TEACHER PERCEPTIONS AND PROFESSIONAL DEVELOPMENT IMPACT ON GENERATIVE AI USE IN MIDDLE GRADES

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Kathryn Dixon

Teacher Perceptions and Professional Development Impact on Generative AI Use in Middle Grades

Educational technology is changing rapidly, partly due to the increased accessibility of generative AI available to teachers and to students. This case study aims to examine teacher perceptions and use of AI use in middle grades and how professional development opportunities impact these perceptions in three middle schools in Indiana. The research questions are (1) What innovative pedagogical uses for AI are reported by teachers?, (2) What professional development opportunities related to AI do middle grade teachers participate in? and (3) How do teacher perceive that professional development has supported their use of AI in the classroom? To obtain information about AI use in middle grade classrooms and teacher perceptions, a survey was disseminated via Google Forms to middle school teachers in three school districts in Indiana, and qualitative interviews were conducted with 12 teachers who elected to participate. Results of the study suggest connections between professional development opportunities in schools and positive perception and innovative use of AI tools in classrooms.

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Chapter 1: Introduction

Despite the recent explosion in the field of artificial intelligence (AI), foundational concepts of this technology have been developing for nearly a century. In the 1930s, Alan Turing, widely regarded as the father of AI, initiated his exploration of machine intelligence. Over the subsequent two decades, he raised pivotal questions about whether machines could learn. In the 1950s, the first computer learned to play checkers (Lynch, 2024). The 1960s saw the introduction of PLATO - an acronym for Programmed Logic for Automatic Teaching Operations - developed at the University of Illinois. This innovative platform allowed thousands of students to interact with information in unprecedented ways, laying the groundwork for today's massive open online courses (MOOCs). In the 1990s, as computers became more affordable and accessible, discussions of plagiarism arose in English classrooms with the advent of Google and other Web browsers platforms and tools (Oswald, 2024).

Over the next two decades, the proliferation of smartphones made information even more accessible with apps, websites, and other technology tools rapidly available to users. The Covid-19 pandemic necessitated a shift to virtual learning for K-12 students, accelerating the integration of AI powered educational technology. This technology focused on automating tasks that previously relied on human cognition (Brown et al., 2020). Online education experienced significant enrollment increases and the Hollywood writers' strike brought the potential downsides of generative AI into public discourse (Lynch, 2024). By 2023, the widespread accessibility of generative AI caused challenges for educators, prompting discussions on maintaining academic integrity while enabling students to use AI responsibly as a learning tool [Appendix C].

As of today, many schools have established policies to guide the use of technology among employees and students. In recent years, it has become commonplace for secondary and postsecondary institutions to require students to disclose any AI use or to prohibit it entirely (Khoo & Bonk, 2022; McKnight, 2021). While instructors should remain vigilant against unoriginal submissions, the use of generative AI tools is quickly becoming mainstream. Like the World Wide Web, AI will be present in multiple facets of students' lives for the foreseeable future. Teachers who embrace AI as a pedagogical tool in their classrooms will play a crucial role in cultivating responsible and ethical digital learners.

Public schools have both the opportunity and responsibility to encourage students to explore AI and understand its implications. Educators can instruct students on evaluating AI-generated outputs, emphasizing the importance of critical evaluation. Recognizing that attitudes and personalities influence AI usage, teachers should monitor students closely to ensure that AI serves as a supportive tool rather than relying on it for the creation of thought (Burkhard, 2022). Encouraging critical engagement with AI-generated information can foster positive learning experiences and reinforce the concept AI as a learning tool or augmentative device. Experts agree that AI cannot be completely trusted due to its uncontrollable nature (Rudolph et al., 2023; Van Eemeren et al., 2016; Yau et al., 2023; Zawacki-Richter., et al. 2019).

Teachers have reported success in using AI to streamline time-consuming tasks and provide feedback to students; however, accurate input is essential for producing reliable outputs (Summers, 2022). Crafting effective prompts requires a level of competency and training, making it imperative for students to develop these skills for independent work to succeed. Many teachers are comfortable using traditional technology tools like PowerPoint and Microsoft Word, yet they may require significant training to implement emerging technologies effectively in the classroom (Beetham et al., 2013). As new technologies emerge and evolve, supporting teachers presents a significant challenge for schools with limited resources (Beetham et al., 2013). Evaluating quality and quantity of professional development opportunities will help determine whether the integration of AI is a priority for school districts. Additionally, some educators express skepticism towards various technology tools, which can hinder their willingness to embrace the new AI capabilities (Nazaretsky et al., 2022).

Problem Statement

Technology is evolving rapidly; however, the implementation of educational technology requires considerable time due to factors such as budget constraints, training needs, equipment accessibility, evaluation processes, and the inherent limitations of already crowded curricula. While AI tools can support teachers in the classroom, these technologies will increasingly shape the student experience and influence future careers. (AlAfnan et al., 2023; Brandao, et al., 2024; Casal-Otero et al., 2023).

This study provides a descriptive case study of public schools in a county in Indiana, offering a snapshot of current practices in middle-grade classrooms regarding the use of AI by both students and teachers. It also explores teachers' perceptions of student use of AI and identify opportunities for professional development that may influence these perceptions and the integration of AI tools in the classroom. In 2022, Nazaretsky et al. conducted research focusing on teacher trust in AI-powered educational technology and the professional development initiatives aimed at enhancing this trust. This study seeks to extend that knowledge by examining how perceptions of generative AI perceptions vary and how the opportunities provided can shape these perceptions.

There is a pressing need to cultivate intentional awareness of the disparate opportunities available for teachers – and consequently, to students - regarding AI intelligence in public schools (Brandao et al., 2024). This study also provides context on how some districts are offering support and encouraging innovation in this area. Ultimately, the goal is to equip school districts that prioritize AI education for students and teachers with the knowledge of available resources, enabling them to capitalize on these opportunities to meet emerging educational needs.

Context

The county under study is comprised of six school corporations and is recognized as a high-performing region in Indiana. Approximately 8,000 students in grades 6, 7, and 8 are enrolled in the ten schools included in this area. Financial disparities exist among the districts due to differing tax rates on farmland versus developed land, as well as varying tax levies in each community, despite generally similar population demographics. This area was selected for this study based on the researcher's access. Collecting data from multiple districts within similar classroom settings yielded valuable insights into differences in perceptions, AI usage, and professional development opportunities in this demographically comparable community. Three of the six districts chose to participate in the study.

Surveys were distributed to teachers in all grade 6 – 8 classrooms across participating districts, including those in specialty areas, to ensure a sufficient sample size of respondents. The interview pool was selected from these respondents using purposive sampling to include current AI users at various levels, as well as representing all participating districts.

A range of AI tools is currently being utilized in classrooms, and their prevalence is expected to increase as technology continues to evolve. Examples of these tools include ChatGPT, Echo Dot, chatbots, intelligent tutoring systems, and automated grading systems (Heffernan & Heffernan, 2014). Students engage with these tools to request immediate feedback, ask questions, or check the pronunciation of words. Conversely, teachers leverage these tools to tailor learning experiences for students. By utilizing such technologies, AI has the potential to impact education by enabling educators to implement more personalized instruction, provide immediate feedback, and offer individualized support. This capability allows K-12 teachers to alleviate some of the cognitive load associated with managing tasks, thereby enhancing their capacity to support student learning effectively (Humble & Mozelius, 2022; Prieto-Andreu & Labisa-Palmeira, 2023; Roll & Wylie, 2016).

Purpose of Study

The purpose of this descriptive case study was to gain insight from teachers regarding the innovative uses of AI in middle grade classrooms within public schools. It also examined instructors' perceptions of AI, as well as the training and professional development they have received related to AI implementation, and how these factors influenced the frequency and types of AI usage in their classrooms. While extensive research is currently being conducted on AI and its development, there is a notable lack of studies specifically addressing student use of AI in middle grade classrooms and the innovative practices of teachers.

By utilizing a case study methodology, this research investigated the relationship between the teachers' perceptions and their classrooms practices, incorporating subjective factors such as attitudes and beliefs about AI usage (Yin, 2016). Although the findings may not be broadly generalizable, the goal is to provide valuable examples of current practices in classrooms.

This study involved collecting data in a central Indiana county, leveraging the researcher's access to classroom teachers and their interest in middle-grade education and the topic of AI. While middle-grade teachers are increasingly incorporating AI into their practices, the pace of technological advancement for personal use – such as tools like ChatGPT, Oculus, and Gemini – outpaces the ability of educational technology developers and teachers to effectively address security risks and determine optimal classroom applications. Educators who are proactive in embracing these tools and encouraging responsible student use are providing their students with valuable exposure to AI, ahead of many of their peers.

The study sought to answer three research questions. First, what innovative pedagogical uses for AI are reported by teachers? Second, what professional development opportunities related to AI do middle-grade teachers report participating in or having the opportunity to participate in? Third, how do teachers perceive that professional development has supported their use of AI in the classroom?

Significance of Study

The findings of this study were intended to assist school districts that aim to embrace the use of AI by teachers and students. By comparing AI applications across various classrooms within a central Indiana county, this research identified barriers to AI implementation, including training, accessibility, and funding challenges, as well as teachers' perceptions. This study provided a snapshot of current practices in an area of Indiana characterized by similar populations and resources, and enabled comparisons and the identification of commonalities across classrooms.

Given the rapid advancement of technology and the growing body of research, AI is poised to play a significant role in the future lives and careers of current middle-grade students. Because of the vast number of curriculum requirements, educators have a limited timeframe to provide access to these tools and to help students become responsible and critical users of technology. Over the past thirty years, I have witnessed considerable progress in educational technology available to learners, with these tools increasingly available to younger students.

However, the negative impacts of social media on the mental health of teens highlight the potential dangers of overreliance on AI. Conversely, neglecting to encourage students to learn critical and responsible use of AI can be equally detrimental. Without this experience, students may face risks such as intentional or unintentional plagiarism, inadequate security, and reliance on inaccurate information.

Additionally, the findings from this descriptive case study inform future educational technology development, ensuring that tools are user-friendly and address teachers' concerns. The results also identify necessary training for teachers to effectively utilize AI tools and enhance student achievement. By highlighting current uses and perceptions, developers can gain a better understanding of how teachers feel about AI integration and the extent to which these opinions vary or align within a region characterized by similar resources and demographics.

Chapter 2: Literature Review

Introduction

While the literature on AI and technology use in schools is expanding, there remains a limited understanding of teachers' perceptions, and the impact of professional development specifically related to AI technology. This study aimed to contribute to the existing body of knowledge by examining the innovative use of AI in middle-grade classrooms within a specific county. It explored the diverse ways that AI is utilized - or not utilized – across different classrooms and subject areas. Additionally, the research investigated how educators' perceptions as well as training influence the development of tools to promote responsible AI use among students.

AI tools are increasingly being utilized in classrooms around the country and beyond. Although research specifically focused on middle-grade applications is limited, insights from literature on high school and elementary school use of AI are also relevant. The following list highlights some current applications of AI in education and their impact on student learning.

Winkler et al. (2021) conducted an empirical study involving high school students and the use of Smart Personal Assistants (SPAs). This research focused on problem-solving, with the SPA serving as a resource to help students obtain information about laws with which they had no prior experience. This study found that, compared to a control group, students who interacted with the SPA – specifically, Echo Dot devices – experienced a tutoring-like effect. This interaction allowed them to engage with the device in a personalized manner, retrieving information in a way that aligned with their specific requests.

Furthermore, the findings indicated that using the SPA facilitated discussion similar to those with a peer partner, prompting students to refine their questions and articulate them clearly and concisely to obtain relevant information (Winkler et al., 2021). This skill - asking precise and clear questions – has the potential to be transferable to job-related tasks later in life. Additionally, the study revealed an increase in problem-solving abilities among students who used the SPA compared to those who did not. However, Winkler et al. (2021) noted that the small sample size limited their ability to explore subcategories, such as how SPA use might differently impact learning among high achievers versus low achievers and other classification groupings.

In another study, AlAfnan et al. (2023) investigated the use of ChatGPT, a generative AI tool, to generate responses to various questions in the fields of communications, business writing, and composition. This research explored how students engage with ChatGPT, and how instructors can leverage it as an educational tool and to promote responsible digital usage among students. The study demonstrated that ChatGPT can produce accurate answers to inquiries, similar to a search engine. However, a significant outcome of the research was the potential for students to utilize ChatGPT's responses to evaluate and analyze for errors and omissions, as well as to uncover ideas they had not previously considered (AlAfnan et al., 2023).

