

Perspectives and Misconceptions of Large Language Models among Novice Teachers: Lessons from using ChatGPT for Lesson Planning

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Abstract

Research explored the perspectives and misconceptions of K-12 level novice, early career teachers regarding the use of Large Language Models (LLM), such as ChatGPT, as lesson planning support tools. A convenience sampling method was used with 43 novice in-service teachers enrolled in an online Master of Arts initial certification program. Data collected came from a researcher-developed survey instrument that queried participants' perspectives of the value and efficacy of LLMs when used as support tools for developing and evaluating their lesson planning efforts. Findings indicate that the majority misunderstood what an LLM is, often mislabeling it as AI. Findings also suggest that a majority (95.2%), found value in the experience and agreed that an LLM, such as ChatGPT, can function as a useful support tool for lesson planning. One major implication of the study is that participants misunderstood what ChatGPT is and were surprised to learn that they were not using AI but rather an LLM. Further implications for professional practice are discussed as well.

1. Introduction

With the integration of Large Language Models (LLM) into educational use, many teachers are using programs such as ChatGPT, Copilot, and other programs targeted to educators and others as Artificial Intelligence (AI) supported. As such, teacher preparation programs are faced with the challenge and opportunity of preparing teachers to effectively use and to seamlessly integrate LLMs usage into their instructional practice. Likewise, programs are faced with the responsibility of educating teachers about what *theoretical* AI is and what it is not. While many consider programs such as ChatGPT, commonly referred to as Generative AI (GenAI), to be transformative systems capable of performing many tasks traditionally considered uniquely human, experts in machine learning recognize that all the programs being marketed to teachers as GenAI or as AI are, in fact, a form of machine learning called LLM [1]. While LLMs, such as ChatGPT, can with some degree of

accuracy recognize patterns and identify data trends within large datasets, describe the content of images and videos, and, via effective prompting, be used to create or generate novel content [2], no thinking is involved in completing these tasks. Instead, LLMs rely on mathematical probability and statistics, such as regression, to arrive at a mathematically probable correct response. Educating teachers about the reality of LLMs and how they work, including their limitations, is critical to educating our global citizenry about where we are and where we may, or may not, be going with AI. That is because the path to true AI will involve choices about how we use or expand access to natural resources such as water and electricity. It is also a path that will require us to decide whether and to what extent we want AI to reshape society. Considerations of the social, emotional, and economic impacts on individual citizens need to be taken into account [3] as well.

2. Literature Review

As LLMs (aka “GenAI”) gain popularity among educational users, emerging research suggests some efficacy as a support tool for teachers, including for lesson planning [4, 5, 6] and assessment [7, 8], and because current LLMs are designed to do some tasks that, in the past, could only be done by humans, they are considered useful for streamlining productivity tasks, such as composing emails to parents [9]. Because of their potential as a support tool for teachers, including novice teachers, it is important to understand the utility of LLMs as educational support tools [10]. While there is an emerging body of research related to pre-service teachers' perspectives of the challenges and opportunities associated with LLMs usage [11], the efficacy of use by novice in-service teachers enrolled in a fully online Master of Arts initial certification program remains unknown. Further, because much of the research looking at LLM usage among preservice teachers is often published using the GenAI label, many readers may be confusing GenAI with *theoretical* AI. Understanding this confusion is a first step to

educating teachers, students, and the larger public about the strengths and, more importantly, the limitations of the programs marketed to them as GenAI or AI. As such, this study seeks to provide insight regarding participants' perspectives and misconceptions of LLMs along with an examination of their depth of understanding of what is meant by the terms GenAI and AI.

Even before its rapid expansion in the spring of 2023, many argued that LLMs, such as ChatGPT, have value for education [12] because early LLMs offered opportunities for the development of personalized learning systems that monitor learning, offering developmentally appropriate learning tasks, providing relevant feedback for learners, and user-friendly interfaces to support learning [13, 14]. They also have been able to construct new academic content based on LLM interaction with learners, saving teachers' time and effort that could, instead, go into more creative academic pursuits. In terms of improving learning, there is limited research currently available. Still, recent research suggests positive possibilities for learning. For example, Holmes et al, [15] report its efficacy for collaborative learning and as a continuous assessment tool. Further, Grives and Warschauer [16] previously found machine learning, a precursor to LLMs, useful in terms of positive teacher attitudes toward its use, particularly in terms of saving time when assessing students' work. Further, efficacy in terms of assisting learners when revising, or honing, their writing skills has been reported [17]. However, issues have been noted as well. For example, Loeckx [18] reported concerns regarding pedagogical design and assessment. Given its suggested efficacy for education, research examining teachers' perspectives, experiences, and approaches is important as is research examining its use as a support tool for educators.

