The Application of Large Language Models in Education — Early Signals from a Chinese Context

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Abstract
The emergence of Generative AI (GAI) and Large Language Models (LLMs) has sparked intense global debates. This study examines early signals from a Chinese context regarding LLMs in education, utilizing OpenAI's ChatGPT for Mandarin text analysis. Through quantitative and qualitative methods, we uncover perspectives of Chinese experts and the public, revealing cautious optimism about LLMs' positive role. Our findings highlight Chinese discourse focus and the influence of cultural contexts and national policies on AI in education. Emphasizing AI literacy and critical evaluation of LLM outputs, this research sets the stage for cross-cultural investigations on LLM integration.

Keywords
Generative Artificial Intelligence, Large Language Models, Text analysis, Chinese education

1. Introduction

In the dynamic landscape of Artificial Intelligence (AI), Generative AI (GAI) and Large Language Models (LLMs) have recently taken a center stage. Their inception marks a new era in the application of AI, and despite the short period they have been available, their impact is palpable across various sectors. This impact was prominently observed following the launch of OpenAI's ChatGPT in November 2022, which sparked a fervor and debate of a magnitude rarely witnessed in the technology world. The ChatGPT debate erupted globally, surprising all corners of the world with its intensity and breadth.

In the overarching narrative of the AI race, particularly the rivalry between the United States and China, it is intriguing to scrutinize the discourse among Chinese academics and researchers. China, due to its Lunar New Year celebrations, joined the discourse somewhat later. Nevertheless, the debate in China has followed similar directions as those seen in the West.

Despite the absence of the ChatGPT API in China, the term ‘ChatGPT’ is discussed fervently in news outlets, academic circles, and political arenas. In the Chinese context, 'ChatGPT' has become a synonym for GAI, detached from the specific tool developed by OpenAI. For an observer particularly interested in educational perspectives on GAI the ‘ChatGPT discourse’ is startlingly disconnected also from China’s national advancement of LLMs. There was a blip in the discussion when Baidu (China’s Google) attempted to launch a Chinese alternative to ChatGPT, ERNIE Bot in March 2023. However, Baidu's attempts did not gain significant traction due to various technical hitches during their tool's presentation. Since then, the discourse surrounding the development of Chinese LLMs appears to have diverged, primary unfolding in media channels devoted to business development, investments, and international AI policies and competition.

According to an overview by Jeffery Ding, University of Oxford’s Centre for the Governance of AI, China is fostering a plethora of LLM initiatives [1]. It is only a matter of time before these initiatives transform the experience for Chinese users, also in an educational setting.

Despite the growing interest and debate around LLMs, their application in education remains largely unexplored and speculative. The brief period since the launch of broadly available tools, such as ChatGPT, precludes a solid practice of using LLMs in education globally. Consequently, discussions regarding their application in education are predominantly conjectural, rooted in public debate among stakeholders in the education sector.

This workshop paper seeks to unveil preliminary indications from China regarding the potential applications of GAI in education. Notably, we will employ GAI in our analysis, utilizing ChatGPT to dissect Mandarin text and execute tasks such as sentiment analysis, summarization, and question extraction. This methodology not only underscores the practical implications of GAI, but also enhances

our report by offering a nuanced understanding of the discourse and narratives surrounding the utilization of GAI in education within China.

Our research is guided by the following primary question: "What are the early signals from China regarding the application of GAI and Large Language Models (LLMs) in education, and how can these insights shape the future discourse and implementation of these technologies in educational settings?"

To answer this, we will implement a blend of quantitative and qualitative methods, conducting sentiment analysis, text summarization, and question extraction from Mandarin content, all through the application of the ChatGPT model. This methodological approach allows for a robust and comprehensive exploration of the Chinese perspective on this burgeoning topic, providing valuable insights into the local sentiments and attitudes toward the integration of such technology in educational settings.

2. Context of AI Development in China

The development of AI in China is a narrative steeped in techno-nationalist discourse, now significantly influenced by the escalating tensions between the United States and China. This discourse is conspicuously prevalent in both traditional and social media platforms within the country. One of the critical focal points of this narrative is the advent of large-scale AI models, particularly the unavailability of OpenAI's API in China. This has instigated concern among Chinese observers, sparking apprehension that China might be excluded from the ongoing generative AI revolution primarily based in the West [1].

