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Online K-12 Teachers' Perceptions of Students' AI Utilization and Teachers' Outlook on the Future of Education in the Context of Artificial Intelligence

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Abstract This study explores the perspectives of online K-12 teachers about the use of Artificial Intelligence (AI) in online educational at a large virtual cool on the East Coast of the United States. The researchers found that teachers' familiarity with AI directly influences their adoption of AI tools in the online classroom. Despite teachers' mixed beliefs about the ability of AI to enhance students' learning, no significant relationship was found between these beliefs and teachers' familiarity or usage of AI. Interestingly, teachers who had already incorporated AI into their teaching practices were more likely to believe in the benefits of AI in online education. However, no significant difference was found between teachers' utilization of AI and their beliefs about whether AI increased student engagement and participation. These findings highlight the importance of teacher training and awareness for successfully integrating AI into online education. Future research should further investigate the factors influencing teachers' adoption of AI and its impact on student outcomes.

Keywords: *K-12 Education, online learning, virtual education, AI tools, ChatGPT, Artificial Intelligence, AI in Education, critical thinking, AI integration, educational strategies, and student perceptions*

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1. Introduction

Artificial Intelligence (AI) has become a common household topic in recent years. The genesis of large language models like ChatGPT, Claude, and Bard have had more than just a moment; they've taken center stage, and it doesn't appear that these AI models will be exiting the limelight anytime soon.

OpenAI first launched ChatGPT-3 in 2022, providing users with the ability to chat with the AI robot to gain knowledge about an infinite number of topics due to the technology's strong language understanding [1]. ChatGPT is a trained large language model that uses scanned books, internet data, and billions of words to provide users with easy-to-access information on a platform that is user-friendly [2].

Soon after ChatGPT became a household name, researchers turned their attention to how AI would affect education. Researchers determined that AI held enormous possibilities for education, like personalized learning for students, increased productivity for students and teachers, automated assessments, and much-needed assistance for teachers [3,4,5].

The benefits of using AI in education were exciting, but there were some red flags researchers warned about, too. Researchers found that AI models could be biased depending on who trained the language model, which could lead to poor pedagogy [6]. In addition, Mintz et al. [6] discovered that AI could disempower teachers, leading to AI replacing educators.

Despite the exponential growth of AI in education, there was a noteworthy gap in understanding how online K-12 teachers perceived student utilization of AI and what teachers' outlook was on the future of online K-12 education because of the advent of Artificial Intelligence released in the virtual classroom.

This study sought to address this gap by exploring teachers' perceptions of students' utilization of AI in the online classroom and teachers' outlook on the future of online K-12 education in the era of powerful AI language models. The exploration of teachers' perspectives aimed to contribute valuable insights to stakeholders at the dynamic intersection of AI and K-12 online education. Understanding how teachers perceive the future of online K-12 education and their perceptions about how K-12 online students use AI will allow educational institutions, policymakers, and technology developers to make informed decisions about the integration of AI in online K-12 education. The findings from this study will provide a nuanced understanding of the challenges, opportunities,

and implications associated with the use of AI tools in the virtual classroom. Furthermore, by investigating teachers' perspectives on the future of education, this research aimed to offer practical recommendations for designing effective professional development programs and crafting policies that align with the evolving needs of educators and students.

The study was completed at a large K-12 virtual school on the East Coast of the United States. The researcher focused the study on K-12 teachers at the organization and aimed to investigate high teachers' perspectives on the usage of AI in online education.

2. Related Literature

The purpose of this study was to explore online teachers' perceptions of students' AI utilization and to define online K-12 teachers' outlooks on the future of online K-12 education considering the prominent rise of AI models like ChatGPT. Since its genesis, the dominance of ChatGPT and other AI tools on education has been a subject of study. Researchers have explored how these technologies can affect education and the potential benefits and challenges of employing AI in both university and K-12 settings. The use of language models like ChatGPT has been examined for its potential to generate content and assist with classwork. Concerns have been raised about plagiarism and the reliance on AI tools, highlighting the importance of understanding AI's limitations and using AI ethically and responsibly [3,4,5]. Artificial intelligence in education is not a new phenomenon. Generative AI is the new technology. Generative AI is trained by imputing books, billions of words, and other information into the algorithm so users can generate answers to simple and even complex questions [2].

Educators have been using chatbots, intelligent tutoring, and automated grading for some time [7]. Researchers found that AI in K -12 education has helped teachers with various administrative tasks, assistance with curriculum and instruction, and with the learning process to support students' learning [8]. Teachers in Estonia were studied about their perceptions of generative AI in the classroom, and the researchers found overall positive attitudes towards AI in K-12 education [9]. The researchers discovered that teachers in Estonia enjoyed the support AI offers them regarding assisting with creating learning materials, organizing lessons and planning, and grading assistance. Teachers in the study also indicated that AI allowed them to understand the thoughts and ideas of their students better, they could clone themselves to help with productivity, and AI was used to identify student misconceptions about content topics allowing teachers to re-teach content in a targeted manner. Bitzenbauer [10] found that ChatGPT was able to assist in making educational work more efficient and participants in the study indicated that ChatGPT would enrich educational experiences because the AI model could help foster critical thinking skills by using ChatGPT to evaluate students' answers to complex problems.

