

WHAT YOUR COLLEAGUES ARE SAYING . . .

“This book will get your wheels turning! Whether you feel excited or terrified by GenAI, you will leave this book teeming with ideas to make your classroom more relevant as we embark on a journey into the era of AI with students. School systems will find this book helpful in honing a vision of how AI integration can look across schools.”

—**Brett Vogelsinger**, English teacher and
author of *Poetry Pauses*

“AI can allow teachers to spend more time connecting with students and less time sitting behind stacks of paperwork, lesson planning, and grading. That’s quite a concept and the authors do an excellent job explaining just that. This book does such a thorough job of showing us that AI not only maximizes student learning, but also makes our job easier as teachers.”

—**Serena Pariser**, educator and
author of *Real Talk About Classroom Management* and
Real Talk About Time Management

“*Future-Ready Teaching With AI* is a practical and easy-to-follow handbook that will help teachers embrace AI to develop efficiency and diminish fear in a new technology already revolutionizing how we understand different tasks. Since I often hear teachers’ fear around ChatGPT, I’m grateful to have a resource to point them to that will help them embrace this next wave of technology that isn’t going anywhere and will certainly force us shift once again to consider which essential skills need to be taught and how to help students successfully navigate this new tool.”

—**Starr Sackstein**, COO of Mastery Portfolio and
author of *Student-Led Assessment*

“Is AI going to destroy civilization? Will it ruin education? Or will it be the panacea that saves us all? Avoid extremes and read this book filled with practical suggestions that can be implemented right now, in classrooms all around the country. Authors Aaron Blackwelder and Jason Cowley point out ways that both teachers and students can employ currently existing technology to make more time and space for the creativity, critical thinking, and motivation that lie at the heart of genuine teaching and learning. They also make the case that students will be using AI whether we teach them to or not—and it’s far better to teach them. Learn how, with this practical book.”

—**Susan D. Blum**, professor of anthropology,
The University of Notre Dame and
author of *Schoolishness*

“It’s no longer a question. AI will transform education. So, then, how might we best navigate this brave new world in education? This timely book provides a timely answer. We must learn to embrace the powerful potential of AI in the classroom, and Aaron Blackwelder and Jason Cowley’s work here shows us the way. A must-own for today’s educator in tomorrow’s world (which is already here).”

—Monte Syrie, 28-year veteran of
the high school English classroom and
author of *better: A Teacher’s Journey*

Future-Ready Teaching With AI

Future-Ready Teaching With AI

Unlocking Student Potential in
the Age of Artificial Intelligence

Aaron Blackwelder

Jason Cowley

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CONTENTS

Acknowledgments	ix
About the Authors	xi
Introduction	1
1. Understanding Generative AI	3
AI Is Transforming Education	5
What Is Generative AI?	6
Examples of Generative AI	8
Generative AI in the Workspace	11
Generative AI for Education	11
Concerns About Generative AI in Education	12
Hopes for AI in Education	13
2. Empowering Educators in the Age of AI	17
Lesson and Unit Planning	19
Generating Vocabulary Content	21
Generating Questions About a Text	21
Changing Types and Forms of Questions	21
Teaching Content and Skills in Different Ways	25
Differentiating Reading Materials	27
Generating Student Exemplars	27
Facilitating Communication	29
Allowing Teachers to Teach	31
3. Student Learning in the Age of AI	35
Generating Writing From Student Input	36
Receiving Feedback on Student Work	38
Providing Intelligent Tutoring and Research Assistance	38
Bringing Content to Life	40
A Look at Classroom Research	41

4. Ethics in the Age of AI	45
Ethics and GenAI	48
Lesson: Writing a Class Code of Ethics	50
STEPS FOR Writing a Class Code of Ethics	50
Teaching Students How to Use GenAI Effectively	54
The Importance of Lateral Reading	54
The ABCs of Ethical AI Use	56
Lesson: Checking GenAI Output for Accuracy	57
Lesson: Evaluating GenAI Output for Bias	60
Lesson: Considering Clarity With GenAI Output	63
Deepfakes and Critical Thinking in the Age of AI	65
5. Elevating Learning in the Age of AI	71
The AI-Proof Assignment	73
The Purpose of Assessment	78
A Focus on Feedback	80
An Emphasis on Decision Making and Reflection	81
Conclusion: Now What?	87
References	89
Index	91



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Future-Ready Teaching With AI.
www.beyondthecurriculum.net/book-1

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As a digital learning coach, Aaron encourages teachers to incorporate technology to promote twenty-first-century learning. He has also led professional development on the transformative power of AI in the classroom. In his teaching, he empowers students to leverage digital tools through student-centered, project-based learning.

