What PreK–12 Teachers Should Know About Educational Technology in 2023: A Research-to-Practice Anthology

Edited by
Richard E. Ferdig, Richard Hartshorne, Emily Baumgartner,
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Thanks to our family, friends, and colleagues who supported us, the authors who went through a fast but rigorous publication process, the reviewers who reviewed manuscripts, and all the teachers, teacher educators, teacher professional developers, administrators, and students who continue to do educational wonders.

But test all things.
Hold on to what is good.
1 Thessalonians 5:21 (CSB)

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Generative AI Technology to Support High School Students Experiencing Challenges With Writing

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Writing is an important aspect of language development that some students find challenging to master. Schools and teachers play an important role in supporting students' writing progression. Part of this role includes the facilitation of, and access to, resources that can support students who are experiencing challenges in producing written text. This chapter examines the ways in which artificial intelligence (AI) tools can support high school students' writing and, more specifically, students who are performing below their grade level. New AI writing tools can alter both how students write and what they need to learn to become capable writers. The tools are becoming more sophisticated and are beginning to have an impact in schools. The AI tools featured in this chapter include editing tools and text generators. Throughout the chapter, examples are provided to demonstrate how the tools can be incorporated into high school lessons. Some limitations of AI tools to support writing are outlined, including ethical issues. Specific considerations for teachers seeking to incorporate AI technologies are presented. An appendix includes links to further information related to school policies, ethics, and AI in education discussion groups.

INTRODUCTION

Writing challenges impact approximately 15% of the school-age population and children who fail to develop age-appropriate writing skills are at a significant disadvantage (Dockrell et al., 2019). Students experience challenges in producing written text for a variety of reasons. This includes diagnosed conditions such as dysgraphia and expressive language disorders, through to gaps in learning due to high absenteeism or poor instruction in the early years (Westwood, 2008). Regardless of the underlying cause, the challenge for high school teachers is to ensure these students can actively participate in lessons alongside their peers and are provided with feedback and strategies that will empower them to continue to improve and build their writing skills.

The release of ChatGPT in late 2022 has brought about lively debate on the use of AI in education settings. In this chapter, we explore the ways in which generative AI tools support differentiation and personalised learning for students experiencing challenges with text production. We critique the technologies for their potential to support writing and conclude by identifying pertinent considerations for educators seeking to incorporate the affordances of AI tools to support high school students who are experiencing difficulty with writing tasks.

RESEARCH REVIEW

There is a long history of assistive technologies being used to support people with special education needs. Handheld lenses were used for people with visual impairment as far back as 1000 A.D. (Robitaille, 2010). In more recent history, since the early 1980s, students with disabilities have benefited from computer-assisted instruction (CAI) and word processing features (such as spell check and word prediction), alongside multimedia technologies (Jeffs et al., 2008). The integration of online assistive tools has evolved, with many technological supports now seamlessly embedded through mobile devices (Maher & Young, 2017; Wu et al., 2020). In the mid-2020s we are currently experiencing a period of technological advancement in the form of AI tools that have the potential to assist students with disabilities and learning difficulties in new ways.

One emerging form of AI is tools that support the generation of text. According to Tate et al. (2023), AI tools like ChatGPT can support students with language or learning disabilities who struggle with writing. These tools may also encourage experimentation and increase student motivation (Kangasharju et al., 2022). New speech recognition technologies are becoming common in homes and educational settings and will become a central part of future life (Shakhovska et al., 2019). In addition, AI text editing tools (such as grammar checkers) can also support students to engage in critical reflection during the writing process (Toncic, 2020). Whilst the potential of these tools to support learning is only now emerging through empirical research, it is suggested that AI applications will provide an assistive role, rather than replacing teacher instruction (Murphy, 2019).