Conversely, there is a sense of national pride associated with the domestic development of large-scale AI models. Chinese companies are not only developing their own models, but are also prominently advertising the utilization of domestically produced hardware and infrastructure for model training. This signifies a strong emphasis on self-reliance and innovation in China's AI landscape [1] . As we delve deeper into this complex narrative, it becomes imperative to understand the role of key players and initiatives in shaping China's journey in the realm of LLMs [2, 3].

Chinese AI innovation in education has been realized through various forms such as smart classrooms (智慧课堂), dual-teacher classrooms (双师课堂), online classes (网络课程), and Chinese Massive Open Online Courses (中国慕课), all leveraging information technology to distribute quality educational resources. This transition from traditional pedagogy, where a teacher's subjective experience guides instruction, to an AI-assisted approach allows for an objective analysis of extensive student learning data, facilitating a potential shift from rote learning to adaptive learning.

In education, Chinese AIED has been focused on adaptive learning, rooted in behaviorist and cognitive psychology. Adaptive learning enables learners to discover and solve problems autonomously within a provided learning environment.

The fusion of AI technology with adaptive learning principles has given rise to the "Smart Adaptation" learning system in China. This system is both a conceptual framework and blueprint, and an actual system embedded in different smart learning systems implemented on city or even province levels. Smart adaptation emphasizes individualized learning, enabling precise evaluation of learners, generation of personalized learning plans, and guidance of efficient learning paths. Through deconstruction of learning progress to "nano-level" knowledge points and adjusting teaching strategies based on learners' status, path, and ability, this system achieves a personalized and efficient form of adaptive learning, maintaining or enhancing learners' focus and performance level [4].

Squirrel AI is one AI company that has had a dominant role in adaptive learning in China, in particular in the after school tutoring market. After the "double reduction" policy shift putting restriction on this market [2, 5], the company has targeted primary education as their new market.

Squirrel AI purports to have evidence supporting the efficacy of its AI-enabled, big data-driven teaching platform in achieving personalized education [4]. The company's approach is to build on the individual learning trajectories of students, asserting an implementation of the 'teaching according to aptitude' philosophy. The system aims at accounting for inherent disparities among students, such as differing family backgrounds and personalities, and tailor instruction to these variances. By utilizing dynamic data analysis, Squirrel AI's system identifies distinct learning needs, thereby facilitating the creation of customized teaching plans.

The arrival of ChatGPT has subtly shifted the Chinese discussion on AI in education, moving beyond the focus on big data-driven personalized adaptive learning to include a wider range of considerations and educational applications. The rest of this paper will try to make sense of this discussion and see where LLMs would fit in an AI supported educational system in the rich and complex educational system of China.

3. Sentiment Analysis of Chinese Discourse

The Chinese discourse on ChatGPT in social media surged significantly after the conclusion of the Chinese New Year celebrations in early February 2023. Using a snowball sampling approach in finding blog entries, interviews, opinion pieces and statements on ChatGPT relevant to AIED we came up with a focused corpus of 72 texts published between February 8th and April 4th. In addition, considering the potential difference between expert opinion and popular opinion, we also crawled 25591 comments posted on Weibo, the Chinese equivalent to Twitter, containing the word 'ChatGPT' during the same period. The objective of crawling for comments is to ascertain if the sentiment observed in the expert community options, primarily from WeChat channels, mirrored the more unregulated discussion on the more open and short message social media platform Weibo.

We used the most general model of Chinese natural language processing, bert-base-chinese[1], to predict the emotions (positive/negative) contained in this corpus. To promote the accuracy of prediction, we first used the Weibo senti 100k dataset, which is a public Chinese sentiment dataset including one hundred thousand comments (positive: negative = 1 : 1) from Weibo, to train the basic model, and the result illustrates that this model finally has reached 87.23% accuracy.

Considering the word limitation (no more than 512 words) as input for the model, and the relevance with ChatGPT, the section of the expert articles that does not contain words 'ChatGPT', 'OpenAI', and 'AIGC' has been dropped. And the paragraphs longer than 512 words are divided into two or more sub-paragraphs whether it's an expert article or a Weibo comment. For Weibo comments, we also removed those that contained only a topic or three words or less. Finally, we got 1552 expert paragraphs and 24182 Weibo comments for sentiment analysis.

