

Article

ChatGPT and Generative AI: Possibilities for Its Contribution to Lesson Planning, Critical Thinking and Openness in Teacher Education

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Abstract: Although artificial intelligence (AI) has been part of our lives for some time, the launch of the Generative Pretrained Transformer (ChatGPT) has given it renewed attention. While most of these debates are about higher education in general, this article focuses on schoolteacher education and teacher training. This research aimed to determine the contribution of generative AI tools such as ChatGPT in lesson planning, critical thinking and openness in education. The research used a qualitative approach and document analysis following an interpretative paradigm. The findings reveal that generative language models such as ChatGPT can provide specific materials and support mechanisms, such as lesson plans, to schoolteachers and student teachers. It also showed that ChatGPT has levelled the playing field by opening access to lesson plans to all teachers. However, to unleash their full potential for education, it is crucial to approach these models with caution and critically evaluate their limitations and potential biases, understanding that they are tools to support teaching and learning and do not replace teachers. The study's contribution lies in ChatGPT-generated lesson plans' implications and the enhancement of critical thinking for teacher education, and it also underscores the need for further research to explore best practices for integrating ChatGPT in lesson planning.

Keywords: artificial intelligence; critical thinking; ChatGPT; lesson plans; open education; teacher education



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1. Introduction

Since its release in November 2022, Generative Pretrained Transformer (ChatGPT) has caused a global buzz over generative artificial intelligence (AI). Despite some critical views, large language models such as ChatGPT represent a significant advancement in AI, and they are here to stay. Experts in education and innovation state that since ChatGPT and other generative AI tools are a part of young people's lives and will continue to be so, ways must be found to incorporate them into education [1].

Numerous authors have written about the potential and threats AI and tools such as ChatGPT hold for education. Most analyze its opportunities and how it will change their realities and practices, as well as their concerns about the potential of AI-generated misinformation and biases and its ethical implications (e.g., [1–3]). More drastic responses to AI are those restricting the use of ChatGPT [4]. It is important to recognize that people can use ChatGPT or any technology in ineffective or lazy ways, just as they can with any other tool or resource. ChatGPT, like many other AI systems, is a tool that can be used for various purposes, and its effectiveness depends on how it is utilized.

The literature shows that generative AI (mimicking human intelligence), such as ChatGPT, will rapidly improve to become even more human-like and powerful [5]. Although predictions of how generative AI will impact society, specifically education, have been made, it is already clear that it will profoundly impact teacher education. For example,

generative AI can help teachers in the process of lesson planning by providing structure, ideas and resources. They can even have conversations with AI tools such as ChatGPT to brainstorm objectives and strategies and to collect relevant teaching materials. This, in turn, can contribute to teachers' own critical thinking, as they must explore various approaches to their lessons. Furthermore, these powerful tools have the capacity to provide examples, analogies and hypothetical scenarios to provoke discussions and critical reasoning in the classroom. In today's digital age, universities and schools must therefore embrace technological advancements rather than resist them. Incorporating technology into educational projects can provide inventive and meaningful ways to achieve learning outcomes. Therefore, teacher educators must rethink their teaching methods and explore innovative ways to integrate technology into the teaching and learning process to thrive in the digital world [6]. When experimenting with this powerful tool, its possibilities and limitations become clear. Instead of safeguards and bans, determining how ChatGPT and similar generative language models should be embraced as part of education is needed, and therefore ongoing research is imperative. By making ChatGPT (and similar language models such as BERT, GPT-3 and RoBERTa) more accessible and understandable, schoolteachers and student teachers can use this tool to enhance efficiency, effectiveness and openness in education. These tools, with their vast knowledge base, provide teachers from different geographical, social and cultural backgrounds with educational support and equal opportunities to access resources, research articles and lesson plans.

Several authors (e.g., [7,8]) have written about the implications that ChatGPT might have on education, mainly referring to higher education. However, it will also greatly affect teachers and teacher training. Authors have briefly mentioned or referred to aspects of lesson planning (e.g., [8,9]), but no research articles that focus on GPT-generated lesson planning and the implications for teacher education could be found. The gap in the literature on education has been noted, and this article contributes to the filling of this gap. For this reason, its focus is to share and discuss an example of a ChatGPT-generated lesson plan, followed by the implications that generative technology such as ChatGPT might have for teacher education.

