A Study on the Use of Large Language Models for Lesson Preparation by Student Teachers in Hong Kong

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Abstract: This study focuses on Hong Kong's student teachers and explores whether they utilize large language models (LLMs) for lesson planning, as well as their perspectives on this practice. The findings reveal that some student teachers have begun adopting LLMs, discovering that it significantly enhances their lesson planning efficiency and enriches their instructional content. However, they also encounter challenges such as mastering artificial intelligence (AI) technology. On the other hand, despite recognizing that LLMs represent a popular trend in the future, some student teachers have not yet adopted this technology due to insufficient guidance and privacy concerns. Overall, student teachers are receptive to the application of AI technology in lesson planning and believe it can revolutionize teaching methods. Still, they call for more support and guidance to surmount potential issues. The study concludes that AI technology holds substantial potential in the education field but requires meticulous guidance and regulation to maximize its positive impact.

Keywords: Generative AI, Lesson plan, Educational challenges.

1.   Introduction

With the rapid development of artificial intelligence (AI) technologies, especially the widespread use of large language models (LLMs), the world is experiencing unprecedented and profound changes. AI, which can simulate human intelligence to perform tasks and iteratively optimize itself through collected data, has significantly boosted the use of intelligent automation in our daily lives [1]. This technological innovation not only disrupts traditional ways of acquiring and sharing knowledge but also deeply influences educational methods and teaching strategies. As a pioneer in educational innovation, Hong Kong has always been at the forefront of reforming education and applying technology in its basic education system. It implements broad, process-oriented approaches to reduce students' exam pressure [2].

Student teachers are seen as the core force in the future of education, as they are in a crucial stage of learning and adapting their teaching skills. Learning how to teach is not just considered as a process of accumulating knowledge and skills, it is often viewed as an opportunity for rethinking and reconstructing knowledge and ideas [3]. In this process, student teachers demonstrate clear positive traits in their personal growth, innovative thinking, and ability to seek support [3]. Lesson planning is a vital component of the teaching process, and its importance cannot be overstated. Student teachers need to use various tools to assess student learning, focusing not only on what students already know

but also using this information to guide all students from their current levels to higher achievements. They need to become effective teachers by carefully organizing their teaching activities and materials. This approach ensures that instruction builds on students' prior knowledge and developmental levels, allowing all students to succeed [4]. As AI technology gradually integrates into the education field, starting to shape the younger generation, understanding teachers' perspectives on AI in education is essential for guiding the professional development of future educators [5].

This study focuses on a group of student teachers in Hong Kong and aims to explore whether they are adopting AI technology for lesson planning. It also seeks to analyze their views on using LLMs to do lesson planning. Given the central role of lesson planning in teaching preparation, this research pays special attention to how student teachers in Hong Kong are using AI technology in recent years to develop the lesson planning process. By examining whether and how student teachers use LLMs for lesson planning, this study aims to reveal current trends in technological innovation in the educational industry. It also seeks to understand how these emerging technologies are gradually shaping the lesson-planning habits and teaching concepts of future teachers.

Additionally, this study aims to collect and analyze student teachers' personal insights and attitudes toward using AI technology for lesson planning. This subjective feedback not only shows the psychological motivations behind technology acceptance but also reveal the challenges faced in practical application, potential opportunities, and insights into the expectations and aspirations for future education models.

2. Method

This study specifically targeted the distribution of questionnaires to students of education at The Education University of Hong Kong who have prior internship experience. As prospective contributors to the educational field, the lesson preparation habits, acceptance of AI technology, and perspectives on educational innovation held by these students are of significant research interest. The questionnaire comprehensively covered various dimensions, including respondents' basic information, specific needs and habits in the lesson preparation process, actual use of AI lesson preparation technology, and their views and future expectations regarding AI in education. To ensure the comprehensiveness and accessibility of the data collection process, the online platform 'WJX'(Wenjuanxing) was selected for distributing the questionnaire. Over the collection period, the study successfully gathered feedback from 56 respondents. After a thorough screening process, 51 responses were deemed valid, resulting in a commendable response rate of 91.1%.