Aaron is a husband and father of two boys on the autism spectrum who inspire him to meet the needs of all students.



Jason Cowley is a National Board–Certified ELA teacher and a former instructional coach with more than eighteen years of experience in the classroom. He also worked as a National Board facilitator for eight years. In addition to his work on AI in the classroom, Jason has extensively studied how assessment practices impact student learning.

When ChatGPT became popular, Jason started using AI in his classroom with students. He conducted action research measuring how to improve student writing using ChatGPT. Jason has shared his findings with large groups and with smaller PLCs.

Jason has collaborated with educators on how to integrate generative AI into classrooms and how teachers can use generative AI to support their own work. Jason works as a high school ELA teacher.

He lives with his wife and children in Vancouver, Washington.

INTRODUCTION

In November 2022, ChatGPT-3 took the Internet by storm. Many declared that it would change the world (O'Malley, 2023). However, fears began circulating among teachers that generative artificial intelligence (GenAI) such as ChatGPT would enable students to cheat, thus opening a Pandora's box that would destroy the teaching of writing across all content areas. Though GenAI can certainly generate code, develop a slide presentation on the metamorphosis of a butterfly, and write a decent five-paragraph essay outlining the character development of Atticus Finch in *To Kill a Mockingbird*, it will not diminish the need for students to learn essential skills. Like any other technological innovation, it will, however, change how we teach and will ask us to develop new essential skills.

Monolithic technology is not new to teaching. Consider spellcheck, the graphing calculator, Internet search engines, and typing vs. handwriting. When these technologies were first introduced teachers expressed their concerns. They worried students would not need to learn essential skills and traditional learning would become obsolete. But as teachers learned how to leverage these tools they became essential components in our classrooms. Teachers no longer worry that Google will destroy research skills. Instead, we teach students how to effectively keyword search to find the relevant information they need. The Internet has not dumbed down education; rather, it allows students and teachers to be better informed. And since the advent of the smartphone, we can acquire up-to-date information about any topic whenever we want and wherever we are.

A common byproduct of new technologies in education is efficiency, which helps afford us time to do more meaningful things. Take spellcheck, for example. Spellcheck did not displace the need to learn how to spell. It helps us write more clearly and communicate our ideas more effectively. Teachers of writing whose students use spell check no longer need to highlight and comment on spelling errors. Instead, time can be spent commenting on the ideas of the writing to help promote deeper thinking. Not having to mark grammatical errors allows teachers to ask probing questions on student essays that enables students to expand upon their writing. Tools such as spellcheck have also helped make writing more accessible for language

learners and students with IEPs by decreasing the amount of effort students need to spend on correcting spelling and grammar.

This book will help teachers leverage GenAI in their practice to streamline the rudimentary tasks we do regularly, such as lesson planning, assessment, and differentiating materials, in order to free up time to do more meaningful work such as building relationships, providing thought-provoking feedback, and personalizing learning to support the growth of all students in our classrooms. This is not a “how to use AI” book. Although we provide some instruction on AI tools, the intent of this book is to move teachers beyond basic use of AI and help them raise rigor, increase engagement, and promote more meaningful learning opportunities in their classrooms.

The book addresses the following topics:

- Understanding generative AI
- Empowering teachers with generative AI
- Supporting student learning with generative AI
- Ethical uses of generative AI
- Shifting pedagogy with generative AI

Each chapter starts with a narrative from either Aaron or Jason that shares their personal experience with GenAI as educators. These are meant to help humanize the role of AI in education. Each chapter concludes with a chapter review that highlights the main takeaways from the chapter, a You Try It activity to help readers apply some of the strategies learned in the chapter, and reflective questions that can be used to help readers grapple with some of the challenging topics in the book or to facilitate book studies within professional learning communities. Finally, a QR code and URL will be included to link teachers to resources mentioned in the book.

