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AI and Teacher Empowerment: Enhancing Professional Development and Classroom Efficiency

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ABSTRACT

Currently powerful Large AI models (with trillions of parameters) have become a transformative mechanism for performing interactive language-based tasks between human and machine (Tan et al., 2023). Given that the majority of interactive applications involve engaging dialogue between teacher and student, there exists a natural penetration between this emerging technology and classroom teaching. However, despite this potential synergy, implementation and integration of these models into current teaching practices remains challenging.

In the context of these challenges, research programmers are formulated by visualizing the effectiveness of classroom-based LLM interactive applications in a diversified manner. New datasets and standards with meaningful evaluation are provided to foster corresponding research communities. Also, a unified framework is given to facilitate the adoption of pre-trained LLMs for creative mainstream educational QA tasks. This comprehensive framework supports processing lengthy conversation text data and condensing messy informative text into well-organized tabular formats. Furthermore, from text-to-tabular processing, basic and extended tasks with diverse tangible applications are formulated, including improving inquiry efficiency, mining more informative dialogues, enhancing teaching compliance checking, and moderating student safety risks in large-scale synchronous interactions with AI (Guo et al., 2021).

Keywords: *Large Language Models (LLMs), Artificial Intelligence (AI), Education.*

1. Introduction

There is growing interest in using Artificial Intelligence (AI) to interact with teachers and improve their teaching. Large Language Models (LLMs) have made substantial progress, which has made it feasible to generate long and coherent texts, allowing for a wide range of applications. This paper explores applying powerful LLMs to classroom teaching for the first time and presents an overall framework that pivots on four educative tasks (ASSIST). The second task, Teacher Questions, is further developed. Among them, the

talk about MOVIE method provides a way to change the question knowledge and type of external corpora. The sample study on the nine-year postgraduate entrance examination shows that QA generated by LLMs can inspire creative thought and promote learning. This paper sketches a cursive in the end on the potential, predicaments and outlooks for using AI technology to improve teacher empowerment (Tan et al., 2023).

In-class teaching evaluation, which is used to judge the process and effects of teachers' teaching and students' learning in classroom settings, has become a research hotspot. Experiments show the effectiveness of the proposed model and AI technology in in-class teaching evaluation. The methodological process and innovative model framework can provide a valuable reference for the design of in-class teaching evaluation mechanisms employing AI technology in the future (Guo et al., 2021).

Artificial Intelligence (AI) includes within its spectrum computer science, information technology, and mathematics. People associated with teaching and curricula can use AI as an aid to problem solving, decision making, and both formal and informal learning. AI tools can aid a teacher's ability to do lesson planning, develop good test questions, and daily classroom teaching. The current condition of AI can be as tools that are used in ways similar to hand tools, power tools, and machinery. There is little doubt that the future role of AI in education will be greater than its role of the present.

It is often hotly debated as to how fast teachers and teacher educators will learn about, become skilled in the use of, and become adept about teaching about the rapidly growing range of AI tools that a variety of experts believe are and will be capable of being developed (G. Moursund, 2006). AI tools have found numerous educational uses. As larger and larger bodies of knowledge are developed, the range of potential applications of AI to education is increasing. In short, AI is powerful "technology," "questions" of what its "role" and "use" will be in education—particularly in the education and ongoing professional growth of teachers and future teachers. Two extremes are possible. At one extreme, AI could have dramatic effects outside of education but only limited effects on education itself. At the other extreme, education could be totally transformed by what some regard as the inevitable and rapid development of Artificial General Intelligence (AGI). AGI is human-like intelligence in computers, i.e. machines capable of doing any "work" that a human being can.

2. The Role of AI in Education

Timid hope, deep skepticism, and studied agnosticism—these are the traditional responses to discussion of artificial intelligence (AI) in education. Teachers and teacher unions often hold common fears of growing automation and layoffs. In wealthy countries they observe that advances in AI and other automation enable the outsourcing of tasks involving low-level skills and knowledge which are at best only loosely related to the educated intuition upon which the cyclic far-from-equilibrium contact between teachers and students relies. Teachers in less industrialized countries are skeptical of promises of more efficient instruction enabling further personalization in the face of a swelling, undertrained teaching population facing unmanageable class sizes and constraints on information technologies. Newly created AIed tools could plausibly liberate some higher-order professional cognitive labor while simultaneously deskilling and reducing the autonomy of (and of course in favor of) the bulk of the teaching population.

Finally, parent and popular movements, increasingly wary of big data, view the radical individualization promised by teaching-learning processes that are either entirely or at least significantly automated with trepidation. Importantly, a meta-analysis of nearly fifty years of research suggests that AIed has 23x the effect of teacher-based instruction on test score improvement and 1.39x the effect on student attitudes (Schiff, 2021). However, a rapid evaluation trigger an increase of those attitudes quite possibly opposite to the ones commonly targeted.