3. Result

3.1. Basic Information About the Sample

A total of 51 valid questionnaires were collected for this survey. Female student teachers accounted for 92.16% of the participants, while male student teachers made up 7.84%. Regarding internship schools' locations, junior high schools were the primary choice for student teachers (54.90%), followed by high schools (41.18%), with a significant proportion also choosing primary schools (37.25%). Concerning the grade levels taught, the highest number of student teachers were teaching third grade (25.58%), followed by fifth grade (22.37%) and second grade (19.77%). In terms of subjects taught, arts subjects predominated (66.67%), while science subjects such as mathematics and physics accounted for 23.53%, and arts subjects like music and art comprised only 1.96%. Additionally, a few student teachers had experience teaching business subjects, and some had taught all subjects in kindergartens.

3.2. Current Status of AI Users

The results of Figure 1 indicate a balanced attitude among participants towards the use of AI tools for lesson preparation. Specifically, 50.98% of participants reported using AI for lesson preparation, while 49.02% did not.
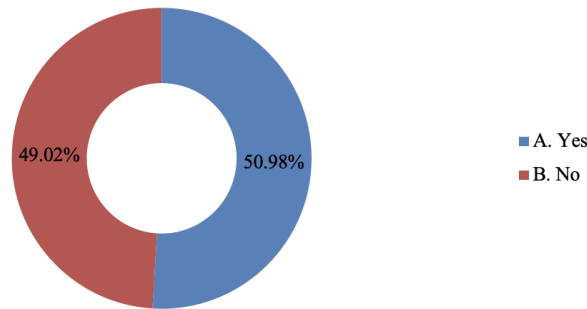

Figure 1: Number of AI Users and Non-AI Users

This study subsequently delves deeper into this classification: on one hand, it analyzes the group of teachers who use AI for lesson preparation, examining their specific motivations and the perceived advantages of AI-assisted teaching; on the other hand, for those teachers who do not employ AI in their lesson preparation, the study investigates the underlying considerations and reasons for their unwillingness to adopt AI.

Figure 2 shows a deeper analysis of the main reasons participants choose to use AI for lesson preparation, revealing motivations such as improving efficiency, obtaining novel teaching ideas, and assisting in the design of teaching activities. The survey results indicate that ChatGPT is the most popular large language model for lesson preparation, with a usage rate of 57.69%. Poe follows with a 30.77% usage rate, demonstrating its potential as an alternative tool. The usage rates for other models, such as ERNIE Bot, Kimi, and IFLYTEK Spark, are lower, at 7.69%, 3.85%, and 0%, respectively.
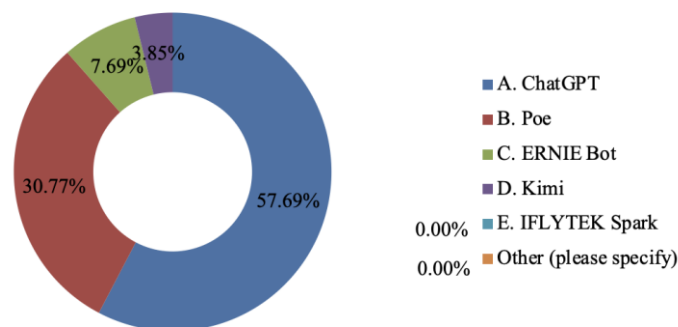

Figure 2: Motivations for Use

Figure 3 indicates that improving the efficiency of lesson preparation (73.08%) is the primary reason teachers opt for AI tools. This indicates that teachers generally aim to optimize the lesson preparation process, reduce time costs, and enhance work efficiency through technological means. Additionally, 18 participants believe that AI tools can be used to obtain novel teaching ideas, while 15 participants believe that AI can assist in designing teaching activities. This demonstrates that AI tools not only help teachers save time but also significantly promote the expansion of teaching

methodologies, bringing more diverse instructional designs to the classroom. This, in turn, enriches the content and improves the quality of teaching.

It is noteworthy that all teachers who have used LLMs for lesson preparation reported that AI tools have altered their lesson preparation habits or methods to some extent. This change may be reflected in various aspects, such as the automation of the lesson preparation process, the enrichment of teaching resources, and the innovation of instructional design.
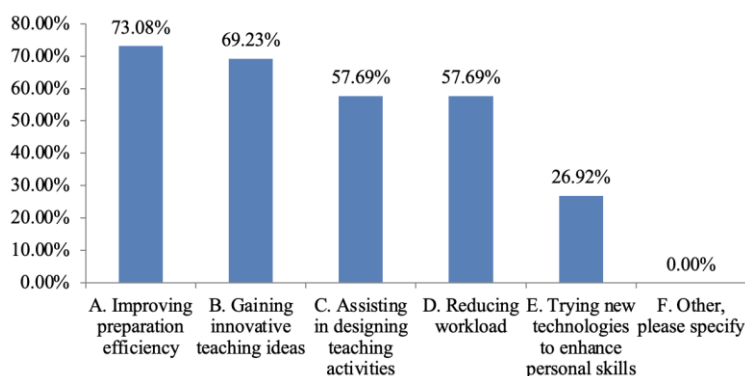