Surprisingly, only 10.8% percent of expert opinions on ChatGPT relevant to AIED are negative, while the ratio of negatives to positives reached 1:2 in Weibo comments (Figure 1). The outcomes of the sentiment analysis depict a complex scenario. In the context of an overall positive attitude towards ChatGPT, we see that the general public seems to be much more cautious and conservative than the experts and opinion leaders. Despite the inevitable errors in the AI model used to predict emotions, it is clear that there are diverging perspectives on the role of generative AI in the educational context. This necessitates a more thorough exploration of the prevailing Chinese discourse surrounding the potential benefits and risks associated with the implementation of Generative AI in the educational sphere. *What are the perspectives and sentiments of experts who have had the opportunity to experiment with ChatGPT and other emerging GAI tools in relation to the digital transformation of education?*

The findings of our quantitative analysis portrayed a mainly positive feeling to ChatGPT for education among our experts, taking place on a backdrop of slightly more negative sentiments among the general public. The negative to positive ratio was 1 to 2, a tendency that may be reflected in early Western debate. A quantitative study on over 1.25 million Twitter messages in the period of December 2022 to January 2023 from 150 countries worldwide about ChatGPT (31,7% from USA) found that users of the chatbot expressed mainly positive or neutral sentiments regarding its performance in assisting human tasks in various domains, such as business analysis, software development, and NLP [8].

In both Western and Chinese discourses, we observe notable expressions of negative sentiment towards ChatGPT, a representative of GAI [9]. This phenomenon is potentially beneficial as it catalyzes awareness of the ethical dilemmas brought about by GAI, a process that hinges on the dynamic interplay between contrasting perspectives on the benefits and risks of these emerging technologies. With this in mind, it becomes apparent that the future trajectory of the discourse is likely to diverge based on the unique discursive characteristics inherent to each culture. This notion warrants further contemplation.

[1] https://huggingface.co/bert-base-chinese

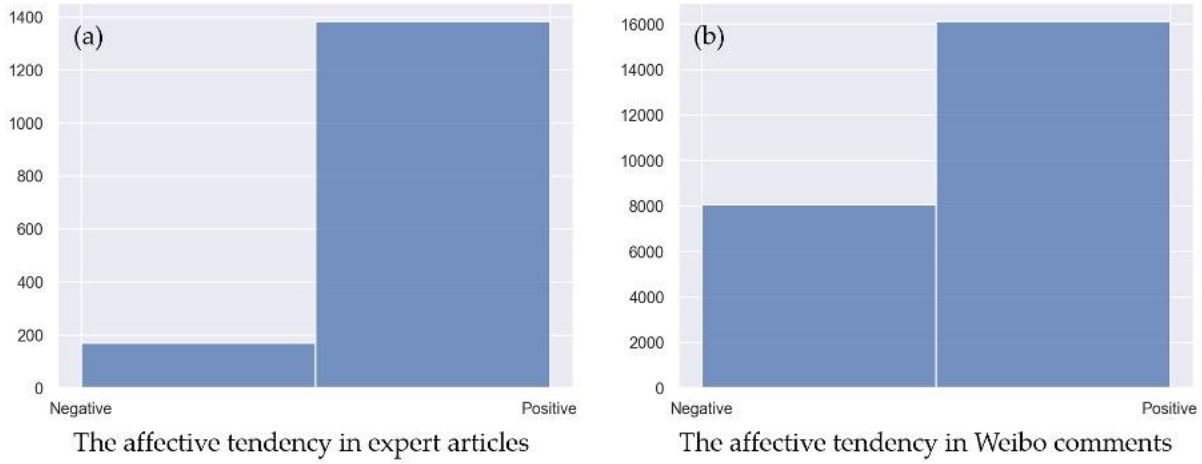

Figure 1. Machine learning prediction of sentiment embedded in (a) the 72 texts related to ChatGPT and education published in Chinese social media channels; (b) the 24182 Weibo comments in February and March 2023.

In China, we have made personal observations that framing of issues along the negative positive dimension comes with "Chinese characteristics". Positive framing is preferred. Controversial questions or questions related to specific practices or domains are more easily dealt with on a more abstract level. And theoretical reasonings have high status [10]; empirical grounding of points of view seems not to be a hard requirement [11]. Against this backdrop, it is striking to observe the diversity and detail encapsulated within the Chinese texts that we have scrutinized. Yet, upon closer inspection of the arguments presented, it became apparent that real-world, practical testing of GAI was largely absent, adding an intriguing facet to our analysis.

4. Potential Applications of LLMs in Chinese Education

We have previously referenced techno-nationalism as a critical backdrop to the broader discourse on AI development. However, within the specific realm of education, a unique set of narratives come into play. These narratives intertwine the anticipated benefits of technology, the role of big data, and the agency of diverse stakeholders, just to mention some themes. As we aim to inform the textual analysis in the upcoming section, we will underscore certain fundamental characteristics of Chinese education lending depth to the ongoing discourse on Generative AI.

