider how to implement AI, a successful approach will include a proactive plan to work with students and families and engage their wider community. Community engagement and collaboration strategies that are inclusive and reflective of the background and needs of students, families, and educators have a higher

likelihood of success. Like other technological leaps and disruptions, AI will likely be a driver of the type of change that is best navigated through highly communicative and collaborative approaches.

Actionable strategies include establishing structures for stakeholder engagement, such as an AI task force or advisory committee to ensure diverse perspectives and needs are addressed. Such a group could be composed of local business representatives, community leaders, parents, students, and educators. This group might be charged with regular policy review, school or district data collection on usage and comfort, and/or considering student and educator feedback to ensure AI tools meet the diverse needs of the school population.

**Digital Divides:** The disparities in access to, use of, and benefits from digital technologies.

- The **digital access divide** refers to inequitable access to connectivity, devices, and digital content.
- The **digital design divide** means that there are unequal opportunities for educators to develop their professional capacity to design learning experiences that utilize or build technology skills for students.
- Equally important but less visible is the **digital use divide**, where students who engage with technology solely as passive consumers miss out on opportunities to analyze, build, and create.

Additional terms in this section are included in the [EDSAFE AI Alliance K-12 AI Policy Lab: Key Terminology](#).

Other actionable strategies include maintaining clear and consistent communication regarding how AI is being used in school, including benefits and challenges, emphasizing how learning about AI can boost students' future competitiveness. Share a list of approved AI tools, along with clear guidelines for using them responsibly. Create a one-

page, accessible guide to help students and the community understand its importance and application. Consider social media, newsletters, virtual and in person town halls, and round tables to share updates and gather input. Limit the use of blocking tools, as students will likely use AI at home, which could inadvertently deepen the access divide.

## Equity and Inclusion Strategies

While progress has been made, a digital access divide still exists in Colorado. Reports estimate that 64,878 Colorado households lack consistent access to the internet for educational purposes<sup>3</sup>. Mitigating this gap is foundational to providing all students with equitable opportunities. As a state, we are continuing efforts to provide every student with effective connectivity and functional devices, including through the [Colorado Broadband Office](#), [Colorado Department of Labor and Employment's Digital Equity, Literacy, and Inclusion Initiative](#), and the [Colorado BOCES Association](#). Continued coordination across efforts will be important, as will ensuring students have more than just a smartphone for education device access.

What we ask students to do with technology is core to addressing the digital use divide: students should use technology not just to complete passive assignments that were once on paper, but to analyze, build, produce, and create. The opportunities we provide for educators to learn, collaborate, and make sense of AI moves us closer to mitigating the digital design divide. When creating future budgets, schedules, professional learning plans, and resource allocations, it will be essential to allocate time and resources for educators to adapt and enhance their technology practices.

As part of an existing AI task force or implementation team, consider using indicators that measure how effectively AI tools are distributed and utilized across different student groups. These might include qualitative and quantitative metrics on AI access, engagement levels, and educational outcomes by demographic. In considering use of AI tools, evaluate the value and effectiveness for student populations that include those with special needs and students who are multilingual learners.

## Ethical Considerations and Bias Mitigation

A top concern from educators regarding the use of AI is cheating, which is only one of the ethical considerations with AI. Current AI detection tools are already failing

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3 Institute of Education Sciences, [Internet Connectivity Across Colorado](#); Colorado Broadband Office, [Closing the Digital Divide](#).

to be helpful to districts as AI “learns” and improves. A more effective approach is to establish guidelines for the ethical use of AI and integrate these into existing conduct policies and practices, recognizing that students will need a space to learn alongside adults about appropriate use of a new technological tool. Teach students to leverage AI productively and ethically, including through reflection on their own academic skill development. Further, teach students and educators to critically evaluate AI outputs. Implement a robust framework for ethical AI use in schools that includes guidelines on data privacy, bias mitigation, and the equitable use of AI. Evaluate AI tools for bias and regularly train staff on how to report and handle instances of AI bias or discrimination.

### Infrastructure and Resource Allocation/Access

Ubiquitous and equal access to AI technologies and educational resources statewide will be essential for ensuring all Colorado students can benefit from the advancements in learning tools. Statewide organizations

have critical roles to play to make this a reality for our state, making sure that local control drives innovation and learning without leaving some Colorado students behind.