2. Conceptual Framework

We first describe ChatGPT as an example of a generative AI tool and how it relates to the main concepts of this research before describing our research methodology, which is a document analysis that analyzed examples of ChatGPT documents related to a lesson plan. Last, we discuss the findings and their implications for teacher education.

2.1. Defining ChatGPT

ChatGPT is a language model developed by OpenAI, and it is a part of the GPT (Generative Pretrained Transformer) series of models. It is designed to generate human-like text based on the input it receives. ChatGPT is initially pretrained on a vast corpus of text from the Internet. During this pretraining phase, it learns the structure and patterns of human language, including grammar, syntax, semantics, and even some degree of world knowledge. According to Atlas [7], ChatGPT is a cutting-edge language model developed by OpenAI that uses artificial intelligence to generate human-like text. It is designed to effectively communicate with users [4]. Hong [8] also argues that ChatGPT can answer follow-up questions, admit mistakes, challenge incorrect premises and reject inappropriate requests. This makes ChatGPT an intelligent and responsible conversational partner, as it constantly learns from user interactions. This means that continuous input can improve its performance and deliver even more accurate and insightful responses. ChatGPT describes itself as follows: "I am ChatGPT, a large language model developed by OpenAI. I am designed to understand natural language and generate human-like responses to various questions and prompts. I was trained on a massive corpus of text data, using deep learning techniques to understand and generate text in a way that mimics human language. My purpose is to assist users in generating natural language text in various applications" [10].

It is essential to understand that, although ChatGPT has been trained on a massive amount of data, allowing it to interpret and generate text with remarkable accuracy, it has not been trained to produce correct answers but to replicate human-like texts it has been trained on.

As the purpose of ChatGPT is to assist its users in generating text, we agree with Tlili et al. [6] that, as a revolutionary generative AI tool, ChatGPT is a visible signal for a paradigm shift in different fields, including education. Along the same lines, Hong [8] argues that ChatGPT is the game changer that education needs to cause substantial changes in the obdurate education system in order to improve teaching and learning effectiveness.

2.2. Limitations and Challenges of ChatGPT

Despite the strides of language models such as ChatGPT, they still have limitations. For example, these models are only as good as the data they have been trained on. Therefore, it is important to acknowledge that AI systems have the potential to provide inaccurate or biased responses, be misused or inadequately deployed, and compromise data integrity and ethical standards. This means that humans are needed for continuous checking, oversight and quality assurance [2]. Authors such as Kasneci et al. [2] have further mentioned copyright issues as a challenge, indicating that, when prompting these models, they might come up with full sentences or even paragraphs of texts that they have been trained on. This can lead to copyright and plagiarism issues. Teachers and students can also misuse content from models such as ChatGPT by plagiarizing and ghostwriting [11]. For this reason, students and teachers need to have conversations about what academic integrity is and what is considered plagiarism when using AI writing tools [11]. Such conversations will contribute to their ethical and legal use, specifically in education. Another limitation is that inputs to the ChatGPT console are limited and the frequency and number of messages are throttled [7]. Additionally, it is important to realize that ChatGPT is a tool, and as Atlas [7] and Hong [8] argue, it is therefore unable to understand human emotions, intentions and reasoning. Furthermore, ChatGPT may lack a deep understanding of common-sense reasoning, which can lead to answers that sound plausible but are fundamentally incorrect or nonsensical. ChatGPT may provide answers that are factually incorrect or unverified, as it does not have real-time access to up-to-date information or the ability to browse the Internet for verification [12].

The above discussion only covered a few issues and is by no means exhaustive. We also acknowledge that, although much work still needs to be performed in terms of its limitations and challenges, large language models will continue to improve and push the boundaries of what is possible in the field of AI.