CHAPTER 1

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UNDERSTANDING GENERATIVE AI

A Message From Aaron

As a digital learning coach whose job it is to support teachers and students as they navigate the ever-changing technological landscape, I often have conversations with educators about artificial intelligence (AI). Many are skeptical and worry about how it will change education. Will it make teachers obsolete? What about cheating? How do we ensure students will meet state learning outcomes? Others are curious and want to learn what it is and how it can be used. Either way, I tell people, AI is a tool like a hammer or blender. It lacks any moral compass and can only do what it is programmed to do. And like any other tool, it is designed to make life easier by streamlining day-to-day tasks. Like a hammer, it can be used to build or destroy. It depends upon who is using it and their intentions.

It is good to have a healthy skepticism around AI—asking questions about authenticity and how it might be used to create content designed to deceive. And like most technology, it will replace certain jobs. But the fear that AI will take over the world, at this point in time, is irrational. Back in the 1970s assembly lines became more and more automated. This led to many assembly line workers losing their jobs, and cities such as Detroit were hit hard. People feared a robot takeover. Popular films such as Blade Runner presented a bleak future where androids were banned from Earth and hunted down and killed because they were seen as a threat to humanity.

Needless to say, robots did not take over humanity nor did they replace us in the workforce. At the time of writing this book, there is

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a labor shortage. In 2022, for example, according to the United States Chamber of Commerce, we had 1.5 million fewer Americans participating in the labor force than in previous years. Robots and AI are not making humans obsolete. Rather, the labor shortage suggests that there is still a need for human labor. Like the automation revolution of the 1970s, the advent of new technology has transformed the workplace and its demands. Jobs requiring manual labor were replaced by jobs that require human interaction. The number of careers in computer programming, data security, and the energy sector increased, for example. The arrival of AI will further transform the nature of work, which means education—how and what we teach to prepare our students for the real world outside our classrooms—needs to be reimaged.

I remember having a conversation with Jason sometime back in 2018. He asked me for my thoughts on the potential of a computer or machine being able to write essays for students. My response was not what one would expect of an English teacher. I said, “Jason, I hate mowing my lawn and I pay someone to come to my house and mow my lawn every week. No one in my neighborhood complains about this. They don’t call me a fraud because I have someone help me make my home look nice. Though I don’t claim to mow the lawn, I do take credit for my home’s appearance and I am quite proud of my home. I know some of my neighbors mow their own lawns and take joy in doing so. I can’t stand mowing my lawn so I outsource it.

Now that we have arrived at a point when writing can be done by a computer, we will have to embrace the fact that some students will want to learn to write and find joy in the writing process while others will find it grueling and will want to avoid it at all costs. Students will eventually have the option to do the writing themselves or outsource it. However, both types of students will need to be taught how to be responsible for the content the computer generates and understand the ethics and rules around using that type of content. We will have to teach students to be more critical thinkers when this technology arrives.”

Fast forward a few years and the technology is here. Students have the option to either complete certain tasks themselves or have AI do it for them. Educators face the challenge of a paradigm shift that no longer relies on outcomes, but rather the process and critical thinking of the outcomes.

This book discusses the impact of AI on teaching and learning and provides a vision for the future of education. Not only will it suggest tools to support you, but it will also offer a lens to help frame the potential of teaching and learning in the age of AI.



Aaron

AI IS TRANSFORMING EDUCATION

AI will forever change the scope of education, paving the way for more inclusive and equitable learning environments. This book equips educators to become leaders in this transformation, demonstrating how to harness the power of AI to empower every student, regardless of background or learning style.

Imagine a classroom where

- **AI tutors** personalize instruction for students who need accommodations, offering text-to-speech conversion or visual aids to enhance comprehension.
- **AI-powered practice tools** can assist students from low-income backgrounds, offering tutoring with targeted practice activities and links to additional resources to bridge any achievement gaps.
- **AI-powered learning platforms** curate personalized learning journeys for students in rural areas, offering adaptive learning materials, interactive simulations, and connections with online mentors, breaking down geographical barriers to learning and creating a world of possibilities within the classroom walls.

This book delves into the practical applications of AI in the classroom, exploring how it can empower teachers to meet diverse student learning needs and prepare students to engage in a world that expects them to be AI literate.

However, we must acknowledge the importance of responsible AI implementation. This book also addresses critical issues of data privacy, the limitations of AI, and how to ensure the technology remains a complementary tool rather than a replacement for human educators.

By embracing AI literacy, educators can create a future in which every student has access to a high-quality, personalized education. This book equips teachers with the knowledge and tools to become leaders in this exciting new age.