While concerns about plagiarism remain, the study suggests that integrating ChatGPT into classroom workshops- where students learn how the tool operates and how to detect it's outputs through language patterns or plagiarism detection software - can mitigate these issues. This approach allows students to use ChatGPT as a resource rather than merely submitting generated content as their own work (AlAfnan et al., 2023; Brandao et al., 2024).

One example from this study involved asking ChatGPT to generate emails to a customer in various tones and scenarios. This exercise allowed students to observe how the voice and style of communication change based on the intended audience and purpose of the message.

Furthermore, because the output is determined by user input, students can identify the types of questions and information they need to consider when crafting their own responses (AlAfnan et al., 2023).

Despite its potential, there are several challenges associated with using ChatGPT, one of which is the organization and structure of the writing it produces. These characteristics can make generated content more easily detectable by instructors. However, as AI technology continues to advance, such errors are likely to be minimized. Overall, ChatGPT can serve as a valuable tool across various contexts, provided that students understand how to use it to enhance their learning rather than replace traditional methods (AlAfnan et al., 2023).

While AI-powered tools are increasingly utilized in classrooms, understanding of what AI is and its full capabilities remains less common among K-12 students. Teaching students about AI is considered challenging and has predominantly occurred at the collegiate level until recently (Casal-Otero et al., 2023). However, experts agree that students should begin learning about AI - its possibilities and limitations- at a young age to become responsible digital learners. As AI technologies become integrated into everyday tasks across various fields, not just in computer science and programming, this knowledge will be essential for future workforce participation (AlAfnan et al., 2023; Casal-Otero et al., 2023;).

This need places educators in a pivotal position. In addition to the tools mentioned earlier, several programs in K-12 education utilize block-based programming to introduce AI concepts. For example, platforms like Scratch teach students how apps and software are designed with AI capabilities (Casal-Otero et al., 2023). Scratch allows students to engage in play-based gaming scenarios that focus on learning content. Game-based learning is particularly appealing to students, given their familiarity with gaming devices such as computer games, consoles like the PS5, and handheld devices like the Nintendo Switch in their leisure time (Yim & Su, 2023).

Regardless of the specific tool being used, it is essential for students to learn to use AI ethically and to recognize these tools as contributors to their creative and original work (Tseng & Warschauer, 2023). As AI tools become increasingly available to students, particularly at younger ages than ever before, it is vital to encourage early critical engagement with these technologies. The sooner students adopt a critical perspective toward these tools, the more successful and responsible they will become as users (Rizvi et al., 2023).

Artificial Intelligence in Education

The United States government has a department dedicated to Artificial Intelligence in Education (AIED), which has been active since the 1970s and aims to integrate technology into classrooms (Dimitriadou et al., 2003). According to Dimitriadou and Lanitis (2003), some U.S. classrooms are designated as SMART classrooms, characterized by students' access to a variety of technology tools and their use by instructors to enhance the learning experience. While some of these technologies, such as behavioral response systems, fall outside the scope of this study, it is noteworthy that advanced technologies are being employed in various ways to alleviate the cognitive and physical responsibilities of teachers. Examples include facial recognition technology for taking attendance and assessing student presence, as well as monitoring levels of engagement and even anxiety in the classroom (Dimitriadou et al., 2003).

While this study focuses on how teachers are currently using AI in classrooms, it is crucial to understand the technologies available to assess whether participating teachers are knowledgeable about these options or if they have not received training on the latest tools. Additionally, many of these technologies are expensive and evolve rapidly, making them difficult for individual teachers to acquire.

One example is the use of Virtual Reality (VR) in classrooms. One study indicates that students demonstrate increased motivation and achievement when engaging with these tools (Martín-Gutiérrez et al., 2017). VR allows students to independently acquire knowledge by exploring virtual experiences and simulating scenarios that would be impossible to replicate in a physical setting (2017). This technology enables students to actively participate in experiences rather than merely observing them. Moreover, due to the immersive nature of VR devices, distractions are minimized, potentially enhancing students' attention and focus (Kruger et al., 2019). However, the costs associated with these tools remain a significant barrier for many schools.

Personalized Instruction

Teachers face numerous demands on their time, including the development of instructional materials and the assessment of student performance. Importantly, AI tools, such as ChatGPT, can assist in these tasks, thereby reducing the time teachers spend on them (Prieto-Andrew & Labisa-Palmeira, 2023; Roll & Wylie, 2016). In K-12 classrooms, AI applications include personalized learning that allow each student to engage with the same content at their own level (Hsu & Ching, 2023), and intelligent tutoring systems (Ma et al, 2020). Additionally, AI can be utilized to track student progress and provide personalized support tailored to the unique needs of each learner (Zhai, 2022).

Immediate Feedback

AI can also serve as a powerful tool for classroom management tasks. Students can receive immediate feedback on writing prompts and spoken language exercises, as well as reminders for various tasks throughout the day (Winkler et al., 2023) Educators can effortlessly create tests, worksheets for extra practice at different levels, and videos for content delivery with just the touch of a button. Furthermore, AI can facilitate simulated experiences for students using devices like Oculus, providing immersive learning opportunities. Yuan et al. (2020) found that automated scoring of essays can be more objective when conducted by AI compared human evaluators.

Schools and educators recognize that personalized learning experiences are ideal for fostering student learning. However, growing class sizes and curricular demands can complicate this goal. AI can assist teachers by providing individualized support tailored to each student's needs (Winkler et al., 2021). Educators understand that their students are diverse learners with unique experiences, goals, and backgrounds (Roll & Wylie, 2016). AI offers the opportunity to create tailed educational experiences based on individual needs or to group students according to achievement levels, interests, age, and more. Additionally, AI can enhance teacher productivity by alleviating some classroom management tasks that are not directly related to instruction, allowing educators to focus more on tailoring lessons to meet student needs (Celik et al., 2022).

AI provides a wealth of resources to learners of all skill levels, whether for enrichment or remediation. With access to information on smartphones and other devices, students can retrieve data that was once expected to be memorized and recited, making knowledge readily available at their fingertips (Roll & Wylie, 2016). According to Roll and Wylie (2016), developers are leveraging AI to move beyond merely supporting basic content knowledge, focusing instead on integrating activities that foster self-regulation, collaboration, and motivation to address the diverse of students. AI has the potential to enable the development of these higher-order skills (Almelweth, 2022).

Assessment

Assessment of student learning is another area where AI can provide significant support, enabling students to receive more comprehensive and immediate feedback on certain tasks without teachers needing to spend hours grading (Zhai, 2022). The purpose of assessment has also evolved; while assessments were once primarily designed to measure learners' knowledge, they are now increasingly used to capture learning processes and trajectories (Roll & Wylie, 2016). This shift is partly a result of the influence of technology on education. However, it is essential to emphasize the continued need for human involvement in assessment tasks, as there are limitations of technology that only a human evaluator can identify (Zhai, 2022).

Disadvantages to using AI in K-12 Classrooms

While the use of AI tools can provide numerous benefits in the classroom, there are also some notable disadvantages. Interaction with a human teacher, who can observe a student's body language, tone, and non-verbal cues, cannot be fully replaced by non-human entities. AI can be viewed as an assistant to teachers, aiding in specific tasks and evaluating student needs to make recommendations for support (Humble & Mozelius, 2022). According to Hsu and Ching (2023), human evaluation of AI-generated content is crucial to ensure the accuracy and reliability of the output.

Additionally, negative perceptions can quickly arise among both students and teachers when errors are detected in the AI-generated output (Cukurova et al., 2020). Dietvorst et al. (2015) suggests that teachers tend to be less tolerant of mistakes made by machines compared to those made by humans.

Potential Bias and Security

Because AI tools, including generative models, are programmed by humans, they carry an inherent risk of bias and potential cultural insensitivity (Celik et al., 2022; Humble & Mozelius, 2022; Tseng & Warschauer, 2023). Efforts are underway to address these issues; however they remain a critical area of concern for educators using AI in the classroom (Zhai, 2022).

With any technology, concerns regarding user privacy, particularly for students, must be carefully considered (Zhai, 2022). While it is acknowledged that AI tools collect data, it remains unclear who has access to that data and how it is utilized (Winkler et al., 2023). Additionally, Winkler et al. (2003) highlight that using AI features to assist teachers with management tasks may pose privacy risks. For instance, if a teacher uses a timer to signal when a student needs to leave for additional academic support or to take medication, this could be perceived as a violation of privacy. Similarly, if AI is employed for student groupings, it may inadvertently share non-public data with others (Winkler et al., 2023).

Quality of Content Development and Lack of Training

Luckin and Cukurova (2019) emphasize that, when considering the intent and application of AI in education, it is evident that the developers of such technology are predominantly computer programmers or scientists, often lacking backgrounds in learning sciences or pedagogy. While instructional designers are trained to focus on the desired educational outcomes, the expectations and needs of teachers are frequently overlooked in the design process (Luckin & Cukurova, 2019). Additionally, there is a lack of training for pre-service teachers regarding the use of AI in classrooms; fostering this knowledge at the pre-service level can lead to more effective implementation (Celik et al., 2022). Similarly, opportunities for training on AI are insufficient not only for teachers but also for parents and the public (Mouta et al., 2023). Alarmingly, K-12 students may possess a greater understanding of AI than their parents and teachers.

Dimitriadou and Lanitis (2023) emphasize that teachers must receive training not only in the effective use of AI tools in the classroom but also in understanding the potential risks associated with their use. If teachers fail to identify incorrect information, security vulnerabilities, and other potential hazards, students may be at risk. Furthermore, it is essential for teachers to model tasks that highlight AI inaccuracies and to promote responsible and critical thinking among students regarding these technologies.

Gaps in Research

There is no doubt that AI will play a significant role in supporting learners in the coming years. However, substantial work remains to optimize its use and address various concerns. Future research is essential to explore the accessibility of AI tools for all learners and to evaluate their equity. Additionally, ethical considerations must be examined, particularly in fostering students' understanding of the ethical implications of AI use and promoting responsible digital citizenship.

The recent proliferation of AI options in educational software, online content, and devices has outpaced the existing research on the long-term effects of AI on student learning. Baskara and Murarto (2023) highlight the importance of examining niche areas within AI applications, particularly concerning English language learners (ELL) and the provision of assistive technology for students with special needs.

Celik et al. (2022) have identified a significant gap in teacher involvement during the development of many AI tools for education. While some studies involve teachers to "teach" the AI correct answers or provide context for simulations, there is often minimal engagement of teachers in the initial design process to address their needs (Celik et al, 2022). Further research is necessary to identify the specific requirements and preferences of teachers using these tools, which could help pinpoint opportunities and barriers to effective implementation.

One reason for the limited adoption of AI in classrooms is teachers' reluctance to embrace it as a future educational tool. This hesitance may contribute to the slower advancement of educational AI compared to other industries such as medicine and business (Luckin & Cukurova, 2019; EdTechXGlobalReport, 2016). Additionally, because much of the development in educational technology is driven by developers and venture capitalists, concerns regarding ethics and the lack of guidelines for AI applications become paramount (MurpyRF, 2019).

Artificial Intelligence will continue to transform how educators approach teaching and learning, making what was once impossible in classrooms a reality. The potential for personalized instruction and immediate feedback are among the features of AI that significantly support student learners. As part of this, AI can aid instructors in adapting content to meet the diverse needs of their learners, highlighting its positive impact on education.

While concerns such as bias and security need to be addressed, the advantages of this technology will drive users to find ways to mitigate these issues and promote responsible student engagement. According to Squicciarini and Nachtigall (2021), jobs requiring skills in AI technology are rapidly increasing. Therefore, it is essential for students to learn how to use AI ethically and responsibly.

Currently, classroom teachers are utilizing AI technologies such as ChatGPT and SPAs, although this usage remains limited due to factors like insufficient teacher training, concerns about ethics, bias, security, and the availability of technology in schools. Many schools have guidelines that prohibit the use of generative AI for classwork, but this approach must change quickly as students gain access to these tools and begin to use them independently (Adams et al., 2023).

If educators do not find a way to integrate AI tools into their curricula and teach students to critically evaluate these technologies, students may sacrifice their learning by relying on the convenience of platforms like ChatGPT. Addressing the issues directly and allowing students to use AI as a support tool or for text evaluation, educators can promote responsible digital learning and encourage healthy skepticism toward these technologies. This approach could foster a sense of caution among students, guiding them to use AI tools appropriately.

At this point, research on the actual AI tools used in K-12 classrooms – especially concerning middle-grade specific applications – is still limited. Several scoping reviews reveal small sample sizes and highlight the lack of training received by both current and pre-service teachers (Casal-Otero et al., 2023; Mouta et al., 2023; Rizvi et al., 2023). Continued research will be essential as AI becomes increasingly accessible to classroom teachers, necessitating the establishment of best practices to ensure these tools are used effectively to enhance student learning.