A growing body of research is examining how LLMs are being integrated into teacher education, particularly in relation to developing digital competencies. Beyond factors like trust, familiarity, and perceived control, the adoption of LLMs by teachers is also influenced by effective design principles and instructional practices. Chatterjee et al. [19], for example, suggest that teacher confidence in using LLMs can be strengthened through scaffolded experiences that model these best practices. This approach is especially valuable for novice teachers, who are often simultaneously learning how to plan curricula and apply instructional design. In such cases, LLMs can serve both as content resources and as instructional design support tools. However, without a solid understanding of what LLMs are and how they work, teachers risk overestimating their capabilities, which may lead to over-reliance or improper use in the classroom [20].

Reading research articles such as those from Goertzel [21] and Sun [22] makes it clear that if teachers are not provided with clear distinctions between AI, GenAI, and LLMs they may attribute anthropomorphic traits to these tools, such as believing they "think" or "understand" content. This conceptual confusion is compounded by widespread marketing language that suggests these tools possess human-like intelligence. The implications are significant; novice teachers may defer too much instructional decisions and authority to LLMs without critical or reflective evaluation. Consequently, there is an urgent need for teacher education programs to provide explicit instruction on AI-related terminology, underlying technologies, and the pedagogical implications of tool usage in classrooms. Doing so would support both effective integration and the development of novice teachers' critical digital literacy.

In addition, ethical and pedagogical concerns remain under-explored, particularly in the context of K-12 teaching. LLMs operate based on datasets that may reflect societal biases, raising issues of equity, inclusiveness, and content appropriateness in diverse classroom settings. Qin [23] noted that LLM-generated outputs can perpetuate biases embedded in their training data such as representation and performance bias, which has significant implications for classroom materials and student learning experiences. Teachers, especially those early in their careers, must be trained not just to use large language models (LLMs) functionally, but also to critically evaluate their outputs through the lens of culturally responsive teaching. This means recognizing that LLMs may produce content that reflects biases, overlooks cultural nuances, or lacks relevance to the lived experiences of diverse learners. To use these tools effectively, educators must also consider the specific context in which they teach, including students' varied cultural backgrounds, learning styles, and community dynamics. Integrating LLMs into the classroom should be done in a way that supports differentiated instruction and fosters inclusive, meaningful engagement. As teachers increasingly turn to these tools for curricular and instructional support, a lack of critical literacy around LLMs may lead to unintentional reinforcement of stereotypes or dissemination of inaccurate information—making critical evaluation and culturally aware pedagogy all the more essential.

On a serious note, the literature points to both the promise and the pitfalls of integrating LLMs like ChatGPT into the educational practice of novice teachers. As these tools continue to shape how educators approach planning, instruction, and feedback, a theoretical grounding is necessary to guide thoughtful, ethical, and pedagogical sound use. The following section presents the theoretical framework

underpinning this study, offering a lens through which novice teachers' interactions with LLMs can be better understood.

3. Theoretical Framework

A theoretical framework grounded in constructivism, with its emphasis on active and student-centered learning approaches, informs the study. Reflective of constructivism, LLMs can serve as a support tool for novice teachers when developing and refining their lesson planning skills [24]. LLMs function as a scaffold across the process. Likewise, the research is reflective of Gibson et al. [25] theoretical model for the development of LLMs applications to bolster learning. Specifically, this research focuses on two macro roles: (a) LLMs to enhance goals and planning by clarifying objectives and identifying routes to achieve stated aims, and (b) use of LLMs to facilitate the formation and evolution of cross-cutting communities, enabling expert communities to integrate with other fields of knowledge through innovation and collaboration. In addition to constructivist principles and the functional roles of LLMs in planning and collaboration, this study is also informed by a critical digital pedagogy lens, which emphasizes the importance of ethical, inclusive, and culturally responsive technology use in education [26, 27]. As outlined in the literature, LLMs are trained on large datasets that may embed systemic biases, and novice teachers may lack the critical literacy skills necessary to detect or mitigate these issues. Therefore, the theoretical grounding for this study includes the notion that effective integration of LLMs into teaching practice must not only support instructional development but also foster teachers' ability to critically evaluate LLM-generated content. This requires deliberate reflection on issues of representation, voice, and equity in classroom materials. Anchoring the study in this dual framework—constructivist learning theory and critical digital pedagogy—supports an exploration of how novice teachers can use LLMs not only as instructional tools but also as objects of critical inquiry that shape and are shaped by their pedagogical values and sociocultural contexts.

3.1. Study Purpose

The study highlights the need for novice educators to develop expertise and technical competencies specific to LLMs as those competencies are critical for strategically designing, implementing, and evaluating instructional materials [20]. Likewise, these competencies assist to inform educators along with society regarding where we are with AI thus allowing

them to fully participate in the decisions that will shape AI's development and use across society. As such, the following research questions frame the study:

- i. To what extent do participants' perspectives change as a result of their experiences learning about and using LLMs?
- ii. What perspectives of value do they hold regarding LLM's value as a tool for lesson planning?
- iii. What are their misconceptions regarding LLMs?