Colorado lacks a current statewide assessment of the disparities in access to classroom technologies and educational resources among students in different regions and schools. AI can be the driver for our state to begin to conduct comprehensive audits to identify gaps in technology resource distribution, focusing on underserved and rural areas. Such an effort can identify and address gaps in device and internet access across different student groups, as well as drive an understanding of district-level resources for education technology. Based on these findings, Colorado can develop targeted programs that provide necessary equipment and software to bridge these gaps. Districts can then establish a continuous feedback loop with students, families, and educators to assess the effectiveness of these initiatives and refine as needed.



*“AI reveals the biases that we have within our own culture, because the images in these datasets reflect the representation in our society.”*  
—Colorado student



## WORKING GROUP RECOMMENDATIONS

# DEVELOPING POLICY FOR TRANSPARENT AND ETHICAL USE



Colorado’s unique local control context empowers local school districts to adopt their own policies, limiting the state department of education’s ability to dictate local technology policies. Even so, Colorado’s current Student Data Privacy rules are among the most protective in the nation. The policies and practices to safeguard students largely already exist, and can benefit from regular review as technology advances. Because policy guidance stretches across multiple areas related to AI in education, we offer the following guiding tenets as prudent for school districts to begin with.

## Guiding Tenets

### Transparency is Key

Transparency is crucial in communicating the use of AI across all contexts. Stakeholders, including educators, students, and families, need to understand how AI is being utilized and the benefits it brings. Open communication about AI use helps build trust and ensures that all parties are informed and engaged.

### First Draft Thinking

Encourage a “first draft thinking” approach that fosters a sense of safety to explore and experiment with AI tools, protecting personally identifiable information and guarding against bias. In Colorado’s context of local control and the rapidly evolving nature of AI, roadmap recommendations prioritize fluid guidance over rigid policy approaches. This flexibility allows Colorado schools and districts to adapt quickly to new developments and maintain relevance in AI strategies, while state agencies can be positioned to rapidly learn alongside them.

### Promote a Positive Approach

Given the fast pace of technological change and the need to make it safe to try new tools, focus on a list of “yes’s” and “do’s” rather than “no’s” and “don’ts.” This positive approach encourages exploration, experimentation, and innovation while maintaining safeguards to protect privacy and ensure ethical use.

### Regular Review and Updates

AI plans should be reviewed semi-annually to keep pace with technological advancements and evolving educational needs. If a separate AI policy is created at a state, district, or school level, it should align with current privacy and security policies and be subject to regular reviews to ensure its continued relevance and effectiveness.

### Principles Over Policy

In this dynamic landscape, principles should guide our actions more than static policies. By emphasizing principles such as transparency, ethical use, and continuous improvement, we can create an environment where AI is used responsibly and effectively to enhance education.

**The policy section aims to provide a comprehensive framework for integrating AI into education, ensuring that its use is ethical, transparent, and supportive of our educational goals.**

## Policy Recommendations

### Student Data Privacy

Regular policy and vendor contract review will be ongoing. In doing so, understanding the data usage in AI model training is crucial, as policies must reflect the iterative and generative nature of AI tools. This involves proactively using certain student information to train AI tools while ensuring bias elimination. Transparency in how data is used to produce outputs from prompts is essential. Clear communication about what data is being used, its storage duration, and data sharing practices with subcontractors or partners enhances data transparency. Additionally, considering how APIs function as gatekeepers for data usage by providers is vital for effective data utilization.

### Acceptable Use

To establish a clear framework for acceptable AI use, it is essential to define specific use cases for both students and staff. This model can help delineate permissible, cautious, and prohibited uses of AI within the educational environment. Furthermore, transparency in critical decision-making involving AI is crucial. Institutions should disclose when and how AI is utilized in critical decisions, drawing from examples such as [Colorado’s new Consumer Protections for Artificial Intelligence law](#). This approach ensures that stakeholders are aware of the AI’s role and can trust organizational decision-making processes.