This study aims to address gaps in research by examining the innovative use of AI by middle grade teachers, exploring their perceptions of AI in classroom, and assessing the training they have received on these tools. While the focus is narrow, the findings may pave the way for future studies that promote responsible AI use among students and encourage developers to involve educators more comprehensively in the development process.

Bin-Nashwan et al. (2023) explored various applications of AI in classrooms, particularly focusing on the integrity challenges associated with these technologies. They emphasized the importance of approaching generative AI tools, such as Chat GPT, with caution. The researchers highlighted that instructors must be aware of both the advantages and drawbacks of using the tools. Additionally, they discussed the broader implications of student use on AI on academic work and how the educational landscape may evolve in response to the increasing availability of generative AI, alongside the growing challenges in detecting its misuse.

Jang et al. (2022) examine how student perceptions of the ethics surrounding AI influence both the level of its use and the justification for that use in classrooms. While their research primarily focuses on the student perspective, it underscores the importance of instructors ensuring that students are aware of ethical issues related to AI. Educators must encourage students to adopt a critical view of AI applications to foster responsible usage.

Chapter 3: Method

This study was conducted across three school districts in Indiana which exhibited similar demographic characteristics [Appendix D]. It focused on middle-grade (grades 6 – 8) educators within a single county, examining their innovative applications of AI in the classroom, their beliefs regarding AI usage, existing policies implemented by their school districts, and the professional development opportunities available to teachers.

Six districts were invited to participate. Of these, three districts responded. Surveys were distributed to all educators teaching grades 6 – 8 in these districts, soliciting self-reported data on their usage, perceptions, opportunities, and concerns regarding AI. Participants were encouraged to share their innovative classroom applications, and a subset of those who consented to interviews was selected for more in-depth exploration of their experiences through interviews. Purposive sampling was employed to ensure that those interviewed represented a range of perceptions regarding their AI usage - those who perceived their AI usage to be less than, equal to, or greater than that of their peers.

Research Questions

There were three key research questions for this proposed study:

1. What innovative pedagogical uses for AI are reported by teachers?
2. What professional development opportunities do middle grade teachers report participating in or having the opportunity to participate in related to AI use for teachers or students?
3. How do teachers perceive that professional development has supported their use of AI in the classroom?

Participants

Participants in this study were middle-grade teachers (grades 6-8) from school districts in Indiana. Permission was obtained from district central office administrations, and surveys were distributed via email to eligible teachers across all subject areas. Middle-grade teachers were defined as those instructing students in grades 6, 7 and 8, regardless of how individual districts classified their middle or intermediate schools. For example, if a district included 6th grade within its elementary schools, only the 6th grade teachers from those schools were included, along with 7th and 8th grade teachers from intermediate, middle, or junior high schools.

This study focused exclusively on public school teachers' perceptions, allowing for a comparative analysis of their experiences through the lenses of education, professional development, and funding. While middle-grade teachers in private and charter schools may encounter similar experiences, the elements examined are most consistently observed within the public-school context.

Surveys were distributed using Google Forms to teachers via their official school email addresses. Accompanying information sheets provided details about the study and included contact information for participants who had additional questions. Surveys responses were anonymous, except for those respondents who consented to be included in the interview pool or the second phase of data collection.

A reminder was sent seven days after the initial survey was distributed, encouraging participation. Following the designated response window, 12 participants who opted into the interview portion were selected for interviews. Each interview lasted approximately 40 minutes;

11 were conducted via Zoom, while one took place in person. All participants consented to the recording of the interviews.

A total of 34 teachers from all three school districts completed the survey. Among the participants, five (14.7%) taught only 6th grade students, 12 (35.3%) taught only 7th grade, eight (23.5%) taught only 8th grade, and nine (26.5%) taught multiple grades, as illustrated in Figure 1.

Figure 1:

Grade level of teachers responding to survey questions

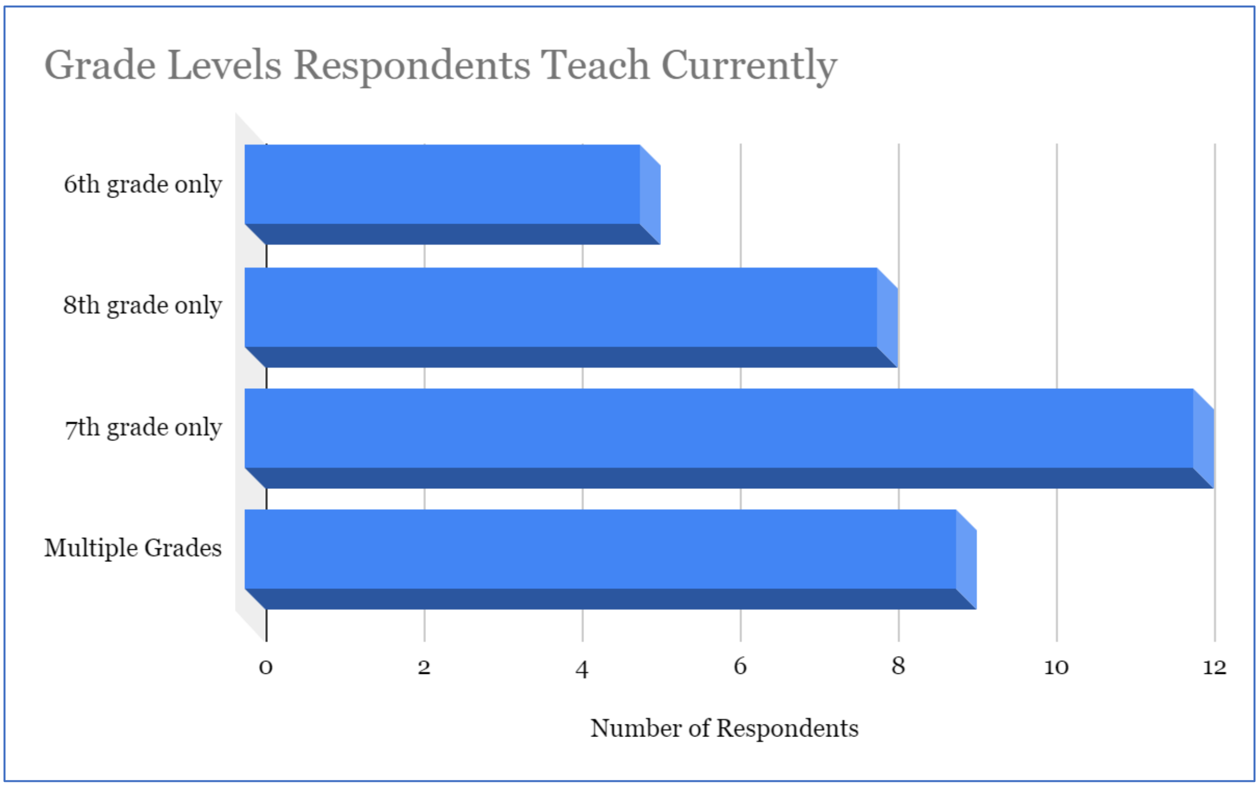
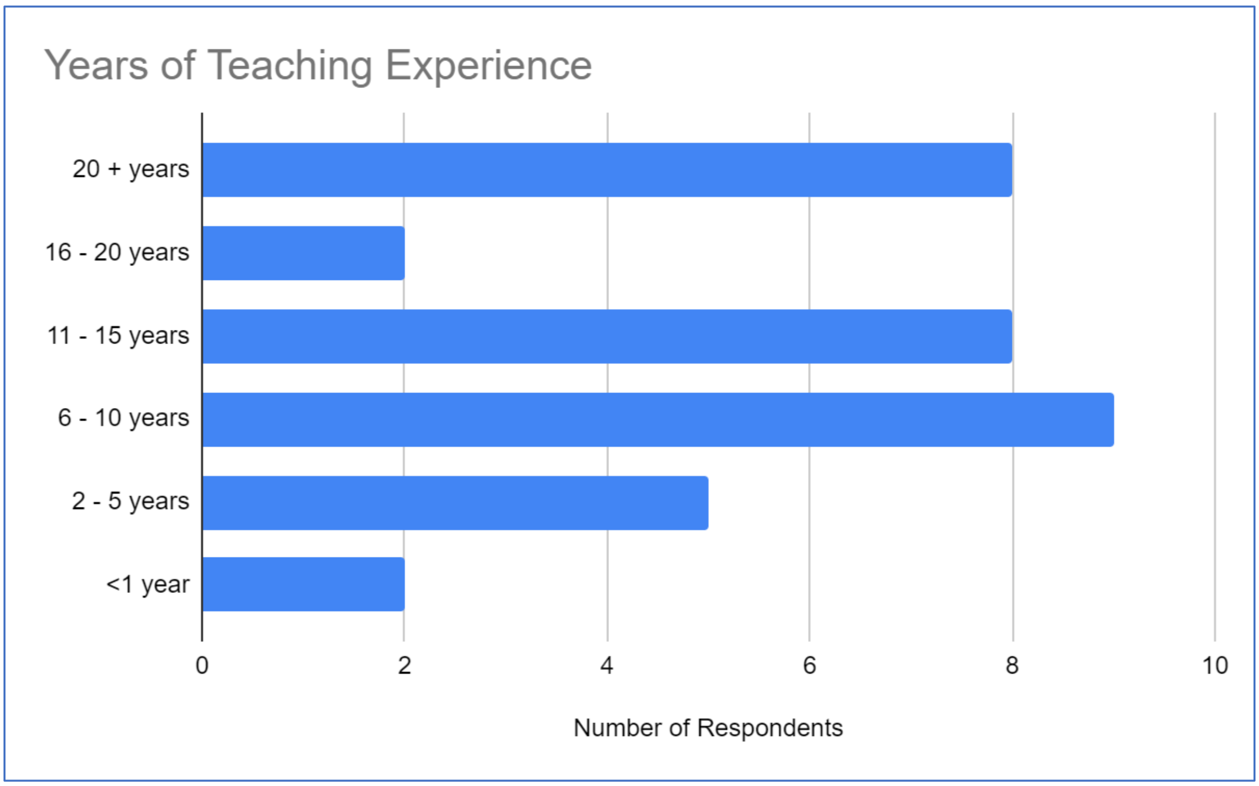


Figure 2 represents the experience levels of the surveyed teachers, encompassing individuals at various stages of their careers. Specifically, eight respondents (23.5%) have taught for more than 20 years, two (5.9%) have taught for 16 to 20 years, eight (23.5%) have taught for 11 to 15 years, nine (26.5%) have taught for six to 10 years, five (14.7%) have taught for two to five years, and two participants (5.9%) have taught for one year or less. The interviewed participants also represented a range of experience levels, including those with only one year of teaching experience, several mid-career educators, and one individual with over twenty years in the classroom.

Figure 2:

Years of teaching experience by teachers responding to survey



Of the teachers surveyed, twelve agreed to participate in interviews, representing all three districts and including both male and female teachers from language arts, science, social studies, and mathematics. No interview participants taught related arts classes such as foreign language, music, physical education, or art; however 14.7% (five participants) of those who completed the survey reported teaching related arts. Among the respondents, 58.8% (20) have earned a bachelor's degree, while 41.2% (14) have earned a master's degree.

Among the interview participants, a representative sample from all three participating districts was included. This diversity is significant, as varying amounts of professional development were offered among the districts, which is relevant to perceptions and innovative uses of AI in classrooms. Specifically, three interview participants were from District A, three from District B, and six from District C. The term "participant" refers to those engaged in the interviews and is used with numbering for confidentiality purposes. Districts are assigned letters to further maintain anonymity. Figure 3 illustrates the relationship between each participant and their respective district.

Figure 3:

This figure shows the relationship between each interview participant and their respective district.

Participant	District
Participant 1	C
Participant 2	C
Participant 3	A
Participant 4	C
Participant 5	B
Participant 6	C
Participant 7	B
Participant 8	A
Participant 9	C
Participant 10	A
Participant 11	B
Participant 12	C

Research Design

The study employed a descriptive case study methodology to explore the perceptions of middle-grade teachers in Indiana public schools within a real-life context (Noor, 2008). This design enabled researchers to investigate how professional development opportunities influence teachers' perceptions of AI in classroom. The case study approach was particularly appropriate for examining real-life situations flexibly, allowing for the incorporation of personal experiences and nuances of each context. (Yin, 2003) Furthermore, the comparative case study design facilitated an analysis of core concepts across three similarly positioned school districts (Dul & Hak, 2008).