Some researchers have expressed concerns about users' overreliance on technology and the Internet in education [11]. Over-reliance on AI was found to possibly limit students' ability to think critically, develop unique ideas around educational content topics, and limit deeper learning of new content [4]. Grissinger [12] also found that AI technology could provide incorrect or misinterpreted information when overly relied upon for schoolwork and may cause students to lose higher-order thinking skills and critical thinking abilities. Other researchers found that K-12 educators were generally positive about ChatGPT in education; however, there were also reservations [13]. The researchers found that K-12 educators were concerned about topics already mentioned, like plagiarism, loss of higher-order thinking skills, and an over-reliance on technology. However, other concerns were also discussed, including AI causing a lack of authentic learning, decreased content comprehension, and fears of the unknown about what AI could mean for education in general.

Ethics played a role in shaping researchers' concerns. A chief concern for researchers focused on privacy [3]. The researchers discovered that AI models collected all kinds of data, public and private data alike, and could regenerate responses to others using that private information. Hadi Mogavi et al. [5] were also concerned about privacy, but more so the researchers found academic dishonesty, fraud, and misinformation to be far greater concerns. AI models like ChatGPT made it easy for students to plagiarize or re-word content and use it as their own work and found that ChatGPT was prone to providing misinformation and even bias due to how ChatGPT is trained by users. Hadi Mogavi et al posited that the possibility for AI to make it easier for academic dishonesty could undermine the efficacy of student education. Dao et al., [14] also were concerned about academic integrity when the researchers discovered that ChatGPT could successfully pass a standard cumulative high school exam in Vietnam, which posed concerns about student plagiarism and cheating.

Woodruff et al. [15] surveyed K-12 teachers from across the United States about their perceptions of the implementation of AI in education and found that educators held generally positive views of AI implementation in education. The teachers surveyed indicated that implementing AI in the classroom would require a significant investment in resources to be able to use AI properly. Learning how AI technology works and how to use it was found to be important [16]. Participants in the study indicated that educators needed to know how generative AI was being used in colleges and universities before they would be comfortable using it in K-12 classrooms. Overall, participants in the study found generative AI, like ChatGPT, to have potential but expressed concerns about implementing the technology school-wide before training educators on how to use it properly and how to implement it alongside the school curriculum.

Whether educators want to use AI or not was a concern for researchers. In China, researchers focused on EFL teachers and studied Performance Expectancy (belief in whether a system will enhance work) and Effort Expectancy (ease of use), and the results showed that when educators had the knowledge about how to use AI to improve their teaching and students' learning, educators would use it [17]. The researchers also discovered that the ease of use of AI did not influence whether educators

would use AI technology. Xin et al. [17] found that the most influential factor in whether educators would use AI was whether the educator perceived the technology as beneficial to teaching performance. A study from Hong Kong found that K-12 teachers needed to be included in curriculum development, especially when incorporating AI tools into the curriculum [18].

There has been a growing demand to incorporate AI tools into K-12 curriculum [19]. In the study, Wong et al found that the US has been working on pathways to incorporate AI into educational standards in a way that is equitable for all stakeholders. The researchers found that AI could be beneficial as an add-in to curriculum if the content was age appropriate. Writing curriculum that was focused on play and fun for younger grades and more hands-on and nuanced activities for upper grades was found to be the most beneficial [19].

While some educators expressed positive attitudes toward AI, acknowledging its potential to enhance teaching and learning experiences, there were reservations regarding the need for proper training, potential loss of critical thinking and learning skills, and ethical issues related to privacy and academic integrity. Researchers highlighted the importance of addressing the concerns and ensuring that educators were well-informed and equipped to integrate AI into K-12 classrooms. As the demand grows to build AI tools into K-12 curriculum, it will be crucial to balance the benefits of AI alongside the potential drawbacks to create an equitable educational environment for all stakeholders.

3. Problem/Purpose Statement

The problem this study addressed stemmed from the limited research about teachers' perceptions of the use of AI models, like ChatGPT, in online K-12 education. In addition, due to the rapid advancement of technology, there was a lack of understanding about how online K-12 teachers viewed the future of online education with AI.

The purpose of this study was to explore online teachers' perceptions of students' AI utilization and to define online K-12 teachers' outlooks on the future of online K-12 education, considering the prominent rise of AI models like ChatGPT. Toward that end, we posed the following research questions:

What are online K-12 teachers' perceptions of students' AI utilization?

How do online K-12 teachers envision the future of education in the context of AI?

By understanding online teachers' views, the study aimed to shed light on how teachers envisioned the integration of AI in education and its impact on teaching methods and student learning outcomes. Through this research, a complete understanding of teachers' perspectives regarding AI in education was gained.