### Discrimination and Harassment

To address bias in AI outputs and uses, it is essential to integrate AI considerations into safe school policies, clearly outlining disciplinary actions for inappropriate AI use by students. Additionally, it is crucial to ensure that all parents are notified of and agree to a safe school policy, updated to include terms related to AI usage. This approach not only promotes a safe and fair learning environment but also fosters accountability and transparency between the school and the families it serves.

### Procurement

While learning about AI tools in education, it is advisable to avoid long-term vendor contracts and instead opt for pilot windows to test these tools. This approach allows for flexibility and adjustment based on initial results. Additionally, it is crucial to select AI tools that align with educational priorities, and provide for student-driven feedback to guard against bias. This ensures that the tools support the overarching goals of the educational institution and promote an inclusive learning environment.

## Ethics, Transparency, and Disclosure Policies

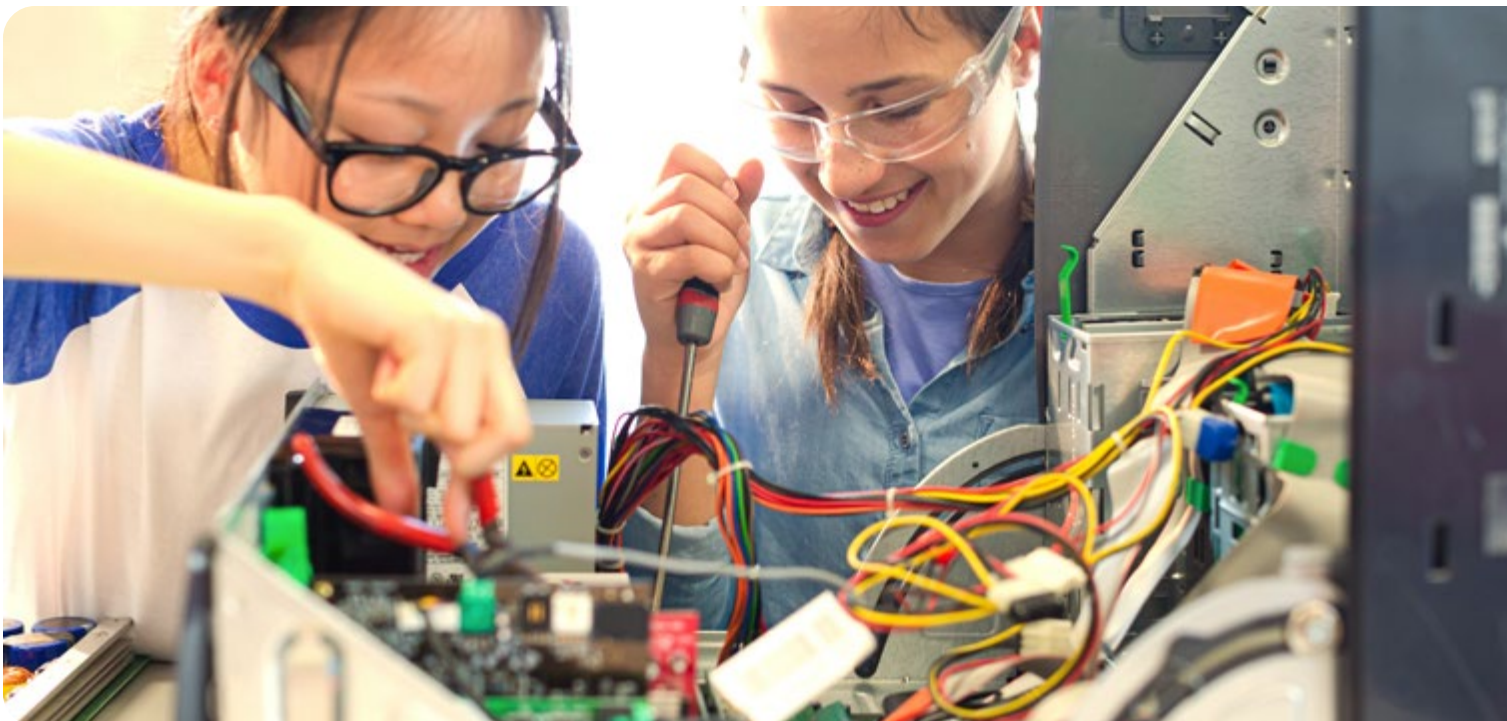
To improve our educational approach, we must first evaluate our curriculum and clearly define what we aim to assess in our students. Teachers can anticipate and integrate appropriate AI usage within their instructional planning. Additionally, it is crucial to engage families in understanding the evolving role of technology in learning. Families also need to understand how the concept of “cheating” will change with AI integration and also be informed about clear processes for reporting and addressing instances of bias or errors in AI systems. Additionally, an appeal process must be established, allowing students to contest AI grading and accusations of AI use. Look to industry for examples: [IBM AI ethics](#), [Microsoft’s Responsible AI Principles](#), [Responsible Innovation Framework](#).

