



# The Future of Artificial Intelligence in Special Education Technology

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## Abstract

This manuscript presents a preliminary discussion of Artificial Intelligence (AI) as a disruptive technology with the potential to significantly change special education practices. The article begins with a brief description of the development of AI. The authors recognize our assertions are subjective and require further research. Several references are not peer-reviewed because educational research takes years to conduct, analyze, and disseminate outcomes. In this manuscript, we discuss current software used for writing with students in special education and discuss similarities and differences with AI software. This discussion is followed by questions and examples related to implementation, ethical and policy considerations, and preservice special education teacher preparation. The article concludes with future considerations for how AI will impact the special education technology field.

## Keywords

special education technology, artificial intelligence, disability, policy, K-12 education, preservice special education teacher preparation

In this article the authors provide a brief discussion of the history of artificial intelligence (AI). They examine what AI software can do, as well as factors to consider in the field of special education technology and teacher preparation. The authors also discuss what AI might mean for the future of students with disabilities. Implications of AI software's ability to support individuals with physical challenges, speech, language, and visual impairments are discussed. The authors contend it is essential to consider the affordances and limitations of AI as a new, potentially beneficial, tool in need of extensive research as our field evaluates its efficacy for students with disabilities before we ban its use in schools (Biron, 2023). While the implications of AI on special education evidence-based practices remain unclear, the need for AI policy considerations and future research in schools is critical.

## Introduction

Millions of people across the world are using Artificial Intelligence (AI) to increase efficiency, automate processes, and relinquish time for other tasks (Lametti, 2022). Artificial intelligence can be defined as a system of computers and machines working collaboratively to emulate logical human cognition (Tai, 2020). These AI applications are especially salient for individuals with disabilities, many of

whom use assistive technology features (e.g., speech-to-text) within their smartphones and other technology-enhanced devices to engage with their environment (Fernandez-Batanero et al., 2022). Most of us utilize AI daily, whether we know it or not. Shopping, social media, ride sharing, travel, and searching the Internet, are each influenced by AI.

The history of AI dates to 1943 when British Mathematician Alan Turing developed the first programable digital computer. He later proposed the Turing Test to measure a machine's ability to emulate human intelligence by solving complex problems. The first artificial neural network was developed in 1956 by psychologist Frank Rosenblatt. Neural networks are computer systems modeled after the human brain and capable of making decisions based on data (Kumar & Thakur, 2012). The speed and

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accuracy of machine-based decisions improved with the evolution of central processing unit speeds and random-access memory storage.

IBM's Deep Blue computer defeated world chess champion Garry Kasparov and the first self-driving car was developed by Carnegie Mellon University in 1997. By 2011, IBM's Watson computer defeated two Jeopardy! champions. Google's AlphaGo defeated the world's best player at "Go" in 2017. "Go" is a complex strategy game originating in China and considered incredibly difficult to master. Each of these events are considered major milestones in AI's development.

These milestones would not have been possible without machine learning and a subtype known as deep learning (i.e., modern AI), which uses large datasets to learn and make decisions. Additional information about machine and deep learning can be found at <https://www.mathworks.com/videos/introduction-to-deep-learning-machine-learning-vs-deep-learning-1489503513018.html>. Deep learning has been used in a variety of applications, including image recognition, natural language processing, and autonomous vehicles.

Artificial intelligence has been used in a variety of educational applications and has recently caught headlines in the news (Stokel-Walker & Van Noorden, 2023). Artificial intelligence-based tutoring systems have been developed to provide personalized instruction to students (e.g., <https://www.tutorai.me>). These systems use student's performance data to adjust future instruction based on their individual needs. AI-based assessment systems also have been developed to provide feedback to students and teachers (e.g., <https://theresanaiforthat.com/s/Assessment/>). These systems can use data from the student's performance to provide individualized feedback on their progress and suggest areas for improvement.

Generative AI has the potential to revolutionize the way students with disabilities learn. AI-based tutoring systems can provide personalized instruction (e.g., <https://tutorly.ai>) for students with disabilities, allowing them to learn at their own pace. AI-based assessment systems also can provide supports for teachers (e.g., <https://educationcopilot.com>), helping them to identify areas of improvement and adjust instruction accordingly. AI-based assistive technologies also can be used to provide support to students with disabilities, such as text-to-speech software and voice recognition systems.

Artificial Intelligence is increasingly considered as an option in education due to its potential positive impact on learning outcomes and everyday life. AI-enabled software applications can recognize patterns, analyze data, and identify trends faster than humans. For example, Alexa or Siri leverage AI to generate responses to verbal data received from users. The future of generative AI will allow special education teachers to quickly adjust educational practices and allow IEP teams to make data-informed decisions with greater speed and accuracy than ever before (Herman, 2022).

