

Graduate Teacher Education Students Evaluate Generative AI: A Two-Year Comparison

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Abstract

Artificial intelligence (AI) has been evolving since the middle of the 20th century. During the latter part of the 20th century and into the 21st century, most AI programs remained within the realm of computer science and psychology. However, when OpenAI launched its generative AI program, ChatGPT, using large language modelling (LLM) software, the world took notice and AI expanded beyond the computer science and psychology fields of study. ChatGPT and other generative programs such as Google's Gemini and Anthropic's Claude AI exploded on the scene and brought AI to the masses. Without a doubt, the emergence of AI has had repercussions in all walks of life, including education. The purpose of this study is to report on the opinions and use of AI by K-12 teachers enrolled in a graduate education leadership program over the course of two years. Beginning in Spring 2023, when ChatGPT first attracted public attention, qualitative data was collected from the teachers enrolled in courses taught by the author. The main purpose of this data collection was to determine if opinions of AI changed during the two years that data were collected. All those enrolled in this program have master's degrees in education and experience as teachers in New York City schools.

Keywords: Artificial intelligence, generative AI, graduate teacher education, qualitative research

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Artificial intelligence (AI) has been evolving since the middle of the 20th century. Luminaries such as Alan Turing and Herbert Simon (Nobel Laureate Economics, 1978) made significant contributions to the field starting in the 1950s. During the latter part of the 20th century and into the 21st century, most AI programs remained within the realm of computer science and psychology. However, the past twenty years have brought major AI development as American corporations such as Alphabet (Google parent company), Microsoft, Apple, Nvidia and Amazon started investing billions of dollars in this technology. Internationally, well-funded companies in China such as Baidu, Tencent, and Alibaba have been challenging American hegemony in AI development. These investments bore fruit in 2022, when OpenAI launched its generative AI program, ChatGPT, using large language modelling (LLM) software. ChatGPT and other generative programs such as Google's Gemini and Anthropic's Claude AI exploded on the scene and brought AI to the masses. Indeed, "AI" was named the word of the year for 2023 by Collins Dictionary (BBC, 2023). In 2025, *Time* named the "Architects of AI" as its 2025 Person of the Year for their profound impact on the world (Jacobs, 2025). Without a doubt, the emergence of AI has had repercussions in all walks of life including education. The purpose of this study is to report on the opinions and use of AI by K-12 teachers enrolled in a graduate education leadership program over the course of two years. Beginning in Spring 2023, when ChatGPT first attracted public attention, qualitative data was collected from teachers enrolled in courses taught by the author. One of the assignments of these courses was to use and evaluate AI as a tool for completing an essay assignment. Forty-five (N=45) students participated in this evaluation. The main purpose of this data collection was to determine if opinions and use of AI had changed during the two years that data were collected. All those enrolled in this program have master's degrees in education and experience as teachers in New York City schools. Their training and experience give them keen insights into pedagogical practice, making them ideally suited to evaluate generative AI as an instructional tool. This article will report on their evaluations.

Definition of Terms

It is important to define generative AI for the purpose of this article as well as to distinguish it from general AI. AI is a broad field of science in which machines are taught to develop humanlike capabilities. General AI occurs at the point when AI can learn human cognitive skills (Suleyman, 2023) and is still years away from full development. A recent term "agentic AI" has evolved and is related to general AI. The primary difference is that agentic AI is a more specific application. It is proactive, autonomous, and adaptive, capable of planning, reasoning, and taking specific complex actions independently to achieve objectives in dynamic environment. Agentic AI applications are actively being developed and are evolving rapidly. Generative AI, on the other hand, is here now. It is a technology within the field of artificial intelligence that utilizes neural networks, which mimic the human nerve system, to generate new and original content. It can produce a wide variety of data, including text, images, audio, and video. Generative AI can also create content such as synthetic data, code, simulations, and more by identifying patterns and structures within existing data. Generative AI builds upon technologies like large language models (LLMs), which are trained on vast amounts of data, enabling them to predict and develop data such as original images or text structured in sentences and paragraphs.