The focus of this study was to determine how teachers use AI in their classrooms and to assess how professional development opportunities contribute to this usage. The case study approach facilitated an in-depth exploration of teacher perceptions regarding AI through surveys (see Appendix I) and semi-structured interview questions (see Appendix B).

The survey (Appendix A) comprised multiple choice questions designed to gather demographic information and perceptions using Likert scale measurements, along with open-ended questions about innovative uses of AI in the classroom. This approach aimed to identify the level of AI usage to inform interview selection. Participants had the opportunity to consent to further discussion through a semi-structured interview (Appendix B), conducted with a selected group of 10 to 12 participants. The objective was to create a narrative case study reflecting the experiences of these educators and their perspectives on AI, including the advantages and disadvantages of its use in the classroom, innovative applications of AI, and how their training and perceptions influence their willingness to integrate AI into their teaching practices.

Data Sources

This study utilized two data sources. The first was a survey that included Likert scale questions aimed at assessing the use of AI in classrooms, general perceptions of AI, and demographic information about the participants. Several questions were open-ended, soliciting permission to contact participants for a semi-structured interview. Additionally, one open-ended question invited participants to describe their current use of AI in the classroom in their own words.

The second data source consisted of semi-structured interviews, with questions developed based on survey responses. Twelve participants were purposively selected from those who provided contact information and consented to be interviewed. This selection ensured representation of high, mid, and low-level users, as well as participants from each of the three school districts. Each interview lasted approximately 40 minutes and was recorded with the participants' permission for later analysis. The interview questions can be found in Appendix B.

A pilot survey was conducted using a small convenience sample prior to the distribution to the school districts. Adjustments were made to address a gap in the demographic information collected before the final survey distribution, and examples were added to guide the responses of participants indicating experience with various AI tools. Additionally, two pilot interviews were conducted to ensure the clarity and appropriateness of the questions. These interviews resulted in modifications, including the addition of examples for one question and a word change to better align with research objectives.

District approval was obtained from administrators of each of the three participating districts. Survey links were provided, and administrators were asked to distribute these to all eligible teachers within their districts. After seven days, a follow-up email was sent, asking administrators to remind teachers about the survey and suggesting specific verbiage to include in their communication. Teachers were given a seven-day window to complete the survey following the reminder, resulting in a total response period of two weeks. Subsequently, those selected for interviews were contacted to schedule either Zoom or in-person interviews, which took place over the following two weeks. The researcher obtained IRB approval through the university for this study. A detailed description of the data sources follows.

Survey and Interview Questions

The survey was designed to assess respondents' perceptions of AI and its application in their classrooms, particularly in comparison to their colleagues. To facilitate analysis and comparison, demographic information was also collected, including respondents' experience, education, and subject area. Participants were asked to rate several statements regarding their perceptions of AI in relation to academic integrity, security, and validity on a five-point Likert scale (1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree). Participants were also asked to identify AI tools with which they had experience and knowledge. Additionally, open-ended questions invited participants to describe their innovative uses of AI in their classroom. Participants were also asked to provide contact information if they were willing to take part in the interview portion of the study.

Following an initial review of the survey data, semi-structured interview questions were refined to capture a comprehensive overview of current innovative uses of AI in classrooms, as well as professional development experiences and general perceptions of AI. This refinement included inquiries about participants' previous engagement with AI, educational changes, and the future of AI usage by students. The study aimed to explore the connections between professional development and its impact on perceptions of AI use, as well as innovative applications in the classroom. To facilitate this analysis, participant districts were identified to enable comparisons of these experiences, providing additional insight into teachers' experiences perceptions, and actual usage of AI tools.

Data Analysis

To capture teachers' overall perspectives on AI technology, questions were posed regarding their perceptions of AI and their innovative applications of it in the classroom. The demographic information obtained from the surveys enabled the researcher to identify participants with varying levels of self-reported usage, as well as to gain insights into the perceptions of a diverse group of teachers across the three surveyed districts regarding AI accessibility, use, and innovation. These results were analyzed by grade level, subject area, and experience level to identify any emerging trends.

A total of 34 participants completed the survey, responding to each of the Likert scale questions regarding AI use in classrooms and perceptions of AI. Of these, 31 addressed an open-ended question about their familiarity with AI tools, indicating at least some level of familiarity. Additionally, 33 participants responded to the open-ended question regarding their current use of AI in the classroom; however, among these respondents, eight indicated that they do not use AI or are unaware of its applications.

A total of 32 participants responded to the open-ended question regarding the types of professional development they would like to see related to AI use in classrooms. However, of these 32 respondents, six indicated that they were unsure or did not desire any additional professional development on AI usage.

Interview data were subsequently collected to identify similarities and differences in perceptions based on the professional development available in each district. This data also revealed various innovative uses of AI, perceived barriers to its implementation in classrooms, and factors driving changes in education related to AI.

The interviews were transcribed and coded, using pre-determined and emerging codes to highlight recurring themes. NVivo was used to identify and label codes. Some examples of these codes were:

- Academic Rigor
- AI Tools
- Barriers to use of AI in Education
- Critical Thinking Skills
- Drivers of AI Advancement in Education
- Ethical Concerns
- Innovative AI use by Students
- Innovative AI use by Teachers
- Policies Regarding AI Use
- Role of AI in Future of Education
- Training and Professional Development around AI use in Classrooms
- Teacher Perceptions of AI

Confidentiality was maintained by identifying interview participants only by participant numbers. Case studies were written to depict the current use of AI in middle-grade classrooms across the county, utilizing quotations from the interviews to address the research questions and themes. Refer to Table 1 below for an overview of the research questions, data sources, and analysis procedures.

Table 1:

Research Question	Data Sources	Analysis Methods
What innovative pedagogical uses for AI are reported by teachers?	Survey questionnaire with self-reported data of innovative use (3 items), Interview questions regarding innovative use of AI in classrooms (3 items)	Descriptive reporting by demographic to identify trends in the data, visual presentation of data included in the results section
What professional development opportunities do middle grade teachers report participating in or having the opportunity to participate in?	Survey questionnaire with self-reported data involving professional development (2 items), Interview questions regarding professional development that has taken place (2 items)	Teacher responses were used to identify trends in survey responses. Emerging themes were analyzed and connected based on school district
How do teachers perceive that professional development has supported their use of AI in the classroom?	Interview questionnaire with self-reported data involving how professional development has supported innovative use (2 items)	Teacher responses were analyzed based on emerging themes.

Chapter 4: Results

Results are presented with each research question to illustrate clear alignment of the data.

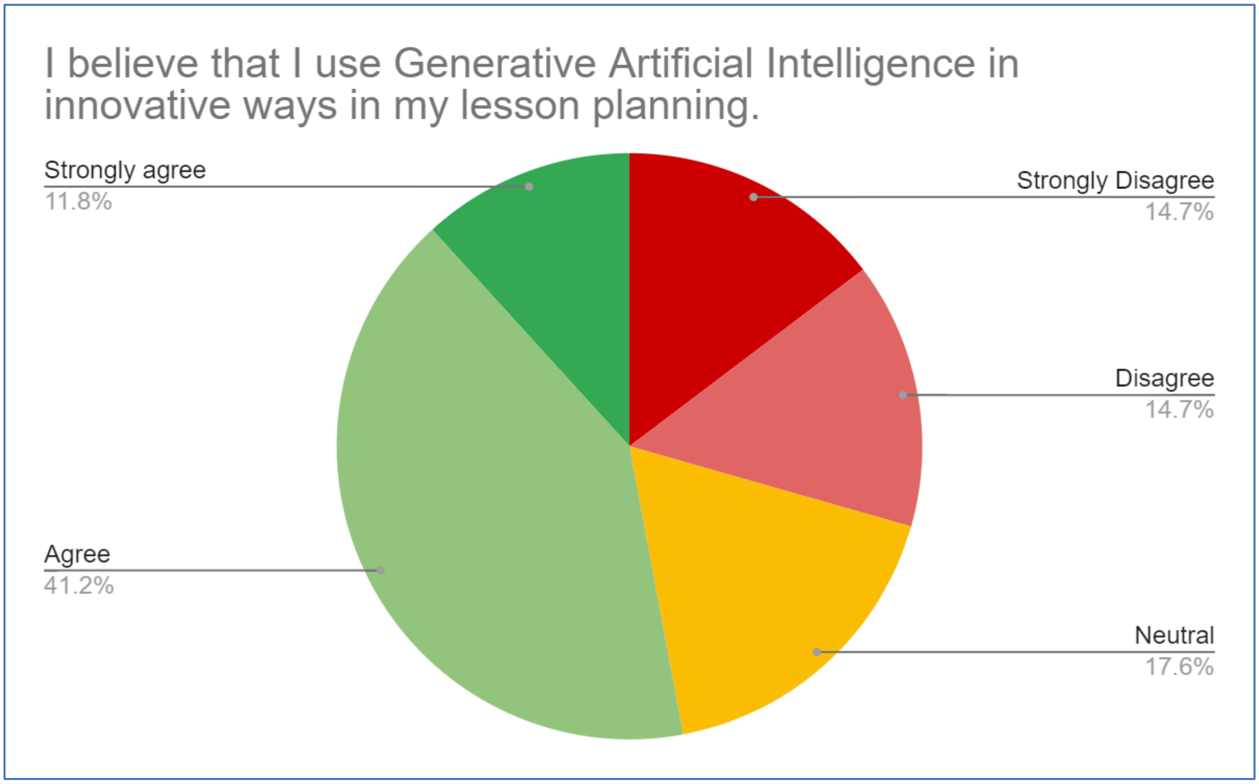
Research Question 1

1. What innovative pedagogical uses for AI are reported by teachers?

In the results of the survey items and interview questions related to this research topic, three themes emerged: (1) Innovative use by teachers and students, (2) creative support for teachers in curriculum development, and (3) differentiation of instruction. Teachers surveyed were asked to evaluate their innovative use of AI in the classroom. 53% (18 respondents) agreed or strongly agreed that they use AI innovatively, while 29.4% (10 respondents) disagreed or strongly disagreed. Additionally, 17.6% (six respondents) remained neutral on the topic. See Figure 4 for a visual representation of these findings.

Figure 4:

Chart indicating self-reported innovative use of AI tools in lesson planning by teachers



Survey participants were asked to describe their innovative use of AI in their classrooms through an open-ended question. Out of 34 respondents, 33 provided answers to this question. Among these, eight indicated that they do not use AI in their classrooms or are unsure how to apply it. One respondent expressed a very negative view of AI, stating "I use it as little as possible and forbid students from using it. I'm very well versed in AI and don't have a positive attitude towards it."

In contrast, 25 teachers reported varying degrees of AI usage. Some innovative applications mentioned include: "I have used [it] to think of word problems and multiple-[choice] questions on the spot. I have used AI to help my wording when writing parents about students." Another respondent noted, "I use AI to help me create professional responses where I feel I am too emotional to write an objective statement, to create multiple choice questions for a text and have also used it to create stories to share with my students." Both teachers utilize AI to assist with writing emails and enhancing creative content delivery.

Additionally, one teacher stated, "I use AI to help with wording in emails, announcements, and occasionally to generate questions for quizzes and tests." Some participants reported using AI to develop extra practice materials, with one sharing, "I use it to create grammar practice and to boost content." Several instructors highlighted the use of AI tools to tailor content for specific students. For example, one teacher noted, "When I need a text leveled or created, I will use Diffit," while another mentioned, "It has created Lexile adaptations of texts."

Another teacher stated he uses AI for "scaffolding for student projects" providing classwork at appropriate levels based on student needs. Yet another shared that she uses Eduaide to "differentiate instruction on topics, it easily provides increasing Lexile scores, remediation and extensions of the same topic/lesson." Lastly, one respondent noted using AI for "translation for ELL students."

Other teachers indicated that they use AI tools for planning, such as creating transcripts or slides from YouTube videos and generating images that align perfectly with lessons. Interview participants also shared several innovative uses of AI tools. Many of the teachers interviewed indicated that while they used AI tools to develop lessons and generate ideas, they were more cautious about encouraging student use. For example, Participant 10 from District A discussed how AI facilitated connections between the novel her students were reading and thematically related movies. Several teachers mentioned using AI tools to write project rubrics, noting the importance of careful editing to ensure the rubric accurately reflected their expectations. However, time savings associated with AI use was a common theme among the participants.

Participant 10 also highlighted how AI tools can assist teachers in addressing aspects of the required curriculum that materials may not align with perfectly. She noted, “We have to teach parallel episodes, and there’s not really clear parallel episodes in *The Outsiders*. We use [AI] to help us think of examples in *The Outsiders* as well as other texts we can pull in for mini lessons.”