## AI for Writing

The authors now turn their attention to AI software designed to enable students with disabilities to create coherent and cohesive written text. We note the context (i.e., AI and writing) is not the point of the argument, but it presents a relevant example. We contend single point and generative AI are disruptive technologies with the potential to alter and enhance the performance of students with disabilities across all subject areas, from the performance arts to English, history, math, and science.

The application of AI during writing instruction can enhance both output and outcomes during the writing process. For years, writing instruction focused on planning, drafting, editing, and publishing (Evmanova & Regan, 2019). Technology enhanced graphic organizers such as WeGotIT! and Corgi were designed to help students identify a writing prompt and plan for an essay by articulating their goal and how they would achieve it. For example, using WeGotIT!, students choose a purpose for their writing, then select a goal from a dropdown menu including: (1) 3 facts, 1 elaboration, (2) 3 facts, 2 elaborations, or (3) 3 facts, 3 elaborations. These steps are followed by a chart scaffolding the drafting process.

Students complete a chart, which requires them to identify their claim, followed by the selection of transition words to the first fact with subsequent elaboration. The chart is comprised of several columns, each leading the students to develop sentences to support the main idea of a paragraph. This process continues until the final fact has been elaborated upon in the manuscript. In the final section of the chart, students complete a conclusion or summary of their argument. The student can then use word processing software along with spelling and grammar software, such as Grammarly, another AI-enabled tool, to compose a final product by editing and publishing the manuscript (See Figures 1–3).

The need for a process, such as the one provided by WeGotIT! remains relevant, but how this process might change with the introduction of AI is at the center of great interest, controversy, and discussion in the field (D'Agostino, 2023). Is using WeGotIT! cheating? Is the use of Grammarly to ensure correct grammar cheating? The authors have been experimenting with different forms of AI writing software over the past several months. This interest accelerated with the release of Chat GPT API. At first glance, these AI-enhanced tools are mesmerizing with their speed and general accuracy. Several of our graduate scholars left our demonstration of the products holding their heads in their hands, mouths agape, unable to speak when hearing the output of the text produced. Several articles also emerged in the popular press about what it means for essay writing and other tasks formerly in the domain of humans when they can be produced in seconds by an AI agent. Consider the following ChatGPT (ChatGPT, 2023) response to the same prompt used in the images of WeGotIT! above. The AI software produced a technically accurate 1000-word essay in 36 seconds (See Figure 4).

**Project WeGotIT! Graphic Organizer**

Name: [REDACTED] Date: 01/10/23

**Prompt**

**Choice A (if needed):** Write a 1000-word scientific argument about why many of the settlers in the Jamestown, Virginia colony died during the first 5 years after it was founded. Cite evidence for your claims in the text and in a references section using APA 7 formatting.

**Choice B (if needed):** Click here to enter text.

**1 Pick your goal:** I will include 3 facts and 3 elaborations.

Figure 1. WeGotIT! prompt.

This type of tool can be life changing for people with disabilities much like standardized accessibility features found on the Internet meeting W3C (<http://www.w3.org>) standards today. For example, one increasingly popular use of AI is natural language processing (NLP), which could be considered a natural extension of the speech-to-text assistive technology students with disabilities have been using for writing tasks for decades (Ok et al., 2022). Examples include NLP as an AI technology that helps machines interpret human language by developing voice-driven applications. For example, Amazon's Alexa uses NLP to understand user commands and carry out tasks such as setting alarms and playing music or turning on the lights.

Artificial intelligence bots also answer customer queries and generate recommendations or advice. Artificial intelligence-based virtual assistants like Apple's Siri, Microsoft's Cortana, and Google now use NLP to interpret speech (Chowdhary, 2020). Another example is the creation of AI companions to help provide affirmations, increase social communication, and provide positive statements to students with disabilities. These types of AI tools using NLP can alleviate the need for reinforcement from adults, while helping increase self-regulation skills (Hughes et al., 2022). The field of special education needs to consider their role in advocacy for tools that others fear that change the playing field for the populations we serve. For example, the field might ask, "How does an AI-enabled tool provide opportunities for access and equity for people with disabilities?"

### Is AI a Prosthesis, or is it Something More?

Artificial intelligence has the potential to act as a cognitive prosthesis, a construct first identified by Edyburn (2006), to assist students with disabilities by providing new opportunities to learn and develop skills. Cognitive prostheses are

devices or systems that substitute or compensate for cognitive functions disrupted or impaired due to an injury or illness. Artificial intelligence has the potential to amplify, complement, and enhance the cognitive potential of learners with disabilities, providing an adaptable tool to overcome diverse challenges across formal and informal learning environments (van Boxtel, 2018). For example, an individual with a physical impairment in their home might say, "Alexa, turn down the music", rather than struggling to adjust the volume using a remote control. Conversely, an individual with a hearing impairment may use an app on their phone to turn down ambient noise in a classroom to hear their teacher more clearly, while a student who has limited physical ability to type might use speech-to-text to create a more efficient process to translate their thoughts into writing.