This study focuses specifically on the use of generative AI programs currently being used by millions of people throughout the world. Large language models (LLM) are based on the concept of a *transformer*, first introduced in 2017 by researchers at Google (Vaswani, et al, 2017). A transformer derives meaning from long sequences of text to understand how different words or semantic components might be related to one another, then determines how likely they are to occur in proximity to one another. These transformers are run unsupervised on a vast corpus of natural language text in a process called *pretraining* before being fine-tuned by human beings interacting with the model.

Generative AI and Education – A Literature Review

Since ChatGPT's debut in 2022, generative AI has been a major topic of discussion in all walks of life including education. Just three years later, one study (Freeman, 2025) reported that the use of generative AI is “soaring” in higher education with 92 percent of undergraduates using it in one form or another. As a result, planning, development and policy issues are permeating in educational institutions regarding the integration of AI into instruction and other activities. At first blush, the knee-jerk reaction to generative AI was an attempt to contain it, especially amid concerns about plagiarism. However, this view is quickly evolving, with many schools trying to figure out ways to harness it as a potentially helpful technology for teaching and learning. A growing research base is evolving mostly in the form of reviews of its deployment in education. For example, (Bahroun, Anane, Ahmed, & Zacca, 2023) in a review of 207 papers concluded:

This review paper presents a comprehensive analysis of generative artificial intelligence (GAI) in education... This study begins with a content analysis that explores GAI's transformative impact in specific educational domains.... The versatile applications of GAI encompass assessment, personalized learning support, and intelligent tutoring systems. Ethical considerations, interdisciplinary collaboration, and responsible technology use are highlighted, emphasizing the need for transparent GAI models and addressing biases. Subsequently, a bibliometric analysis of GAI in education is conducted, examining prominent AI tools, research focus, geographic distribution, and interdisciplinary collaboration. ChatGPT emerges as a dominant GAI tool, and the analysis reveals significant and exponential growth in GAI research in 2023. Moreover, this paper identifies promising future research directions, such as GAI-enhanced curriculum design and longitudinal studies tracking its long-term impact on learning outcomes. These findings provide a comprehensive understanding of GAI's potential in reshaping education and offer valuable insights to researchers, educators, and policymakers interested in the intersection of GAI and education.(Bahroun, Anane, Ahmed, & Zacca, 2023, p. 1)

Other reviews (Mao, Chen, & Liu, 2023; Ahmad, Murugesan, & Kshetri, 2023; Taniga, 2023) have a similar focus and conclude that generative AI is enjoying increased use by faculty and students alike. An important area of concern regarding the use of generative AI is whether the “human” element of teaching and learning may be compromised (Henane, 2023; Lo, 2023; Global Services in Education, 2023) These authors raised pedagogical questions related to the social and emotional aspects of learning. For example, Henane (2023) commented that “AI may excel in numerous tasks, but it will never possess the capacity to teach a child how to love, care,

express their feelings, and develop their unique personality.” (Henane, 2023) Parra and Chatterjee (2026) likewise emphasized that, considering AI, teachers need to maintain human connections and sociocultural responsiveness. In an article examining “critical conversations” in AI, they concluded, “We need to focus on the humans and the relationships.” (Parra & Chatterjee, 2024, p. 10)

It is not possible in this short article to review all the possible uses of generative AI in instruction because subject matter and teaching approaches would dictate how to use it most effectively. For instance, in a writing or essay assignment, students might be encouraged to use generative AI if they cited text appropriately. In science courses, generative AI can make available access to simulations, images, and other media to provide graphic insights into biological, chemical, and physical processes. In professional courses, such as health, nursing, law and social work, generative AI can be used to develop case studies with multiple outcomes. Using generative AI does require a certain amount of trust in students, but faculty have been concerned about this issue for years given the plethora of material that exists on the Internet and the search capabilities of engines such as Google. This is evident from the proliferation of plagiarism detection software such as Turnitin now routinely made available on all major course and learning management systems. In sum, generative AI, with its ability to create new text, code, images, and more, can be a tool in the classroom for both students and teachers. Here are several pros and cons.