From a classroom perspective, we have the observations detailed in [6] focusing on Chinese primary and secondary school teachers' perceptions of data management. The study revealed that Chinese educators show a considerable openness and interest towards the information that educational big data can provide. All types of information, not solely those directly related to learning activities, were perceived as relevant by the teachers. The authors attributed this receptiveness to China's unique educational system, culture, and policy implementation strategies, where economic innovation serves as a key driver in introducing big data in schools.

In a recent paper [7], these observations are extended to the institutional level. The ongoing digital transformation presents a variety of dilemmas. While data-driven AI innovation and adaptive learning systems promise the transformation of education, it's crucial to balance these tools with the autonomy of teachers and students, as well as diverse educational theories and pedagogical approaches that foster social and collaborative learning.

China is spearheading this transformation with its comprehensive policy incentives, funding support, and a market-driven approach. Nevertheless, this rapid progress has brought forth a myriad of challenges and ethical concerns. It is now incumbent upon Chinese stakeholders to revisit current policies, strategies, and practices to fully leverage the potential of AI in Education (AIED), without compromising the overarching educational goals.

In the face of these challenges, three key areas emerge as paramount. From a policy perspective, the need to address legal and ethical issues, ensuring student privacy is non-negotiable. From a pedagogical perspective, [7] argues the future development of AIED necessitates participatory, evidence-based research that involves teachers 'in the loop', thus addressing the real needs of education and enhancing

both students' learning experiences and the teacher's role. Finally, from a practical perspective, enhancing the digital skills of teachers and students for the responsible use of AI, and interpretation of the output of an AI tool is indispensable. Teachers ought to be equipped to understand machine learning decisions and assess the value of AI system recommendations.

However, as articulated in [7], achieving the desired transformation hinges on comprehensive interdisciplinary research. This research should not only be wide-ranging and longitudinal, but it should also scrutinize how AI is being employed by both teachers and students in schools. Furthermore, it should explore how AI ought to be designed and developed to assist students in acquiring new competences—competences which are indispensable for learning and active participation in an increasingly digital society.

In conclusion, the potential applications of Large Language Models in Chinese education represent a multifaceted landscape. From techno-nationalistic policy strategies, through a classroom-level enthusiasm for big data, to the complex institutional and cultural dilemmas outlined in [7], the dynamics are rich and varied. However, the true implications of LLMs will be understood not just by these broad strokes, but by delving into the nuanced debates and opinions that are shaping the trajectory of these technologies. The next section, therefore, will shift our focus to a detailed text analysis of the discourse around LLMs in education. This analysis will draw upon the insights of experts, educators, and academics in the field, providing a deeper understanding of the ways in which these powerful tools are being perceived, discussed, and potentially integrated into the future of Chinese education.

5. Text Analysis of Expert Opinions in Using ChatGPT in Education

In Section 5 of this study, we embark on a text analysis of Mandarin content using ChatGPT, which serves as a case study. We have curated a selection of six texts that fall under three distinct categories: expert interviews, journalistic summaries of scholarly papers, and academic-style commentaries by experts, published across three different Chinese journals. The rationale behind this selection is anchored in our local understanding of who commands respect and influence within the relatively open community of esteemed educational scholars in China.

We aim to leverage ChatGPT to perform tasks such as summarization, sentiment analysis, and question extraction from these texts. Specifically, we're interested in determining the questions inherently present in the texts, as well as potential questions that could arise from the discussions and issues raised. These questions might pertain to the opportunities and benefits of AI in education, as well as the risks and potential adverse effects.

While our texts are originally in Chinese, we've chosen to conduct our text analysis in English to evaluate the capabilities of AI technology in this context. As such, we have utilized Google Translate to create reference translations of all texts. Subsequently, we've fed excerpts of the Chinese texts into ChatGPT, requesting summaries, sentiment analysis, and question extraction in English.

The exploratory nature of a workshop paper allows us to experiment with new methods and approaches. Traditional text analysis often involves manual coding of text, a method that is well-established but time-consuming. As part of our investigation into the utility of large language models (LLMs) like ChatGPT-4, we're interested in exploring whether such technology can expedite the process of qualitative text analysis without compromising depth or richness of analysis.

