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Not peer-reviewed version

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Posted Date: 22 September 2023

doi: 10.20944/preprints202309.1554.v1

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Brief Report

Leveraging Large Language Models for Educational Enhancement: A Case Study of ChatGPT, BingChat, and Bard

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Abstract: This paper examines the potential of large language models, specifically ChatGPT, BingChat, and Bard, in enhancing the work of teachers in various educational settings. These models, powered by cutting-edge artificial intelligence, offer a wide range of applications that can aid educators in curriculum development, personalized instruction, student engagement, and administrative tasks. By harnessing the capabilities of these language models, teachers can not only streamline their workload but also improve the overall quality of education. This paper explores the ways in which these models can empower educators and revolutionize teaching practices.

Keywords: ChatGPT; BingChat; Bard; large model language

1. Introduction

The emergence of large language models (LLMs) has revolutionized the field of education, offering innovative solutions to common challenges faced by educators. LLMs such as ChatGPT, BingChat, and Bard can assist teachers in various aspects of their work, including lesson planning, content creation, differentiation, personalized instruction, assessment, feedback, and professional development. This paper investigates how these language models can assist teachers in various aspects of their work, ultimately leading to improved educational outcomes.

LLM evaluation methodologies: In [1], the authors present an exhaustive review of the methodologies employed in the evaluation of large language models (LLMs). The research meticulously dissects three pivotal dimensions of evaluation: what to evaluate, where to evaluate, and how to evaluate. The authors provide a panoramic view of evaluation tasks encompassing general natural language processing tasks, reasoning, medical usage, ethics, education, natural and social sciences, agent applications, among others. They delve into the intricacies of evaluation methods and benchmarks, which form the bedrock of LLM performance assessment. The study encapsulates both the triumphs and tribulations of LLMs across various tasks and underscores the future challenges in LLM evaluation. The authors advocate for treating evaluation as a critical discipline to foster the advancement of LLMs. This research serves as a beacon for scholars in the field of LLM evaluation, thereby contributing to the evolution of more adept LLMs.

LLMs in automated feedback systems: In [2], the authors explore the potential of large language models, specifically ChatGPT, in the context of Automated Feedback Systems (AFS) for educational purposes. The research meticulously examines the readability of feedback generated by ChatGPT and measures its agreement with human instructors in assessing student assignments. Furthermore, the study employs a renowned theoretical feedback framework to scrutinize the efficacy of ChatGPT's feedback. The findings reveal that ChatGPT can generate detailed, fluent, and coherent feedback that effectively summarizes students' performance. Moreover, it was found that ChatGPT aligns well with human instructors in assessing assignment topics. The study concludes with the promising potential of ChatGPT in providing process-oriented feedback, thereby aiding students in developing learning skills. This research underscores the potential of large language models like ChatGPT in revolutionizing educational settings by providing comprehensive and constructive feedback to students.

LLMs as automated teacher coaches: In [3], the authors delve into the potential of generative AI models, specifically ChatGPT, as automated teacher coaches. The research introduces three novel teacher coaching tasks for generative AI: scoring classroom observation transcript segments, identifying instructional strategy highlights and missed opportunities, and providing actionable suggestions to elicit more student reasoning. The study employs expert math teachers to assess the zero-shot performance of ChatGPT on these tasks using elementary math classroom transcripts. The findings suggest that while ChatGPT can generate relevant responses for instructional improvement, they often lack novelty or insight. For instance, 82% of the model's suggestions were already implemented by the teacher in the transcript. This study illuminates the challenges in generating insightful, novel, and truthful feedback for teachers and sets the stage for future research to overcome these hurdles and enhance the ability of generative AI to coach teachers effectively.