Artificial intelligence can be used to support students with disabilities in a variety of ways (Barua et al., 2022). For example, AI-enabled chatbots can respond to simple student queries, freeing up teachers and educational assistants to focus on increasingly complex student needs. Artificial intelligence-enabled computer vision systems can detect a variety of physical behaviors, including emotional expressions and gestures, which can be beneficial for students with autism or emotional impairments (Asthana & Gupta, 2019). Furthermore, AI-enabled artificial instructors can deliver personalized learning experiences tailored to the needs of the individual learners by providing adaptive experiences tailored to individual needs (Chen et al., 2020; Devi et al., 2022).

For example, AI could identify three pathways for a student to achieve the objectives of the lesson. This approach could provide multiple pathways for assessment; using AI to strengthen the effectiveness of academic accommodations, such as providing students with digital tools to assist with

notetaking, organizing and planning, or providing them with prompts to remind them of upcoming assignments. These cognitive agents and AI assistants are particularly relevant as special education teacher shortages and inadequate pay continue to plague the profession, resulting in unmanageable caseloads and underserved students (Billingsley & Bettini, 2019).

## Ethical Concerns of Using AI in Education

The news is filled with ways AI is materializing in inclusive classrooms across the world. AI technologies such as robotic teachers, interactive learning platforms, and intelligent tutoring systems help students with disabilities learn more efficiently. However, when introducing AI into classrooms, ethical implications associated with the technology are essential considerations (Dwivedi et al., 2021).

Concerns about the use of AI in K-12 settings have led to the creation of a journal focused on a critical topic to consider, *AI and Ethics*. The purpose of this journal is, “to promote informed debate and discussion of the ethical, regulatory, and policy implications that arise from the development of AI”. Akgun and Greenhow (2021) discuss the potential issues in K-12 noting concerns of bias, surveillance, autonomy, and privacy all having implications, which vary with the age and grade level of the students engaged in the AI environments (Sijing & Lan, 2018). For instance, there is the issue of privacy. Students may be uncomfortable when their personal data is collected and analyzed by a computer system. Furthermore, some AI systems are designed to analyze and detect patterns in student data, which can lead to bias and limit perceptions of student performance.

Ethical issues could be exacerbated by disclosing a disability. Therefore, beginning an open dialogue about AI and its implications for individuals with disabilities is critical. In addition, IEP teams should discuss how it can support teachers and learners while creating an ethical learning environment. AI’s primary use in educational contexts is to provide learning assistance to students. AI systems have the potential to collect and analyze student data, such as academic performance, learning preferences, and social interactions. This multi-modal data can provide personalized instruction leading to increased student engagement while improving academic performance (Liao & Wu, 2022).

Another ethical issue associated with introducing AI in inclusive classrooms is consent. While AI systems can potentially help students learn more effectively, students may not adequately understand the implications of the technology, such as what data the AI system is collecting, how it is being stored, and who has access (Ali et al., 2019). Technology coordinators, administrators, special education teachers, and parents need to ensure students with disabilities are aware of the implications of using the technology. Students should be taught about data privacy and cyber-security, so they are aware what data is being collected, who has access to it, and who

owns it. Students, educators, and parents should understand potential risks associated with using AI, such as the potential for bias, discrimination, or data breaches. Parents should discuss the ethical issues associated with AI and make family decisions about whether an AI-enabled school is the best choice for their child.

Special education teachers also need to be aware of their own beliefs and values to ensure they use AI in an ethical manner. This means teachers need to assess the potential risks by asking questions such as: Does the AI system comply with the students Individualized Education Plan? How does it align with the ethical norms of my school and district? Can the AI system provide personalized instruction while being respectful of diverse student backgrounds and values? Is the AI being used to enhance the learning experience or replace the teacher? Finally, special education teachers need to be cognizant of the potential for bias and discrimination within AI systems.

## AI in Formal K-12 Settings

The potential impact of AI in education is not clear, but the development, use, and potential are rapidly evolving. Many educators in classrooms today are not familiar with the range of AI capabilities. The authors interviewed a convenience sample of K-12 colleagues for their input on this manuscript and received a range of responses from, “writing classes are no longer needed” to, “we need to ban this tool”. In recent weeks, some schools have returned to paper and pencil tests to assess student knowledge (Mahdawi, 2023). What does this mean for students with disabilities who need accommodations?

Interestingly, these reactions mirror what occurred with the introduction of the calculator and the computer. Educators can disagree with the use of AI, but students are already adopting this tool as part of their academic lives. Understanding how AI can be leveraged during the learning process is crucial as AI continues to emerge in the field of special education.

In a systematic review of the AI literature in education, tools reviewed included intelligent tutoring, machine learning, language processing, robotics, data mining, and deep learning (Zafari et al., 2022). The impact of AI for teaching a student with a disability to write verses how it might be used to scaffold creative thinking is unknown at the time of this publication. Therefore, a relationship is provided to illustrate how ChatGPT writing technology compares to other disruptive technological inventions in society and for reflection of readers on the potential impact, implications, and accessibility aspects of this emerging tool.