2.3. ChatGPT, Critical Thinking and Openness in Education

Generative AI tools such as ChatGPT should be seen as tools that can assist the teacher in improving the quality of education in schools and not as a threat to teacher training, teacher education and schools. In this regard, Saunders [3] argues that users may also find ChatGPT to be extremely helpful when creating scenarios for real-world case-study-based assessments, especially if teachers and student teachers use ChatGPT to create individual scenarios to which their assessments will respond, such as critically evaluating lesson plans. According to Phillips [9], “[t]he job of the educator is to hold the hand of the student as they go through the process of learning and to remind them of what the integrity of the learning process requires. It’s not about getting the answer, it’s about the process of learning. And the student’s job is to learn how to learn—not just what to learn, but also how to learn”. Students might thus use examples from lesson plans on ChatGPT to distinguish between what is versus what ought to be. This can help enhance critical thinking. Although authors such as Kasneci et al. [2] caution against the over-reliance on these tools, which can negatively impact their critical thinking and problem-solving skills, they agree that activities involving them for critique and evaluation promote not only critical thinking but also creativity and problem-solving skills.

One of the biggest advantages of generative AI tools such as ChatGPT is that they are free (although ChatGPT prompts one to pay for its Plus version with more functions), and all that is needed is access to the Internet. However, as Lutz [13] argues, disadvantaged communities and citizens are equally disadvantaged by their lack of access to the Internet and, therefore, to AI tools. Consequently, although these language models are open to all and provide, for example, resources, lesson plans and information on any education topic, they can widen the digital divide.

In order to gain access to ChatGPT, one must register and provide an email address and contact number. It also saves and keeps track of all the user's prompts. This means that tools such as ChatGPT, developed by OpenAI, open up education, as it is accessible to all who have access to the Internet. For example, OpenAI has recently unveiled a pricing plan, and under this new framework, users who opt to continue with the free version of the tool may encounter constraints regarding the manner and timing of their tool utilization. This means that, while some level of access may still be available without charge, restrictions could be imposed on usage frequency, advanced features or the extent of interaction, potentially affecting the overall experience for users who choose not to subscribe to a paid plan [10,14].

2.4. Lesson Planning in Teacher Education

As a schoolteacher, developing a thoughtful lesson plan is essential, as it provides a roadmap for the teacher to follow, ensuring that he or she covers all the necessary material in a logical and organized manner. It is crucial for effective teaching and learning and ensures that the teacher communicates effectively, manages time efficiently, engages students and provides an accurate assessment and evaluation. Even before ChatGPT, many examples of lesson plans were available, such as "How to build a lesson plan: Templates, requirements, and more" by De Leon and McClure [15], Milkova's [16] strategies for effective lesson planning and seven components of an effective classroom lesson plan by McClymonts [17]. All of these examples include steps for preparing a lesson plan, such as outlining learning objectives, developing the introduction, planning the specific learning activities (the main body of the lesson and learning materials), planning or checking for understanding, creating a realistic timeline, presenting the lesson plan and reflecting on the lesson plan (assessment). However, there might be shortcomings, such as the fact that it did not help develop critical thinking skills or take the context into consideration. According to Sherrington [18], in a class of multiple individuals, there is no straightforward way to find out how successfully each individual person is learning and identify what their difficulties or gaps are and then use that information to close their learning gaps with appropriate responses. All too often, faced with this ever-present difficulty, teachers cut corners and do not structure lessons so that they focus on flushing out difficulties, errors and gaps in recall and understanding.

Considering the accessibility of advanced AI systems such as ChatGPT, we concur with Hooks [19] about the need to recognize the importance of establishing an educational environment that places paramount value on fostering critical thinking, encouraging self-reflection and empowering students to actively engage in the learning process. These are invaluable lessons that should be integrated into educational curricula and practices, considering the evolving landscape of technology and its potential impact on pedagogy. Lesson planning can be used to empower student teachers to analyze and think critically.

Against the above background, this article addresses the following question:

How can ChatGPT and generative AI potentially contribute to lesson planning, foster critical thinking and promote openness in teacher education?

3. Research Methodology

The research methodology is a strategy of enquiry that is used to identify, select, process and analyze information to answer the research question. Patel and Patel [20] state that the research methodology is a systematic way to solve the research problem by

logically implementing different steps that help us to understand not only the products of scientific inquiry but also the process.

The document analysis procedure was undertaken in terms of the aim of this study, and we selected a ChatGPT-generated lesson plan.

An exploratory case study research design was used to explore the implications of generative technology such as ChatGPT for teacher education and suggest ways that teacher-education institutions can use online tools to improve their lesson planning and develop critical thinking. Yin [21] states that exploratory case studies in qualitative research assist in researching complex phenomena (cases) or those that we do not know much about.