Participant 11 shared that they use AI to enhance relevance for their students. They explained, “One particular class, I had seven Taylor Swift fanatics. I made a quiz just for them. It had the same math concepts, but was all Taylor Swift… It got them a little bit more excited about the quiz.” This example illustrates how teachers are creatively using AI to connect with students.

Several teachers mentioned AI tools that allow them to convert YouTube videos into transcripts, develop questions, identify key points, and even generate flashcards on a topic. Participant 11 emphasized that these tools are particularly useful for creating substitute plans when a teacher needs to be out of the classroom on short notice.

In District C, Language Arts teachers commonly use AI tools like ChatGPT to provide writing feedback to students. Participant 12 described how he carefully crafted prompts to elicit feedback closely aligned with specific assignments. By pasting student work into the tool, the teacher could quickly generate constructive feedback that met the assignment’s goals. “I can’t provide individualized feedback to 32 students in a class period, but I can plug in their writing and in 30 seconds offer them suggestions for improvement,” he explained. He also noted that AI effectively highlights students’ strengths while identifying areas for growth. “It is able to provide feedback on content as well as grammar." Thanks to the tailored prompts, AI delivered responses that allowed students to receive individualized mini lessons focused on their specific needs.

Even those interviewed who were more reluctant users of AI reported experimenting with the tool to enhance lesson engagement and to create visual content. Participant 2 indicated that he utilizes AI less than frequently than his peers, yet recognized AIs potential to make lessons more engaging. He emphasized that students are primarily visual learners; for instance, by generating a collage of images related to a study of Egypt, students' engagement increases. "Pyramids, Pharoh, sphinx, hieroglyphics… it will make a whole collage, and they will be able to understand. It increases their attention."

Participant 3 shared a creative application of AI tools, specifically using an app called Suno to quickly generate songs based on specific input information. This approach serves as a reward for hardworking classes, allowing the inclusion of student names and classroom jokes to enhance personalization and relevance. Notably, this tool was referenced during professional development sessions in District A, as several other participants from the district also mentioned its use.

Several teachers noted that AI can serve as a time-saving tool in lesson planning. However, two of the interviewed educators expressed that correcting or editing AI-generated outputs often proved cumbersome, leading them to conclude that developing lesson plans independently was more efficient. Participant 9 emphasized the importance of addressing inaccuracies in AI tools, stating "We have to teach it, and it has to get better."

Differentiation

AI tools enable teachers to save time when making accommodations for students. According to Hargrave et al., only 50% of a teacher's time is spent on direct interaction with students (2024). Participant 5 highlighted that using Magic School facilitates the provision of necessary differentiation based on student IEPs in a straightforward and efficient manner. Similarly, Participant 11 mentioned utilizing AI tools to generate math practice questions tailored to various levels of student ability.

The schools that participated in this study are located in an area experiencing rapid increase in the number of English Language Learner (ELL) students. In addition to Spanish, many students speak languages from West Africa, such as Creole and Yoruba. This linguistic diversity poses challenges for teachers who may be unfamiliar with these languages, and finding staff who can communicate effectively in them is particularly difficult. Mainstream teachers need to be prepared to teach ELL students due to the increasing numbers (Lucas & Grinberg, 2008). AI tools facilitate translation, enabling teachers to convert text into languages that students can understand, which is especially important when focusing on content. Participant 11 noted that the ability to translate into simpler or different languages enhances access for all students, particularly in subjects with technical vocabulary, such as science and social studies.

Participant 5 also highlighted the use of translation tools for websites and documents, noting the ability to translate into even fictional languages such as Klingon, which may engage some students. Furthermore, Participant 12 utilized AI tools to create questions at varying levels of difficulty, allowing for a nuanced assessment of student comprehension. Participant 5 additionally mentioned the capability to input a slideshow into an AI tool to generate a Word document that provides guided notes for students.

Innovative Student use of AI

Among the teachers interviewed, 83% reported that students utilize AI in their classrooms. Participant 10 from District A explained that following professional development on the use of Magic School, her department designed a lesson in which students explored various functions of the tool and documented their experiences. This guided exploration enabled students to understand how AI can support their learning in ways beyond simply generating answers. It encouraged them to view AI as a tool and develop strategies that could be applied to other tasks.

The same teacher also developed a unit that enabled students to "interact" with historical figures, including Frida Kahlo. Students were encouraged to pose questions to the AI tool as if they were conversing directly with Kahlo, with the AI responding according to the parameters established by the teacher. This approach not only provided students with tailored responses aligned with their individual interests but also fostered the development of effective questioning techniques, thereby deepening their learning experience. Unlike static texts, the AI offered immediate answers to follow-up inquiries, allowing for real-time engagement with points of interest.

One notable example of innovative student engagement involved a lesson focused on writing, specifically aimed at encouraging students to capture a particular mood. "We had students write a short [piece] about an artifact that was important to them, and then plug it into AI to see how close the rendering of the picture was that AI created to what they wrote to show the power of the little details" and how descriptions affect AI. The students were tasked with editing their writing to get the image as close to the original idea as possible. This exercise illustrated the impact of nuanced details in their writing and demonstrated how descriptions influence AI outputs.

Students were responsible for refining their narratives to align the AI-generated images more closely with their original concepts. This approach reestablished critical thinking skills by allowing students to receive immediate, tangible feedback similarly to a peer reviewer, offering constructive feedback and enabling students to recognize the significance of their word choices. Furthermore, AI's consistent and tireless nature makes it an ideal collaborative partner, responding to an unlimited number of inquiries, a capacity that human peers or instructors may not possess.

This scenario emphasizes the importance of student agency, as learners are encouraged to determine the depth of their engagement and the level of independence they wish to achieve. While some educators have expressed concerns about the potential erosion of critical thinking skills, this activity exemplifies how AI can serve as a valuable tool for fostering the development of these skills.

Another innovative use for students using AI was to bridge the gap between their internal writing check list and progress when they would become stuck. Participant 11 shared that students are asked to compare two novels in his class. In many cases, it has been a month or more since students completed the last novel and many students have trouble remembering details. AI tools such as ChatGPT can be used to refresh a student's memory or even provide examples of common elements of characterization. While the expectation is that the student still complete the full writing assignment, asking generative AI to support the learning to ensure students are on the right path is useful when students would otherwise shut down. He commented that this is similar to the "ask a friend" part of their in class process, but in this case, the student can do so silently and is still expected to generate the question to obtain the desired information.

Research Question 2

The second research question focuses on professional development and the opportunities that middle-grade teachers had the opportunity to participate in.

2. What professional development opportunities do middle grade teachers report participating in or having the opportunity to participate in?

Two themes emerged in survey questions and interview inquiries regarding this question: Interest in professional development surrounding AI and lack of interest. Interview participants from District A had the opportunity to engage in a full day of professional development focused on AI prior to the start of the school year. This district-wide workshop equipped teachers with practical applications of AI, featuring insights from expert Matt Miller. In contrast, participants from District B reported minimal exposure to professional development related to AI. Meanwhile, educators from District C engaged in informal discussions with peers and teacher leaders about AI usage, but did not receive any formal training on the subject.

Professional development around AI

While only 14.7% of respondents reported having received training on AI use in classrooms during their undergraduate or graduate coursework, 61.8% of respondents indicated they had participated in professional development specifically related to AI.

Figure 5:

Number of responding teachers reporting the formal coursework surrounding AI integration.

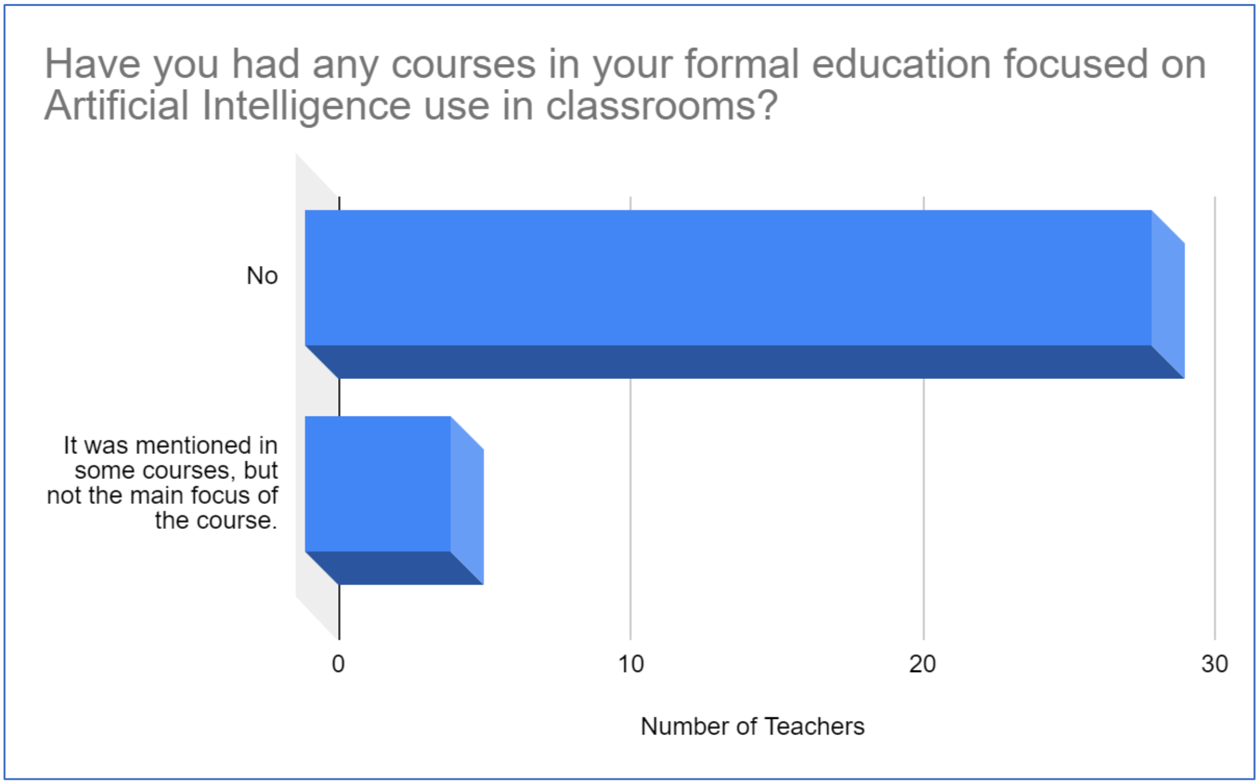
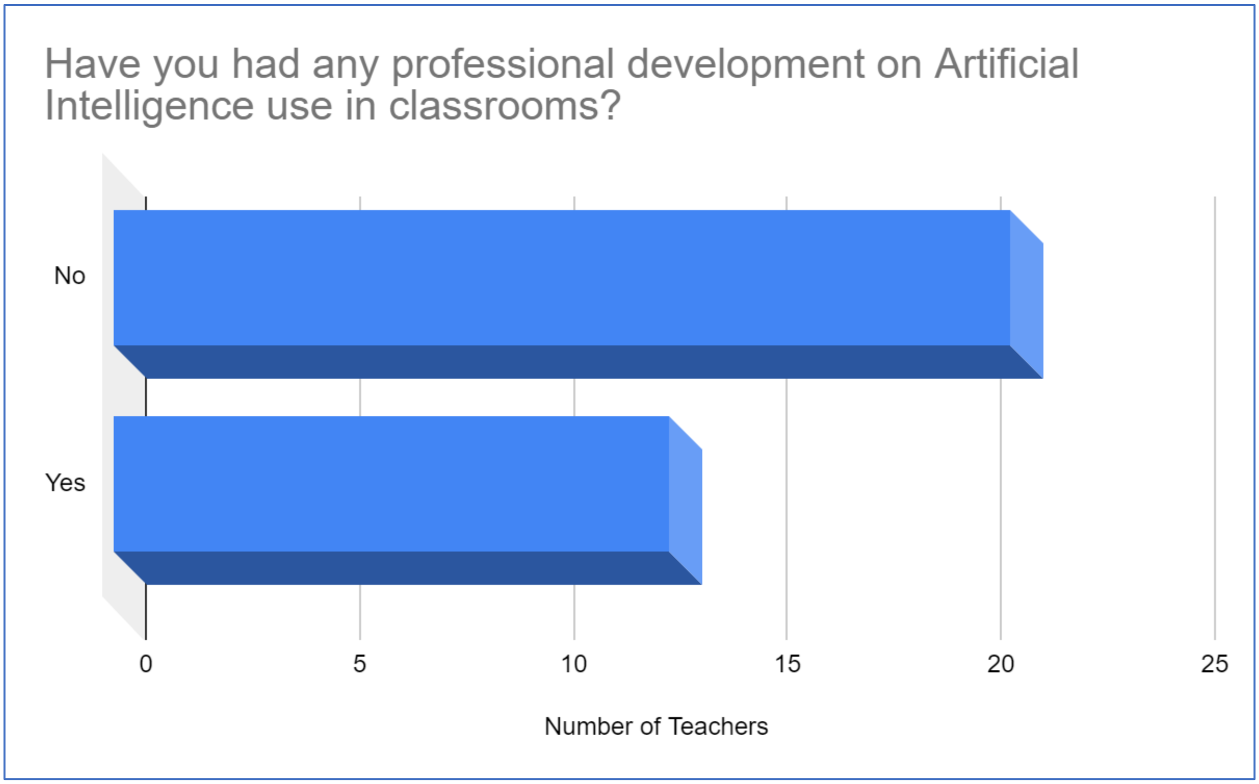


Figure 6:

Number of responding teachers reporting professional development around AI integration.