Consider the invention of the automobile, the calculator, or even a simple application called Photomath, which can calculate any mathematics problem and illustrate each of the steps used to solve the equation. How is the potential use of ChatGPT concepts in K-12 education similar? When automobiles were invented, no one thought about a speed limit or the impact of the Internet on privacy. These concerns could not initially be addressed or realized without both envisioning the



future based upon this technological disruption and evolving as the automobile and Internet became ubiquitous in daily life.

Another example is the use of AI assistants in our homes (e.g., Alexa, Google Home, etc.), which are common in homes across the country. How will these tools be adopted in K-12 education for students with a diverse range of abilities? The same question should be asked for AI writing software. Should it be banned? Technological disruptions such as ChatGPT can make the world easier to navigate by reducing cognitive load associated with complex tasks such as gathering, evaluating, and summarizing copious amounts of research (Mayer, 2014).

Today we know the implications if someone does not wear their seatbelt, crosses over the medium, runs a red light, and the potential impact on our planet from automobile emissions. Using the same lens, ChatGPT could support K-12 learners, but will it? Greene (December, 2022), a Senior Correspondent for Forbes, noted, "ChatGPT doesn't mark the end of high school English class, but it can mark the end of formulaic, mediocre writing performance as a goal for students and teachers. That end is long overdue." (para. 13). When the calculator, which was the precursor to machine learning, was invented, educators made a shift in how they understood mathematics. The same was true when we began to use audio books as options for reading. For those who were blind or could not process text, reading became about understanding content, not about pronouncing words.

What does this mean for AI? Does this mean the end of foundational writing strategies such as those developed by the University of Kansas Center for Research on Learning, the strategies provided by the IRIS Center at Vanderbilt, or the substantial work by Graham and Harris in SRSD writing strategies are no longer needed? Graham and Harris (2016) pointed out teachers should facilitate students' writing as they compose. They called for students to work together as they plan, compose, edit, revise, and publish.

How does AI change these processes? It allows students to start their work at the editing phase and work backwards. For example, they could use ChatGPT to ensure the goal of the article is clear, fact check the information, make sure the AI-enabled passage provided for adequate transition statements between ideas, and finally ensure the summary is consistent with the facts and elaborations. In the words of a middle school student with dyslexia we interviewed, "This [ChatGPT software] could have saved me 2 weeks of time searching for articles on Google! Why should I bother when this can write the entire paper in less than a minute?"

Consider how teacher educators use Graham and Harris's work to teach writing as a series of steps: plan, organize, compose, edit, etc. Now consider Universal Design for Learning and the idea of multiple pathways. Using AI, teachers can provide students with options in their approach because a linear progression during writing is no longer necessary. Students of all abilities have choices about how they will engage with the writing task.

We would argue the writing process remains an essential component of cognitive development, much like learning to read. However, while technology-based graphic organizers may be the answer for a majority of students, some may be unable to hold a pencil, type on a keyboard, or compose a logical progression of thoughts even with intensive interventions. For these students, ChatGPT may be a better option.

## Who is the Author?

One question K-12 and publication experts will have to answer is who should be listed as author of this text? Does ChatGPT need to be cited or is it the mind of the learner or writer who created the prompt for the text, which made the computer create the text, and therefore, the passage is their work. Perhaps the future of ChatGPT will allow the human brain to scrutinize text in a way we have yet to consider. We are certain potential benefits and pitfalls await and the field needs to ensure that these considerations include people with disabilities at the center of the discussion.

To further illuminate this potential in K-12 education and the potential for students with disabilities two different prompts are provided with a citation that is not yet approved, so we are unsure how to cite it. Perhaps APA 8 will provide the answer. Will ChatGPT be a co-author, with first author guidance or does ChatGPT get credit at all? The following prompts were generated by asking ChatGPT using the following question with different parameters, "How will Open AI impact K-12 education." The only parameter in this example was the number of words.

ChatGPT has the potential to revolutionize K-12 education. By leveraging artificial intelligence (AI) and machine learning, ChatGPT can provide students with personalized learning experiences that are tailored to their individual needs. ChatGPT can help teachers create more engaging lessons by utilizing natural language processing, computer vision, and other AI technologies to better understand student behavior and preferences. This would allow teachers to make adaptive changes in real time based on feedback from their students. For example, if a student is having difficulty understanding a concept or struggling with an assignment, ChatGPT could recommend additional resources or modify the lesson plan accordingly. In addition, AI-driven tools could be used for formative assessment purposes so that teachers know where each student stands in terms of mastery.

For the next passage ChatGPT was provided the same prompt but asked to create a passage at a 2000 Lexile level. This text is more complex and interesting with each text offering a different response.