WHAT IS GENERATIVE AI?

When we think of AI in science fiction, we often think of robots fighting humanity. In these stories robots become sentient and an uprising follows. This is a common misconception about AI. Researchers term this kind of AI *artificial general intelligence* (Rogers, 2023). It is important to understand that when talking about AI in education and generative AI (a.k.a. GenAI) specifically, we are *not* talking about artificial general intelligence. Generative AI is something entirely different.



HOW GENERATIVE AI WORKS

Before we go any further, we will share a simple overview of how generative AI works. This will help ensure that we have common definitions for the terms listed below, as they will come up frequently throughout the rest of the book.

Generative AI: Generative AI is called *generative* because ultimately it is used to generate something (text, pictures, other media) in response to a prompt. *Generative* describes what it does but not the process by which it completes a task. Generative AI works by recognizing patterns and then predicting what the likeliest response to a prompt would be. Generative AI that you are familiar with probably includes text-producing AI like Open AI's ChatGPT or Google's Gemini.

Large Language Models: Generative AI is based on Large Language Models (LLMs), so named because they are trained by “reading” a lot of text or other data. An article from the website Science Focus claims ChatGPT-3 was trained by using 570 GB, or 300 billion words, of text (Hughes, 2023). According to back-of-the-napkin math, that is the equivalent of reading 3 million novels! Websites like Wikipedia, books, social media sites like Reddit, and other sources were used to train these LLMs. While the scope of ChatGPT-3 is massive, ChatGPT-4 is estimated to be more than 10 times larger! It is estimated that ChatGPT-4 contains more than 1.8 trillion parameters and was trained on 13 trillion tokens (Walker, 2023).

Transformers: LLMs read the text and run it in through something called a transformer. (The GPT in ChatGPT stands for “generative pretrained transformer.”) The transformer spots words and patterns and then makes predictions about what words or phrases might come next. This is commonly seen in predictive text on a cell phone, but it works at an even stronger level with the transformer. For example, given the phrase “On Sunday, I mowed my _____”, the transformer would likely predict that, based on the

text it has read, *lawn* or *yard* would have a high probability of being the next word in that sentence. It isn't likely to produce a sentence about mowing your *flamingo* because the text the LLMs were trained on makes no mention of mowing flamingos (unless one regularly mows a lot of flamingos and writes about it). It is important to understand that LLMs don't "know" that lawns are mowed and flamingos are not. It predicts that based on the text it has read. Generative AI that produces images, video, and audio largely functions the same.

Usually, LLMs are further refined by human operators who fix mistakes and create rules for generative AI to follow. This is why the largest generative AIs will refuse to answer certain questions or prompts.

Chatbots: A chatbot is the interface users interact with while using generative AI. Users can have a conversation with a chatbot and receive information based on their inputs that the transformers read and respond to accordingly. Examples include ChatGPT, Google Gemini, and Microsoft Copilot.

Generative AI predicts a response based on its programming, but it doesn't have an awareness of the meaning behind what is said. This is important because it means that even though generative AI can answer questions and hold a conversation, it doesn't understand what it is saying. This has huge implications. Generative AI cannot distinguish between accurate and inaccurate information. Also, it can generate a combination of false and true information (known as *hallucination*); for example, it may cite real authors and publications but make up statistics.

For example, while researching writing instruction, one of the most widely used GenAI platforms was asked the following question: "Are there data or statistics you can find indicating how popular formulaic writing instruction is in K–12 education in the United States?" The response from GenAI contained the following information: "A 2016 survey of English teachers found that 72% of them reported using formulaic writing instruction in their classrooms" (Google, 2023). This sounds like great information from a highly respected source. Unfortunately, when pressed, GenAI was unable to provide a link or any further information on the study. Searching the NCTE website was equally fruitless. In this case, it appears highly likely that GenAI manufactured plausible-sounding data. A more recent repetition of the original question yielded different statistics and studies that the GenAI was once again unable to cite, find, or link to. Thus generative AI, especially the text-based LLMs, have the potential to be the world's greatest con artists: They sound intelligent and convincing, but they don't understand anything they are saying.

EXAMPLES OF GENERATIVE AI

The prevalence of GenAI is on the rise, finding its way into various tools like search engines, social media platforms, and other industry tools. Its integration aims to simplify and enhance user experiences, leading to significant transformations in how people work. With GenAI, users can now effortlessly generate new content, ideas, and designs, ranging from realistic images to videos and innovative solutions, making it an indispensable aspect of the modern workplace.