3. Benefits of AI in Professional Development

Introduction to Evidence-based Sentence Variation and Paraphrasing with Artificial Intelligence (AI-SV-Parrot) platform

Artificial Intelligence (AI) has the potential to make a significant impact on how we work, learn, and teach in the years ahead. Questions are being raised about what AI has to offer and what impact it will have on professional development and classroom practice. Every challenge presents an opportunity, and it's important to embrace the issue head-on. This explores initial research carried out looking at what AI actually is and where it can be found, or more commonly hidden, in education and teacher training. Ultimately, the goal is to inform, equip and empower Teacher Training Centres (TTCs) to better prepare teachers for digitalized workplaces.

There is a wide range of opportunities to upskill teacher educators – and in turn the teachers – through specific and focused training on AI applications. These include but are not limited to adherence in: designing for inclusivity, fostering critical literacies, and developing problem-solving skills. Arguably the most significant potential benefits are in the professional development of teachers themselves, especially when they are better empowered to support learners in the school environments. It is in fact nothing new – learn from a near-ubiquitous reality in modern schools, much of it undoubtedly positive. At the same time, however, the ubiquity and intensity of techno-saturated environments raise legitimate worries about the nature and quality of much of that engagement. How can teachers be better equipped to understand, critique, shape and harness technologies? On a more mundane but equally significant note, how could TTCs protect their staff from the feeling of constant hurriedness, cognitive overload and – at times – just plain exhaustion that involvement in ed-tech inevitably brings about? Having a better understanding of AI and its pitfalls could together save time, boost efficiency, and – more importantly – empower reflective and critical engagement in TTC staff development sessions. Such engagement could in turn enrich trainee teachers' experience and professional growth, ensuring that they are better prepared to sustainably embrace the affordances of AI in their own classrooms (Chen, 2022).

4. AI Tools for Classroom Efficiency

By their very nature, students exhibit a diverse range of abilities, preferences, and prior experiences. Traditional teaching techniques are not always able to address this diversity, and inclusive methods can be time-consuming to implement. Despite educators' best intentions, some students may not be adequately engaged, and their individual needs may be overlooked. With the integration of AI in education, this can

change significantly. AI tools can analyze curricula alongside data on students' abilities and preferences, and develop tailor-made learning paths. Such tailor-made material can offer an informed basis for discussion on critical thinking, moral implications, or creativity among students, irrespective of their learning level. In addition, the use of technology can extend class participation to students who are not able or are hesitant to participate actively in a class discussion. Moreover, the broadening of the participation spectrum can move the discussion away from groupthink (Karpouzis et al., 2024). AI tools on their part, can provide an opportunity to set a more systematic performance evaluation, in accordance with the concept of higher order skills. Students can debate a topic both against and in favor, after being informed about the stance they have to support, and receive a mark based on how logically sound their argumentation was. Since there are different preferred methods from different students on how arguments can be formulated, focus could be made on the ones that also stimulate collective creativity. A group could be assigned to research and present an argument on a topic of their choosing, and this position would afterwards be debated against. By collaboration with a research group on AI techniques for argument mining, an appropriate tool could be developed and integrated in a Moodle quiz.

5. Challenges and Ethical Considerations in AI Integration

Integrating Artificial Intelligence (AI) in professional development offers new opportunities for teachers and researchers to reduce teachers' workloads and improve their professional ability. AI can improve learning efficiency and recognize innovative ideas and concepts, making it possible to develop innovative learning environments and contribute to the school education reform of the 21st century. Research on AI in professional development is expanding. However, consideration of teacher empowerment is missing from this research area. This paper reveals what AI interests teachers have regarding classroom efficiency and information development and trends of those interests.

To provide teachers with useful information development tools, inferring knowledge from teachers' monthly questions to a Q&A website is effective. The knowledge inferred had a potential to be used as feedback for teachers. New findings include the relationships between AI interests in professional development of teachers. A method to infer useful information from huge question log data of teachers is proposed. It is important to investigate teachers' interests in AI regarding professional development and effective information development.

6. Conclusion

The integration of Artificial Intelligence (AI), particularly Large Language Models (LLMs), into education marks a transformative phase in teaching and learning practices. This paper has explored the multifaceted roles AI can play in classroom settings—from lesson planning and teaching evaluation to professional development and student engagement. The proposed frameworks and applications highlight how AI tools can enhance inquiry, personalize instruction, and foster higher-order thinking skills. Moreover, they offer scalable solutions for both instructional challenges and administrative efficiency. However, despite the immense potential, significant challenges remain—ethical concerns, infrastructural disparities,

teacher readiness, and the risk of deskilling educators must be addressed. Teacher Training Centres (TTCs) must play a pivotal role in preparing educators not just to use AI, but to critically engage with it. Ensuring that AI serves as an empowering, rather than replacing, tool is vital for sustainable integration. The success of AI in education hinges on thoughtful implementation, robust training programs, and a commitment to inclusive, human-centered learning environments. As we move forward, continued research and collaborative effort will be essential to balance innovation with integrity, ensuring AI truly enhances the educational experience for teachers and learners alike.

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