## Student Use of AI

Be open to rethinking academic integrity; include clear definitions of plagiarism and academic dishonesty while emphasizing how students can responsibly use AI as a tool, eliminating the need for a separate AI plagiarism policy. Additionally, providing basic AI literacy education is essential, linking it to data literacy and career readiness. It is also crucial to teach students how to verify AI-generated information for truthfulness, ensuring they can critically assess the accuracy of such information.

## Teacher Use of AI

AI can allow educators to focus more on creating robust learning experiences instead of repetitive tasks like grading papers. Like students, teachers will need time and support to experiment with new tools. To integrate AI effectively in educational settings, it is essential to prioritize accuracy and vetting, ensuring that teachers carefully vet AI-generated information before using it in their classrooms. Providing AI literacy training is also crucial; teachers should be educated on data privacy, ethics, and responsible AI use. Transparency in AI use should be encouraged, with teachers disclosing their AI usage to students and inviting feedback to foster a collaborative environment. Teachers should collaborate on classroom usage approaches, so that students have clear expectations across learning environments.



## NEXT STEPS

While caution is warranted, our understanding of how AI can improve learning and enhance the role of educators is continually expanding. By establishing a shared learning agenda focused on both risk mitigation and the ethical, responsible use of AI, we can ensure that students across the state benefit equitably and evenly. To this end, the final recommendation of this Roadmap is that all of Colorado’s stakeholders and organizations commit to collaboration and continuous learning. Embracing the principle that “together is better,” especially during times of change, will enable us to navigate the complexities of AI integration more effectively. Collective sensemaking will better serve Colorado’s educational community than isolated efforts, fostering a more unified and informed approach to AI in education.

### Recommendations to School Districts

- Create the conditions to learn from early adopters, national leaders, and statewide efforts. This may require a new or augmented role in many school districts and a reallocation of resources in others.
- Create a community task force for ongoing feedback on AI policy and practice, with robust and intentional participation from students.
- Begin or broaden communication efforts to families related to AI usage and approaches.
- Conduct or update an audit on student internet and device access.
- Prioritize an approach to AI that closes digital divides and opportunity gaps.
- Invest in differentiated educator professional learning.
- Create and update acceptable use frameworks in partnership with students, families, and educators.
- Update conduct and discipline policies.
- Review and augment existing data privacy policies and vendor agreements.

## Recommendations to Statewide Organizations

- Establish committees and working groups to drive statewide coherence and support Colorado’s progress on AI in education over the next 24 months. These may include:
  - » Technical advisory committee
  - » Ongoing learning communities
  - » Student advisory panels
- A Colorado summit for learning and exchange between educators, policymakers, and support organizations.
- Create new and strengthen existing educator networks for cutting-edge teachers and administrators.
- Consider a statewide audit related to, at a minimum, student internet and device access.
- Consider the benefits of adopting statewide digital literacy standards or strengthening existing imbedded standards.
- Study current approaches and investments related to Open Educational Resources (OER) in Colorado and in other states to drive a sustained investment that improves access to resources across Colorado.
- Consider particular areas for statewide research into AI-enhanced tools to address ongoing Colorado challenges (e.g. Individual Career and Academic Plan (ICAP) production, secondary math, etc.).
- Work with districts to understand the costs related to teacher professional development and tool and curriculum adoption; consider statewide purchase agreements to help small districts with pricing.

# RESOURCES

Please note that this is not a comprehensive list but a starting point to guide your exploration and adaptation of AI tools in education. As our knowledge and understanding of AI continue to evolve, the Colorado Roadmap for AI in K-12 Education will be updated to reflect the latest advancements and insights. Please complete [this form](#) to share additional AI in education resources and/or to receive future updates or revisions to this roadmap.