Comparison of LLMs for Vietnamese education: In [4], the author embarks on a quest to discern the most effective large language model (LLM) for Vietnamese education among ChatGPT, BingChat, and Bard. The research meticulously evaluates the performance of these LLMs across various academic subjects. The findings reveal that while ChatGPT and BingChat outperform Bard in mathematics, ChatGPT excels in literature. Interestingly, BingChat emerges as the superior LLM for English instruction. In the realm of physics, all three LLMs demonstrate comparable performances. For biology, BingChat and Bard surpass ChatGPT, while Bard takes the lead in chemistry. In social sciences, BingChat and Bard outshine ChatGPT. These findings offer invaluable guidance for Vietnamese educators and students in selecting the most suitable LLM for their specific academic subjects.

Other research: Other research on LLMs in education, [5–20], has demonstrated their capabilities in various settings, such as generating personalized learning materials, providing feedback to students on their writing, and helping teachers to assess student learning.

LLMs have the potential to transform education by providing innovative solutions to common challenges faced by educators. They can assist teachers in various aspects of their work, leading to improved educational outcomes.

2. Role of Teacher in School

Teachers are responsible for developing, planning, and implementing curriculum, lesson plans, and educational programs for students within their areas of expertise. They advise, test, and teach students in a variety of academic subjects, presenting and reinforcing learning concepts. Teachers also answer student inquiries, resolve problems related to curriculum and course prerequisites, and develop and oversee community outreach activities for targeted student populations.

In addition to their teaching responsibilities, teachers may also be involved in the following:

- Preparing appropriate documentation and reports on programs and student progress
- Recruiting, training, and supervising tutors and teachers
- Coordinating retention activities such as student mentor programs, tutor services, advising, and study skills workshops
- Planning, developing, and coordinating special events
- Overseeing academic and financial aid/scholarship advisement
- Performing miscellaneous job-related duties as assigned

Teachers play a vital role in the development and education of students. They are responsible for creating a safe and supportive learning environment where students can thrive. Teachers must have strong interpersonal and communication skills, as well as the ability to plan and implement effective instruction. They must also be able to assess student learning and provide feedback to help students improve.

Specific examples of teacher duties:

- Developing lesson plans that align with state and national standards
- Creating and using a variety of instructional materials and resources
- Differentiating instruction to meet the needs of all learners
- Assessing student learning and providing feedback

- Communicating with parents and guardians about student progress
- Collaborating with other teachers and staff to improve student learning

Teachers have a challenging but rewarding job. They are responsible for the education and development of the next generation of leaders. Teachers must be highly skilled and knowledgeable in their subject areas, as well as effective communicators and classroom managers.

3. LLMs can help Teachers

LLMs such as ChatGPT, Bing Chat, and Bard can help teachers improve their work in a variety of ways, including:

- **Curriculum Development:** Large language models possess the capability to generate content and provide valuable insights into curriculum development. Teachers can leverage these models to create engaging and up-to-date learning materials, adapt curriculum to student needs, and ensure alignment with educational standards. Furthermore, these models can aid in the generation of diverse teaching resources, such as lesson plans, assessments, and multimedia content.
- **Personalized Instruction:** One of the key advantages of large language models is their ability to tailor content to individual student needs. By analyzing student data and feedback, these models can generate personalized learning pathways and recommend supplementary resources. Teachers can use this information to differentiate instruction, addressing the diverse needs and learning styles of their students.
- **Student Engagement:** Engaging students in meaningful learning experiences is a central challenge for educators. Large language models can assist teachers by generating interactive and gamified content, facilitating discussions, and providing real-time feedback. Such tools can enhance student engagement and motivation, making learning more enjoyable and effective.
- **Administrative Efficiency:** Teachers often face administrative burdens that can detract from their primary role as educators. Large language models can assist in automating administrative tasks, such as grading, attendance tracking, and communication with parents or guardians. This automation allows teachers to dedicate more time to instruction and student support.
- **Professional Development:** Continual professional development is essential for educators to stay current with best practices and emerging trends. Language models can offer personalized learning pathways, suggest relevant research articles, and provide access to online courses and resources. Teachers can utilize these models to enhance their own knowledge and pedagogical skills.
- **Multilingual Support:** In diverse educational settings, language barriers can pose significant challenges. Large language models are equipped to provide translation services, making educational content accessible to students from various linguistic backgrounds. This feature promotes inclusivity and ensures that all students have equal access to quality education.
- **Special Education Support:** Teachers working with students with special needs can benefit from language models that offer assistance in generating tailored resources and lesson plans. These models can help create individualized education plans (IEPs) and recommend best practices for supporting students with diverse abilities.
- **Research and Data Analysis:** Educational research and data analysis are essential for evidence-based teaching practices. Large language models can assist in data collection, analysis, and interpretation. They can also generate research summaries and assist educators in staying informed about the latest educational research findings.