One way to understand the application of AI technology to support student writing is through the lens of Universal Design for Learning (UDL). While originally developed as a way of "providing access to the curriculum for students with disabilities, [UDL] has simultaneous benefits to many other students. UDL provides a vision for breaking the "one-size-fits-all" mould and therefore expands the opportunities for learning for all students with learning differences" (Edyburn, 2005, pp. 17–18). UDL incorporates multiple or flexible representations of information and concepts (the "what" of learning); multiple or flexible options in expression and performance (the "how" of learning); and, multiple or flexible ways to engage learners in the curriculum (the "why" of learning; CAST, 2023; Meo, 2008). Recognizing and responding to diversity is a core motivation for engaging in UDL practice and generative AI tools support multiple means of representation, expression and engagement through the extensive and varied levels of accommodation and adjustment these tools enable (Banes & Behnke, 2019).

IMPLICATIONS

The implications section is divided into two parts. The first section focuses on the practical use of AI writing tools to support students who are experiencing challenges with the writing process and editing. The second section is focused on the associated ethical implications and presents a list of considerations for educators when evaluating the value of AI technologies as assistive tools for students requiring additional writing support.

AI writing tools

AI technologies can provide personalised learning to assist students with SEN to engage in inclusive writing experiences that align with their peers' activities. The tools can help students develop writing skills at their own pace and in ways that work best for their individual abilities. A powerful feature of these tools is that they provide students with immediate feedback and error correction when the teacher is not directly available. Drawing on the affordances of these tools, two types of AI are examined: editing tools and text generators.

The tools used as illustrative examples in this chapter can be accessed as either a free or paid versions. The cost of the paid versions varies depending on how they are accessed and the types of features that are selected. Additionally, the cost may vary in different countries.

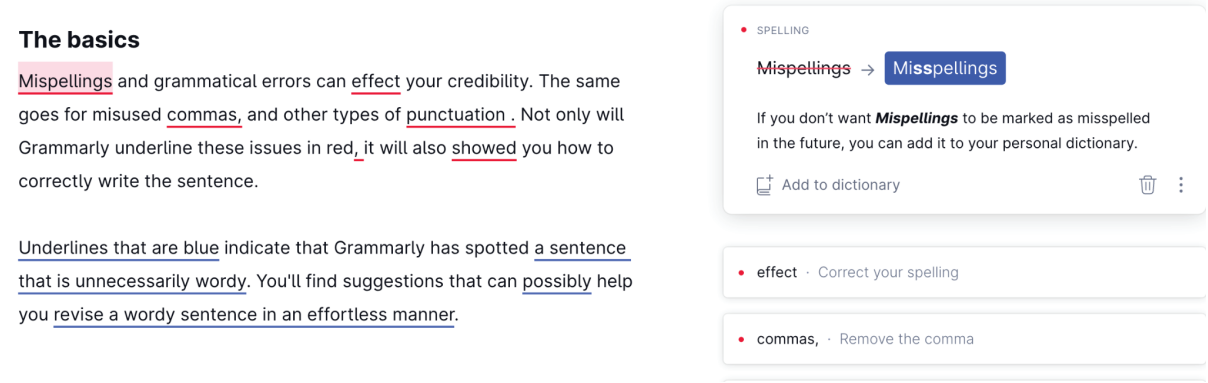
Editing tools

For students with the capacity to create texts independently, but not at grade level, several AI-powered tools provide editing assistance and can be embedded into software that students are already familiar with, such as Word, email, and social media platforms. This is useful as students are not required to learn new programs. Such tools can be exploited to explicitly demonstrate to students how their writing could be improved.

Grammarly is one such tool. Grammarly not only corrects spelling and grammar but will rephrase sentences and alert students to the tone of their writing. The use of colour-coding draws student attention to the words in the text that are being corrected, as depicted in Figure 1.