4. Methodology

4.1. Design

A mixed methods study was selected as the design for this research to enable an in-depth exploration of teachers' perceptions of AI. The quantitative component consisted of a brief survey, and the qualitative component consisted of focus groups. The goal was to provide detailed information to help create a comprehensive understanding of teachers' perceptions of AI utilization among students and its potential impacts on online education. This design was selected due to the recent implementation of AI and sparse literature on perceptions of its impact, particularly among online teachers.

4.2. Participants

The study was conducted in a large public virtual school in the United States. A survey link was sent to high school teachers using the school's email system. An electronic consent form was presented at the beginning of the survey to ensure the teachers' identities were protected. The survey was designed so that it could not be completed if consent was not obtained. Only one teacher did not consent to participate after opening the survey. Teacher identifiers, including first and last name, employee number, gender, and date of birth, were not recorded to ensure anonymity. A total of 64 high school teachers completed at least a portion of the survey; only five teachers did not provide answers to every question.

Additionally, the primary author facilitated five focus groups with 15 middle and high school teachers at the virtual school using the Zoom videoconferencing application. Zoom has become a widely used online interviewing tool, and studies suggest that participants prefer Zoom to other options [20,21]. The focus group participants taught a variety of subjects and had been teaching online for at least three years.

4.3. Materials

The researchers created an 8-item close-ended survey instrument designed to gather the opinions of teachers regarding the use of AI. The survey consisted of three Likert-type scale questions, one dichotomous (yes/no) question, and four multiple-response questions. The phrasing of the items and their corresponding response options are shown in the Results. The survey was created in Qualtrics, which is an online survey tool that allows researchers to distribute surveys and collect responses. The primary author also created a semi-structured focus group protocol that outlined specific questions and probes, as shown in Appendix A.

4.4. Procedure

The survey data were exported from Qualtrics to SPSS 28 for statistical analysis. The analytic strategy included descriptive and inferential statistics such as frequency tables, chi-square tests of independence, and one-way ANOVA where appropriate. For chi-square tests, the *p*-value associated with Fisher's exact test [23] is reported in cases where at least one cell has an expected count of less than five responses.

The lead author was the moderator for all focus group sessions. The sessions were recorded in Zoom with all participants' consent to allow for automatically generated

transcriptions. The researchers used AI for thematic analysis of the transcripts, which is effective in generating concrete, descriptive themes [24]. Copilot, a generative AI chatbot developed by Microsoft, was selected because it is approved for use by the virtual school. The focus group transcripts were uploaded to Copilot, and the following prompts were used:

1. What did teachers say about their familiarity with AI tools? Can you provide an example where teachers said AI can be wrong?
2. What did teachers say about how they have incorporated AI tools in online teaching?
3. Did teachers feel that AI enhances online learning?
4. What were some of the perceived benefits of AI in education according to teachers?
5. What were some of the teachers' concerns about students' use of AI?
6. What did teachers have to say about their evolving role as a result of AI integration?
7. What were teachers' beliefs about the impact of AI on online teaching methods in the future?
8. What did teachers have to say about their professional development or support needs regarding the use of AI?

The responses generated by Copilot were then edited to provide a concise answer for each question, along with relevant quotes from participants.

5. Results

Table 1. Frequency Table of Responses to Survey Items

Survey Items and Response Options	*n*	%
How familiar are you with the use of Artificial Intelligence (AI) tools in K-12 education?		
Not familiar at all	2	3.1
Somewhat familiar	9	14.1
Moderately familiar	21	32.8
Very familiar	24	37.5
Extremely familiar	8	12.5
Have you incorporated AI tools or technologies in your online teaching practices?		
Yes	44	68.8
No	19	29.7
Missing	1	1.6
To what extent do you believe AI enhances student learning in the online K-12 environment?		
Not at all	5	7.8
A little	22	34.4
A moderate amount	23	35.9
A lot	9	14.1
A great deal	4	6.3
What are the potential benefits you perceive for students using AI tools in their education? [a]		
AI has the potential to significantly enhance personalized learning experiences.	28	45.2
AI can contribute to the development and improvement of problem-solving skills in students.	20	32.3
The utilization of AI tools may increase student engagement and participation.	38	61.3
I do not believe AI can positively impact online learning.	11	17.7
While I acknowledge the potential benefits of AI in online learning, I am uncertain about the specific ways it could be advantageous.	13	21.0
What concerns do you have regarding students' use of AI in their learning? [a]		
I am concerned about privacy and security implications associated with AI usage.	27	43.5
I have potential concerns related to a perceived lack of teacher control over AI-driven learning environments.	35	56.4
I am concerned about fairness issues arising from the implementation of AI tools in education.	41	66.1
I have no concerns regarding students' use of AI in their learning.	3	4.9
I do not feel that I know enough about AI to decide whether I have any concerns.	3	4.9
In what ways might the role of teachers evolve in the future with the increasing integration of AI in education? [a]		
Teachers may facilitate more student-centered learning by guiding students in their individual learning paths and encouraging self-paced learning.	11	18.0
Teachers may collaborate with AI technologies to provide personalized learning experiences and real-time feedback to students.	42	68.9
I do not anticipate significant change, as the fundamental role of teachers in guiding and mentoring students will stay the same.	8	13.1
What impact do you foresee AI having on online teaching methods in the next 5-10 years?		
No impact	0	0
Minimal impact	0	0
Moderate impact	11	18.0
Strong impact	48	78.7
Unsure	0	0
Missing	5	8.2
What kind of professional development or support do you believe online teachers need to adapt to the evolving landscape of AI in education? [a]		
Specialized training focused on effective use of AI tools in an educational context.	45	73.8
Pedagogical support to integrate AI seamlessly into teaching methodologies.	41	67.2
Guidance on policies and best practices related to integrating AI in education.	45	73.8