This discrepancy may be attributed to the varying experience levels among respondents, many of whom have substantial years of teaching experience. It is reasonable to assume that many completed their coursework before the widespread adoption of AI tools for educators. The high percentage of respondents with professional development experience may be attributed to District A's provision of a full day of training featuring a speaker focused on this topic, as well as District C's practice of utilizing department meeting time for teachers to share their experiences with AI among colleagues.

The participants interviewed exhibited a range of experiences with professional development. Teachers from District A attended a district-wide workshop earlier this year focused on AI tools and their classroom implementation. This investment reflects District A's strong commitment to integrating these technologies, as dedicating an entire day of professional development represents a significant allocation of both time and resources. Notably, the participants from this district comprised the majority of those reporting high usage of AI in their classrooms and showcased the most innovative applications for both themselves and their students. They also cited the largest variety of AI tools. Furthermore, District A maintains a paid membership to Magic School, whereas participants from other districts primarily accessed the free version, which offers considerably fewer features.

Participants from District B reported minimal exposure to professional development related to AI, resulting in a more hesitant approach to its use. In contrast, participants from District C benefited from a colleague's presentation on their own experiences with AI during a staff meeting, which introduced them to new ideas. Many individuals from District C indicated that this exposure motivated them to conduct further research on their own.

One of the participants who recently attended a presentation by Matt Miller on AI in the classroom raised concerns about effectively integrating AI. Participant 10 highlighted that teachers often feel pressured to convey extensive information and caution when introducing AI, which can overwhelm students. She noted that Matt Miller recommended a gradual approach, suggesting that educators introduce AI in small increments while discussing potential inaccuracies and security risks with students over time.

Of those interviewed, three were in their first year of teaching, yet none had been exposed to AI tools during their formal education. Additionally, many respondents reported that their exposure to AI and its innovative applications was largely self-directed, often using AI for personal tasks rather than for teaching. Given the increasing responsibilities placed on teachers, districts aiming to promote productive AI use among students must allocate time for professional development. However, prioritizing professional development topics poses a challenge for districts (Fairman et al., 2022). Teachers expressed a desire to explore ways to integrate AI into their practice, while simultaneously recognizing the importance of fostering critical thinking skills in students. Many were concerned about how to balance these two objectives effectively.

Interview participants were asked to identify the types of professional development they would find beneficial. In addition to introductory sessions on AI tools currently in use, teachers expressed a need for training on identifying student misuse of these tools. They also sought guidance on leveraging AI for time-consuming tasks, such as conference scheduling, parent communication, and rubric development. Most participants indicated a desire for further training on crafting effective prompts to achieve desired outputs, particularly in the context of student feedback. Additionally, Participant 4 specifically requested content-specific information and examples of effective classroom applications from other educators.

Participant 6 expressed a desire for more strategies to engage students in a manner that meets students where they are. She emphasized the need for approaches to differentiate instruction, remediate learning gaps, and offer targeted support for students who are lagging behind their peers or face language barriers.

Research Question 3

3. How do teachers perceive that professional development has supported their use of AI in the classroom?

In addressing the third research question of this study, three key themes emerged: the challenges associated with AI use in classrooms, student access to AI tools outside of school settings, and concerns regarding academic rigor and the potential for misuse of AI by students.

Challenges presented by AI use in classrooms

Several of the teachers interviewed were primarily math educators, and they shared unique challenges related to their subject. These challenges included inaccuracies in AI's detection of negative signs versus subtraction, the complexity of AI-generated solutions, and difficulties in using variables correctly. Participant 8 specifically noted issues with fractions and percentages. Nevertheless, many teachers utilized tools like Photomath and Magic School to promote independent work among students and to differentiate instruction for varying skill levels within the classroom. For instance, Magic School was highlighted as a tool that enables teachers to assist students by completing the first step in an equation. This approach to differentiation allows students to engage in the same tasks as their peers while receiving the additional support they need.

Students are ahead of the AI game

One participant from District B highlighted that teachers often find themselves trying to catch up with students in terms of technology. Participant 11 stated, "We're always kind of one step behind on trying to make sure that they are using it [appropriately]." They noted that some language arts classes are actively teaching students how to use AI to "raise up their writing" and refine word choice in specific phrases. "It's happening right now. And so [we] have to teach the kids how to use it… in a way that makes sense," they emphasized. Participant 11 also mentioned the use of a plagiarism detector for student work, which is a controversial practice due to the known inaccuracies and potential biases associated with these tools, particularly regarding cultural sensitivity (Uzun, 2023).

Several concerns were raised regarding student access to AI tools outside of school. Participant 7 remarked "AI is everywhere. I get on Tik Tok and it can make me into a cartoon character. It can write me a song. It's fun, creative, and fast. It gets people views. It gets people laughs. The notion that AI can do the heavy lifting for you is something that is instilled in the younger generation."

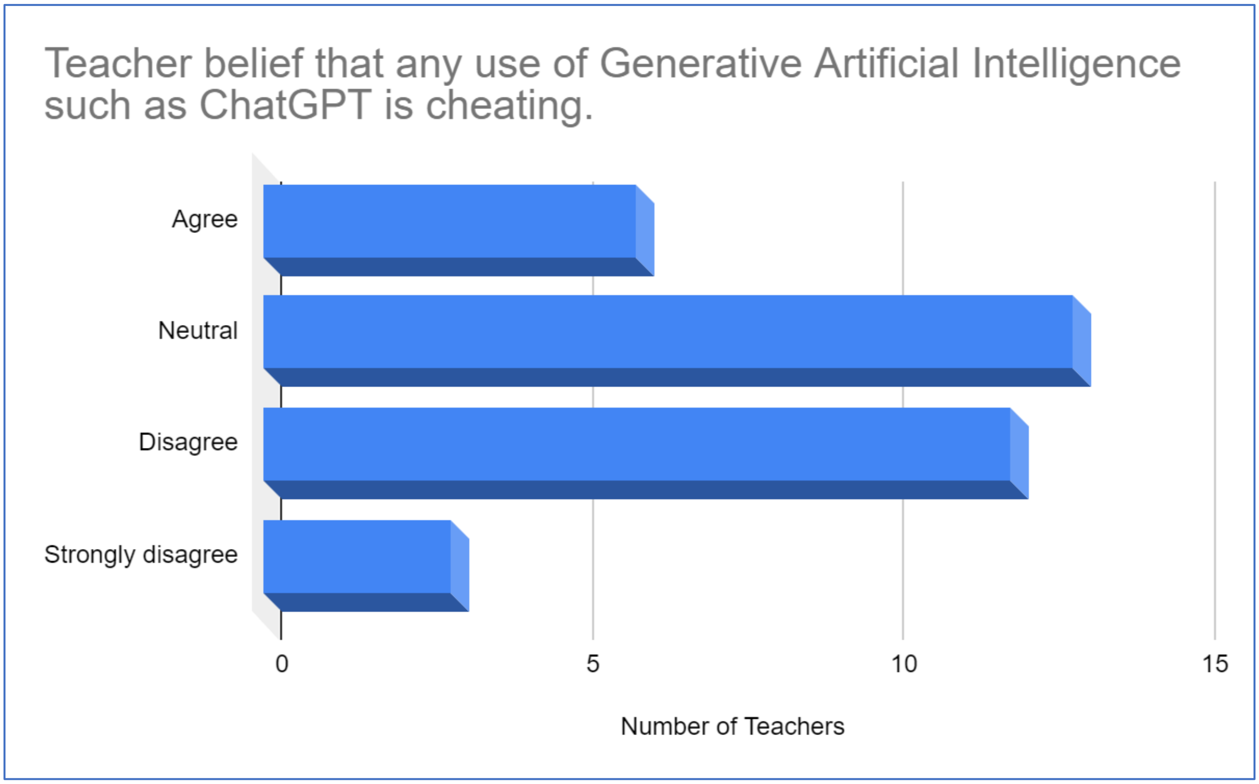
Three participants noted the reactive response that educators often exhibit toward new technology, emphasizing the need for a proactive approach. Participant 10 stated, "One of the most important indicators of integration into education will be districts and administrations embracing it and providing positive tools and room and time for discussion so that teachers don't feel reactive. Instead, they can be empowered to incorporate it [into classrooms]." She expressed concern that some districts delay in embracing changes, which can foster negativity among teachers. Participant 6 added, "Schools should go ahead and say here is how you should or shouldn't be using this."

Misuse of AI tools and mitigation

While many teachers expressed concerns about students using AI-generated content as their own, survey results indicated that most teachers believe that AI tools can support learning without constituting "cheating." None of the respondents strongly agreed with the statement that any use of AI is cheating, and only 17.6% agreed with it. Notably, 38.2% of respondents remained neutral on the subject, suggesting a lack of confidence in their responses or discomfort with taking a definitive stance. In contrast, 44.1% disagreed or strongly disagreed with the statement, indicating at least some level of comfort students using AI tools in their learning. This trend supports a shift in the prevailing belief that AI can be utilized as a tool rather than solely as a source of potential academic dishonesty, (Onesi-Ozigagun, 2024).

Figure 7:

Self-reported teacher belief that any use of AI by students is cheating



Several teachers interviewed noted that it is often easy to identify when students use AI to generate written content, as the resulting writing typically exhibits a more formal and professional tone than students would naturally employ. Participant 11 remarked, “If it sounds very different than a kid would actually speak, it’s clear they did not write that paper. Using [AI] for enhancements is one thing. Using it to cheat is something different.”

Some middle grade teachers were apprehensive about sharing the power of AI with their students due to concerns about potential misuse. “I’m afraid to let the genie out of the bottle,” Participant 2 said. His concern stems from the belief that students currently lack sufficient knowledge about how to use AI responsibly; once they become aware of its capabilities, they may be tempted to misuse it. Participant 2 emphasized the importance of educating students on how to effectively communicate with AI tools, encouraging them to provide detailed context for their requests. For example, he suggested his students say "I'm an 8th grader. Can you make that a little easier to understand?" This approach promotes the use of AI as a supportive tool rather than merely entering prompts and using generated outputs as original material, which is a common concern among educators.

Several teachers interviewed expressed significant concerns about inaccuracies in AI. Participant 5 concurred, stating "AI is a helpful tool, but that's all it is. It's a tool. So you have to be the user and be aware that sometimes this information is not going to be quite right." She emphasized that AI can provide valuable support for students when human assistance is unavailable, but stressed the importance of teaching students to use it correctly. "It's important… to be very intentional with it in your classroom," Participant 5 noted, adding that proficiency with AI will be crucial for students in their future careers.

Participant 8 expressed a more relaxed attitude toward student use of AI. She stated, "I have no problem if they're using it as a learning tool or learning resource, but if they're going to keep using it to cheat, at some point it will catch up with them."

Academic Rigor

Teachers interviewed held varying perspectives on the relationship between academic rigor and AI use in classrooms. Some believed that academic rigor must be enhanced by educators to counterbalance the tendency of AI tools to perform critical thinking tasks for students. Conversely, others felt that AI use presents opportunities for deeper learning activities. Participant 11 emphasized the need for teachers to find creative methods for students to demonstrate their learning, while also highlighting that utilizing available tools is a vital life skill for both adults and students. Participant 5 from District B noted that her use of AI in lesson development enables her to tailor the same content to different reading levels, thereby meeting the diverse needs of students and increasing rigor for many. She specifically pointed out that Magic School allows teachers to adjust the difficulty of questions with the click of a button, facilitating efficient and effective challenges for those who require it.

Participant 6 drew a comparison between the use of AI and calculators, noting how perceptions of their usefulness have evolved over time. “Just like through using calculators in math, we have been able to have students work through bigger and more challenging math problems because we’re eliminating some of the time constraints… You still have to go through the steps.” She expressed the belief that AI tools enable educators to cover more content within the same timeframe by allowing students to progress through practice more quickly.