Figure 3: The main reasons for choosing to use this AI tool for lesson preparation

The results of this questionnaire expose multiple challenges faced by participants when using AI-generated lesson plans. The most significant issue identified is the instability of the quality of the generated content, with an overwhelming 92.31% of participants in Figure 4 indicating this as a concern. Additionally, as shown in Figure 4, 65.38% of participants highlighted the difficulty of adapting AI-generated content to personalized teaching needs as a significant challenge. This indicates that while AI tools may offer general lesson plans, they often fall short in terms of customization to suit individual class requirements and teaching styles. In contrast, the complexity of operating the technology was cited by only 7.69% of participants as a major obstacle. This suggests that, overall, teachers do not consider the technical aspects of using AI tools to be a significant barrier.
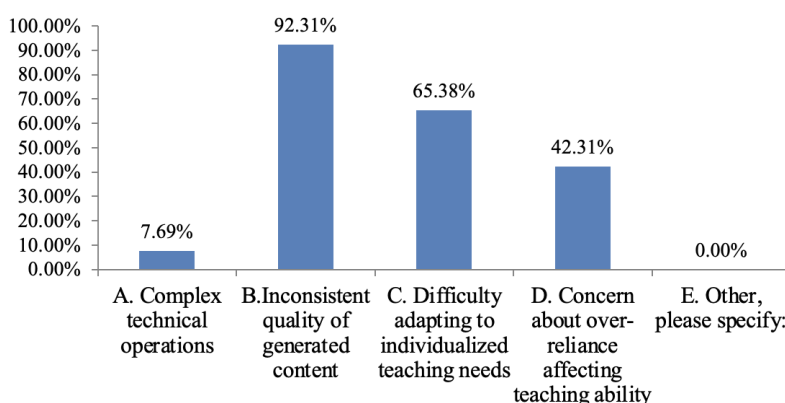

Figure 4: The main challenges student teachers may encounterwhen using LLMs to prepare lessons

3.3. Reasons for Non-users

In Figure 5, participants provided multiple considerations regarding their reasons for not using generative AI to prepare lessons, reflecting their awareness, acceptance, and practical application of the technology. Firstly, the lack of knowledge or exposure to such tools (28.00%) emerged as one of the primary reasons for not using AI in lesson preparation, indicating that the current market penetration of AI preparation tools requires improvement. Concerns about the reliability and accuracy

of the technology (52.00%) were another significant factor deterring teachers from adopting AI-assisted lesson planning. This high percentage reflects teachers' doubts about the stability of AI technology in practical applications.

Additionally, working habits and personal preferences (40.00%) also influence teachers' acceptance of AI-assisted lesson planning tools. This suggests that despite the numerous advantages of AI technology, teachers' personal working methods and preferences remain key factors in determining whether they adopt new technologies.

The lack of relevant training or guidance (28.00%) is another reason why teachers do not use AI for lesson preparation, indicating that teachers often need external support and assistance to overcome the learning curve and effectively use new technologies. Similarly, time constraints and the lack of time to experiment with new methods (32.00%) reveal the pressures and challenges teachers face in their daily teaching activities, making it difficult for them to find time to explore and try new approaches to lesson preparation.
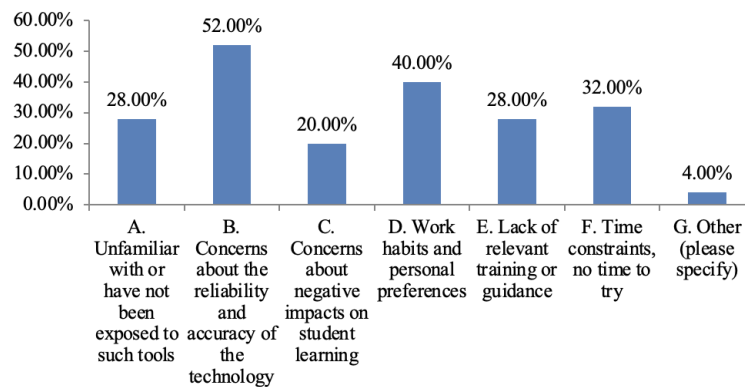
Figure 5: Specific Reasons for Not Using AI for Lesson Preparation