Furthermore, this research was performed from an interpretative paradigm, focusing on human interest in a study. According to Kivunja and Kuyini [22], a paradigm is defined as the researcher's beliefs or worldview that navigates the research action or an investigation. A qualitative research approach was used, making use of a phenomenology type of research. The method used for this research was the document analysis. İlin [23] defines the document analysis as the process of interpreting documents to give voice and meaning to an assessment topic.

The authors took care of the trustworthiness of the qualitative data. According to Collins and Hussey [24], the trustworthiness of qualitative content analysis is presented by four criteria, which are (1) credibility, (2) transferability, (3) dependability and (4) confirmability.

Texts generated by ChatGPT were utilized for the purpose of a document analysis. The researchers ensured that, through credibility, the data were collected from the official ChatGPT site. Transferability relies on the fact that the findings of this study can be transferred to other settings or groups. Dependability is defined by data stability over time, but we do not pretend that the same findings will be achieved, because we work from the premise that reality is subjective and contextual. Then, confirmability refers to objectivity between two or more independent persons regarding the data's accuracy, relevance or meaning. Ethical clearance was obtained from the ethical review committee from 2022 to 2025 from the authors' institution, with reference number 2022/02/09/90001400/08/AM.

4. Document Analysis

A document analysis was performed by making use of texts generated by ChatGPT. We wanted to know to what extent ChatGPT was able to generate a lesson in a specific subject on a specific level. The capacity to do so can save teachers time and effort and contribute to accessibility and openness in education. As an example, we asked ChatGPT the following basic question: "Can you design an English second language lesson on prepositions for Grade 6 learners?"

The answer we received from ChatGPT was as follows:

As a follow-up question, we asked ChatGPT for a worksheet for learners with sentences containing prepositions of place and movement. Within seconds, it provided the following worksheet with the key to the answers:

The use of worksheets and assessment tasks, such as reading comprehension and multiple-choice questions with automated feedback and grading, was confirmed by authors such as Dijkstra, Genç, Kayal et al. [25]; and Gabajiwala et al. [26].

Lastly, we asked ChatGPT for a visual presentation of this lesson. It generated the following answer:

We acknowledge that many more or different prompts could have been added for more and different responses. As Kasneci et al. [2] argue, the options for lesson planning prompts are endless in providing learners with opportunities to master the content.

5. Discussion of the Findings

The above lesson has the basic elements of a lesson plan (Figure 1), stating the lesson's purpose; providing a warm-up exercise; then a presentation, practice, production, and

wrap-up; and ending with an assessment activity. ChatGPT was thus able to create an acceptable basic lesson plan. The lesson also has guidelines for the time to spend on each stage. It has the potential to be adapted to suit the needs and the context of the teacher and the learners. For example, the level in the example lesson is indicated as “intermediate” and can be adapted to suit, for example, fast learners. In response to a ChatGPT-generated 6th-grade lesson on the causes of climate change [21], some teachers (see Section 4, document analysis) argued that the lesson was outdated, while others indicated that it only provided a framework that still needed sources. One teacher added the analogy with a recipe which still needed a chef. However, all agreed that the lesson provided a framework with the basic ingredients to save the teacher’s time. The guidelines in the lesson are precise, such as the activities indicated during warm-up:

Sure, here is an example English as a Second Language lesson plan on prepositions for Grade 6 learners:

Topic: Prepositions

Level: Intermediate

Objective: By the end of the lesson, learners will be able to use prepositions of place and movement in sentences correctly.

Materials:

Whiteboard and markers

Pictures of places and movements

Preposition worksheet

Procedure:

1 Warm-up (5 minutes)

Start the class by showing the learners pictures of different places and movements (e.g., a classroom, a park, running, and walking). Ask the learners to describe the pictures using prepositions of place and movement (e.g., “The cat is on the table” and “I am walking to the store”).

Write the sentences on the whiteboard and ask the students to correct any mistakes.

2 Presentation (10 minutes)

Introduce the concept of prepositions by explaining that they are words that show the relationship between a noun or pronoun and other words in a sentence.

Write some examples on the whiteboard and ask the students to identify the preposition (e.g., “The book is on the table” and “She is running to the park”).

Explain that prepositions of place show where something is located, and prepositions of movement show how something is moving.

3 Practice (20 minutes)

Give the students a worksheet with sentences containing prepositions of place and movement.