By streamlining routine tasks such as writing emails, crafting presentations, and producing tutorial videos, GenAI significantly boosts workplace productivity. Employing automation and intelligent algorithms, it can efficiently create reports, analyze data, and perform complex calculations, ultimately saving time and minimizing human effort.

Creative blocks are common hurdles for artists, causing ideas to feel elusive and inspiration to wane. GenAI platforms offer a valuable remedy by providing an abundance of inspiration. Designers can explore the vast array of generated content on these platforms, gaining fresh perspectives and sparking ideas that reignite their creative processes.

One of the most valuable contributions of GenAI is its ability to create novel and imaginative content, thus fostering creativity and innovation within the workplace. Creative professionals, including artists, designers, and writers, can harness GenAI as a powerful tool to develop ideas, produce original artwork, and craft engaging content. As GenAI continues to advance, its impact on creativity and productivity in the workplace is set to be even more profound.

GenAI Chatbots

Chatbots are intelligent programs designed to engage users in natural language conversations. They possess the capability to comprehend user input and generate relevant responses. A popular application of chatbots is in providing customer support for companies through their websites. For instance, if a person encounters issues with their cable television, they can visit the provider's website and initiate a conversation with the chatbot to seek solutions to their service problems. These chatbots are engineered to simulate human-like interactions, creating a sense of interaction with a live person.

Beyond customer service, chatbots have expanded their utility to include generating original texts. Among the widely used GenAI chatbots are OpenAI's ChatGPT and Google's Gemini. Both ChatGPT and Gemini effectively respond to prompts and offer users a diverse array of text options. Their advanced capabilities empower users to explore creative content generation through interactive conversations.

The most common uses of chatbots are the following:

Answering questions: Chatbots can answer questions in a comprehensive and informative way to help users learn information quickly and efficiently.

Generating text: Chatbots can generate different creative formats of text content like essays, blog posts, poems, scripts, musical pieces, emails, letters, etc.

Translating languages: Chatbots can translate text into more than 100 languages, allowing users to understand or communicate with a broader audience.

Leveling text: Chatbots can rewrite a text at various reading levels to support diverse learning needs.

Summarizing text: Chatbots can summarize long articles or web pages into a few sentences, allowing users to process information more efficiently.

Brainstorming ideas: Chatbots can help users brainstorm ideas for projects, articles, or blog posts and act as a thought partner to help gain new perspectives.

Writing code: Chatbots can write and debug code in a variety of programming languages to empower coders to be more creative with their applications.

Collaborating: Chatbots can be a sounding board and collaborate on projects by sharing ideas, feedback, and suggestions to ensure clarity in one's writing and ideas.

In schools, these platforms have become indispensable tools supporting academic endeavors. Chatbots play a crucial role in assisting with research, paper writing, presentation creation, and exam preparation. Creative writers also benefit from these platforms, utilizing them to generate ideas, brainstorm plots, and craft compelling dialogues.

Businesses have also recognized the value of GenAI in streamlining various tasks. These chatbots are now integral to customer service, marketing strategies, and product development processes, enhancing overall efficiency and effectiveness. On a personal level, individuals have embraced these tools, employing them for tasks like vacation planning, email composition, and menu and shopping list creation.

As chatbots continue to evolve, their potential for innovative and creative applications will only expand further, and they will undoubtedly become even more ubiquitous.

Generative AI Image Generators

Besides generating text, GenAI has been developed to create images. With some basic prompt engineering and some creativity, even the novice can produce some stunning and imaginative images never seen before. Like its text-based brethren, AI image generators scour the Internet for images, take basic elements from them, and compile them into novel productions.

Text-to-image programs like Dall-E 2, Midjourney, and Imagine AI Art Generator have revolutionized the creative landscape, enabling the rapid generation of unlimited designs. With the help of GenAI, I can effortlessly request the creation of imaginative mashups, like envisioning a flamingo superhero. This technology becomes a



Created by Aaron Blackwelder via Canva.com



Created by Aaron Blackwelder via Adobe Firefly

potent tool in the hands of students, empowering them to craft distinctive logos, layouts, and visual elements tailored to specific requirements and preferences. Not only does this save valuable time, but it also infuses students with newfound inspiration and novel perspectives, breaking through creative barriers and propelling them to explore uncharted territories.