Figure 1

Example of basic Grammarly features

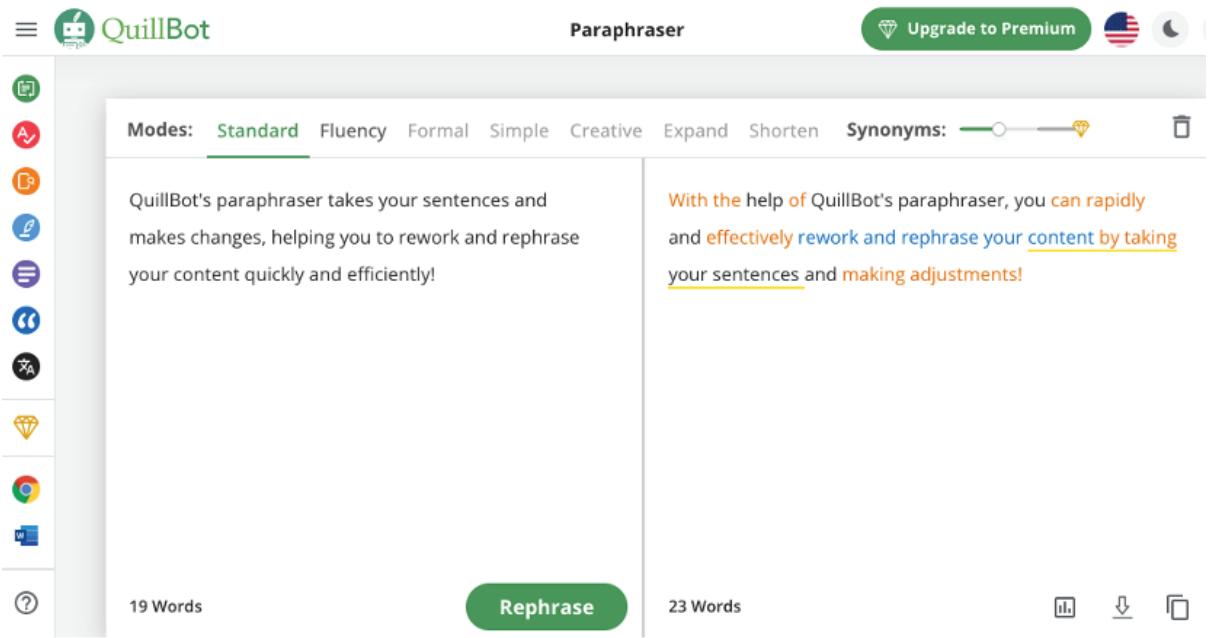


While all students could benefit from utilising a tool such as Grammarly, students requiring greater teacher instruction to master editing skills would particularly benefit. For example, in a high school English class where students are required to submit a narrative text, Grammarly could be used to support the student/s who have not developed adequate proofreading skills. Rather than waiting to receive teacher feedback at a later stage, the student/s could use Grammarly, or a similar tool, during the final revision process before handing in for marking. In final reporting, the teacher would acknowledge the accommodation that was made; noting that the narrative product was supported using Grammarly.

Quillbot is another tool that can be embedded into existing software and can rephrase text according to the author's desired tone. A benefit of this tool is having the original and revised text side-by-side, which enables students to easily compare the versions (Figure 2). This tool goes further in that it can expand or shorten the text and, in doing so, is beneficial to students who are learning how to build on their ideas or are learning how to summarise. Again, in highlighting the changes to students a form of 1:1 instruction is provided at times the teacher is not available for individual instruction.

Figure 2

Example of Quillbot with revised text alongside the original text



Quillbot could be used during the writing process. An example of this is a year 10 history class where students are writing an information report. For students in this class who find such a task challenging, Quillbot can provide just-in-time support by rephrasing student-produced text into more formal language or suggesting synonyms to broaden the student's vocabulary.

Other AI tools with similar features are WordTune and copy.ai. Teachers need to consider which tools can be seamlessly embedded into a platform a student already uses and whether a subscription is required to access all features of the tool. To be effective as instructional aids, teachers must build in a period of instruction when introducing an AI tool. During this period of instruction, the teacher will need to explicitly teach students how to use the feedback features to avoid students automatically accepting changes without consideration.