Participant 5 emphasized the responsibility of teachers to provide context for students regarding AI use. She acknowledged the frustration that arises when students rely on AI to generate ideas but cautioned that if educators do not share the potential of AI, students may miss out on understanding its productive applications. “If you just kind of ignore it, students won’t know that they can use it to simplify text. They won’t know that they can ask for examples of vocabulary words… So I think its important to be very intentional with it in your classroom.”

Participant 10 expressed concerns about students who seek to complete work without engaging in critical thinking. This tendency places an additional burden on teachers to ensure that students are using the tools appropriately.

This study suggested there may be a relationship between professional development that teachers receive and their willingness and positive attitude toward implementation of AI tools in their classrooms. This is supported by Sun et al., (2023) and Brandao et al., (2024). In addition, Chounta et al. (2022) conducted research on teacher perceptions. The present study continued this work by interviewing teachers who have received meaningful professional development around AI tools, other teachers who have received introductory professional development, and additional teachers that have received no professional development to allow researchers to compare their perceptions and innovative use based on their experiences. While Chounta et al. discussed teachers' ideas about how AI could support them in classrooms, the teachers in this study were more familiar with AI tools as they have advanced significantly since the 2022 study was completed.

Chapter 5: Discussion

The open-ended survey question regarding innovative application of AI in the classroom suggests that teachers are using AI to support a variety of creative tasks, ranging from composing emails to parents to generating practice questions and scenarios for students to address in word problems and reading passages. Additionally, some educators are using AI tools to provide appropriately leveled content tailored to meeting students' individualized needs, (Judijanto, 2024; Rakap, 2024). This theme of using AI to meet individual student needs recurred throughout the survey responses and interviews, with many teachers identifying the ability to use AI technology to appropriately level material as one of the most beneficial, as it significantly reduces the time required for preparatory tasks.

There may be a connection between the teachers who reported using AI innovatively in their classrooms and those that have participated in professional development offered by their district. In District A, educators had a full day of professional development focused on the application of AI use in the classroom just before the school year commenced, during which they received a book from the speaker. This experience encouraged these teachers to adopt a more forward-thinking perspective. One participant noted, "For our students' sake, to prepare them for the future, we can't look at the world through "today glasses." We must use our "tomorrow glasses" (Miller, 2004).

Many of the teachers reported utilizing tools introduced during their professional development training, and notably, only District A has invested in the paid version of Magic School AI, one of the most frequently mentioned tools in the study. In District C, some educators also demonstrated innovative uses of AI; however, most indicated that their exposure was limited to professional development shared by colleagues, focusing primarily on ChatGPT and Magic

School AI's free version. Conversely, participants from District B reported minimal use of AI in their classrooms. These educators expressed a lack of confidence in the tools, limited exposure to various applications, and a general distrust of the technology.

Time savings emerged as a common rationale for AI use among the interviewed teachers. However, several educators expressed frustration with inaccurate responses and the necessity of revising prompts to achieve the desired output. Despite these challenges, some teachers noted that the process of creating prompts became easier with practice. Additionally, tools like Magic School AI offer the capability to save prompts for future use, enhancing consistency and ease of application.

Books focused on the innovative use of AI in classrooms have become increasingly prevalent. One such resource, *The Artificial Intelligence Playbook*, provides educators with examples of AI applications in educational settings, along with guidance on how to effectively prompt generative AI tools to produce the desired outputs. The book also addresses common concerns among teachers regarding AI use, including issues related to plagiarism, how to analyze outputs, and the credibility of available resources. These concerns support the findings of Brandao et al. (2024), and Sun et al. (2023). While educators recognize the potential benefits of AI tools, they also express valid concerns regarding ethics, accuracy, and reliability.

Accessibility in education was a prominent topic, and the use of AI tools to support diverse learners represented a compelling application of AI in classrooms. These districts are experiencing rapidly increasing populations of ELL students, with many students speaking languages unfamiliar to staff, such as Creole and Yoruba. Most teachers are seeking methods to address the needs of their students while also saving time on classrooms tasks, thereby allowing them to focus more energy on direct student engagement (Rebolledo Font de la Vall & Gonzalez

Araya, 2022). Educators who are utilizing AI tools are discovering innovative ways to efficiently meet the needs of their students.

Multiple examples of accessibility were evident in the interviews, including the use of AI tools to adjust level of content paragraphs and to translate materials into various languages. Additionally, the time-savings opportunities identified by teachers often enhanced accessibility for students; for instance, AI tools were used to generate transcripts and guided notes from YouTube videos, as well as to create study materials such as flash cards and extra practice questions with minimal effort required from teachers. It appeared that teachers may be more inclined to utilize this technology for modifying their own materials or those sourced for their classrooms rather than relying solely on the AI tools to produce new content.

The overall tone of responses from teachers who had participated in professional development differed from those who had not engaged in such opportunities. Educators in districts that offered even minimal professional development related to AI exhibited a positive outlook reflective of a growth mindset. In contrast, teachers from districts without any professional development regarding AI demonstrated reluctance, criticism, and distrust – elements characteristic of a fixed mindset. As Farrow (2020) notes, “One of the first personal responses to a challenging situation is how we perceive, understand, and act in relation to that challenge.” Farrow also emphasized that those who are most adaptable will be most successful. Although her observations pertain to corporate organizations, the same principles apply to the field of education. She asserted, “Those organizations that have a limited adaptive capacity will find themselves without the resilience and endurance to transition.” If we accept this premise, it underscores the necessity for educators to incorporate AI usage and to teach students responsible digital literacy skills in order to remain relevant and to equip students with the competencies needed to thrive in an increasingly AI-driven workplace.

An analysis of the survey responses revealed a correlation between teachers' experience and their perceptions of AI. Among the 34 respondents, only two teachers strongly agreed that students should learn to use AI tools to support their learning; notably, both of these teachers had been teaching for one year or less. In contrast, of the eight respondents with more than 20 years of teaching experience, six expressed a neutral stance on the topic. This disparity suggests that new teachers may be more open to adopting newer technologies, possibly due to their familiarity with such tools from their own experiences as students or because they are still in the process of developing their teaching styles. This may be a relevant and useful topic for future research.

This trend also suggests that more experienced teachers are open to exploring new ideas and acknowledging the evolving landscape of education, recognizing that students' needs are not only different on a collective level but also increasingly individualized. Furthermore, it may indicate that these educators are seeking ways to streamline their workloads, viewing AI as a potential means to achieve this goal. Notably, there was no consistent relationship observed between respondents' levels of education and their responses to this question, implying that formal education may not influence perceptions of AI use in the classroom.

An examination of the investments made by the three districts revealed a contrast between the district that allocated an entire day for professional development focused on AI and the district that made no investment of time or resources in this area. This difference likely contributed to teachers' perceptions, as the allocation of time and sources signals that a topic is a priority for the district. In this instance, ensuring that educators had the time and particular opportunities to learn, providing relevant resources, and fostering discussions within professional learning communities – rather than focusing on other potential topics – demonstrated a commitment to encouraging teacher engagement with AI.

Most teachers reported familiarity with ChatGPT and Magic School AI. One notable advantage of a paid subscription to Magic School is the ability to save search inquiries and prompts for consistency. The creation of effective prompts is a concern for teachers, as they worry that the results may be inadequate or that developing prompts may be time-consuming. The option to save prompts for future assignments or share them with colleagues could alleviate this concern and reduce the associated burden. Additionally, this feature may enhance consistency in the classroom, ensuring uniformity from one assignment to the next and providing coherent feedback for all students.

Several teachers expressed a desire for AI use to be more consistent and user-friendly. Given that generative AI retrieves information from an ever-evolving array of online resources, achieving consistency poses a significant challenge. However, textbook publishers and instructional designers could assist educators by providing suggested prompts, offering a foundational starting point for effective use of these tools. This could help streamline the integration of AI into classroom practices, making it more accessible and reliable for teachers.

There's a clear difference between the drivers and the barriers to AI use in education. Based on teacher responses, the barriers, or concerns with AI use in education varied between those who experienced the professional development and those who did not. Those teachers who did not participate in the professional development surrounding AI were primarily concerned with academic dishonesty and lack of critical thinking skills assumed to be required when using AI tools. Those who participated in the training noted that AI generated text was fairly easily identifiable and that the critical thinking is still required to generate information input and evaluate responses (Appendix E). When asked about the driver of increased AI presence in education, those who had participated in the professional development offered more optimistic responses of students and teachers – those stakeholders looking to improve the in class experience. Those who did not participate in the professional development were more cynical and suggested that the increase may be driven by corporations looking for profits or government entities looking to ensure technologically advanced workers upon graduation (Appendix E). The difference between these opposing forces are illustrated in the Force Field Analysis in Appendix E.

Changes in Education

The use of AI offers students the opportunity to receive real-time support when they need it. As Participant 12 reflected, there were instances when students would stare at a blank computer screen for entire class periods, uncertain of how to begin an assignment. “When they got to the end of their own mental checklist, they had nowhere to go.” In contrast, tools like ChatGPT can facilitate idea development; because they do not tire or judge, AI interactions can often be more encouraging than peer interactions, (Zhang et al., 2021).

Participant 8 expressed confidence that AI will continue to serve as a valuable tool for special education students, helping to alleviate the burden on teachers to create differentiated materials. “Some [students] will never get to grade level. No matter what happens, they’re not at a point to reach it, and that’s okay… I’m pro using AI to help them reach a point where they can be successful.” Participant 8 further remarked, “AI is real and AI is growing and AI is going to be an incredible tool… I think we need to stop in education and ask what’s really important?” This perspective exemplified the growth mindset previously mentioned, as Participant 8 acknowledges the evolving needs of students and the potential for technology to provide a more personalized educational experience, (Zhang et al., 2021).

Limitations of the Study

While the current study yielded valuable insights, several limitations may have influenced the findings. One notable limitation was the number of districts that responded to the request for participation. Although three districts in an Indiana county participated, this represents only 50% of the total districts. Including all districts would have presented a more comprehensive snapshot of the current landscape in these public schools.

Another limitation was the demographic context and financial status of the schools involved in the study. While there are certainly other districts in the U.S. that face similar challenges, the districts in this study are higher performing and may not reflect the difficulties encountered by those experiencing issues such as declining enrollment, low teacher retention, decreasing graduation rates, and poor test scores. Additionally, the percentage of students living in poverty within a district may influence its focus on AI and other technological tools, as districts may prioritize addressing more pressing needs before allocating resources to the integration of AI in classrooms.

Furthermore, on several survey questions, many teachers selected “neutral” in response to whether they believed that any form of AI use constitutes cheating, as well as whether AI could enhance their innovative instruction in the classroom. This neutral response suggests a reluctance to fully commit to a positive or negative stance, which may not accurately capture the teachers’ true perceptions of AI. This, in addition to all responses being self-reported by teachers which may reflect skewed perception of use of AI compared to others, is a limitation to this study that could be addressed in future studies by using observation or quantitative research tools.

Given the lack of current information provided by districts regarding AI use, additional guidelines may be necessary to help teachers feel comfortable about utilizing these tools for middle grade students. Several teachers expressed concerns about district support for AI implementation, voicing uncertainty and fear of being reprimanded for inappropriate use. Districts aiming to encourage AI use in classrooms should consider offering clear guidance to educators and developing policies that delineate appropriate and inappropriate uses for both teachers and students. While establishing such guidelines may present challenges, doing so is essential for fostering teacher buy-in.

Slavov & Yan (2023) highlight concerns regarding the scarcity of trained experts in some countries to support the integration of AI in education both at the collegiate and K-12 levels. They advocate for a student-centered approach that prioritizes the needs of students entering the workforce, underscoring the importance of incorporating AI into classroom practices.

Participant 10 remarked on the potential philosophical shift regarding the use of AI by students in education. She questioned whether students' ability to find information might become more valued than their capacity for independent critical thinking and contemplated what such a paradigm shift might entail. This perspective is progress; prior to the 1990s, the notion of utilizing technology as a resource was largely unconventional, whereas it is now integrated into daily educational practices (Powell, 2013).

Suggestions for Further Research

There is no doubt that the use of technology carries social implications, and AI is no exception. Future research is essential to identify areas of vulnerability related to AI use in education and to develop strategies to mitigate these risks to protect students, (Selwyn, 2022). As AI tools develop, research will be needed to determine its changing role in education, the need for teacher training and support, and how it will impact skills needed to enter the workforce.