Ask the students to complete the worksheet by filling in the blanks with the correct preposition.

After the students finish the worksheet, review the answers together as a class.

4 Production (20 minutes)

Divide the students into pairs or small groups.

Give each group a picture and ask them to write a sentence using a preposition of place or movement to describe the picture.

Have each group share their sentence with the class and ask the other students to identify the preposition used.

5 Wrap-up (5 minutes)

Review the concept of prepositions and ask the students to summarize what they learned in the lesson.

Encourage the students to practice using prepositions in their everyday conversations and writing.

Assessment:

Assess the students’ understanding of prepositions by reviewing their worksheets and production activities. Observe their ability to use prepositions of place and movement correctly in sentences. Provide feedback and additional practice as needed.

I hope this helps! Let me know if you have any questions or if there is anything else I can do to assist you.

Figure 1. Second Language lesson plan on prepositions for Grade 6 learners [10].

Although the above activities are clear and should assist the beginner teacher or student teacher, an experienced teacher might want to adapt the activity or be more creative by, for example, asking the learners to find their own appropriate pictures in magazines. Reflecting on activities created by ChatGPT can help to broaden teachers’ perspectives and inspire creativity by offering a range of potential activities and approaches to teaching a

particular topic. This can encourage teachers to think outside the box and consider new and innovative ways to engage their learners in the learning process. On the other hand, teachers are bound, in some cases, to follow a specific curriculum and to use prescribed textbooks and need to be cautious about this.

The lesson's objectives in Figure 1 are clearly stated, as well as the materials needed, although only one objective was given. These are the whiteboard, markers, pictures of places and movements and a preposition worksheet, which was also provided upon a request to ChatGPT and presented in Figure 2. This worksheet seems basic, with ten sentences that must be completed by adding the correct prepositions. The teacher needs to assess the worksheet to determine if the answer key is correct and if this worksheet is adequate to assess learners' knowledge of prepositions. This means that the materials provided by ChatGPT cannot be used without critically evaluating them for correctness, level of creativity, demand and context.

Sure! Here is a worksheet with sentences containing prepositions of place and movement:

Prepositions of Place and Movement Worksheet

Directions: Complete each sentence with the correct preposition of place or movement.

- 1 The cat is _____ the table.
- 2 The ball rolled _____ the street.
- 3 The flowers are _____ the vase.
- 4 The book is _____ the shelf.
- 5 The child is hiding _____ the bed.
- 6 The bird is flying _____ the tree.
- 7 The pencil is _____ the desk.
- 8 The car is driving _____ the bridge.
- 9 The dog is sleeping _____ the couch.
- 10 The box is _____ the floor.

Answer key:

- 1 on
- 2 down
- 3 in
- 4 on
- 5 under
- 6 towards
- 7 on
- 8 over
- 9 on
- 10 on

I hope this helps! Let me know if you have any questions or if you need further assistance.

Figure 2. Worksheet for learners with sentences containing prepositions of place and movement [10].

As shown in Figure 3, we prompted ChatGPT further by asking for a visual presentation [10]. Such a presentation could be used to facilitate a lesson on PowerPoint or a similar presentation program or on electronic whiteboards. ChatGPT provided specific guidance on the content, such as pictures and sentences, to add to the different slides. It even suggests additional resources, namely online exercises, games, worksheets and additional websites and books to learn more about prepositions.

Sure! Here is a visual presentation on prepositions for your learners:

Prepositions of Place and Movement Visual Presentation

Slide 1: Title slide
 Title: Prepositions of Place and Movement
 Image: A picture of a map with various prepositions marked on it

Slide 2: What are prepositions?
 Definition: Prepositions are words that show the relationship between a noun or pronoun and other words in a sentence.
 Examples of prepositions: in, on, at, to, from, with, without
 Image: A sentence with a preposition highlighted

Slide 3: Prepositions of Place
 Definition: Prepositions of place show where something is located.
 Examples: in, on, under, behind, beside, between, next to
 Image: A picture of a house with prepositions of a place marked on it

Slide 4: Examples of Prepositions of Place
 Example sentences:
 The cat is on the table.
 The book is on the shelf.
 The keys are on the table.
 The car is parked in the garage.
 Image: A picture with the preposition highlighted