## General AI in Education Resources

- [aiEDU.org](#)
- [Code.org](#)
- [Common Sense Media, AI Initiative](#)
- [Digital Promise, Artificial Intelligence in Education](#)
- [EDSAFEai SAFE Framework](#)
- [ISTE Artificial Intelligence in Education](#)
- [Stanford University's Human-Centered Artificial Intelligence Definitions](#)
- [Teachai.org](#)
  - » [AI Guidance for Schools Toolkit](#)

## Government and Policy Documents

- [Office of Educational Technology, Artificial Intelligence](#)
  - » [Designing for Education with Artificial Intelligence: An Essential Guide for Developers](#), July 2024
  - » [Artificial Intelligence and the Future of Teaching & Learning](#), May 2023
- The White House
  - » [Blueprint for an AI Bill of Rights](#)
  - » [Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence](#), October 2023
  - » [Office of Management and Budget Policy to Advance Governance, Innovation, and Risk Management in Federal Agencies' Use of Artificial Intelligence](#), March 2024

## Colorado AI Resources

- [Artificial Intelligence Policy Guidance](#), Colorado Association of School Boards
- [Colorado Academic Standards](#), Computer Science, CDE
- [CDE's Instructional Support](#) page includes general AI resources, educator AI training opportunities, digital citizenship resources, and more
- [Colorado Digital Learning Solutions \(CDLS\)'s AI Resources for Districts and Resources](#)
- [Open Education Resources Colorado](#)

## Other State Guidance

- [Framework for Implementing Artificial Intelligence in State Education Agencies](#), ILO Group
- [Other State AI Guidance Documents](#)
- [Review of Guidance from Seven States on AI in Education](#)

## Curriculum, Instruction, and Professional Learning Resources

- [AI for Equity's AI Literacy Curriculum Hub](#): provides a list of curriculum resources with descriptions, implementation ideas, and a leader planning template
- [AI for Education's Resource Hub](#): contains many free resources and tools, including webinars, student lesson plans, curriculum resources, policy development resources, AI adoption strategies, and more
- One of the most compelling is [GenAI Chatbot Prompt Library for Educators](#), which supports educators to differentiate lessons, create rubrics, write newsletters and email responses, and more
- [Code.org AI 101 for Teachers](#)

- [ISTE Courses for Educators, including \*AI Explorations for Educators\*, \*Digital Citizenship in Action\*, and more](#)
- [MIT AI Curriculum for Middle Schools Students](#)

## Research and Reports

- [EDSAFE AI Alliance K-12 AI Policy Lab: Key Terminology](#)
- Federation of American Scientists
  - » [Establishing a National Center for AI in Education](#)
  - » [Establishing a Teacher AI Literacy Development Program](#)
- [The Value of AI in Today’s Classrooms](#), Walton Family Foundation

## Articles & Videos

- [2024 AI+Education Summit: What do Educators Need from AI?](#)
- [Co-Intelligence: AI in the Classroom with Ethan Mollick](#)
- [How is AI being used in Colorado Classrooms?](#), *Colorado Public Radio*, April 2024
- [Sal Khan: How AI will Revolutionize Education](#)
- [Teaching Students to Embrace AI Responsibly](#), *Ed Tech Digest*, February 2024
- [What we see and what we value: AI with a human perspective—Fei-Fei Li \(Stanford University\)](#)