Pros for Students

Brainstorming and Creativity: Students can use generative AI to get ideas flowing for projects, essays, or presentations. AI can generate different scenarios, characters, or plot points to jumpstart creative thinking.

Personalized Learning: AI tutors can provide students with individualized practice problems, quizzes, and explanations tailored to their specific needs and learning pace.

Language Learning: AI chatbots can converse with students in a foreign language, helping them practice speaking, listening, and comprehension in a safe and engaging environment.

Writing Improvement: Generative AI can help students overcome writer's block by suggesting ideas, generating outlines, or even creating drafts that students can then edit and improve.

Pros for Teachers

Content Creation: AI can streamline lesson planning by generating quizzes, worksheets, or practice problems based on specific learning objectives.

Accessibility Tools: AI can create alternative formats for learning materials, such as audio versions of text or captions for videos, making them more accessible to students with disabilities.

Differentiation: Teachers can use AI to create different versions of assignments or learning materials to cater to students with varying learning styles and abilities.

Feedback and Assessment: AI can help automate the grading of some types of assignments, freeing up teachers' time to provide more personalized feedback to students.

Pros and Cons of Generative AI in Education

Plagiarism and Cheating: Students might misuse AI-generated content by plagiarizing or using it to complete assignments without understanding the material.

Over-reliance and Critical Thinking: Students may become overly reliant on AI for content creation, hindering the development of critical thinking and research skills.

Bias and Misinformation: AI models are trained on data, and if that data is biased, the AI-generated content can also be biased or contain misinformation.

Teacher Role and Job Security: There are concerns that AI could replace some of the roles traditionally filled by teachers, leading to job insecurity.

Ethical Considerations: The use of AI in education raises ethical questions about data privacy, student ownership of work, and the potential for algorithms to perpetuate bias. (Google, (2024))

The above list was generated by the *Gemini* generative AI software on June 3, 2024. I agree with its comments and conclusions.

Methodology

This study uses qualitative research to evaluate generative AI as an essay writing tool. Elements of Creswell's (2009) characteristics for qualitative research were utilized as follows:

- the use of a natural (class) setting;
- collect multiple sources of data;
- researchers as instruments;
- inductive data analysis; and
- participants' meaning. (Creswell, 2009)

The participants in this study were enrolled in a required graduate course in the Administration and Supervision Program at Hunter College. The program has selective admission requirements as follows:

A master's degree from an accredited institution with a Grade Point Average (GPA) of at least 3.0.

Permanent or professional New York State (NYS) certification as a teacher and/or pupil personnel service provider within grades PreK-12.

A minimum of three years of approved teaching and/or school service within grades PreK-12 under regular appointment (or its equivalent for counselors, social workers, and school psychologists) or two years approved teaching and/or school service and at least one year of relevant management/leadership experience.

The students in this program were generally well-organized, focused on their studies, and had good writing skills. Enrollment in this course was as follows: Spring 2023 (N=15), Fall 2024 (N=13), and Spring 2025 (N=17), for a total N=45 study participants.

The basic characteristics of these students were:

Gender: 34 females; 11 males.

Teaching Level: 23 high school teachers; 11 middle school teachers; 11 primary school teachers.

Average Age: 32.3 yrs.

Average teaching experience: 9.5 years.

In each case, students were given an assignment to write an essay using ChatGPT, Gemini, or any other generative AI software program with which they were familiar. Out of 22 students enrolled in Spring 2023, seven students did not wish to use a generative AI to write their essay. The author allowed this, leaving an N=15 for the comparison. Although the seven students made no explicit comments for the study, their reluctance might be construed as further evidence regarding the opinions about generative AI at the outset.