Note. [a] Percentages do not sum to 100% because teachers could select more than one response option.

Study results are presented for each major theme addressed by the survey and focus groups. For each theme, quantitative results are presented first, followed by qualitative results. Teacher responses to the survey are summarized in Table 1.

5.1. Familiarity with AI Tools in Education

5.1.1. Survey Results

As shown in Table 1, most teacher respondents indicated that they were moderately (32.8%) or very (37.5%) familiar with the use of AI tools in K-12 education. Only 3.1% were not familiar at all with AI tools. Due to the relatively small number of respondents in some of the original response categories, a composite variable was created in which "not familiar at all" and "somewhat familiar" were combined, and "very familiar" and "extremely familiar" were combined for subsequent analyses.

5.1.2. Focus Group Results

Teachers who participated in the focus groups are aware of the importance of AI tools in education and are preparing to integrate them into their teaching methods. They believe that they need to show students how to use AI to enhance their critical thinking skills. They also emphasize the importance of teaching students that AI can be incorrect and that they should not just accept the answers given by AI without analyzing them. For example, one teacher said:

As teachers, we're going to have to start showing students how to use AI to infuse their critical thinking skills. In other words, our jobs are evolving to show them how AI can be wrong. So they can understand, 'Hey, listen, AI can be wrong, so you can't just ask it a question and then plug that as your answer and keep it moving. You have to actually analyze what AI has now given you to identify what is correct and what is wrong.' This is to show them how to use critical thinking and problem-solving with AI.

Teachers are preparing for a future where critical thinking skills and AI usage will start together. They see their roles evolving to guide students in this new learning environment. They express concern that students as young as 5th grade are already using AI without having the proper critical thinking and problem-solving skills.

5.2. Incorporating AI Tools in Online Teaching

5.2.1. Survey Results

The majority of teachers (68.8%) indicated that they had already incorporated AI tools in their online teaching practices. Teachers who were more familiar with AI were more likely to have incorporated AI tools into their teaching practices ($\chi^2(2) = 11.58$, $p = .003$). That is, teachers who were very or extremely familiar with AI were more likely to use AI in their teaching practices.

5.2.2. Focus Group Results

The thematic analysis of the transcripts indicated that teachers use AI for a variety of purposes. One teacher mentioned using AI to **generate general prompts**, which helps them save time and mental effort:

I use AI every day for some facet of our job. It's a wonderful tool, so I like that we can work smarter, not harder… just using it for general prompts where I don't have to think so hard and use all my brain power.

The same teacher has used AI in live lessons to **show discrepancies and biases** that can be present in how AI makes interpretations. Another teacher talked about using AI tools to **create videos and build depth of knowledge**:

So I've been using AI tools with DBAs [Discussion-Based Assessments] with live lessons. And then all the pretty things that I like to send out to my students weekly. But the big thing is, you know, making videos…[in order to build] depth of knowledge. Okay, can they get this base layer? Let's move up. Let's move up and see how far I can challenge the student in a DBA.

The same teacher also mentioned using AI to create **"what-if" scenarios** to challenge students' understanding of historical events and their potential outcomes.

These examples show that teachers are finding innovative ways to incorporate AI tools into their online teaching methods to improve efficiency and learning experiences. They are using AI not just as a tool for delivering content but also as a subject of study itself, teaching students about its capabilities, limitations, and implications.

5.3. Beliefs about AI Enhancing Online Student Learning

5.3.1. Survey Results

A one-way ANOVA was used to describe the relationship between teachers' degree of familiarity with AI and their beliefs about the extent to which AI enhances student learning. The results indicated that familiarity with AI was not a statistically significant predictor of these beliefs ($F(2, 60) = 0.34$, $p = .71$). Similarly, there was no statistically significant relationship between responses to this item and teachers' actual utilization of AI tools ($F(1, 61) = 2.25$, $p = .14$). Teachers had mixed beliefs about the ability of AI to enhance students' learning, and there was no relationship found between beliefs about AI and familiarity with AI or current usage of AI.