AI art generators hold boundless potential for students to reimagine school mascots, for example, be it for student government, homecoming week, sporting events, band performances, or other activities. Embracing these innovative tools, students can infuse their creativity into various school events, fostering a sense of ownership and uniqueness in every endeavor.

Creativity stands as a cornerstone of twenty-first-century education, and its nourishment thrives on inspiration. GenAI image-creating platforms offer precisely that, infusing students with fresh perspectives and new possibilities. Leveraging the prowess of graphic AI tools like Dall-E 2 and Imagine AI Art Generator, students gain access to powerful algorithms capable of producing unique and unconventional visuals, expanding beyond the boundaries of conventional design. By embracing these platforms, students' creative horizons widen, sparking an influx of innovative ideas and propelling them toward artistic brilliance.

GENERATIVE AI IN THE WORKSPACE

Workspace tools such as word processing, presentation software, spreadsheets, and email are getting smarter thanks to AI. This AI infusion aims to streamline workflows and boost efficiency for professionals. Imagine creating documents like proposals or client letters with just a prompt! Presentations can be whipped up in seconds by feeding the AI a topic, data, and desired length. Spreadsheets become more powerful with AI suggesting formulas, analyzing data, and generating visuals automatically. Even emails get a boost, with AI assistants summarizing key points and helping craft responses.

Beyond efficiency, AI in workspaces empowers users. It unlocks a wellspring of knowledge and lets them create content that reflects their unique voice and needs. These tools are designed to be partners, not replacements. As our students enter a workforce that expects them to leverage these AI tools, educators must become familiar with them as well. This will prepare students to thrive in a world where AI assistance is the norm.

GENERATIVE AI FOR EDUCATION

Imagine a classroom where history comes alive through a conversation with Gandhi or a heated debate about literature with Hermione Granger. This isn't science fiction; it's the potential of AI in education.

Using GenAI, teachers can streamline their workload, including lesson planning and differentiation, and spend more time engaging with students in meaningful ways. For example, GenAI can provide basic scores and feedback on student work based on sample rubrics so teachers can focus more deeply on student ideas. Additionally, teachers can allow students to submit assignments to AI chatbots before the assignment is due, to receive immediate and actionable feedback.

Teachers can also leverage AI to support student learning by creating their own interactive learning experiences, even with minimal technical skills. Teachers can design chatbots that act as tutors, historical figures, or even research assistants. This allows for focused learning journeys, guiding students through curated resources, which enables them to delve deeper into class content, sparking curiosity and critical thinking. Debate bots further hone these skills, allowing students to tackle complex topics and prepare for discussions. Q&A bots can even provide students with a safe space to ask questions and receive answers with links to reliable sources.

AI in education isn't a replacement for teachers; it's a powerful tool that strengthens their role. By partnering with AI, teachers can personalize learning, ensure students master key content, and develop critical thinking skills in a way that fosters meaningful interactions and student success.

CONCERNS ABOUT GENERATIVE AI IN EDUCATION

GenAI is changing education. It is understandable to be concerned about how this impacts the critical work of teachers. But it's important to remember as educators, we have survived changes in the past, like the widespread adoption of the Internet or even graphing calculators, so there is no reason to believe that we will not survive this change as well. After all, if there was one thing that became clear during the remote learning phase of the COVID-19 pandemic, it was the importance of the human and relational element of learning. No amount of GenAI will ever be able to provide that. Even still, here are some of the top concerns we hear from educators around the country:

Diminished academic integrity: One of the greatest concerns educators have is academic integrity. How will they know whether students wrote their papers themselves when GenAI can be prompted to write the paper for them? This causes teachers to spend extra time reviewing students' writing and playing gotcha, which costs time and stress for the student and the teacher. Cheating is not a new concern in education. Educators have dealt with cheating for decades: students have copied assignments, found test questions ahead of time, or even gotten someone else to write a paper for them. GenAI allows student writing to be copied as easily as some of the other instances of cheating. One way to get around this is to AI-proof your assignments. This doesn't mean using AI detection software to catch cheating. Instead, rethink the prompts and tasks students are challenged with so that AI cannot answer for the student but might even be able to support the student to complete the tasks more effectively. This will be discussed later in the book.