ChatGPT is an artificial intelligence (AI) research laboratory that was established in 2015 with the goal of "advancing digital intelligence in the way people interact with technology." ChatGPT's mission is to develop open-source artificial general intelligence

for everyone and not just a select few. As this new form of technology begins to become more commonplace, many are beginning to explore how it can be used to revolutionize education and improve learning outcomes for students. ChatGPT has already started making its mark on K-12 education by introducing innovative ways for students to learn. For instance, ChatGPT recently launched a program called GPT-4 which uses natural language processing (NLP) algorithms and machine learning techniques to generate text from given prompts.

Can you tell if the above passages were written by the authors of this article or ChatGPT, 2022? This question, along with many others remain. For example, are AI generated books owned by the author of the prompts? Does the field allow AI to dictate the most important aspects of our field? Will AI reduce solutions to the least common denominator? The future of this work in K-12 education and the role of people with disabilities using AI-enabled platforms is yet to be realized, understood, and imagined.

Many researchers have argued existing curricula, programs, interventions, and methods do not address learner variability adequately. Todd Rose's now famous book, *The End of Average* (2015), argued the average learner was a statistical convenience, as opposed to actual learners who vary on many dimensions related to learning. Programs designed for the average meet the needs of no one particularly well and leave many out. The growth of interest in Universal Design for Learning (UDL) and personalized learning in many facets of education show how this idea has taken hold. Where would ChatGPT fit into this equation? If a class of 30 submits the same prompt for writing, the AI-enabled tool will produce similar, but not identical, output for all of them. Is the AI with ChatGPT creating a new average, which is regressing to the mean, but does not reflect learner variability?

Alternatively, will future versions include background information, personal voice, and experience to enable the AI application to produce truly individualized responses? In the case of writing, student work provides data to teachers about the students' conceptual understanding of a topic, text structures, grammar, vocabulary, and voice. Students receive feedback on these topics and, hopefully, their skills improve over time. ChatGPT changes the type of analysis that could be used, the kind of feedback produced, and how the student could improve.

We have more questions than answers related to bias, application, ethics, attribution, use, and more. We posed the following query to ChatGPT to provide some questions for further consideration: Write 10 questions related to the use of AI like ChatGPT in education. It produced the following:

1. How can AI like ChatGPT be used to enhance the learning experience for students?
2. Can AI tools like ChatGPT be used to personalize the learning experience for each student?







3. How can AI tools like ChatGPT be used to supplement traditional teaching methods in the classroom?
4. Can AI tools like ChatGPT be used to provide additional support and resources for students struggling with certain concepts?
5. How can the use of AI tools like ChatGPT be integrated into the curriculum in a meaningful way?
6. What are the potential benefits and drawbacks of using AI tools like ChatGPT in education?
7. How can the use of AI tools like ChatGPT be evaluated and measured for effectiveness in education?
8. How can AI tools like ChatGPT be used to enhance the teacher's ability to provide individualized instruction?
9. How can the use of AI tools like ChatGPT be used to support the development of higher-order thinking skills in students?
10. How can AI tools like ChatGPT be used to support the differentiation of instruction for diverse learners?

These questions are a start. K-12 education has reached a crossroads where we must reconceptualize instruction in the field of special education. We must decide how to best advocate for the use of AI tools, much like occurred in the past decade for text-to-speech, scribing, and calculator use as standard accommodations for people with disabilities. What are the affordances, challenges, and ethical dilemmas associated with this new tool (e.g., much like a need for seat belts and speed limits emerged with the introduction of the automobile)? As a field, we should reflect on the possibilities for students with diverse abilities and students with limited access to advanced or even qualified teachers in writing. We should also consider first-generation students whose parents may struggle with writing or those who struggle to physically produce text.

The fear is no one will know when a written response is from a human brain or ChatGPT unless we are educated about this tool. Banning a potentially transformative disruptive technology is rarely the right approach, but perhaps thinking creatively about the parameters of use and the meaning for students in K-12, individuals with disabilities, and higher education should be considered and discussed in a public forum such as <https://community.ciddl.org>

## Considerations for Higher Education and Personnel Preparation

For years academics have noted concern over how AI will impact society, from taking over small tasks (e.g., writing), to eventually replacing the human workforce (Huang & Rust, 2021). Since the release of public beta ChatGPT, opinions have already declared the use of AI for writing cheating (Reich, 2022), while others have highlighted unique ways to integrate AI into course writing assignments (Lametti, 2022).

	 <b>Main Points</b>	 <b>Sentences</b>	 <b>Check Your Work!</b>
 <b>Identify your claim</b>	The founding of Jamestown	Click here to enter text.	<input type="checkbox"/> included my claim.
 <b>Determine 1st fact</b>	Click here to enter text.	First, <input type="text"/> click here to enter text.	<input type="checkbox"/> included 3 facts to support my opinion.
 <b>Elaborate with evidence</b>	Click here to enter text.	Choose an item. <input type="text"/> click here to enter text.	
<b>Determine 2nd fact</b>	Click here to enter text.	Choose an item. <input type="text"/> click here to enter text.	