4. Methodology

Research explored the perspectives and misconceptions of forty-three K-12 level novice teachers regarding the use of LLMs as a support tool for lesson planning. Changes in perspective were explored as well using a mixed methods approach. Institutional Review Board approval from the university was obtained in advance of the study.

4.1. Participants

Convenience sampling was used with 43 master's level K-12 novice teachers enrolled in an online Master of Arts certification program. At the time of the study, all were employed in public schools, with the majority serving as the teacher of record for a classroom despite not being officially licensed teachers. As a part of their hiring contracts, they were expected to successfully complete a master's level teacher licensing program before securing permanent employment status within their districts. The group was composed of eleven males (25.58%) and thirty-two females (74.42%), with participants ranging in age from their early 20s to late 50s. Course demographics were reflective of the larger program's enrollment demographics.

4.2. Setting

Participants came from two intact sections of a fully online master's level course in instructional technology. The course, aligned with ISTE standards for educators [28], was required for all candidates enrolled in the program and was taught using synchronous and asynchronous teacher-directed instruction, peer-to-peer learning through small group assignments, and reflective writing assignments. Across the course, the instructor scaffolded exploration and use of an LLM (i.e., ChatGPT) as a lesson planning tool.

4.3. Instrumentation and Data Analysis

A five-point Likert-like scale, ranging from

“strongly agree” to “strongly disagree,” was used to establish perspectives pre and post participation in the LLM supported lesson planning activities. Descriptive statistics are reported along with the results of a pair samples t-test. Further, written reflections were collected across the LLM experience to assist in identifying trends in data related to challenges and opportunities. This data was also used to confirm the quantitative results.

5. Results

In the following sub-section 5.1. to 5.5 we analyses the participants data and the limitation(s) of our small data collection.

5.1 Pre-LLM Data

Six participants strongly agreed and eight agreed on the value of LLMs as a support tool for teachers, with two strongly disagreeing and seven disagreeing, meaning 33% believed in advance of the study that LLMs had value as a lesson planning tool. However, nineteen (44.2%) participants expressed uncertainty. The average for this indicator was 3.232 (SD = 1.043), suggesting a majority were uncertain about the efficacy of LLMs, including ChatGPT, as a support tool in advance of engaging in the LLM supported lesson planning tasks.

5.2. Post-LLM Data

A paired samples t-test was used to examine participants' perspectives after engaging in a series of LLM supported lesson planning, discussion, and reflection activities across the term. Results indicate that twenty-eight (65.12%) participants strongly agreed, and twelve others agreed on the value of LLMs. Two disagreed, with one participant expressing uncertainty. The average for this indicator was 4.534 (SD = 0.767). Results of the t-test indicate that the change in means was significant, ($t(42) = t = 8.2440$, $p \leq 0.00001$).

5.3. Participants' Perspectives of Value

Participants' post reflections demonstrated a greater depth of understanding of LLMs. All were able to identify both challenges and opportunities associated with use. For example, Mallory wrote:

“[LLMs] can give information that looks correct but is actually wrong or outdated. This can create problems if the teacher includes it in a lesson without realizing the mistake.”

She further stated that another challenge involved the LLM not knowing:

“the class it is planning for” and not being able to “adjust for student interests, behavior, or learning needs the way a teacher can, which can make the material feel off.”

Charlotte elaborated her final perspectives stating that LLMs, “can help reduce the amount of time educators spend on planning and creating materials” and that LLMs can be used to “create or enhance numerous [educational] resources...based on the prompts it's given.” She continued, arguing that opportunities with LLMs:

“outweigh the challenges because the teacher is still in control.”

She further stated that LLMs can be used:

“to generate ideas, but that teacher still must be the expert”

Deciding:

“what to use and how to change it for students.”

Further, Charlotte wrote that LLMs:

“help teacher with planning which saves time”

and that LLMs provide:

“useful tools” in support of teaching. In summary, she wrote that “the teacher still makes the final decisions”

and that:

“[s]ince it supports the teacher, instead of replacing them, the benefits are more helpful than the problems.”

Aaron argued that current LLMs can be used to give students' feedback on their work so as to improve that work in advance of final submissions, which:

“outweigh the challenges [but only] if the teacher is able to work to address these challenges.”

A few, however, disagreed. For example, Reagan wrote that usage could become a crutch, and that use:

“may result in teachers replying too much on it and trusting it too much.” She reported believing that “the challenges outweigh the opportunities...”

and that it remains important for teachers:

“to reach and teach every student...[and that i]f the resource [doesn't] consider student needs,”

teachers have an obligation to:

“know that and defer use until it does.”