Text 1 - "What can be done, what is difficult and what should be done, 12 experts talk about ChatGPT" (Published 2023-05-06[2])

The analyzed text conveys an optimistic outlook on the integration of new technologies, specifically ChatGPT, within the field of education. It suggests that rather than hindering educational development, new technologies and tools like ChatGPT can be instrumental in driving progress. According to the text, the utilization of these advancements has the potential to bring about transformative improvements in teaching and learning practices, empowering educators and learners alike.

The sentiment expressed by the 12 nationally renown experts in the field of education leans towards a positive perspective. The interviewed experts acknowledge the significant influence ChatGPT and similar technologies can have on education. While recognizing the need for ethical considerations and vigilance, the overall sentiment suggests a belief in the constructive impact of ChatGPT. This sentiment

[2] https://mp.weixin.qq.com/s/1q4DQKp3eYi4P0K0oJy9ew

aligns with the notion that judicious application of technology can act as a catalyst for educational advancement and open new possibilities for fostering creativity and imagination.

When invited to delve into the deeper meanings and inherent values associated with the initial stage of innovation caused by the new GAI the experts delivered somewhat vague and high-level answers emphasizing the unique and significant development, the transformative role of AI in education, the advent of a new knowledge tool with potential to speed up the arrival of the Metaverse, and so on. However, when asked to focus on the emergence of AI Generative Content (AIGC) products, especially the difference of use in basic education and higher education, the comments were more education related.

Text 2 - "ChatGPT and education: Hot discussion among experts" (Published 2023-03-23[3])

Text 2 presents a collection of abstracts with links to 31 Chinese academic papers discussing ChatGPT and education. It is worth noting that academic professionals in the field of education in China tend to publish papers that lean more towards the op-ed format, a trend that distinguishes them from their Western counterparts. Of the 31 papers, only one was grounded in empirical research and published in an international journal.

ChatGPT-4 was used to evaluate the sentiments expressed in the abstracts. The overall sentiment across these abstracts regarding the use of ChatGPT in education is cautiously optimistic. While the authors acknowledge the transformative potential of AI, particularly ChatGPT, in reshaping and enhancing educational methods, they also express concerns about various ethical, ideological, and practical challenges.

When asked to identify and analyze any recurring themes or concepts across these abstracts regarding AI in education the LLM we identified three themes in this text:

- **The Role of AI in Education:** All abstracts emphasize the significant role that AI, especially ChatGPT, can play in education. It is seen as a tool that can answer questions, write articles, and interact directly with students, thus potentially revolutionizing the educational landscape.
- **Ethical and Security Risks:** Another recurring theme is the ethical and security risks associated with using AI in education. There are concerns about data privacy, algorithmic bias, disruption of teacher-student relationships, and potential misuse of the technology leading to ideological infiltration.
- **The Need for Ethical Norms and Regulations:** The abstracts consistently argue for the need to establish ethical norms and regulations to guide the use of AI in education, emphasizing the importance of addressing the associated risks and challenges.

We also used ChatGPT-4 to contrast the different views on AI's role in education as presented in these abstracts finding that while all the abstracts agree on the potential of AI to transform education, they offer contrasting views on how this transformation might unfold and the accompanying challenges, including data privacy issues, ideological infiltration, and disruption of teacher-student relationships. (ChatGPT-4, May 12th version)

Text 3 - "How ChatGPT affects future education" (2023-03-23[4])

The third text is an interview with 13 educational researchers and practitioners being asked how ChatGPT will affect future education. The LLM we use finds the sentiment throughout the text to be predominantly neutral to positive. "The participants in the discussion are acknowledging the capabilities of ChatGPT and its potential impact on various aspects of education and research. However, they are also emphasizing the need for critical thinking and a human touch in the educational process", the model summarises.

ChatGPT - 4 is able to extract underlying questions in the opinions stated in the interview. As expected, educationalists are concerned with pedagogical issues, how humans and machines will interact, the role of the teacher, and what opportunities and challenges we would expect. A further

[3] https://mp.weixin.qq.com/s/ekH1QaYHFphr1MSLR-pzEA
[4] https://mp.weixin.qq.com/s/AbURGzvSiP3o-zNzVvfJZw

breakdown of the different perspectives in this text gives these opinions related to opportunities and challenges. The analysis captured these different points of view, which may be of interest, for example:

- Xu Huifu emphasizes that despite ChatGPT's impressive capabilities, it's still a form of weak AI and won't significantly impact human material production methods. He also underscores the irreplaceable role of education in maintaining social civilization, innovation, and satisfying personalized needs.
- Li Zhengtao sees the rise of ChatGPT as a chance to reshape the relationship between humans and machines, promote human evolution, and enhance the value and abilities of teachers. He outlines the skills that teachers need in this new era of AI.