Slide 5: Prepositions of Movement
 Definition: Prepositions of movement show how something is moving.
 Examples: to, from, towards, away from, through, over, under
 Image: A picture of a person walking with prepositions of movement marked on it

Slide 6: Examples of Prepositions of Movement
 Example sentences:
 I am walking to the store.
 She is running towards the park.
 He is jumping over the puddle.
 The bird is flying through the sky.
 Image: A picture with the preposition highlighted

Slide 7: Practice
 Practice exercise: Students can identify the prepositions in a set of sentences, or complete sentences with the correct preposition.
 Image: A worksheet with sentences and blanks to fill in the preposition

Slide 8: Summary
 Summary of prepositions of place and movement and their usage
 Image: A picture with prepositions highlighted in it, with labels of what they are

Slide 9: Resources
 Additional resources for learning prepositions, such as online exercises, games, or worksheets
 Image: A list of websites or books that can be used to learn more about prepositions

I hope this visual presentation helps! Let me know if you have any questions or if there is anything else I can do to assist you.

Figure 3. A visual presentation on prepositions of place and movement [10].

The above example in Figure 4 shows the potential of ChatGPT in guiding lesson plans and suggestions for related materials for teachers [10]. ChatGPT leaves the choice of actual texts and images to the teacher, meaning that teachers can choose their own materials and adapt them to suit their contexts and levels of learning. ChatGPT cannot provide contextual information or a diverse range of cultural perspectives and contexts, and teachers have the responsibility to choose materials and concepts applicable to a specific cultural environment. This aligns with Greenfield [27], who argues that ChatGPT is not sentient and does not have the capacity for subjective experiences, awareness and consciousness, which are traits that are currently only attributed to living beings.

Start the class by showing the learners pictures of different places and movements (e.g., a classroom, a park, running and walking).

Ask the learners to describe the pictures using prepositions of place and movement (e.g., “The cat is on the table” and “I am walking to the store”).

Write the sentences on the whiteboard and ask the students to correct any mistakes.

Figure 4. Examples of activities in the ChatGPT preposition lesson plan [10].

Apart from the potential to generate lesson plans, teachers can submit their lesson plans to ChatGPT to ask for feedback on matters such as quality and effectiveness. ChatGPT has the potential to provide individualized feedback and suggestions for improvement based on its understanding of best practices in education. Unfortunately, plagiarism is one way in which teachers and students can misuse content generated by models such as ChatGPT. Furthermore, submitted work to ChatGPT might be stored and might be used by other users.

Student teachers and schoolteachers can use lesson plans and related materials such as quizzes, presentations and worksheets for evaluation, critique and discussion in the classroom or during initial and continuing teacher training. Limitations (based on the literature review and personal use of ChatGPT) were found, such as interpretation, the use of cooperative learning and the use of critical thinking.

We believe that the findings reported in this research have specific implications for teacher education, and these implications are discussed next.

6. The Implications of AI-Generated Lesson Plans for Teacher Education

Generative language models such as ChatGPT have opened new opportunities for making education more equitable, open and accessible. One way in which this is happening is by creating lesson plans and related materials, such as worksheets, articles and essays, which can act as open educational resources (OERs) for teachers and student teachers alike. By making these materials freely available, the cost of textbooks and other course materials can be reduced, which can help to level the playing field for teachers who may otherwise not have access to these resources. Moreover, by guiding the incorporation of materials into lessons, such as using worksheets, pictures and texts, teachers can tailor their instruction to the needs of their learners, thereby assisting learners in mastering the content. Lessons can be shared online to create cooperative learning between student teachers.

Contextualized materials, in particular, have the potential to be highly effective in this regard, as they can be tailored to specific contexts and student populations. This is especially important for learners who do not have textbooks or textbooks and materials that are not created for a specific context. Contextualized materials have the potential to improve the quality of teaching and assist learners in mastering the content. Student teachers can also gather data and identify concepts and evaluate these concepts against academic references to either confirm or decline correctness.

ChatGPT has the potential to provide specific and personalized guidance to teachers and student teachers. This can save them time and effort in creating materials and allow them to focus on spending more teaching time with their learners. However, to do so, they need the technological, content and professional knowledge to access materials and assess the quality and relevance thereof [28].