5.3.2. Focus Group Results

Overall, teachers felt that AI enriches online learning. One teacher expressed that AI will enhance personal connections and help customize teaching in a new way. Another teacher indicated that AI will quickly identify students' learning gaps and modify lessons to fill those gaps. Teachers also see the potential of AI in making lessons more engaging and quicker by adapting to students' changing learning patterns.

These points suggest that teachers see AI as a valuable tool that can enhance the online learning experience by providing personalized learning, saving time, and making lessons more engaging. They also see their roles evolving in response to the integration of AI in education.

5.4. Perceived Benefits of AI in Education

5.4.1. Survey Results

To analyze the perceived benefits of AI, response options were converted to binary variables (0 = not selected and 1 = selected). Most teachers surveyed recognized the potential of AI to increase student engagement and participation in online learning (61%). In addition, most teachers acknowledged the role of AI in enhancing personalized learning (45%) and students' problem-solving abilities (32%). The researchers also found that some teachers (39%) expressed uncertainty or did not perceive AI as being beneficial for online learning.

Teachers who had already incorporated AI in their teaching practices were more likely to believe that AI enhances personalized learning experiences (χ^2 (1) = 3.92, p = .05), improves problem-solving skills (χ^2 (1) = 5.74, p = .02, and positively impacts online learning (χ^2 (1) = 6.36, p = .01. There was no difference between teachers' utilization of AI and their beliefs about whether AI increased engagement and participation.

5.4.2. Focus Group Results

The focus group transcripts revealed several themes regarding the perceived benefits of AI:

Scale: Teachers foresee a future where they can handle more students as AI takes over tasks like grading and answering common questions. If students can demonstrate mastery of the material more quickly, this could also lead to an increase in the number of courses they can take.

Customized Teaching: AI is expected to enhance personal connections and help customize teaching in a whole new way. It is believed that AI will quickly identify students' learning gaps and customize lessons to fill those gaps.

Enhanced Student Engagement: AI is seen as a tool that can increase student engagement and learning outcomes. For example, one teacher mentioned using AI for developing depth-of-knowledge questioning, which has helped students better demonstrate their learning and gains.

Efficiency: Teachers find AI to be a helpful tool that allows them to work smarter, not harder. For instance, one teacher mentioned using AI for generating general prompts, which helps save time and mental effort.

These points suggest that teachers see AI as a valuable tool that can enhance the online learning experience by providing personalized learning, saving time, and making lessons more engaging. They also see their roles evolving in response to the integration of AI in education.

5.5. Concerns About Students' Use of AI

5.5.1. Survey Results

As with the previous question, response options regarding concerns about students' use of AI were converted to binary variables (0 = not selected and 1 = selected). Teachers were primarily concerned about fairness issues (66%) and privacy and security implications (44%). Only 5% had no concerns regarding the use of AI by students for learning purposes.

A series of crosstabulation procedures were conducted to further understand the relationship between AI utilization patterns and teachers' concerns about AI. There was no difference between actual utilization and concerns about privacy (χ^2 (1) = 0.00, p = .91), lack of teacher control (χ^2 (1) = 0.39, p = .42), or fairness issues (χ^2 (1) = 0.15, p = .70).

An additional series of chi-square tests examined concerns elicited by teachers based on their beliefs about whether AI could positively impact online learning. There was no statistical difference regarding beliefs about the positive impacts of AI and concerns about privacy (χ^2 (1) = 0.57, p = .52) or fairness (χ^2 (1) = 1.39, p = .31). However, teachers who did not believe that AI could positively impact online learning were more likely to express concerns about perceived lack of teacher control as a result of AI utilization by students (χ^2(1) = 7.02, p = .02).

5.5.2. Focus Group Results

Teachers participating in the focus groups had several concerns about students' use of AI. One teacher mentioned that students often **misuse** AI tools, thinking they can just type in the assignment and turn in whatever the AI generates. They don't understand why this is not acceptable and that they need to use their brains too. The same teacher also expressed concerns about **academic integrity**. They mentioned that students often have enough knowledge about a topic to get through an academic integrity discussion, even if they didn't do the assignment themselves. Another teacher expressed concern about students using AI before they have had enough real-life experiences with **critical thinking and problem-solving**. They believe it's crucial for students to practice these skills before they start using AI. A different teacher raised concerns about **accessibility and privacy**. They mentioned that not everyone has access to large language models and that the way AI operates is basically not private.

These concerns highlight the need for careful implementation and use of AI in education, ensuring that it enhances rather than hinders learning and that it is used ethically and responsibly.