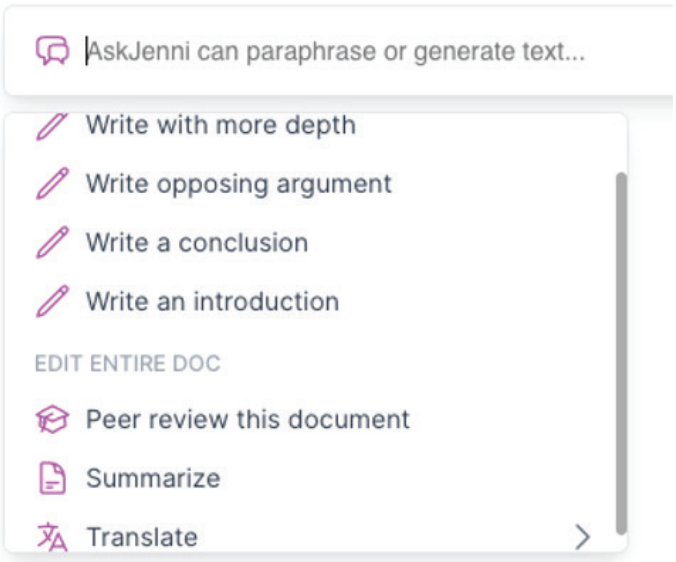
Text Generators

AI editing tools such as Grammarly, Quillbot and WordTune are useful to support students who have the capacity to write independently but struggle with spelling, grammar, and syntax. For students experiencing challenges in formulating ideas and collating new information, AI text generators may provide the support required to participate in classroom-based writing activities alongside their peers. Recently, much discussion has focused on ChatGPT. This tool enables a student to artificially generate text based on their own prompt and this text can be used as the basis for a writing task that enables the student's inclusion in a lesson. Similar tools exist, that overcome some of the current limitations of ChatGPT.

One such tool is Jenni.ai. This tool builds text based on the user's prompt but creates the text sentence-by-sentence, thereby requiring the student to read and consider each sentence before proceeding. This sentence-by-sentence approach also allows students to adjust the direction of the text relevant to their desired writing goal. During the writing process additional instructions can be provided, such as writing in more depth, or writing an opposing argument (Figure 3). These features position the tool as substantially more useful for instructional purposes, as compared to AI tools that automatically construct an entire text.

Figure 3

Sample of writing tools available through Jenni.ai



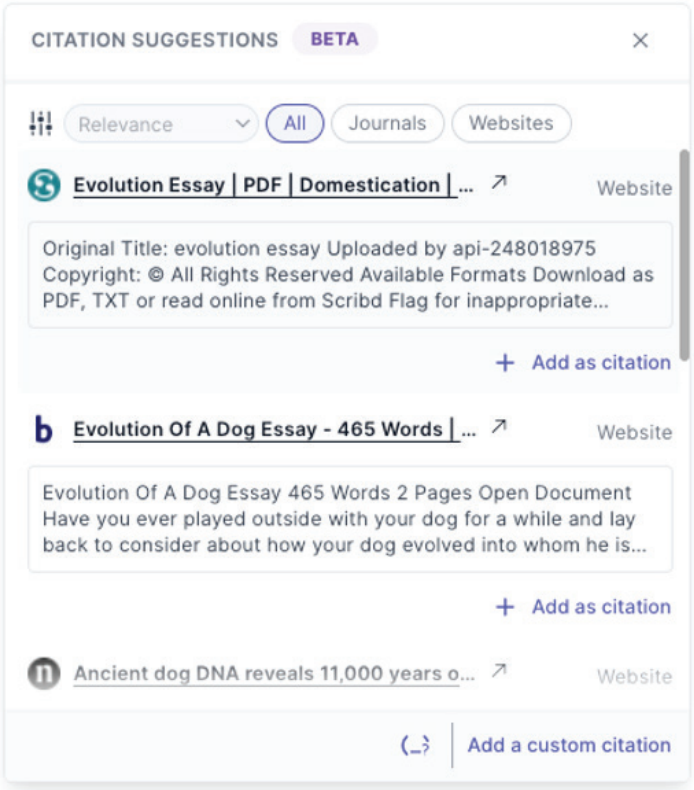
Tools such as Jenni.ai are particularly useful instructional tools for teachers wishing to focus on a specific aspect of text construction. For example, in a Year 8 English class, where students are writing persuasive texts or preparing for a debate, a student who has not mastered the necessary skills can use the jenni.ai (or similar) to assist them to formulate