**Figure 2.** WeGotIT! essay organization chart.

One professor noted on Facebook he caught a student using ChatGPT to write a term paper and charged him with plagiarism (Hick, 2022). Whether using ChatGPT to write a term paper is plagiarism or simply technology-enhanced performance is yet to be determined.

Artificial intelligence is increasingly replacing traditional teaching methods of content delivery (Popenici & Kerr, 2017). Special education teacher preparation programs must reconsider how we prepare future teachers. The authors asked ChatGPT for some ideas. When provided the prompt, “Given the future use of AI, what are some considerations for preparing future educators and special educators?” ChatGPT gave the following answer. None of the words in these seven considerations have been edited.

1. Equip educators and special educators with the knowledge and skills to understand and use AI in the classroom. This includes understanding the various types of AI, the ethical considerations, and the potential applications of AI.
2. Provide educators and special educators with the opportunity to explore how AI can be used to support personalized instruction and how AI can be used to identify student learning needs.
3. Educate educators and special educators on the implications of using AI in the classroom, such as potential privacy concerns, data security, and bias in AI systems.
4. Provide educators and special educators with resources on AI-based learning and assessment tools, and how to integrate them into their teaching and assessment practices.

5. Develop guidelines and protocols for the use of AI in the classroom and for the ethical use of AI by educators and special educators.
6. Educate educators and special educators on the potential risks of AI and the ways in which AI can be managed, monitored, and regulated.
7. Encourage educators and special educators to collaborate with experts in AI to ensure that AI is used to its fullest potential in the classroom.

The concerns with AI are following the trends anticipated by authors who considered the future of these technologies in special education (e.g., Basham et al., 2020a; Basham et al., 2020b). Rushing to judgment on the use of AI within programs of higher education is not the answer without considering the short and long-term consequences, especially related to supporting individuals and students with disabilities. Additionally, those involved in personnel preparation need to begin identifying the immediate implications for supporting the preparation of future personnel. ChatGPT identified some general considerations to begin the conversation. However, comprehension of the benefits and limitations of AI will only occur when research examines the implementation protocols and outcomes thoroughly. We have not yet begun to examine the impact of this disruptive technology.

For those of who have studied the role of technology in education and society, the historical laws of Kranzberg seem to still stand true (Pitt et al., 2021). Kranzberg’s six laws included:

1. Technology is neither good nor bad; nor is it neutral.

### The basics

Mispellings and grammatical errors can effect your credibility. The same goes for misused commas, and other types of punctuation . Not only will Grammarly underline these issues in red, it will also showed you how to correctly write the sentence.

Underlines that are blue indicate that Grammarly has spotted a sentence that is unnecessarily wordy. You'll find suggestions that can possibly help you revise a wordy sentence in an effortless manner.

**Figure 3.** Grammarly example.

2. Invention is the mother of necessity.
3. Technology comes in packages, both big and small.
4. Although technology might be a prime element in many public issues, nontechnical factors take precedence in technology-policy decisions.
5. All history is relevant, but the history of technology is the most relevant.
6. Technology is a very human activity – and so is the history of technology

The development of AI is neither positive nor negative. It was developed out of the necessity to support society's information age. To date, the AI packages released (e.g., ChatGPT) are simple and intended to support the greater learning of the AI itself while also helping society grasp the coming age of AI. Clearly, the field of future special educators needs to be informed about the ethical considerations previously cited. Moreover, the field needs to understand how to communicate and advocate this information to parents, administrators, policymakers, and students effectively.

Artificial Intelligence enables practitioners to shift their focus from providing remedial instruction interventions to empowering students with disabilities using compensatory strategies (e.g., ChatGPT), which will continue to advance as students leave school and enter the workforce. Special education technology has paved the way for education and other fields through the development and integration of assistive technology in phones, computers, cars, watches, etc., combined with digital accessibility guidelines and design frameworks, such as UDL.

Artificial Intelligence, while complex, is the next disruptive technology we must embrace in special education and teacher preparation. If those of us in higher education jump too quickly to ban this technology, because it interferes with the term paper assignment in one of our classes, we are reinforcing a position that will either directly or indirectly impact how