Text 4 - "Will the large-scale language model lead to structural changes in schools? - Forward-looking analysis based on ChatGPT" (2023-03-01[5])

This paper published in "Distance Education in China" represents the first in our selection of six texts that delves into a comprehensive analysis of the potential pedagogical affordances of Large Language Models (LLMs) in education.

The paper positions AI technologies as instructional tools, emphasizing the importance of comprehending the intent of the developers when scrutinizing these tools. The paper discusses five potential automated teaching behaviors that ChatGPT can perform: dialogue tutoring, skill training, lecturing and demonstrating, collaborative creation, and interactive assessment.

However, the authors express concern regarding the direct teaching behavior of ChatGPT. The concept of software replacing teachers and algorithms controlling learning content and progression—termed as the automation of teaching—raises questions about the potential restructuring of school teaching systems.

Looking at existing intelligent educational systems or resources, the authors draw insights into the potential effectiveness and impacts of ChatGPT. They discuss systems like AutoTutor for dialogue tutoring, Cognitive Tutor and ASSISTments for skill training, and Massive Open Online Courses (MOOCs) for teaching demonstrations. However, despite their success, these systems haven't significantly challenged the conventional "classroom teaching" and "teacher-led" teaching structure. The authors suggest that the adoption of modern teaching methods has rather reinforced the "divided courses" by making teachers' guidance on student learning more indirect.

The authors also attempt to analyze why existing systems have not been successful in bringing about structural changes in schools. They highlight limitations in the theoretical and research foundations, the constraints of computer technology, the characteristics of skill learning, and learner factors. They pointed out that the interaction mode of the current version of ChatGPT is deemed relatively limited, making it challenging to simulate learning environments necessary for problem-solving with specific skills. As such, the authors conclude that for ChatGPT to achieve broader domain teaching, it requires modifications or supplements to the domain model, student model, interaction model, and more.

The sentiment of this paper is mixed with both negative as well as positive tones of language.

Text 5 - "Analysis on the Impact of Artificial Intelligence General Model Education Application" (2023-04-07[6])

This paper published in a key Chinese journal ("Open education research") discusses LLMs in education. The sentiment of the paper appears to be primarily neutral and informative, with a positive outlook on the potential of AI in education. The text provides an analysis of the role of AI in the education sector, highlighting both its positive impacts and the challenges it presents.

Positive sentiments:

- It acknowledges the advantages of AI technologies in enhancing the quality of educational experiences and supporting teacher development.

[5] https://mp.weixin.qq.com/s/uoJTNliTRPzC0iRCpcUkMQ
[6] https://mp.weixin.qq.com/s/Xt_p9DtJ4mGKx36BFLAEeQ

- It expresses optimism about the potential of large AI models like ChatGPT in various applications, including education.
- It indicates a positive view towards the digital transformation of education, emphasizing the benefits of digitization, personalization, and diversification in education.

Neutral sentiments:

- The text provides a balanced analysis of AI's role in education, addressing both its benefits and ethical challenges.
- It discusses the need for a robust system of ethical norms for AI applications in education.

Concerns/Challenges:

- It raises concerns about various ethical issues associated with AI in education, such as data leaks, public safety, and malicious competition.
- It highlights the need for ethical review of data collection and algorithm development in AI applications in education.
- It emphasizes the need to prevent misuse of AI in education and to protect privacy and data security.

Overall, the text seems to advocate for the careful and ethical use of AI in education while acknowledging its transformative potential.

Text 6 - "Thinking about artificial intelligence to promote educational change and innovation triggered by ChatGPT" (2023-05-05[7])

This last text in our selection is a paper published in "China Education Informatization" (2023:29). The three authors of this paper claim that AI has shifted education from a 'teaching' to a 'learning' approach, challenging how students should be educated. They see it as important to not only impart knowledge to students but also prepare them for societal integration and adapt to future world changes. AI has broken the "barriers" of the traditional campus, providing more "steps" towards successful education. In the future, regardless of the stage of life, the dream of "returning to an 18-year-old campus" is within reach.