# ACKNOWLEDGEMENTS

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## AI IN EDUCATION STATEWIDE STEERING COMMITTEE FOR COLORADO

### AI Steering Committee Members

- **Vinny Badolato**, Education Program Director, Voqal
- **Joanna Bruno**, Assistant Commissioner, Teaching and Learning, Colorado Department of Education
- **Marsha Cody**, Superintendent, Brush School District
- **Natasha Dillenburg**, Art and Technology Teacher, Julesburg School District
- **Lisa Escárcega**, Vice-Chair, Colorado State Board of Education
- **Graham Forman**, Founder and Managing Director, Edovate Capital
- **Natasha Gordon**, Senior Consultant of Online Learning, Colorado Department of Education
- **Diana Jones**, Superintendent, Alamosa School District
- **Evan Kennedy**, Senior Director of Social Impact, Public Education & Business Coalition
- **Bill Knous**, Director Charter School Growth, Colorado League of Charter Schools
- **Becky Langlois**, Executive Director of Assessment & Innovation, Weld Re-3J School District
- **Diane Lauer**, Chief Academic Officer, St. Vrain Valley Schools
- **Frannie Matthews**, Former President and CEO, Colorado Technology Association
- **Sami Mooney**, Educational Consultant, Colorado Workforce Development Council
- **Jessica North**, Director, Clear Creek School District Board of Education
- **Ivan Portilla**, Robotics and Data Scientist, Ricoh USA, Education, University of Colorado Denver
- **Karen Quanbeck**, Colorado Education Initiative (Facilitator)
- **Patty Quiñones**, Colorado Education Initiative (Facilitator)
- **Ronica Rooks**, Professor and Director of Online Education, University of Colorado Denver
- **Beth Rudden**, CEO and Cognitive Scientist, Bast AI
- **Matt Smith**, Instructional Technologist, Durango High School
- **Krista Spurgin**, Colorado Executive Director, Stand for Children
- **Tammy Sumner**, Director Institute of Cognitive Science, University of Colorado Boulder
- **Jennifer Vanwarden**, ELA Teacher, Cañon City Schools
- **Antonio Vigil**, Director Innovative Classroom Technology, Aurora Public Schools
- **Mai Vu**, AI Program Manager, Innovation Center at St. Vrain Valley Schools



## AI Thought Leaders

- **Adeel Khan**, Founder and CEO, MagicSchool
- **Alex Kotran**, Co-Founder and CEO, aiEDU
- **Tara Nattrass**, Managing Director, Innovation Strategy, ISTE
- **Jahnell Pereira**, Chief Business Development Officer, SparkFun
- **Christian Pinedo**, Chief of Staff, aiEDU
- **Mary Schlegelmilch**, Business Development Manager, Cisco
- **Shaun Wilson**, Corporate Social Responsibility Manager, IBM

## Student Advisory Group

The student advisory group included 18 students from eight Colorado school districts and two postsecondary institutions. These students came from Adams 12, Boulder Valley, Cañon City, Clear Creek, Haxton, Roaring Fork, St. Vrain Valley, and West Grand school districts, as well as Colorado College and Colorado State University. The group was chaired by Marcy Hoefner, a retired Jeffco Public Schools administrator and educator.

## WORKING GROUPS FOR AI IN COLORADO EDUCATION

### Advancing Equity Using AI

This working group explored ways to equitably integrate AI in the classroom to provide a competitive advantage for students and support schools in achieving educational excellence.

#### Members

- **Deagan Andrews**, Greeley-Evans School District 6
- **Dan Coppa**, Cañon City Schools
- **Matt Cormier**, Jeffco Public Schools
- **Judith Martinez**, Stand for Children
- **Jae McQueen**, Cherry Creek Schools
- **Elaine Menardi**, Colorado AeroLab (Chair)
- **Alma Olivas-Aguilar**, Greeley-Evans School District 6
- **Linda Rittner**, Front Range Community College
- **Colin Sailor**, St. Vrain Valley Schools
- **Sam Schneider**, Colorado Department of Education
- **Ashley Simpson**, Aurora Public Schools
- **Olivia Sutphen**, Access Opportunity
- **Joseph Wehbe**, DAIMLAS

### AI Curriculum Development

This working group explored ways to implement effective AI-instruction in the classroom to help close learning gaps and deliver content in more relevant ways.

#### Members

- **Samantha Agoos**, Colorado Department of Education
- **Bobbie Bastian**, Adams 12 Five Star Schools (Chair)
- **Elisabeth Bell**, Community College of Aurora
- **Laurie Lacombe**, Douglas County School District
- **Pam Lewis**, Colorado Department of Education
- **Valerie McCormick**, Legacy Fellowship
- **Andrea Mikulin**, Public Education & Business Coalition
- **Judy Perez**, iLearn Collaborative
- **Ana Poe**, Roaring Fork Schools
- **Jennifer Radosevich**, Cherry Creek Schools
- **Marnie Roush**, Jeffco Public Schools
- **Adrienne Ryland**, iLearn Collaborative
- **Julie Taylor**, iLearn Collaborative
- **Brian Zamarripa**, Cañon City Schools

## AI Policy Recommendations

This working group explored policy priorities that support students in developing lifelong AI literacy skills.