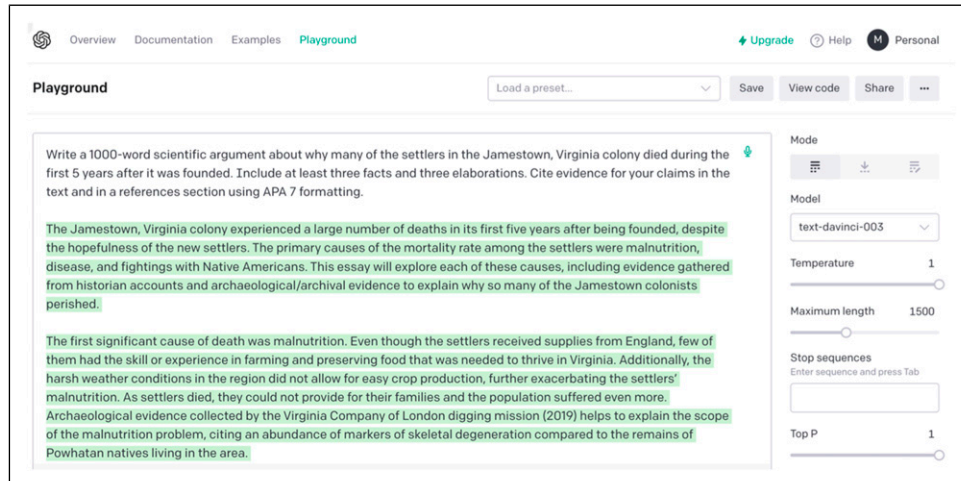
individuals with disabilities are supported. Our field should instead reflect on the greater implications for individuals and students with disabilities prior to haphazardly deciding the future of AI in higher education.

### Implications for Policy

Technology advancements with the goal of improving human life often complicate it in the near-term as affordances and constraints are identified. Artificial intelligence and machine learning have been used for some time to improve the way humans interact with their world, but the recent development of this technology poses a looming challenge to both policy and legislation regarding data privacy and use (e.g., on state or standardized assessments). Artificial intelligence technology has been used for a variety of applications such as language translation, summarization, and text analysis. While OpenAI (OpenAI API, 2023; Tomić et al., 2022) has stated the primary use of ChatGPT is to generate stories or blogs, the codebase and algorithmic design of ChatGPT (2023) have been used in many applications related to data analytics (Dale, 2021).

ChatGPT has been shown to generate accurate results using given data points and parameters, which caused fears of its potential to generate predictions that are accurate and comprehensive, often well beyond what can be achieved with existing technologies (Chan, 2022). The sheer accuracy of ChatGPT's predictive capabilities has created a serious challenge for policy lobbyists and legislators. ChatGPT raises concerns about the potential for data privacy and ethical problems arising if this technology is adopted more widely. For example, the technology could be used to gain insight into an individual's behavior, opinions, and activities, leading to manipulation and unethical exploitation (Illia et al., 2022; Gibney, 2022).





**Figure 4.** Introduction to Chat API response to the prompt.

Moreover, ChatGPT could be applied to existing datasets that already contain sensitive and confidential information, creating a unique and potentially high risk of unauthorized access and misuse of that data (Katrak, 2022). Considering these pressing privacy issues and the potential risk of misuse by malicious individuals, policy makers and lawmakers must consider developing measures and regulations to bolster citizens' data privacy rights.

Most Large Language Models such as ChatGPT are developed by resource-rich organizations and are frequently kept from the public for intellectual property protection reasons. Governments and policy makers can start by introducing an open-source policy regulating the use of ChatGPT and other AI technologies. Recently, Big Science Large Open science Open access Multilingual Language Model (BLOOM) was released as a collaboration of hundreds of researchers for an open-source response to OpenAI and similar movements (Gibney, 2022). As data grows more complex, policy makers need specific regulations to protect vulnerable individuals and sectors, such as establishing clear principles for the responsible use of AI and algorithmic decision-making. Concrete measures should also be put in place such as the requirement for disclosure of data sources and data sharing protocols before any AI-influenced decision-making process can be undertaken (Chan, 2022). In addition, policymakers need to provide regulations such as data safety to ensure the safety of citizens' data while also protecting their legal rights.

Policymakers also must identify an appropriate level of transparency and accountability concerning any AI or machine language (ML) related decisions, as well as the right to access and modify data. Furthermore, policymakers should consider introducing risk assessment mechanisms to regularly review the impact of AI and ML technologies on data privacy (Chan, 2022). OpenAI, ChatGPT, and BLOOM present exciting opportunities and significant risks. Policymakers must

act responsibly and develop regulations protecting citizens' data privacy and safety by introducing measures to ensure the responsible use of AI and ML. Only then, policy makers can ensure that AI and ML is used as a tool to improve human life in a responsible, ethical, and safe way, while considering accessibility use and implications for individuals throughout all processes of legislation creation.

## Future Directions of AI in Education

The authors are both excited and cautious about the implications of AI and ML for K-12 and higher education, as well as for individuals with disabilities. During October 2022, the White House Office of Science and Technology Policy developed a blueprint for an AI bill of rights (White House, 2022). This document is designed to initiate the conversation around AI, ML, and NLP addressing the benefits and concerns the authors previously addressed. The nationally funded Center for Innovation, Design, and Digital Learning (CIDDL) by the Office of Special Education Programs initiated a set of blog posts to bring together educators interested in the topic. Here we hope to continue a democratic discussion ([www.cidddl.org](http://www.cidddl.org)) with hopes of influencing policy, research and development cycles, diversity, equity, and inclusion issues for educators, students with unique abilities, and families interested in supporting all individuals including those with disabilities.