The sentiment of the paper appears to be largely positive and optimistic towards the potential of AI and big data in transforming various fields. The authors acknowledge the transformative potential of AI in education, arts, research, and traditional Chinese medicine, while also recognizing its role in enhancing efficiency and creativity. They advocate for embracing AI technology and highlight the importance of learning to use these tools effectively and ethically.

However, this optimistic stance is balanced with a recognition of the challenges and concerns associated with AI use. These include potential disruption to traditional research methods and ethical considerations such as plagiarism in education. The authors stress that while AI can augment human capabilities, it should not be seen as a replacement for human judgment and expertise, particularly in areas like teaching and research.

Overall, this paper promotes a balanced view of AI, celebrating its potential benefits while cautioning against misuse and over-reliance.

6. The Future of LLMs in China

The first half of 2023 has seen a profound shift in the global discourse on Artificial Intelligence (AI), particularly AI in Education (AIED), spurred by advancements in Generative AI (GAI). Never before in the history of digital technologies has there been such an imperative need for an open, candid, and in-depth discourse on the benefits and concerns of AI, bridging gaps across cultures, national boundaries, political ideologies, and other divisions. The technological evolution and socio-technological dialogue in China is often perceived as opaque from a Western perspective. This can lead to the formation of misconceptions and myths. This underscores the significance of our research into the preliminary signals from China regarding the application of GAI and Large Language Models (LLMs) in education. Leveraging GAI, we demonstrate that such research is feasible even without proficiency in Mandarin, a language that not many Western researchers are fluent in.

[7] https://mp.weixin.qq.com/s/AtKBWIKAxvRDrfGUJduAGg DOI: 10.3969/j.issn.1673-8454.2023.04.001

Our findings illustrate that Chinese educational experts engage in a discursive practice that mirrors the depth, diversity, and responsibility seen in Western counterparts when responding to the AI challenge. However, drawing comparisons between the East and West surfaces intriguing insights, which can inform our mutual learning and interaction.

Firstly, we observed that the Chinese discourse on AI in education commenced approximately two months later than in the West. It is understandable, given that a smaller number of Chinese academics had the opportunity to experiment with ChatGPT before formulating and articulating their opinions. This delay, coupled with culturally specific factors, has influenced the framing of the discourse.

Secondly, the range of opinions within the Chinese discourse mirrors the diversity seen in the West, though Chinese political and cultural contexts will undoubtedly shape the future direction of the discourse. It's reasonable to infer that some Chinese perspectives are influenced by Western discourse, an observation corroborated by our analysis of several texts. We will soon delve into how these uniquely Chinese factors could influence the future discourse.

Lastly, while our qualitative analysis suggests a cautious optimism towards the use of ChatGPT in education, our quantitative analysis reveals an underlying current of strong technological optimism both within the expert community and the broader public. We hypothesize that this optimism may differ slightly from the sentiment prevalent in the West. However, these interpretations remain speculative and warrant further research.

Based on these preliminary insights, it appears that while the Chinese discourse on GAI in education is largely centered around the aspects of technological integration, pedagogical transformation, and ethical considerations, it lacks equal depth in relation to teacher roles, professional development, student engagement, learning outcomes, and policy and governance. The minimal attention to professional development is particularly striking. Thus, these findings suggest a need for realigning the discussion to better incorporate these seemingly neglected areas. By doing so, a more comprehensive understanding of the implications of GAI on education could be established, thereby facilitating more effective strategies for its integration into the education system.

On April 11, 2023 the Chinese Government published a draft regulation for comments on "Management Measures for Generating Artificial Intelligence Services[8]". The regulation is addressing GAI in particular, building on other regulatory work (e.g., regulation against "deepfake AI"). In essence the new regulation requires that the person training the machine or the entity training the machine must be able to guarantee the authenticity, accuracy, objectivity and diversity of the data. The content created shall comply with the requirements of Chinese laws and regulations, respect social morality, public order and good customs, reflect the core values of socialism; shall not contain subversion of state power, overthrow of the socialist system, incitement to splitting the country, undermine national unity, bring propaganda of terrorism and extremism, propaganda of national hatred, ethnic discrimination, violence, obscene and pornographic information, or false fake information, and content that may disrupt economic and social order. The problem for AI developers is to know that the data that AI has been trained on is accurate. And furthermore, how much does this particular stipulation kill innovation? After all, the Internet is not a perfect place, and that is what is used to train the LLMs.