Here are some specific examples of how LLMs can be used to improve teacher work:

- A teacher can use an LLM to generate a lesson plan on a new topic that they are teaching. The LLM can generate a lesson plan that is tailored to the specific needs of the students in the class, and that includes a variety of activities and assessments.
- A teacher can use an LLM to create a personalized quiz for each student in the class. The quiz can be based on the student's individual learning needs and progress.
- A teacher can use an LLM to grade student essays and provide feedback. The LLM can identify areas where the student needs to improve, and can provide suggestions for how the student can improve their writing.

- A teacher can use an LLM to create a professional development plan for themselves. The LLM can identify areas where the teacher needs to improve, and can provide resources and training opportunities to help the teacher improve their skills.

LLMs are a powerful new tool that can help teachers to improve their work in a variety of ways. As LLMs continue to develop and become more sophisticated, we can expect to see even more innovative and effective ways to use them in education.

4. Conclusions

Large language models, such as ChatGPT, BingChat, and Bard, have the potential to be transformative tools in the field of education. These models offer a wide range of applications that can assist teachers in curriculum development, personalized instruction, student engagement, administrative tasks, and professional development. By harnessing the capabilities of these language models, educators can not only enhance their efficiency but also improve the quality of education they provide. As technology continues to advance, it is imperative that educators embrace these tools to better serve the evolving needs of students in the 21st century.