Although ChatGPT has impressive capabilities in creating materials such as lesson plans, visual presentations, worksheets and assessment tasks, it cannot act as a substitute for teachers. Teachers are needed to evaluate, improve, adapt and apply lesson plans and materials to be successful in their teaching. While ChatGPT can provide targeted and relevant information, it cannot provide emotional support and the interaction and human touch needed for teaching [28]. Additionally, Thorp [29] argues that ChatGPT is not able to understand the text it generates or the context thereof, which might result in incorrect answers. For this reason, ChatGPT and other AI models should be seen as tools to enhance and supplement teachers' work but not replace the teachers.

AI-based feedback, as indicated in the worksheet example in this article (Figure 3), can provide instant feedback and, therefore, can reduce teacher workload and allow them more quality teaching time. In this regard, Zhai [28], who experimented with a complex science assessment task on ChatGPT, found that the chatbot did well and provided the needed information for a high-level assessment. The author indicated that doing so can assist teachers in creating assessment tasks.

Although generative technology holds endless opportunities and advantages, teachers and students should be aware of challenges and limitations, such as the bias and wrong information that AI generative tools can provide. Additionally, as Hong [8] argues, teachers and student teachers could develop their critical thinking skills by discussing and critiquing the functions and working mechanism of ChatGPT, as well as its limitations and shortcomings. Lesson plans created by ChatGPT should therefore be seen as a starting point, not a final product. Teachers should add their own knowledge by, for example, analyzing and critiquing lessons individually or as a group before adapting and using them.

Basic lesson plans created by ChatGPT can provide teachers with a starting point for their lesson planning. However, teachers must still be able to evaluate the suitability of the suggested lesson plan for their specific contexts and modify it as needed to meet the unique needs of their learners. This requires critical thinking skills, as teachers must assess the relevance and appropriateness of the suggested lesson plan based on factors such as the aims and objectives of the lesson, the learners' abilities and the classroom environment. Therefore, lesson plans created by ChatGPT can be a powerful tool for developing teachers' critical thinking skills, enabling them to evaluate, adapt and improve their instructional practices to meet the needs of their learners better. We agree with Naidu [1] that this practice could provide the needed opportunities for teachers to develop the necessary knowledge and skills to use ChatGPT and other AI models for planning and instructional purposes.

7. Conclusions

The purpose of this article was to explore how ChatGPT can assist with lesson planning and, in doing this, contribute to openness and critical thinking in teacher education to prepare teachers and learners for the reality they are faced with in the workplace.

The findings indicate that generative language models such as ChatGPT can provide materials and support mechanisms, such as lesson plans, to teachers and student teachers. In the past, these might have been available to those in privileged contexts or who could afford to pay for such materials, services and training. ChatGPT has levelled the playing field by opening access to all teachers. The potential of ChatGPT is indeed exciting, providing new opportunities for creativity, efficiency and innovation for all.

However, to unleash their full potential for education, it is crucial to approach these models with caution and critically evaluate their limitations and potential biases, understanding that they are tools to support teaching and learning. Lesson plans and related materials should be cautiously used and critiqued and adapted where needed. If ChatGPT is used by student teachers and teachers to evaluate and critique existing lessons, they might be equipped with the skills they need to succeed in the technology-driven world by focusing on applying knowledge; creating new meanings from existing knowledge; and developing skills relevant to the 21st century, such as critical thinking and problem solving. Learners need to be prepared for the fourth and fifth industrial revolutions through a comprehensive education strategy incorporating effective pedagogical strategies if education is to practice freedom. ChatGPT can be used to develop critical thinking in the form of data generation, and student teachers need to look for references to validate information and compile core arguments.

The use of large language models in education is a promising area of research that offers many opportunities to support the work of teachers. The article is meant to explore how such language models, particularly ChatGPT, can assist with lesson planning and contribute to openness in teacher education. As exploratory research, it has its limitations. For example, only one lesson was used in one subject on a specific level, with no further

specifications. This could have resulted in a more focused lesson plan. However, this preliminary research of AI and the latest generation of chatbot technology is believed to lead to more studies on lesson planning in different subjects and at various levels to better understand AI systems in this constantly evolving field.

While this exploratory research reflects our optimism about the opportunities of large language models such as ChatGPT to transform education, it also underscores the need for further research and explore the best practices for integrating ChatGPT into lesson planning.

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