According to the results of Figure 6, those student teachers who do not use LLMs to prepare lessons still hold high expectations and recognize the potential benefits of such tools. More than 70% of respondents believe that AI can save time and improve efficiency in lesson planning. This option received the highest support rate among all options, indicating that non-AI users generally believe AI technology can significantly reduce their lesson planning burden, allowing them to allocate more time to other teaching tasks or professional development. Over two-thirds of respondents believe that AI can assist in generating initial teaching content, and more than 60% think that AI can help with data collection and collation. This suggests that they recognize the potential of AI to process large amounts of information and organize teaching materials, which they believe could substantially save them time and effort.
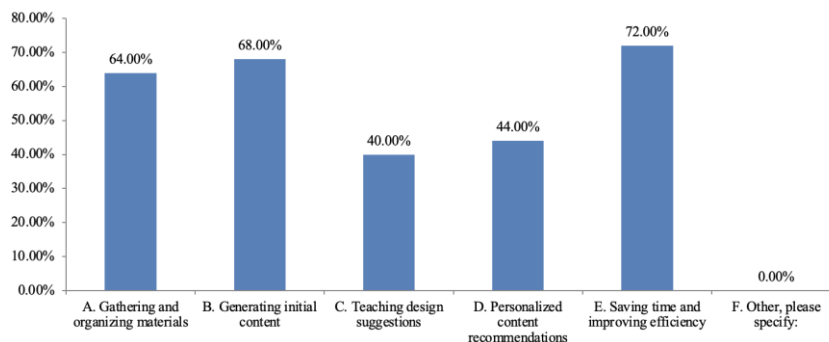
Figure 6: Views on AI-Assisted Lesson Planning Among Non-AI Users

When exploring the impact of using AI for lesson preparation on the future of education, the Figure 7 results show participants' complex attitudes towards this emerging trend. While the majority (72.00%) of respondents believe that AI-assisted lesson preparation is "somewhat helpful, but should be used with caution," this choice underscores their acknowledgment of AI's potential while also expressing deep concerns about potential negative impacts and dependency issues.
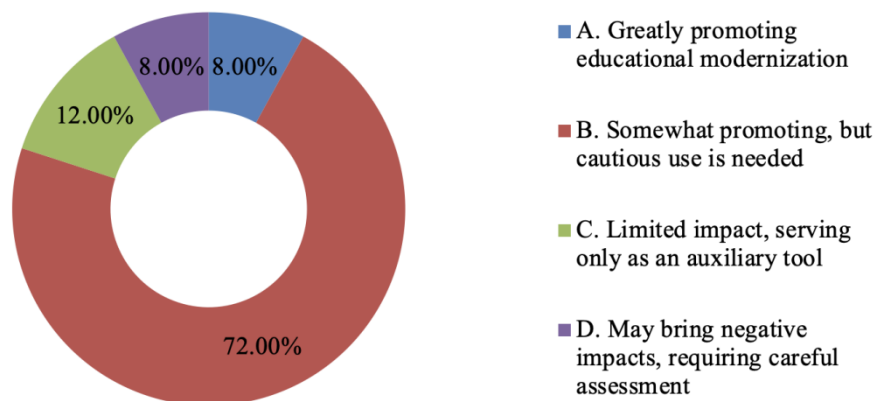

Figure 7: The impact of AI on preparing lessons in future education

4. Discussion

4.1. Research Overview

This study employed a questionnaire survey to comprehensively explore the current situation, attitudes, and expectations of students majoring in education at The Education University of Hong Kong, particularly those with internship experience, regarding the use of LLMs, especially ChatGPT, in the lesson preparation process. The results indicate a balanced acceptance of LLMs to prepare lessons among student teachers, with approximately half already use AI for lesson preparation and the other half not yet adopting it.

4.2. Comparison with previous research

The teachers involved in this study have put forward a few expectations and improvement suggestions for using LLMs as AI teaching preparation tools, which resonate with current views within the education community regarding AI technology. First, there is a consensus on the importance of improving content quality, with teachers hoping that AI teaching preparation tools can generate content that is more accurate, concise, and aligned with teaching needs. This demand reflects the high standards and strict requirements that teachers have for the practical application of AI technology.