To provide a supportive environment, the author provided a one-hour introduction to generative AI using ChatGPT as an example geared to the essay assignment. Students were free to ask any questions about the assignment including the use of a generative AI program. During the semester, several student progress sessions were conducted during which students could ask any questions they had about the assignment.

The two major data collection tools for this study were the student essays and focus group discussions. Student essays required them to answer a series of questions related to their experiences using generative AI (see Appendix A). In addition to preparing the written essay, students participated in a two-hour focus-group discussion after they completed their assignments. Student responses to the questions on the essay and comments made during the focus group discussion were the sources of data for this study.

Findings and Discussion

The first major finding in this study was that over the two years of data collection, most students had begun to use generative AI in preparing their lessons or for other school-related activities. During the initial data collection in Spring 2023, only one student of the fifteen participants had previously used generative AI. By Spring 2025, almost all students used it to

some degree. Several indicated that their school districts had initiated staff development activities. The following represent examples of student comments. They are not meant to be all-encompassing reporting of everything the students stated.

Using AI

I frequently use generative AI to assist in planning my math lessons. I typically use Magic School. I attended a workshop that was offered by my school this September on Superintendent's Conference Day. It has become an invaluable resource in my teaching. When I have a specific math standard in mind, I often type that standard into AI and request differentiated word problems or multi-step word problems. This allows me to generate a variety of problems that cater to the diverse learning needs of my students, ensuring that each student can engage with the material at their own level. (Student RDD, Spring 2025)

This school year, we have been experimenting with the use of AI to improve instruction. Specifically, we have used Microsoft Co-Pilot, ChatGPT, and Magic School AI. So far, we have found that Magic School AI is by far the most effective and efficient AI tool. While the scope of this experiment is small and in its early stages, initial findings indicate that AI's greatest value lies in supporting teachers rather than replacing their expertise. (Student TII, Spring 2025)

My perspective began to change when our school invested in a dedicated program called Toddle AI, which is specifically designed to support teachers in developing comprehensive and effective lessons. Although I found Toddle AI to be a powerful tool with a wide array of features, its complexity was a bit overwhelming at first. I was still hesitant to fully rely on AI for all aspects of my teaching until I encountered another practical application—drafting report card comments. (Student HJJ, Spring 2025)

This assignment showed me that I am completely underutilizing AI in my practice. There are so many times I'm making things from scratch or starting from nothing. Knowing my personality, I'm sure there will always be things about lessons that AI gives that I would tweak or change, but it can provide me with a really solid foundation that can be applicable in my planning process and in my practice. (Student MMJ, Spring 2025)

The comments above indicate that school districts are taking a more proactive role in 2025 in providing professional development opportunities for teachers to evaluate and use generative AI software. In addition, school districts are moving beyond generic AI programs such as ChatGPT and Gemini and are using AI programs such as Magic School and Toddle AI that are designed specifically for teachers.

Second, in the first data collection in Spring 2023, several students indicated that generative AI could be of benefit to particular student populations such as students with special needs and ESL learners. Below is a comparison of comments regarding using generative AI for students with special needs.

Special Education Students

Some of my co-workers have been utilizing ChatGPT *to create IEP goals for their students*. I was amazed with how capable it was at any task it was given, which is why I wanted to utilize it for this assignment. (Student KAA, Spring 2023)

I regularly use Magic School AI to assist with differentiating lessons for my special education students. For instance, I utilize its text-leveling and text-summarizing tools to adjust the Lexile levels of reading materials, making them more accessible for diverse learning needs. (Student OKK, Spring 2025)

I work in a school where 100% of the students are deaf and deaf disabled, so I almost did not include 'deaf' in my search because I figured Chat GPT would not be able to create a lesson plan for deaf students. But while looking over the plan, they incorporated American Sign Language into the lesson and at a very appropriate level that I would have done (introduction to 'family' and 'community words' in sign language as well as family-related signs). Also, deaf students and deaf students with disabilities rely heavily on visual aids, and ChatGPT made sure to include this repetitively throughout the daily lessons. The lessons also specifically stated on the bottom 'This plan uses visuals, interactive elements, and sign language to ensure engagement and learning for deaf kindergarten students.' (Student BLR, Spring 2025)