Artificial Intelligence and ML are increasingly impacting education. For example, AI provides more efficient search results on websites to aid assessment and grading (Tomić et al., 2022). It is adept at identifying patterns and insights from data gathered from student performance. In addition, AI-enabled tools can identify new approaches to personalize learning (Molenaar et al., 2022). Artificial Intelligence also provided dashboards tailored for administrators, special

education teachers, and parents for better monitoring of student performance (Aleven et al., 2022). The use of AI can make tutoring more efficient by providing personalized content that matches the learner's ability (Bhutoria, 2022).

Machine Learning is increasingly ubiquitous in improving technology user experiences. It can provide personalized writing and grading systems involving handwritten tests (Gaillat et al., 2022). Machine learning may provide teachers a deeper understanding of students' skills and capabilities to better understand their students while providing more personalized guidance. Natural language processing has been changing the way we interact with technology in general and has made an impact on creating more interactive learning through bots that ease processes like using Amazon Alexa or Apple Siri etc., Machine learning systems also can help create customized learning paths based on learner history, interests, and goals providing many possibilities for educators when it comes to customizing education for individual learners. Developing rapidly over the past few years, with advancements like deep learning where machines learn from data itself without being explicitly programmed for specific tasks. This deep learning data enables machine learning to make better decisions autonomously.

As these technologies continue to disrupt what we know about education and human behavior, it is imperative interdisciplinary experts continue a dialogue about shaping the future of society inclusive of people with disabilities. Unfortunately, educators or individuals with disabilities are frequently excluded from the discussion when developers are creating these innovations. For example, The [National Science and Technology Council \(2022\)](#) publication, "The Networking and information technology R&D Program and the National Artificial Intelligence Office Supplement to the President's FY 2023 Budget" does not have any representation from the Department of Education and any representation of people with disabilities is not disclosed. We find both groups potentially being omitted to be a horrific oversight.

Additionally, the databases and bias built into these ML, NLP, and AI systems are of major concern. The current world of AI development is filled with graduates from many of the same universities and backgrounds. This field of developers significantly lack representation of diversity, equity, and inclusion, and the representation of those with disabilities is not clear at this time. Innovations such as AI, ML, NLP have the potential to benefit all of humanity. However, when these tools are developed by a select group of people with similar backgrounds and histories the result is serious limitations in who can and will benefit from these tools.

A lack of diversity has been present throughout modern AI's development (Adams & Khomh, 2020). This needs to change. To initiate this change, we recommend a slowdown in

the development cycle. Most investors and companies are seeking rapid iterative development. When delivering return on investment takes precedence, developers are under constant pressure to deliver "brand new, shiny products and services" on a tight schedule coordinated with shareholder meetings. Currently no incentive exists to prioritize safety, equity, privacy, and ethical concerns and access for people with disabilities, over rapid development cycles. As content developers for our most vulnerable populations, we should allow time for research, development, reflection, and iteration.

## Conclusion

The recent developments of OpenAI, ChatGPT and BloomAI are the most recent developments in the rapid application of AI to education. Each day brings a new media post musing or lamenting the implications of AI for the future of teaching and learning for all students. No doubt this surge is just the beginning of the evolution of AI-enabled platforms and tools. AI will continue to develop more sophisticated solutions. We need to address the many issues described in this paper related to policy, bias, authorship, privacy, teaching practices, and assessment. We posed many questions that we do not have answers for.

These foundational questions are meant to initiate a reflection on this disruptive technology. More questions will emerge as we engage in critical conversations. We propose calls for banning these technologies are misguided as they could eliminate tools critical to the range of learners we care about in special education. Technologies hold promise and even untapped potential to assist students with disabilities, to increase access, and to impact student achievement. The challenge for us, in the field of special education, is to imagine the unique contribution of human beings combined with AI agents in the world of education and the workforce for all, inclusive of individuals with disabilities.

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Video games he co-developed with funding from IES and NSF projects are featured as exemplar science learning games by the U.S. Department of Education in the publications “Re-imagining the Role of Technology in Education” and “Future Ready Learning”. He has presented this work nationally and internationally with more than 80 peer reviewed and invited presentations across three continents.

**Eleazar Vasquez III** is the director of the Toni Jennings Exceptional Education Institute and professor of exceptional student education in the College of Community Innovation and Education at the University of Central Florida. The goal of this research is to understand how K-12 and postsecondary students with and without disabilities can effectively learn science, technology, engineering, and mathematics (STEM) content using innovative technologies (e.g., AI, AR, VR, video gaming, and mobile applications) through interdisciplinary collaborations, lean startup models, and universal design for learning framework. Nationally he serves on Executive Board member for Center for Applied Special Technology (CAST), the Universal Design for Learning Implementation and Research Network (UDL-IRN), and a technical reviewer for NSF and IES.

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