an opposing argument. These tools can be used to explicitly support specific parts of the writing process that a student is struggling with, for example, writing an introduction or writing a conclusion.

Jenni.ai (and others like it) allow the user to request references (Figure 4), which is valuable for high school students learning referencing techniques. This overcomes issues surrounding the first generation of ChatGPT which produced false references. References may also be formatted into the desired form, such as Harvard or APA.

Figure 4

Example of referencing using Jenni.ai



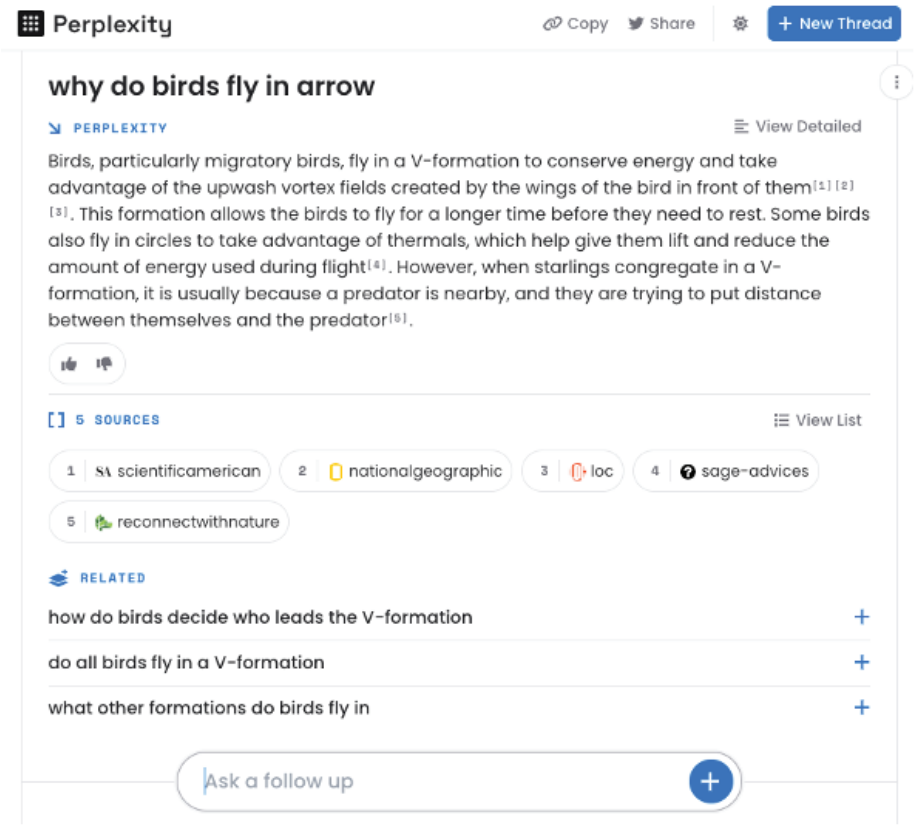
Perplexity.ai. is another tool that creates text in response to the user's prompt. It includes the references that were used to create the text and provides prompts that suggest follow-up investigations (Figure 5).

Perplexity, and similar tools, are useful to high school teachers who set assignments that require students to include reference sources. Such tools could be used by students at the outset of the writing process to help them gather appropriate resources to support their writing. Perplexity is particularly useful to students who struggle to develop a comprehensive response to assignment questions as these students can use the 'related' section, as shown at the bottom of Figure 5 to continue to generate new ideas for writing.