Hayden wrote that teachers have to be:

“careful about what kind of information”

they are imputing into:

“these types of tools” as “student privacy is [a] critical concern.”

5.4. Clarifying Misconceptions

Pre-LLM activities, no students were aware of machine learning, nor could any explain what an LLM is. However, participants recognized commonly used terminology, such as GenAI and AI. This recognition came with varying degrees of accuracy, with all thinking that GenAI and AI are interchangeable terms. Jamie's post-LLM reflections are reflective of this confusion:

“I did not know that ChatGPT was not AI and that it uses mathematics essentially to give an answer according to the level of quality that the question is stated.”

He continued:

“if ChatGPT does not know how to respond it can give something completely made up.”

Also, Dylan wrote:

“[t]hank you for explaining...how AI is currently theoretical and won't arrive for quite some time, if at all, considering what would be needed for it to be possible”

while Morgan stated:

“[i]t's all very interesting. I can see the benefits of machine learning at least, but the future of AI scares me.”

5.5. Limitations

Limitations include the small sample size (n=43), use of a convenience sample drawn from a required

course, time spent engaging in the experience, and the online learning environment which required some level of student autonomous learning. Prior misunderstandings of what theoretical AI is may also have impacted the study's findings. Further, immersion in the experience within a scaffolded online learning setting may have resulted in only temporary changes in perception.

6. Discussion and Implications

Understanding and using the correct terminology when considering AI is important as is educating teachers about where we are with AI development. Knowledge is key to safe, effective, and ethical use of any technology, but it is critical when considering usage of existing LLM programs, such as ChatGPT. AI remains *theoretical*, meaning that AI does not currently and may never exist given the critical resources (e.g., money, time, electricity, and water) required for successful AI development. Teachers and others need to understand this, and they need to understand the importance of a disposition to take action to assure ethical and fair AI development and use not just in education but across society. In democratic societies the task of citizenship education often falls to educators. Knowing that we have the power to take action to shape the emergence of true AI is important for all of society's members to know as acquisition of that disposition to participate in deciding whether and to what extent AI will be implemented within education and society is key to ensuring fair and equitable implementation across all sectors of society.

In terms of challenges, all participants agreed that challenges with use remain important to know. Illustrative of this, this participant clearly articulated where we are with LLMs such as ChatGPT, stating that:

“content produced may reflect biases based on the data it uses, negatively impacting how instruction is delivered or the materials used by excluding or catering to certain student demographics.”

She continued, writing:

“[a]nother challenge is that it may not always provide reliable content. Content produced...can include false information, work from others without proper attribution, or material that can lead to student misunderstandings.”

These issues:

“highlight the importance of critically analyzing any content provided...[and] checking for accuracy and useability.”

Yet another agreed, reflecting that LLMs are not:

“familiar with the students that it is supposed to be generating material for, so the assignment/material generated may not be useful in class because it was unable to be made with the students['] personalities and quirks in mind.”

She continued:

“differentiation and accommodation for one set of generative material is quite difficult. Human minds are much better at determining what other people need.”

6.1. Understanding of LLM and other AI associated terminology

No participant recognized the term LLM in advance of the study. All assumed that because LLMs are marketed as GenAI, that ChatGPT was, in fact, AI. They did not understand the difference between GenAI and AI. None knew that AI remains *theoretical*. Yet despite learning more about LLMs and where society stands with AI and learning to use the more accurate LLM terminology rather than more commonly used marketing terms (i.e., GenAI and AI), a majority found value in LLM usage. This suggests that correct terminology and a fuller understanding of the strength and challenges associated with LLM use may not slow down educators' interest in using ChatGPT as a support tool.

Expert integration of LLMs into teacher education coursework requires educators to see the value along with the limitations of LLM usage, particularly in terms of teaching and learning. Teachers also need to know how to model effective methods and strategies when using LLMs as a learning tool. Equitable assessment strategies are important as well. Further, knowing how best to prioritize the use of LLMs to build and hone students' higher order thinking skills (i.e., critical thinking, problem solving, reflection, and computational thinking among others) is required. Additionally, novice teachers often grapple with lesson planning even as they strive to create engaging, standards-based learning experiences for their learners. This provides LLMs a valuable role as a support tool. However, teachers and others must recognize that LLMs are a tool, not a replacement for human expertise. Instead, it functions as a support tool that teachers can use to customize or hone lessons to meet the unique needs of individual students.

7. Conclusions

Results suggest positive perspectives among

participants because of their LLMs supported lesson planning activities. As such, the study has implications for those interested in the integration of LLMs into teacher education and within teachers' professional practice. As an emerging field, issues for further research abound. For example, issues associated with integration, including the effective use of structured teacher training, including professional development workshops, mentoring, and use in other educational settings remain and should be examined in order to promote more effective professional development offerings.

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