The impending regulatory measures pose a considerable challenge to compliance and innovation, predominantly impacting the AI industry. Nonetheless, educators, too, are likely to experience the effects of these attempts to moderate the unchecked evolution of GAI. Bound by the same laws and values, Chinese educators understand their obligation to endorse and deliver content that has undergone stringent quality vetting.

7. Conclusions

This research offers a first glance into the conversation surrounding Large Language Models (LLMs), like ChatGPT, within the context of Chinese education. By analyzing the opinions of experts and the general public through both quantitative and qualitative methods, we have begun to understand the opportunities and challenges associated with incorporating these advanced tools in educational practices.

[8] http://www.moj.gov.cn/pub/sfbgw/lfyjzj/lflfyjzj/202304/t20230411_476092.html

Our results suggest that Chinese educational experts, though cautious, see a potential positive role for LLMs in education. The broader public also leans toward a hopeful outlook regarding the role of AI in learning. These findings are important as they not only highlight the varying viewpoints, but also the areas that could benefit from further discussion.

As the conversation about AI in education unfolds, we expect it to shape and be shaped by different cultural contexts and national policies. The gaps identified offers a starting point to navigate the diverse aspects of this discourse and ensure that all necessary areas are covered.

In this study, ChatGPT was not just the subject of our analysis, but also a key tool in our research process. Its use underscored the importance of understanding how to effectively work with LLMs while maintaining a critical eye on their outputs. This new form of AI literacy is a skill that will likely become increasingly important as more people interact with such technologies.

Looking forward, we acknowledge that our research has some limitations that suggest directions for future work. Specifically, the scope of our analysis was constrained by the number and type of texts we examined. In future studies, we plan to expand our analysis to include discussions from Western contexts. This will allow us to better understand the similarities and differences in how LLMs are perceived in education across cultures.

In short, this is a promising time for education, with new technologies opening up possibilities that we're just beginning to explore. As LLMs continue to develop and become more integrated in education, it's crucial that we continue investigating, discussing, and questioning their role. This research is one step in that process, and we look forward to contributing further to this important conversation and debate.

8. References

[1] J. Ding and J. W. Xiao. Recent Trends in China's Large Language Model Landscape. (2023). Online: https://www.governance.ai/research-paper/recent-trends-chinas-llm-landscape

[2] Jeremy Knox. How the 'taming' of private education in China is impacting AI - on_education. On Education (2021). Retrieved from www.oneducation.net/no-12_december-2021/how-the-taming-of-private-education-in-china-is-impacting-ai

[3] Jeremy Knox. Artificial intelligence and education in China. Learning, Media and Technology 0, 3 (April 2020), 1–14. DOI:https://doi.org/10.1080/17439884.2020.1754236

[4] Guo Bin, Bu Maoyong, and Guo Lizh. AI adaptive education system in the teaching process Applied experimental research. Posted on Beijing Education informatization in China. (March 2023). Online Chinese original version: https://mp.weixin.qq.com/s/PdyjX9PNeO3QJMcZoSYW4w

[5] Jinglin Gao and Jiang Jiang. How have key participants adapted to after-school tutoring reform in China. 2022. Retrieved from https://www.gingerriver.com/p/how-have-key-participants-adapted?utm_source=substack&utm_medium=email

[6] Tore Hoel, Weiqin Chen, and Lu Yu. Teachers' perceptions of data management as educational resource - A comparative case study from China and Norway. 2020. Nordic Journal of Digital Literacy, 15(03), 178–189. https://doi.org/10.18261/issn.1891-943x-2020-03-04

[7] Li Yuan. Where does AI-driven education, in the Chinese context and beyond, go next? (2023, in press).

[8] Hanna Huang. Twitter Sentiment Analysis about ChatGPT. 2023-05-17. Published on Github https://github.com/hxycorn/Twitter-Sentiment-Analysis-about-ChatGPT

[9] Lingyao Li, Zihui Ma, Lizhou Fan, Sanggyu Lee, Huizi Yu, Libby Hemphill. ChatGPT in education: A discourse analysis of worries and concerns on social media. 2023. Online: https://arxiv.org/pdf/2305.02201.pdf

[10] Lixian Jin & Martin Cortazzi. Changing Practices in Chinese Cultures of Learning, Language, Culture and Curriculum, 2006. 19:1, 5-20, DOI: 10.1080/07908310608668751

[11] Anne-Wil Harzing. Response Styles in Cross-national Survey Research: A 26-country Study. 2006. International Journal of Cross Cultural Management. Vol 6, Issue 2. https://doi.org/10.1177/1470595806066332