Reduced effort or critical thinking: Another concern is that student work will no longer require effort or critical thinking. For example, writing is a skill, so part of this worry is that by not practicing the skill (writing) students will not develop into strong writers. Students may ask, "Why bother with writing when I can have a machine do it for me?" When used properly, GenAI should challenge students. Students need to develop complementary skills using AI to draft and refine their ideas. Remember that the skill underlying writing is thinking. GenAI will challenge students to apply more critical thinking, assist them to become more effective and thoughtful communicators, and enable them to see the power of effective communication.

Eventual skill replacement: Some teachers worry that GenAI will make learning some skills such as writing, and even the instruction of those skills in school, obsolete. If the machines can do it better, why bother learning certain academic skills at all? Ultimately, the same argument could be made for math when calculators became ubiquitous. Math instruction has not vanished; it has simply shifted to include thinking and explaining. A basic understanding of essential academic skills is still needed to be effective. GenAI merged with these basic skills will help students thrive.

Potential job displacement: Eventually, there is a worry that even teachers themselves can be replaced by GenAI. If a computer can teach a student the parts of a cell, or how to find the area of a circle, are educators needed? What if this AI can also edit and score student projects? The worry that GenAI can replace teachers is real. However, even if it could do all of those things, online instruction during the pandemic exposed just how valuable in-person, social education is. Because learning is a social act, educators do not have to be worried about being replaced by machines.

Discernment of credible information: Even teachers who want to use GenAI have lots of concerns about the technology itself. Because it tries to sound credible and knowledgeable, GenAI will make up information that sounds plausible even when it is not. This is highly dangerous, especially for students who are just starting to learn about a topic. Students will not necessarily have the expert knowledge to spot false information. Not only that, but it is very easy to have the AI generate plausible information and much harder to have students check the information to make sure it is correct. As we will discuss later in the book, this will require students to learn and practice specific skills related to confirming the accuracy of information.

Knowledge of information bias: AI is only as good as its input, and the training set for our LLM AI tools has been the Internet, which is written by primarily by white, middle-class, and upper-class males (Jesutofunmi et al., 2023). Bias from historical sources can also easily seep in because part of GenAI's job is to sound authentic to the text it is based on, including sharing those perspectives. For example, when ChatGPT is asked what happened on the Oregon Trail, it may respond that the pioneers faced "hostile encounters with Native American tribes" (ChatGPT, May 11, 2024) but make no mention of land that was taken from those tribes. As with the false information concerns above, students need to develop skills around the detection and correction of bias. This concern will be addressed later on in Chapter 4.

Disruption of the status quo: GenAI can change education. The widespread use of AI may disrupt the way students learn and communicate. AI will certainly challenge pedagogy and the way educators operate. Low-level assignments are more susceptible to GenAI. However, educators can partner with students, checking work and asking students to explain the decisions they made during the process of completing the project. This will be further explored in Chapter 5.

HOPES FOR AI IN EDUCATION

Despite these concerns, GenAI has enormous potential. Used properly, GenAI can help reduce inequities inherent in education by reducing the skill gap between the highest- and lowest-performing students. Research supports this both for students in the classroom and workers across a large range

of jobs. Professor Ethan Mollick (2023) cites numerous studies across different professions showing that “AI acts as a skills leveler for a huge range of professional work. If you were in the bottom half of the skill distribution for writing, idea generation, analyses, or any of a number of other professional tasks you will likely find that, with the help of AI, you have become quite good.” AI has the potential to assist workers and students who have historically found writing and thinking tasks difficult.

This is especially true of writing tasks. Research at MIT by Noy and Zhang (2023) suggests that workers with poor writing ability who use ChatGPT for writing benefit the most. “Inequality between workers decreases, as ChatGPT compresses the productivity distribution by benefiting low-ability workers more.” This mirrors some of our personal classroom research discussed in Chapter 3, where the lowest performing group of students demonstrated some of the largest increases in writing scores.

Beyond writing tasks, GenAI can act as a thought partner to help students communicate their ideas effectively. It can tutor students who otherwise would not have access to tutoring outside of school. GenAI can help translate student writing and teacher worksheets more effectively than tools like Google Translate.

GenAI can also help teachers save time by helping them plan units, come up with lists of vocabulary words, draft emails, rewrite assignments, and much more. Also, the more knowledgeable the teacher is about a topic, the better they will be able to prompt the AI to generate useful outputs.