This was my first experience ever using generative AI for the purpose of instructional planning. I chose the prompt because I currently work as a special education teacher teaching a hydroponics lab to students with autism. I work in the most restrictive setting in the New York City Department of Education, meaning that the student to teacher ratio is the lowest possible by law (6:1). Having never previously used generative AI to create educational content, this experience was something that I entered into without any preconceived ideas about what to expect using the software. After several detailed prompts, the AI produced a lesson plan that had both strengths and weaknesses in the final product. (Student GPP, Spring 2025)

ESL Students

The majority of the students I teach are newly arrived ESL in the United States, as such, writing often causes them anxiety. By using this technology to brainstorm assignments, it would show them how to write a basic essay and not stare at a blank page, perplexed by what they have to do. (Student MEE, Spring 2023)

As a teacher juggling many demands from district initiatives to guidance from administration to a variety of student needs, using generative AI to help with lesson planning has been a valuable resource that I use from time to time. Teaching special education and working in a school with concrete ELA/ Writing lesson structures using generative AI has been incredibly helpful in advising me when feeling stuck on a lesson or when needing to approach a lesson differently. At this time, I use AI to support my lesson planning in ESL as my school currently uses a general education curriculum for reading instruction. (Student CAA, Spring 2025)

The second prompt I asked ChatGPT was: ‘Include strategies for English Language Learners.’ The initial prompt produced a module with differentiation and strategies to support ELLs. When asked ChatGPT to produce strategies for ELLs, the AI bot shared the following strategies:

- Use visuals and manipulatives, visual vocabulary support
- Simplify and repeat instructions
- Use sentence frames and prompts
- Scaffold learning with small group instruction
- Employ peer support and cooperative learning
- Incorporate real-life contexts
- Provide time for oral and written practice
- Use technology and interactive tools

The response also included a few suggestions for which ELL strategies to use on each of the five lesson days. Overall, the plan offered was universal and did not go in-depth. I agree that visuals and repeated instructions, language frames, small groups, and technology are all strategies that support ELLs and all learners. However, why did the initial prompt not provide these universal strategies for learning? For example, visual strategies support all learners. But if we specifically pair a visual with a word label in multiple languages, it is a more contextualized support. (Student ABB, Spring 2025)

The above comments indicate that in Spring 2023, teachers thought that generative AI might be of use in the future. By Spring 2025, generative AI, in fact, was in regular use. During the focus group sessions, the number of comments about the benefits of generative AI for special education students was of particular interest. Students were adamant in what they saw as benefits of a generative AI tool for applications involving students who struggle with writing in general, for ESL students, and for special education students.

The final area of comparison between the students in these courses has to do with whether they would allow their own students to use generative AI. The students in Spring 2023 were fairly consistent in limiting use by their students who were in earlier grades versus those in high school. Here is a sample from the Spring 2023 participants:

I am a second-grade teacher, so ChatGPT isn’t very relevant. (Student LRR, Spring 2023)

I would consider allowing students in my high school classes to use this for writing assignments, but I would hesitate with my middle schoolers. We already have a ton of plagiarism issues because the students don’t fully understand how to use sources instead of copying/pasting google searches. (Student OMM, Spring 2023)

I teach International Baccalaureate History (High School) and recently the IB established a policy allowing students to use and cite ChatGPT in their writing. As a result, I would allow students in my class to use it for their work as long as they follow the proper parameters in citing the work. (Student WPP, Spring 2023)

And a sample from Spring 2025 participants:

I would certainly allow (First Grade) students to use AI for certain lessons and projects if it didn't interfere with them learning a key skill. Nonetheless, using AI would be challenging for some students as they aren't all able to spell or speak at this time. However, my students could instead use their devices to request the information they are looking for. I could have students use their devices to tell me what facts they are looking for, which I or another staff member could input into the AI. (Student CCA, Spring 2025)

While I do not yet allow my (High School) students to utilize generative AI for assignments, I have encountered students using it, and it has been fairly obvious to me when they do. One of the most significant concerns I have about allowing students the use of these technologies is that by relying on AI, they are not developing the essential skills of reading and writing for themselves. (Student GII, Spring 2025)

With the addition of 11 AP (High School) courses in my school and opportunities for students to take advanced Regents exams early, AI has become a tool students are leveraging for assignments. Student use of AI spans a wide spectrum, from submitting AI-generated first drafts to using it as a tool to refine and edit their own writing. In response, we are developing guidelines to ensure AI use enhances rather than replaces student thinking. (Student TII, Spring 2025)

I'm torn on the idea of using generative AI as a student-facing tool in elementary school. I'm hesitant because my students are still building foundational skills across all academic areas, and I worry that using generative AI could hinder their natural academic growth by offering shortcuts instead of promoting critical thinking and independent problem-solving. Also, at this age, children are just beginning to learn how to use technology in productive and safe ways. Any future use of generative AI with students would require careful thought and planning to ensure they use it in meaningful and productive ways—though maybe generative AI could even help with that! (Student HHJ, Spring 2025)

I have not yet permitted students to use artificial intelligence (AI) for completing assignments; however, I have observed them using AI tools to navigate their academic work. While AI may offer students efficiency in completing tasks, its overreliance contributes to significant academic deficits. Using AI to complete assignments often leads to students performing below their potential. In my experience, the 11th-grade students I teach typically read and write at levels between 5th and 8th grade, and using AI to generate responses helps them maintain their academic capacity but does little to improve it. When students use AI for assignments, it becomes a normal and dependent behavior that discourages critical thinking, diminishes attention span, and reduces resilience. As such, it would be beneficial to teach students how to navigate AI responsibly, integrating it as a tool for learning without allowing it to replace essential cognitive skills. (Student OKK, Spring 2025)

The comments above indicate that the students enrolled in Spring 2025 are more familiar with the nuances of generative AI and appear to be making more informed decisions as to whether they would allow their students to use it. While recognizing certain efficiencies using AI, they are also concerned and cautious about broader cognitive developmental issues.

Conclusion

In this article, data were presented comparing how graduate students, themselves teachers, are developing positions and attitudes about the use of generative AI to support their students or their teaching. An appropriate interpretation of the data is that after two years, teachers have developed a far-more informed and sophisticated knowledge of generative AI as they contemplate their own and their students' usage of this technology. In those two years, Generative AI platforms have also proliferated, and more are now available which were specifically created to help teachers. We need to keep in mind that we are still in the beginning stages of the integration of AI into our lives and organizations, including schools. The next decade will see the evolution of full-blown general AI. In November 2024, the author was on a panel discussing the future of AI and received an email from one of the attendees who asked: "What will all this technology do?" I answered him by saying that his was the wrong question. The right question is: "What will all this technology NOT do?"

Declarations

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Institutional Review Board Consent This project was reviewed by the City University of New York Institutional Review Board. Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest

The author declares no conflict of interest. The manuscript avoids promotion of specific products in the research (e.g. "proving" the effectiveness of a single tool or product).

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Appendix A

To complete this assignment, students are to use a generative AI program such as ChatGPT or Gemini. You are free to include as much of the AI generated text into your paper as you wish as long as you cited it accordingly. And at the end of your paper, please include a paragraph(s) on your experience with using generative AI in this assignment answering the following:

- a) Have you used generative AI previously? If so, how did you use it?
- b) Do you feel the AI program produced good-quality material for your paper?
- c) Do you allow students in your own classes to use generative AI for assignments. And if yes, what has been your experience in allowing students to use it?