5.6. Teachers' Evolving Role as a Result of AI Integration

5.6.1. Survey Results

As shown in Table 1, the majority of participants (69%) indicated that teachers should leverage the power of AI to offer students personalized learning and personalized feedback on work. Fewer teacher survey participants (13%) thought that the role of the teacher would remain unchanged after integrating AI into their teaching practices. Teachers who believed in the potential of AI to enhance student learning in the online K-12 environment were more likely to indicate that AI could contribute to improved student learning (F(1,57) = 6.36, p < .01). However, teachers who held this belief were significantly more likely to indicate that AI enhances student learning in the online K-12 environment (F(1,57) = 6.36, p < .01).

5.6.2. Focus Group Results

Teachers shared several insights about how their roles are evolving due to the integration of AI:

Guiding Critical Thinking: Teachers see their roles evolving to guide students in using AI in conjunction with critical thinking skills. They believe they will have to start

showing students how AI can be wrong and that they need to analyze the answers given by AI.

Facilitating Learning: Teachers foresee a future where they become facilitators of learning as AI takes over tasks like grading and answering common questions.

Scaling Education: Teachers anticipate being able to handle more students as AI takes over more tasks. Additionally, if students can demonstrate mastery of the material more quickly using AI tools, they might be able to take more courses.

Customizing Teaching: Teachers see AI enhancing personal connections and helping customize teaching in a new way. They believe AI will quickly identify students' learning gaps and customize lessons to fill those gaps.

These insights suggest that teachers see their roles not just as content deliverers but as guides and facilitators in an increasingly AI-shaped learning environment. They are preparing for a future where critical thinking skills and AI usage start together, and they see their roles evolving to guide students in this new environment.

5.7. Impact of AI on Online Teaching Methods in the Future

5.7.1. Survey Results

There was widespread consensus among respondents regarding the transformative potential of AI in the online classroom. The majority of respondents (75%) indicated that AI will have a strong impact on online teaching methods in the next five to ten years (see Table 1). It is interesting to note that none of the respondents indicated that AI would have minimal impact at all on online teaching and learning. Furthermore, there were no significant differences between teachers' perceptions of the impact of AI and teachers' concerns about privacy (χ^2 (1) = 1.86, p = .20), control (χ^2 (1) = 2.10, p = .19), or fairness (χ^2 (1) = 1.49, p = .30).

5.7.2. Focus Group Results

Teachers believe that AI will significantly impact online teaching methods. As noted previously, teachers envision a future where they can handle more students as AI takes over time-consuming tasks like grading and allows them to focus more on building relationships with their students. Additionally, teachers believe students could take more courses if they can use AI to get through the course material and demonstrate mastery of that material more quickly. Teachers also foresee an increase in curriculum writing as some courses might be removed from the schedule.

These insights suggest that teachers are optimistic about the potential of AI to transform online teaching methods, making education more scalable, personalized, and efficient. They are preparing for a future where their roles evolve to guide students in this new learning environment. They believe that AI will enhance personal connections and help customize teaching. They see their roles evolving to become facilitators of learning as AI takes over more tasks. They also see the potential of AI in making lessons more engaging and quicker, adapting to the changing learning patterns of students. They are using AI not just as a tool for delivering content but also as a subject of study itself, teaching students about its capabilities, limitations, and implications.

5.8. Need for Professional Development or Support

5.8.1. Survey Results

Most survey respondents (74%) expressed a need for professional development or other support to help teachers adapt to AI in education (see Table 1). Respondents recognized the value of AI and indicated a need for training about how to integrate AI effectively into online teaching practices. In addition to professional development, participants indicated (67%) that there was a need for pedagogical support. This support likely involves guidance on how to incorporate AI tools into online teaching methods and ensure they align with educational goals and the needs of online students.

5.8.2. Focus Groups

Teachers expressed a need for more professional development and support in the use of AI. For example, teachers expressed a need for more **hands-on training** to create better inquiries to solve complex problems requiring deep research and collaboration. They believe that mentoring from professional development is crucial. Teachers also want to **understand AI capabilities**. They expressed a desire to learn more about how AI can be integrated into their curriculum and how it can enhance their lesson plans to create engaging learning experiences. Teachers also highlighted the importance of **inquiry-based learning**. They believe that professional development programs should be structured effectively to prepare teachers to integrate AI.

These insights suggest that teachers are seeking more support and professional development opportunities to integrate AI into their teaching practices effectively. They believe that understanding the practical capabilities of AI and having hands-on training are crucial for this purpose. They also see the potential of AI in enhancing inquiry-based learning, which is a student-centered approach that involves exploring the natural or material world, triggering curiosity, and leading to asking questions and making discoveries.

6. Discussion

This study focused on addressing the limited research about teachers' perceptions of the use of AI models, like ChatGPT, in online K-12 education and the researchers sought to define how teachers in a fully online K-12 educational environment viewed the future of online learning with AI. Two research questions drove the study.

Our survey revealed that a majority of teachers (70%) are familiar with AI tools in education, with many teachers using AI tools regularly in their virtual classrooms. When it came to familiarity with AI tools in education, the focus group discussions highlighted that teachers are not only aware of AI tools, but actively seeking ways to integrate AI tools into their virtual classrooms and teaching methods. The researchers

determined that this could lead to more widespread adoption and integration of AI tools in the classroom, potentially transforming online teaching and learning.