Secondly, enhancing personalized recommendations is one of the key expectations of teachers. They hope that AI can deliver personalized teaching content and suggestions based on students' learning progress, individual interests, and teaching goals, thus promoting the development of personalized learning. Recent studies on teachers' educational concepts in a technology-driven environment reveal that teachers' views are gradually shifting from traditional, teacher-centered knowledge transmission to a more student-centered approach focused on knowledge construction [6]. The student-centered teaching philosophy emphasizes the development of higher order thinking skills, viewing the learning process as one of knowledge construction, and highlights the active role teachers play in facilitating students' meaningful understanding. Teachers who embrace this philosophy strive to create a learning environment conducive to students' meaning making through interactive and

collaborative activities, effectively enhancing students' creativity and critical thinking skills [7]. This shift aligns perfectly with the current educational trend advocating student-centered teaching and showcases the immense potential of AI technology in promoting personalized education.

Additionally, teachers have high hopes for AI tools to support teaching innovation, especially benefiting the lesson preparation process for new teachers. They expect that AI will not only provide fresh teaching ideas and activity designs to spark teachers' creativity and make classrooms more engaging, but also promote knowledge sharing and information exchange among teachers. Kim, Lee, and Cho point out that teachers suggest establishing professional learning communities made up of teachers from various subjects [8]. The aim is to gain a deeper understanding of the broad values of each subject and to openly share information and knowledge, exploring and identifying effective interdisciplinary teaching practices. This expectation reflects teachers' strong confidence in the role of AI technology in driving educational innovation.

From a broader perspective, the integration of AI technology is profoundly reshaping the traditional education industry. This transformation is not only reflected in innovative teaching methods but also signifies a fundamental shift in learning models. Indeed, this process is accompanied by numerous challenges and discussions. One significant barrier to implementing AI in education is the lack of qualified and competent AI educators [9]. However, in the face of new opportunities and challenges for education in the AI era, schools are actively responding. They are aligning their efforts with educational reforms and the development trends of AI technology, exploring and promoting new requirements suitable for the intelligent age [10]. It is important to note that the knowledge gap teachers have regarding AI may lead to misunderstandings and hinder their classroom practices and curriculum design. Therefore, accurately identifying and describing this knowledge gap is crucial for guiding the professional development of teachers [11]. In this background, most educators and researchers agree that AI technology will play an increasingly important role in the future of education, becoming a key force driving educational innovation, enhancing teaching quality, and promoting personalized learning.

5. Conclusion

This study deeply explored the use of LLMs to prepare lessons by student teachers in Hong Kong. It found that those who have not used AI have high expectations for it and recognize its potential benefits, such as saving time, improving lesson preparation efficiency, and advantages in content generation and data organization. Meanwhile, the survey results show that participants have mixed feelings about using LLMs when preparing lessons. Most believe it is helpful but should be used cautiously, acknowledging its potential while also worrying about possible negative impacts.

Through a questionnaire survey, this study comprehensively understood the current use, attitudes, and expectations of students majoring in education at The Education University of Hong Kong, especially those with extensive internship experience, regarding LLMs in lesson planning. The results reveal that student teachers have a balanced acceptance of LLMs, with about half having used them and half not. Compared to previous studies, teachers have expectations and suggestions for AI teaching preparation tools, hoping they can generate more accurate and concise content, provide personalized advice, and support teaching innovation, particularly in helping new teachers with lesson planning.

Although this study gained important insights into the application of using LLMs for Lesson Preparation among student teachers in Hong Kong, there are still several limitations. Firstly, the sample size of this study is relatively small, with only 51 valid questionnaires collected, which may limit the generalizability and representativeness of the findings. Therefore, future research should consider expanding the sample size to more comprehensively reflect the attitudes and views of trainee teachers from different backgrounds and levels on AI-assisted lesson planning tools.

Secondly, this study mainly focused on the usage of using LLMs for Lesson Preparation by student teachers and did not deeply explore the specific experiences and challenges faced by experienced teachers in actual classroom teaching using these tools. To gain richer practical experiences and cases, future research should further investigate the actual usage of LLMs by experienced teachers.

Finally, there may be limitations in the questionnaire design of this study, with some questions possibly not fully reflecting the complete needs and expectations of the respondents. Therefore, future research should further optimize the questionnaire design to ensure that the questions can comprehensively and accurately reflect the actual situation and opinions of the respondents, thereby enhancing the depth of the research.

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