Ultimately, students need to be ready for the world that awaits them after high school. Workers from every industry imaginable are using these tools. We need to prepare our students for a future in which they will be expected to use GenAI effectively, and that means using it in our classrooms.

CHAPTER REVIEW



The Big Ideas

Chapter 1 discussed both the benefits and drawbacks of generative AI in education. It emphasized the importance of using generative AI responsibly and effectively to improve learning outcomes and included the following:

- **What is generative AI?** Generative AI is a type of artificial intelligence that is trained to generate creative text formats, like poems, code, scripts, musical pieces, etc. It works by recognizing patterns and predicting what the likeliest response would be to a prompt.
- **How generative AI works:** Large Language Models (LLMs) are generative AI systems trained on massive amounts of text data. They can answer your questions in a comprehensive and

informative way, generate different creative text formats, translate languages, summarize text, brainstorm ideas, and even write code.

- **How generative AI is used:** Generative AI is being integrated into various tools and platforms like search engines, social media, and workspace software. It can streamline tasks such as writing emails, creating presentations, and generating creative content.
- **Student use of generative AI:** In education, generative AI can be used to help students as a writing assistant, supporting brainstorming ideas, plot development, and crafting dialogues. Generative AI also has the potential to reduce inequities among students by providing free or inexpensive tutoring and making education more accessible for diverse learners.
- **Teacher use of generative AI:** Teachers can use generative AI to create quizzes and assessments, differentiate lesson plans, and change the reading level of a piece of text. It can also help teachers save time and improve their productivity.
- **Concerns about generative AI:** Concerns about the use of generative AI in education include diminished academic integrity, reduced student effort, and potential job replacement for teachers.

You Try It: Generating Writing Prompts With Large Language Models (LLMs)

Use a large language model (LLM) like ChatGPT or Google Gemini to brainstorm “bell ringer” writing prompts for students.

What You’ll Need:

- Access to a computer with Internet connection
- An account with a Large Language Model (LLM) platform such as the following (other LLMs might be available depending on your region and preferences):
 - ChatGPT (<https://openai.com/chatgpt>)
 - Google Gemini (<https://gemini.google.com>)

Instructions:

1. Choose your LLM platform and create an account (if needed) or log in to your existing account.
2. Decide on the type of writing prompt you want to generate. Think about the writing skills you want your students to practice, the genre you’re focusing on, or the theme you’d like to explore. Here are some examples:
 - Process prompts: Explain an experiment, how to solve a mathematical equation, or the process for a bill to become a law.
 - Narrative prompts: Generate a story starter with a specific setting (e.g., a futuristic city on Mars), a character description (e.g., a robot with a secret), or a conflict (e.g., a missing object with magical powers).
 - Descriptive prompts: Describe a character, a place, or an object in detail, using all five senses.

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- Argument prompts: Write a persuasive essay on a controversial topic (e.g., Should schools have uniforms?).
 - Poetic prompts: Generate a poem with a specific rhyme scheme or meter or based on a particular image or emotion.
3. Craft your prompt for the LLM. Be clear and specific about what you want the LLM to generate. Here are some tips:
 - Start with a clear instruction. For example, “Generate creative writing prompts for bell ringer activities.”
 - Provide additional details if needed. For example, “Students are currently learning about mitosis.”
 - Consider the age and skill level of your students. For example, “Design this for multiple abilities and provide differentiated options.”
 4. Input your prompt into the LLM platform. Follow the platform’s instructions on how to submit your prompt.
 5. Generate and review the prompts. The LLM will generate one or more writing prompts based on your input. Review the prompts and choose the ones that are most appropriate for your students’ needs.

Additional Tips:

- You can experiment with different prompts and refine them based on the results you get.
- Consider using the generated prompts as a starting point and then adding your own creative twist to them.
- Discuss the generated prompts with your students and have them explain why they find them interesting or challenging.

Questions for Reflection

1. Which concern about generative AI in education worries you the most? Why?
 2. What aspect of using generative AI in education are you most excited about?
 3. Is there a risk that AI could become another burden on teachers, requiring them to learn new skills and navigate complex software? Explain your thoughts.
 4. After reading Chapter 1, what new ideas or possibilities do you see for using generative AI in your classroom?
- Follow the link or scan the QR code for more helpful resources related to the content found in Chapter 1.



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