### Members

- **Joanne Addison**, University of Colorado Denver
- **Leslie Bogar**, Colorado Association of School Boards
- **Jeff Einerson**, Weld Re-3J School District
- **Amber Elias**, Colorado Education Initiative (Chair)
- **Ken Haptonstall**, Colorado River BOCES
- **Mindy Heller**, Cherry Creek Schools
- **Rachel Jeffrey**, School District 49
- **Robert McMullen**, Limon School District
- **Greg Nusz**, Colorado Department of Education
- **April Pratt**, Harrison School District 2
- **Axel Reitzig**, St. Vrain Valley Schools
- **John Sepich**, Ranum Reimagined

## Evaluating AI Teacher Tools

This working group explored AI tools and strategies to help reduce the digital divide and close equity gaps.

### Members

- **Jessica Babbs**, Academy District 20
- **Brandon Beaudette**, Roaring Fork Schools
- **Jane Brown**, eNet Learning
- **Yvette De La Cruz**, Westminster School District
- **Katie Gallagher**, Gunnison Watershed School District
- **Kate Harris**, Jeffco Public Schools
- **Raymond Johnson**, Colorado Department of Education
- **Jason Kelsall**, St. Vrain Valley Schools (Chair)
- **Zach Kennelly**, DSST Public Schools
- **Dick Lee**, Value Innovations
- **Katrina Litzau**, Public Education & Business Coalition
- **Chrissy McKinney**, Adams State University
- **Dan Morris**, Colorado Digital Learning Solutions
- **Anna Otto**, Adams 12 Five Star Schools
- **Heidi Ragsdale**, STEM is My Future
- **Alex Ramirez**, Westminster School District
- **Lindsey Thomson**, Public Education & Business Coalition
- **Trevor Timmons**, Weld RE-4 School District

## Improving the Role of Teachers with AI

This working group explored how AI tools can help reduce workload for teachers and support educator professional development.

### Members

- **Michelle Bigler**, Colorado State University
- **Ronda Bucholz**, Las Animas School District
- **Tamara Durbin**, Northeast BOCES
- **Lynn Gershman**, Boulder Valley School District
- **Kate Hudnut**, TEACH Colorado
- **David Jarboe**, Harrison School District 2 (Chair)
- **Anthonya Kahrs**, Northeast BOCES
- **Kristin Kipp**, Colorado Department of Education
- **Jeremy Koselak**, Academy District 20
- **Jen Kral**, Morgan County School District
- **Kendall Kreiser**, Douglas County School District
- **Sarah Langford**, Clear Creek School District
- **Colleen O'Neil**, Colorado Department of Education (Formerly)
- **Deanna Padilione**, Cañon City Schools
- **Matt Reamy**, RCG Talent Solutions
- **Elisha Roberts**, Colorado Education Initiative
- **Mike Rudolph**, Littleton Public Schools

## COLORADO EDUCATION INITIATIVE TEAM

CEI partnered to develop, facilitate, and support the statewide steering committee and working groups throughout this process.

## CEI Colorado Roadmap for AI in K-12 Education Team

- **Claire Cecere**, Associate, Communications and Outreach
- **Samantha Olson**, Vice President, Strategy
- **Karen Quanbeck**, Vice President, Statewide Partnership
- **Cassandra Quillen**, Assistant Director, Communications and Marketing
- **Patty Quiñones**, Senior Partner, Leadership and Innovation
- **Carly Schwab**, Director, Implementation and Design

“aiEDU is proud to support Colorado’s launch of the AI Roadmap. This Roadmap is a crucial step towards ensuring all students are prepared to thrive in an AI-driven world. CEI’s collaborative approach to developing this Roadmap exemplifies our shared vision of embedding AI readiness into the core of teaching and learning programs across Colorado. As a state known for its forward-thinking approach to education, Colorado is poised to lead the way in providing the knowledge and skills necessary for all learners to succeed as technology continues to evolve.”

—aiEDU