The researchers were interested in how virtual K-12 educators incorporated AI tools into online teaching and survey results indicated that a majority of teachers (68.8%) have already incorporated AI tools into online teaching practices. Focus group results indicated that teachers were already finding innovative ways they have incorporated AI tools into their teaching methods. Our results indicated that the more knowledgeable online teachers were about AI, the more the teachers used it in their teaching practice. The level of familiarity with AI directly influenced the adoption of AI tools in the classroom. This highlights the importance of teacher training and awareness for successfully integrating AI into online education.

Researchers were interested in discovering what beliefs online K-12 teachers had about the ability of AI to enhance online student learning. The researchers found that despite mixed beliefs about the ability of AI to enhance students' leanring, survey results revealed no significant relationship between these beliefs and teachers' familiarity ($F(2, 60) = 0.34$, $p = .71$) or usage ($F(1, 61) = 2.25$, $p = .14$) of AI. Researchers found that regardless of a teacher's level of familiarity or usage of AI, teachers had mixed ideas about the impact of AI on student learning. The absence of a clear relationship between familiarity, usage, and beliefs highlights the complex work of integrating AI into education. The researchers found that more research is needed to fully understand the dynamics between these factors and their impact on student learning outcomes.

Online K-12 teachers' perceptions about the benefits of AI in education was another point of interest for the researchers. Survey results indicated that most teachers recognized the potential of AI to increase student engagement and student participation in online learning (68%). In addition, survey results found that teachers acknowledged the role of AI in enhancing personalized learning (45%) and students' problem-solving abilities (32%). Focus group discussions revealed that online teachers view AI as a valuable tool that can enhance students' online learning experiences. What was noteworthy among the survey results was that teachers who had already incorporated AI in their teaching practices were more likely to believe in the benefits of AI in online education. It is interesting to note that there was no significant difference between teachers' utilization of AI and their beliefs about whether AI increased student engagement and participation. Though some teachers may be hesitant to incorporate AI into their teaching practices, teachers indicated an overall positive impact on AI usage and student learning.

Online teachers' concerns about students' usage of AI was an additional point of interest for the researchers. Survey results found that teachers were concerned about fairness issues (66%) and expressed misgivings about privacy and security with students' usage of AI (44%). Teachers during the focus group discussion shared concerns about students' misuse of AI tools and the need for students to develop critical thinking and problem-solving skills before using AI. What was remarkable among the survey results was that participants' beliefs about the impact of AI on student engagement and participation did not differ based on teachers' utilization of AI. This suggests a broad consensus among online educators that AI offers positive outcomes for students despite some teachers' reservations about the technology.

Teachers' perceptions about their evolving roles in online education were interesting to the researchers. Survey results indicated that online teachers see their roles evolving as they leverage AI to offer students personalized learning and feedback (69%). Focus group discussions revealed that online teachers feel their role is shifting to that of a guide for students as students work in an increasingly AI-shaped learning environment. It is interesting to note that teachers who held the belief that AI could enhance personalized learning for students were not necessarily more likely to utilize AI tools. A key observation from the study was the discovery of a significant correlation in the data. It was found that educators who recognized the potential of AI to augment student learning in an online K-12 setting were more inclined to suggest that AI could lead to enhanced student learning outcomes ($F(1,57) = 6.36$, $p < .01$). This suggests that positive perceptions of AI's impact on student learning may influence its adoption in educational settings. While teachers recognized the enormous potential of AI, the adoption of AI tools remained multifaceted. These findings shed light on the unique interplay between teachers' beliefs about AI, the utilization of AI, and teachers' perceived benefits of AI in education.

One particular interest the researchers had going into the study was the perceptions of online teachers about the impact of AI on online teaching methods for the future. Survey results found there was widespread consensus among participants regarding the transformative potential of AI in online education in the future (75%). Focus group discussions revealed that online teachers believe AI will significantly impact online teaching methods, making education more scalable, personalized, and efficient. This suggests that such factors do not significantly influence teachers' expectations of AI's impact. These findings lead the researchers to conclude that while teachers are concerned about privacy, control, and fairness, teachers are mostly positive about the transformative impact AI will have on online education.

Researchers wanted to know about the perceptions online teachers had about the need for professional development in the wake of the release of AI tools. Survey results indicated that there was a majority of participants (74%) who expressed a need for professional development to help online teachers adapt to AI in education. Participants also expressed a need for pedagogical support (67%) about how to use AI tools. Focus group discussions concurred and revealed that online teachers expressed a specific need for professional development in the wake of the release of AI tools in education.