References

1. Y. Chang *et al.*, "A Survey on Evaluation of Large Language Models," *arXiv Prepr. arXiv2307.03109*, Jul. 2023, Accessed: Aug. 10, 2023. [Online]. Available: <https://arxiv.org/abs/2307.03109v6>.
2. W. Dai *et al.*, "Can large language models provide feedback to students? A case study on ChatGPT," 2023.
3. R. E. Wang and D. Demszky, "Is ChatGPT a Good Teacher Coach? Measuring Zero-Shot Performance For Scoring and Providing Actionable Insights on Classroom Instruction," *arXiv Prepr. arXiv2306.03090*, 2023.
4. X.-Q. DAO, "Which Large Language Model should You Use in Vietnamese Education: ChatGPT, Bing Chat, or Bard?," *SSRN Electron. J.*, Jul. 2023. <https://doi.org/10.2139/ssrn.4527476>.
5. J. de Winter, "Can ChatGPT pass high school exams on English Language Comprehension?" https://www.researchgate.net/publication/366659237_Can_ChatGPT_pass_high_school_exams_on_English_Language_Comprehension (accessed Mar. 21, 2023).
6. A. Hellas, J. Leinonen, S. Sarsa, C. Koutchme, L. Kujanpää, and J. Sorva, "Exploring the Responses of Large Language Models to Beginner Programmers' Help Requests," *arXiv Prepr. arXiv2306.05715*, 2023.
7. T. Wei, J. Luan, W. Liu, S. Dong, and B. Wang, "CMATH: Can Your Language Model Pass Chinese Elementary School Math Test?," *arXiv Prepr. arXiv2306.16636*, Jun. 2023, [Online]. Available: <http://arxiv.org/abs/2306.16636>.
8. X.-Q. Dao *et al.*, "VNHSGE: VietNameese High School Graduation Examination Dataset for Large Language Models," *arXiv Prepr. arXiv2305.12199*, May 2023. <https://doi.org/10.48550/arXiv.2305.12199>.
9. X.-Q. Dao, N.-B. Le, X.-D. Phan, and B.-B. Ngo, "An Evaluation of ChatGPT's Proficiency in English Language Testing of The Vietnamese National High School Graduation Examination," *SSRN Electron. J.*, Jun. 2023. <https://doi.org/10.2139/ssrn.4473369>.
10. X.-Q. Dao, "Performance Comparison of Large Language Models on VNHSGE English Dataset: OpenAI ChatGPT, Microsoft Bing Chat, and Google Bard," *arXiv:2307.02288*, Jul. 2023. <https://doi.org/10.48550/arXiv.2307.02288>.
11. X.-Q. Dao, N.-B. Le, X.-D. Phan, B.-B. Ngo, and T.-D. Vo, "Evaluation of ChatGPT and Microsoft Bing AI Chat Performances on Physics Exams of Vietnamese National High School Graduation Examination," *arXiv Prepr. arXiv2306.04538*, Jun. 2023. <https://doi.org/10.48550/arXiv.2306.04538>.
12. X.-Q. Dao, N.-B. Le, T.-D. Vo, B.-B. Ngo, and X.-D. Phan, "LLMs' Capabilities at the High School Level in Chemistry: Cases of ChatGPT and Microsoft Bing Chat," *ChemRxiv. Cambridge Cambridge Open Engag.* 2023, Jun. 2023. <https://doi.org/10.26434/CHEMRXIV-2023-KXXPD>.
13. X.-Q. Dao and N.-B. Le, "Investigating the Effectiveness of ChatGPT in Mathematical Reasoning and Problem Solving: Evidence from the Vietnamese National High School Graduation Examination," *arXiv Prepr. arXiv2306.06331*, Jun. 2023. <https://doi.org/10.48550/arXiv.2306.06331>.
14. X.-Q. Dao, N.-B. Le, X.-D. Phan, and B.-B. Ngo, "Can ChatGPT pass the Vietnamese National High School Graduation Examination?," *arXiv Prepr. arXiv2306.09170*, Jun. 2023. <https://doi.org/10.48550/arXiv.2306.09170>.
15. X.-Q. Dao and N.-B. Le, "ChatGPT is Good but Bing Chat is Better for Vietnamese Students," *arXiv Prepr. arXiv2307.08272*, Jul. 2023. <https://doi.org/10.48550/arXiv.2307.08272>.
16. L. A. Vinh, B. T. Diên, L. Q. Quân, and V. V. Luân, "Khả năng thực hiện bài kiểm tra định kì môn Toán và môn Ngữ văn cấp Trung học của công cụ ChatGPT: Kết quả nghiên cứu và một số khuyến nghị ban đầu," *Tạp Chí Khoa Học Giáo Dục Việt Nam*, vol. 2, no. 2, pp. 1–10, 2023. <https://doi.org/10.15625/vjc.2018-0041>.

17. P. Nguyen, H. Truong, P. Nguyen, P. Bruneau, L. Cao, and J. Wang, "Evaluation of Google Bard on Vietnamese High School Biology Examination," *Researchgate.Net*, 2023. https://www.researchgate.net/publication/372965480_Evaluation_of_Google_Bard_on_Vietnamese_High_School_Biology_Examination (accessed Aug. 28, 2023).
18. N. Phong, H. Truong, N. Phuong, B. Philippe, C. Linh, and W. Jin, "Google Bard's Physical Capabilities in Vietnamese High Schools," *Available SSRN 4525863*, 2023.
19. P. Nguyen, H. Truong, P. Nguyen, P. Bruneau, L. Cao, and J. Wang, "Google Bard's Performance on Vietnamese High School Civic Education Examination," *SocArXiv*, 2023. <https://doi.org/10.31235/OSF.IO/UQHTS>.
20. P. Nguyen, P. Nguyen, P. Bruneau, L. Cao, J. Wang, and H. Truong, "Evaluation of Mathematics Performance of Google Bard on The Mathematics Test of the Vietnamese National High School Graduation Examination," Jul. 2023. <https://doi.org/10.36227/TECHRXIV.23691876.V1>.

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