As with ChatGPT and Jenni.ai, we are not suggesting that students simply use Perplexity to create text. We argue that these AI tools can be used to enable a student to independently engage in classroom activities alongside their peers, where they would otherwise be unable to do so. Also, the specific features of the tools should be used to support learning, only after the student has received instruction from the teacher on appropriate use of the tools.

Figure 5

Example of Perplexity with referencing and follow-up questions



Ethical implications

The use of AI in education raises important ethical considerations that must be rigorously debated (e.g. who owns the data, privacy, broadening the digital divide). There is also concern about student learning as Tate et al. caution, "[t]eachers will have to balance the teaching of effective writing with AI and writing without AI to ensure that students build up the necessary 'muscle tone' (p. 10). The use of AI technology, like any technology, should be used to support the writing process, rather than replace it. Schools need to establish guidelines that define what level of AI assistance is appropriate for students to receive from AI tools in relation to classwork, homework/assignments, and assessment tasks.

At the time of writing, Open AI terms and conditions state that users "must be at least 13 years old to use the Services. If you are under 18, you must have your parent or legal guardian's permission to use the Services" (OpenAI, 2023). This limits the use of apps like ChatGPT to middle school or high school students, and to students where parental permission has been obtained. Other apps may have different restrictions, so it is important to investigate these before incorporating the tools into classroom practice.

Considerations

Before introducing AI technology to assist a student or group of students experiencing writing challenges, there are several considerations that must be deliberated:

1. Terms of use. Are there age restrictions? Is parental consent required?
2. Does the technology integrate with any other assistive devices the student has already mastered or requires? For example, voice recognition software.
3. Can the AI tool be used across a number of subjects/classrooms?
4. Does your school offer professional development opportunities to enable teachers to explore and understand how to use the technology?
5. Does the student have the capacity to be taught how to use the tool effectively? How long would it take to teach the student how to use the technology?
6. Who will be responsible for instructing the student on how to responsibly use the technology? When and where will this instruction take place?
7. Is the use of the tool a short-term measure or will the student require support long-term? If short-term, what strategies will be in place to transition the student to a less intrusive support?
8. Will the student have access to the technology in their homes? Is there a parent or caregiver that can support the student in the home?

Finally, it is recommended that the teaching team, including any specialist educators, brainstorm potential unintended, negative consequences. For example, lack of engagement with the writing process, over-reliance on AI, loss of creativity, or misunderstanding of concepts. A teacher then needs to weigh up the cost-benefit of introducing the technology to support inclusion over the potential negative consequences.

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APPENDIX A

AI tool descriptors

Grammarly https://www.grammarly.com/
The basic (free) Grammarly version is an online typing assistant that suggests corrections for numerous aspects of writing such as spelling, grammar and punctuation within Gmail, Facebook, Google Docs, LinkedIn, text messages, and many more services and applications. Grammarly Premium (paid) includes tools to help improve word choice and tone of writing and also a plagiarism checker. GrammarlyGO (paid) is an AI co-creator to compose, ideate, rewire, and reply, informed by your context and goals.

Quillbot https://quillbot.com/
Quliibot is described as a paraphrasing tool. Its free features include the grammar checker, synonym options, and rephrasing tool. It rewrites text based on selected writing modes: standard, fluency, formal, simple, and creative, as relevant to the writer's intended audience. The basic (free) Quillbot tool can also shorten or expand on text. The paid premium version increases limits (e.g. from 1200 words to 6000 words in summariser) and includes additional features such as plagiarism checker, tone detector and paraphraser history.