Overall, the findings provided valuable insights into the perceptions of online K-12 teachers towards the use of AI in online education. The findings revealed a high level of familiarity with AI tools among online teachers, a direct correlation between this familiarity and the adoption of AI in the classroom, and a recognition of the transformative potential of AI in online education. Despite concerns about fairness, privacy, and security, there was broad

consensus about the positive impact of AI on student learning. The findings also highlighted the evolving role of teachers in an AI-shaped learning environment and the need for professional development and pedagogical support to help teachers adapt to this new educational landscape. As we continued to navigate the integration of AI in education, these findings underscored the importance of ongoing research to fully understand the dynamics between these factors and their impact on student learning outcomes. This study served as a steppingstone towards a more comprehensive understanding of the role of AI in shaping the future of online K-12 education.

6.1. Limitations

The researchers acknowledge that certain limitations exist within this study. First, the sample size and diversity of the respondents could potentially limit the generalizability of the findings. A second limitation was the data collected was self-reported data, which could introduce bias as respondents may have overestimated or underestimated their familiarity and usage of AI. Another limitation was the absence of a control group of teachers who do not use AI tools. This limited the ability of researchers to draw definitive conclusions about the impact of Ai tools on student learning outcomes. The next limitation focused on subjectivity in focus group discussions. The participants' subjective experiences and opinions may not be generalized to all online K-12 teachers. Finally, the study focused on teachers' perceptions and did not consider students' perspectives on the use of AI in their learning process. This could limit the comprehensiveness of the study's findings. Despite these limitations, the study provided valuable insights into the potential of AI tools in enhancing student learning in the online K-12 environment. Future research could address these limitations to provide a more comprehensive understanding of teachers' perceptions about AI tools in online education.

6.2. Recommendations for Future Research

Researchers who study AI and online education would do well to focus research on the specific types of professional development online teachers will need the most for successful AI implementation. Gathering data about the specific AI tools that carry the biggest impact on student learning would provide valuable information for teachers working in online education. More research should focus on specific subjects or grade levels to measure specific and targeted data about teachers' perceptions of AI and the overall outlook about the future of education in light of Artificial Intelligence. Furthermore, future research could involve a larger and more diverse sample of K-12 online teachers to enhance the generalizability of the findings. Future research could include a control group to provide a comparative analysis of the impact on student learning outcomes. An additional focus of future research could limit its scope to a longitudinal study could provide insights into the long-term effects of AI tool usage in online K-12 education. By addressing these recommendations, future research could contribute to a more comprehensive and nuanced understanding of the role and potential of AI in online K-12 education. This would ultimately support the development of more effective and engaging online learning environments for K-12 students.

6.3. Summary

This research primarily focused on online K-12 teachers' perceptions of students' AI utilization and their outlook on the future of education in the context of Artificial Intelligence. The study found most teachers are familiar with AI tools and have started incorporating them into their online teaching practices.

Interestingly, the study revealed a direct correlation between a teacher's level of familiarity with AI and their likelihood of integrating AI into their teaching practices. This suggests that familiarity breeds confidence, underscoring the need for online schools to provide teachers with comprehensive professional development and support to build their confidence in using AI in the classroom.

The survey participants acknowledged the potential of AI to enhance student engagement and facilitate personalized learning. Despite some reservations about incorporating AI tools into the online classroom, the overall sentiment among respondents was positive. They anticipate that the integration of AI will transform the role of online teachers, making education more interactive and personalized.

However, the study also highlighted that for successful implementation of AI into online education, teachers need not only technical training but also pedagogical support. This would help them understand how to effectively use AI tools to enhance teaching and learning outcomes. The study thus underscores the need for a holistic approach to teacher training for AI integration in online K-12 education.

In conclusion, while AI holds great promise for online K-12 education, its successful integration hinges on providing teachers with the necessary support and training. Future research should explore effective strategies for teacher training in AI and investigate the long-term impacts of AI integration on student learning outcomes.

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Appendix A

Focus Group Questions

1. Describe a specific instance or scenario where you have integrated AI tools in your online teaching. What was the impact on students' learning outcomes?
2. **S**hare specific examples where the use of AI tools in your teaching has led to increased student engagement, enhanced personalized learning experiences, or improved problem-solving skills
3. How do you navigate the balance between incorporating AI in teaching and maintaining a

personal connection with your students in an online learning environment?

4. What challenges have you encountered when implementing AI tools, and how have you addressed or mitigated these challenges in your teaching practice?
5. Share specific instances where you had concerns about fairness, privacy, or security when using AI tools in your teaching? How did you address these concerns?
6. In your view, how should professional development programs be structured to effectively prepare teachers for the integration of AI in education?
7. Can you share your thoughts on the potential impact of AI on students' critical thinking and problem-solving skills? How do you see your role as a teacher evolving in this context?
8. Are there any specific AI-related policies or guidelines that you believe should be established at the school or district level to support teachers in using AI effectively?
9. What recommendations do you have for educational institutions and policymakers to better support teachers in adapting to the changing landscape of AI in K-12 education?

Looking ahead, how do you foresee the collaboration between teachers and AI evolving in the next decade, and what implications might this have for the overall education system?

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