In addition, technology companies may continue to work with educators to determine needs of teachers and students regarding AI including support for ELL students, time saving tools for teachers, and making AI resources accessible to all. Marketing and education may need to take place to gain buy in from school districts and educators as this study indicates a wide range of perceptions surrounding AI use by students. Demonstrating the benefits and mitigating the concerns that teachers express may result in increased support and willingness to use AI tools.

Future research could seek to quantify the amount of AI use that is happening in classrooms through observation and quantitative survey methods. It could also explore additional innovative ways that AI is being used and obtain survey data before and after a professional development opportunity takes place. This could offer a more robust idea of the connection between the perceptions and the actual professional development impact taking place. This research could be valuable to school district administrations looking to increase the amount of AI education students receive or determine the value in purchasing programs surrounding AI use and education for students. It also could be valuable to teachers looking to use AI in innovate ways either to save time on daily tasks or to use with students. Additionally, the research could be useful to technology developers to determine how teachers are using AI and what parts of the existing tools are used to their potential and what teachers would like to see available in the AI arena.

Conclusion

These findings suggest that there may be relationships between teacher perceptions of AI use and the professional development they receive on this topic. Additionally, there may be a relationship between the innovative use of technology by teachers and the professional development that they have undergone.

Change is inevitable- in education, in student needs, and in technology. School districts that aspire to be progressive in addressing student needs and staying at the forefront of technological advancements must commit to investing time and resources in this area. Teachers across all experience levels are open to exploring AI in classrooms, but several conditions must be met for AI use to become a priority.

First, districts must provide clear guidance on what constitutes the appropriate and expected AI use. Teachers need to feel that their efforts are supported and aligned with district goals. Second, educators must feel confident that the time they invest in learning a new tool will be worthwhile, replying to its stability and longevity. Most teachers surveyed in this study acknowledged that AI is likely to remain integral to education, recognizing the necessity for ongoing training and the incorporation of AI tools into classroom learning.

While there were valid concerns about academic rigor, honesty, and the security of AI tools in education, proper training and experience can help teachers and districts address these issues. Given the inevitability of AI's presence in future careers for today's students, it is essential for them to become responsible digital learners throughout their K-12 education.

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Appendix A: Survey

Teacher Perceptions and Professional Development around AI use in Classrooms

This survey is being conducted as part of a dissertation project by Kathryn Dixon, an Education student in Instructional Systems Technology at Indiana University. Participation in this survey is optional. By participating in this study, you acknowledge that you have read and agree to the Informed Consent Statement for research found here. Indiana University Informed Consent Statement All efforts will be made to keep information confidential. This survey should take approximately 10 minutes to complete.

katiedixon719@gmail.com Switch account

Not shared

This survey is for certified teachers in grades 6 - 8. Do you meet this qualification?

- ◯ Yes
- ◯ No

What grade level do you currently teach?

- ◯ 6th grade only
- ◯ 7th grade only
- ◯ 8th grade only
- ◯ Multiple Grades

What category best describes your licensure?

- I'm licensed to teach K- 6 non-departmentalized
- I'm licensed to teach 5 - 12 departmentalized
- I'm licensed to teach K - 12
- Other

Please select the range that best matches your teaching experience in any role.

- 1 year or less
- 2 - 5 years
- 6 - 10 years
- 11 - 15 years
- 16 - 20 years
- 20 + years

Please list all subject areas in which you provide direct instruction to students. (ex. Language Arts, Math, Science, Social Studies, Related Arts)

Your answer

Please indicate the highest level of education that you have completed.

- ○ Bachelor's Degree
- ○ Master's Degree
- ○ Doctoral Degree
- ○ Other

Please indicate which of the following you are familiar with. Add any additional AI tools that aren't on this list.

- ☐ ChatGPT
- ☐ Scribe
- ☐ CoPilot
- ☐ Google Bard
- ☐ Cohere Generate
- ☐ AlphaCode
- ☐ Duet AI
- ☐ Synthesia
- ☐ Other: ____________________

Have you had any courses in your formal education focused on Artificial Intelligence use in classrooms?

- ◯ Yes
- ◯ No
- ◯ It was mentioned in some courses, but not the main focus of the course.

Have you had any professional development on Artificial Intelligence use in classrooms?

- ◯ Yes
- ◯ No

Select the answer that best aligns with your beliefs on using Generative Artificial Intelligence such as ChatGPT in the classroom.

- ◯ Generative Artificial Intelligence such as Chat GPT is not discussed in my classroom at all.
- ◯ My students are informed about Artificial Intelligence and are forbidden from using it.
- ◯ We use Generative Artificial Intelligence for a variety of uses in my classroom and students are encouraged to use it for a number of tasks.
- ◯ I inform my students about Generative Artificial Intelligence and caution them to be critical of its output.
- ◯ What's Generative Artificial Intelligence?

I believe that student should use Generative Artificial Intelligence such as ChatGPT as a tool in their learning.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

I believe that any use of Generative Articificial Intelligence such as ChatGPT is cheating.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

I believe that I use Generative Artificial Intelligence in innovative ways in my lesson planning.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Compared to my peers, I use AI in my classroom

- More than others
- The same as others
- Less than others

I am interested in learning more about using Generative Artificial Intelligence in my classroom.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Generative AI has the potential to transform teaching and learning in my classroom.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

My teaching practices are more creative with the help of Generative AI.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Please describe your current use of AI in your classroom.

Your answer

What type of professional development would you be interested in surrounding the use of AI by students or teachers?

Your answer

Are you willing to share any artifacts or examples of lessons using AI that you are using? If so, please include your email address here.

Your answer

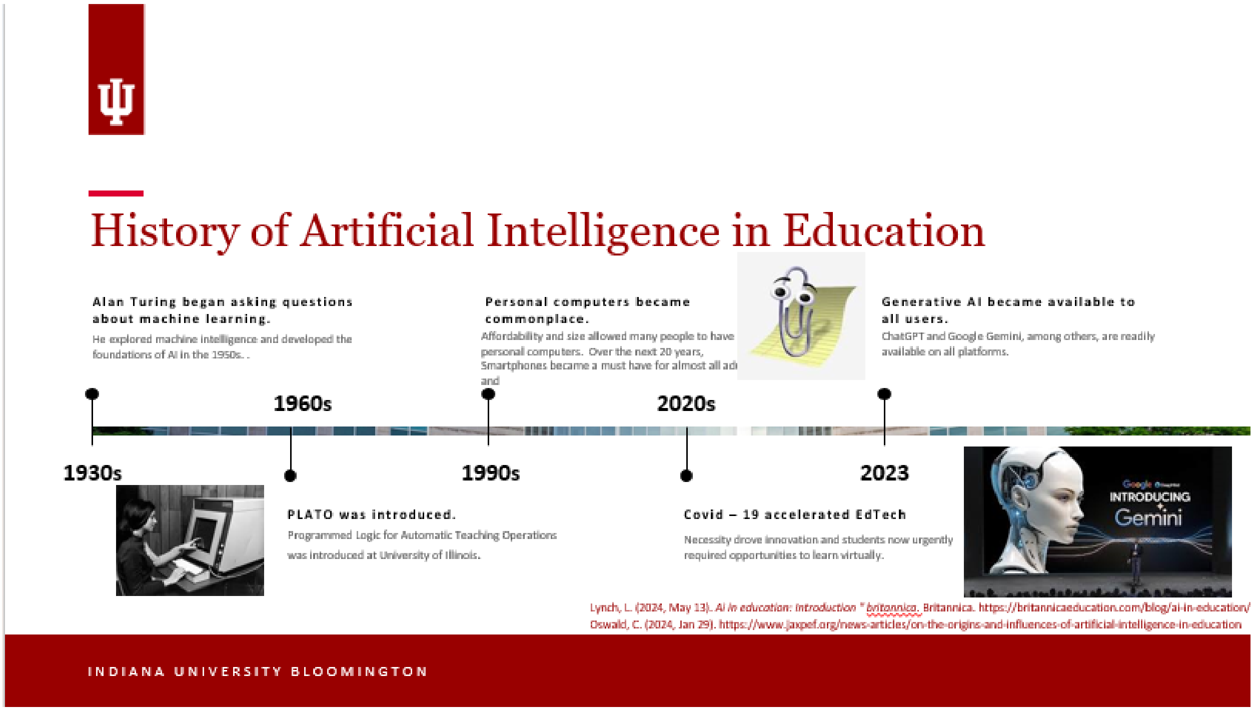
If you are willing to be contacted for a 30 - 40 minute interview, please include your email address here. All of those selected to participate will receive a $25 gift card as a token of appreciation for participation.

Your answer

Appendix B: Semi-Structured Interview Questions

1. Describe your current use of Artificial Intelligence such as ChatGPT in your classroom.
    a. How does it support you as a teacher?
    b. How does it support students?
    c. What policies do you or your school have in place surrounding use of Artificial Intelligence?
2. What, if any, training have you had around Artificial Intelligence use in education?
    a. Was it required or optional?
    b. What were some of your key takeaways?
3. What role do you believe Artificial Intelligence plays in the future of education?
    a. Do you feel that these changes will be positive or negative?
    b. Who do you believe will be the driving force behind these changes?
4. What are some tasks that you believe Artificial Intelligence can support for teachers or students?
    a. How do you think that use of Artificial Intelligence affects academic rigor?

Appendix C:


History of Artificial Intelligence in Education
Alan Turing began asking questions about machine learning.
He explored machine intelligence and developed the foundations of AI in the 1950s. .
1930s
1960s
PLATO was introduced.
Programmed Logic for Automatic Teaching Operations was introduced at University of Illinois.
Personal computers became commonplace.
Affordability and size allowed many people to have personal computers. Over the next 20 years, Smartphones became a must have for almost all ad
and
1990s
2020s
Covid – 19 accelerated EdTech
Necessity drove innovation and students now urgently required opportunities to learn virtually.
Generative AI became available to all users.
ChatGPT and Google Gemini, among others, are readily available on all platforms.
2023
INTRODUCING
Gemini
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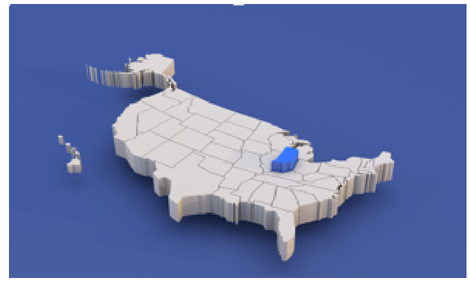
Appendix D: Facts and Stats for Study

Facts & Stats



School Corporations	Grade Levels Surveyed	Students in grades 6 – 8 in participating county schools	Number of Survey Respondents	Number of Interview Participants
3	**6th - 8th**	**4,000**	**34**	**12**
School Districts Elected to participate	grades	6, 7th and 8th grade students	Middle Grade Teachers	Middle Grade Teachers

Appendix E: Force Field Analysis Between Concerns and Drivers Surrounding AI

Concerns about Academic Rigor and Ethics

- Use of AI tools eliminates Critical Thinking Skills from students
- How will teachers know if student work is original?
- Input is based on output
- Evaluation of responses are necessary
- AI Generated text is apparent

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Drivers of AI Advancement in Education

- Corporations – Commercial and School
- Government
- Students
- Teachers

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Kathryn J. Dixon Ed.D.

Curriculum Vitae

Credentials	
2024	**Doctor of Education in Instructional Systems Technology** Indiana University, Bloomington, Indiana Doctoral Research Topic: Teacher Perceptions and Professional Development Impact on Generative AI Use in Middle Grades
2006	**Master of Education** Indiana Wesleyan University, Marian, Indiana
2003	**Bachelor of Arts in English (Writing), Minor: Secondary Education** DePauw University, Greencastle, Indiana
Professional Experience	
2011 - Present	**Travel Advisor and Trainer** Hi Ho Vacations Greenfield, Indiana
2008 – 2009	**Smarthinking Tutor** Smarthinking, Inc.
2003 – 2008	**7th Grade Teacher** MSD Decatur Township Indianapolis, Indiana
2003 – Present	**Indiana Educators License # 1543462** Office of Educator & Licensing, Indianapolis, Indiana
Participation in Professional Development	
2023	**IST Spring Conference** Indiana University, Bloomington, Indiana
Service	
2022 – Present	**Brownsburg Community School Corporation Board of Trustees** Brownsburg, Indiana
2022 – Present	**Brownsburg Education Foundation** Member Brownsburg Community School Corporation
2016 – 2020	**Parent Support Group President** Reagan Elementary School Brownsburg, Indiana
2015 – 2022	**Scouts BSA (Formerly Boy Scouts of America)** Membership Advisor Five Creeks Council (Formerly Hou Koda) Indianapolis, Indiana