Jenni.ai https://app.jenni.ai/
The tools available using Jenni.ai include:

- Autocomplete (co-construction writing tool)
- Customized styles (choose the tone and type for pesonalized AI generation)
- In-text citations (Jenni consults the latest research and cites in APA, MLA or Harvard style)
- Paraphrase & Rewrite (paraphrase any text in any tone. Rewrite the internet customzied to you)

WordTune https://www.wordtune.com
Wordtune is an AI writing assistant that identifies writing errors, suggests alternative tones, and generates sentences to expand on what you're writing. Wordtune Read will instantly highlight the most relevant information and add short summaries to be displayed next to each passage. Besides reading, summaries can easily be exported or copied to use outside the app.

Copy.ai https://www.copy.ai
copy.ai is a writing tool that generates high-quality essays and academic papers. To save time, it provides rich text editing, ideas, and flexibility. copy.ai provides support for creating quality content. There are a variety of output options and a variety of templates to choose from.

Perplexity.ai https://www.perplexity.ai
Perplexity AI is a chatbot that uses machine learning and Natural Language Processing (NLP) to respond to user's questions and prompts and also includes links to citations and related topics. Perplexity uses current information, including footnotes with links to the sources of the data.

APPENDIX B

Links to further information

Artificial Intelligence (AI) in Education
https://www.cosn.org/wp-content/uploads/2023/03/CoSN-AI-Report-2023-1.pdf

Artificial Intelligence in Education
https://www.unesco.org/en/digital-education/artificial-intelligence

ChatGPT, Chatbots and Artificial Intelligence in Education
https://ditchthattextbook.com/ai/

Future of Testing in Education: Artificial Intelligence
https://www.americanprogress.org/article/future-testing-education-artificial-intelligence/

How Is AI Used In Education — Real World Examples Of Today And A Peek Into The Future
https://bernardmarr.com/how-is-ai-used-in-education-real-world-examples-of-today-and-a-peek-into-the-future/

School policy

Artificial Intelligence Policy in Secondary Schools
https://leonfurze.com/2023/02/23/artificial-intelligence-policy-in-secondary-schools/

School Policies for Integrating AI in Classroom Practices
https://digitalpromise.dspacedirect.org/bitstream/handle/20.500.12265/130/School%20Policies%20for%20Integrating%20AI%20in%20Classroom%20Practices%28updated101221%29.pdf?sequence=8&isAllowed=y

Setting school policy about AI: A cautionary tale
https://ditchthattextbook.com/ai-conversations/

ChatGPT: Education assessment, equity and policy
https://www.teachermagazine.com/au_en/articles/chatgpt-education-assessment-equity-and-policy

Ensuring a measured response to ChatGPT
https://www.kds.vic.edu.au/ensuring-a-measured-response-to-chatgpt/

Ethical considerations

Exploring the ethics of artificial intelligence in K–12 education
https://education.msu.edu/news/2021/exploring-the-ethics-of-artificial-intelligence-in-k-12-education/

Ethical principles for artificial intelligence in K–12 education
https://www.sciencedirect.com/science/article/pii/S2666920X23000103

How Should We Approach the Ethical Considerations of AI in K–12 Education?
https://www.edsurge.com/news/2021-10-25-how-should-we-approach-the-ethical-considerations-of-ai-in-k-12-education

Ethical Considerations When Using Artificial Intelligence-Based Assistive Technologies in Education
https://openeducationalberta.ca/educationaltechnologyethics/chapter/ethical-considerations-when-using-artificial-intelligence-based-assistive-technologies-in-education/

A Year in K–12 AI Education
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjqmbyI5en9AhVN2HMBHaBeCuk4ChAWegQIIxAB&url=https%3A%2F%2Fojs.aaai.org%2Faimagazine%2Findex.php%2Faimagazine%2Farticle%2Fview%2F5289%2F5162&usg=AOvVaw1Pos4SiLD0w57L26eol4cn

AI in education discussion groups

LinkedIn
AI for Quality Education and Research
https://www.linkedin.com/groups/13949843/

Facebook
AI and education: https://www.facebook.com/groups/530533990630012/
ChatGPT in Education: https://www.facebook.com/groups/744858756989529

Twitter
AI group: Centre for Education and Training
https://twitter.com/AiGroup_CET