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AI in Shadow Education: An Experimental Study in Hong Kong Tutorial Centers

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Abstract

Shadow education is highly prevalent in Hong Kong, driven by parents' and students' desire to succeed in public examinations. However, the quality of these supplementary lessons, which exist in various forms, has often been questioned by educators, parents, and students alike. The methods for enhancing the quality of shadow education have become a widely discussed topic among scholars and educators. This study involved 10 local tutorial centers that integrated Artificial Intelligence (AI) into their English lessons. Additionally, 24 participants, including center owners, tutorial center tutors, and students, were invited to share their perspectives on AI in shadow education through interviews. The results indicated that AI could offer students a 'second opinion,' but its responses often lacked clarity. As this is an experimental study, further research is needed on this topic, particularly regarding practical methods for integrating AI into shadow education settings.

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Introduction

Shadow education refers to supplementary lessons or private tutoring in society (Bray, 2010). While it manifests in various forms across different parts of the world, it consistently remains a 'shadow under the light' of mainstream schooling. In Asian regions such as Japan, Korea, and Taiwan, shadow education has long been an integral and well-recognized component of their education systems (Dawson, 2010). This trend appears to be extending towards European countries (Cheng, 2024). In Hong Kong, where academic success is highly emphasized, the demand for shadow education is substantial (Bray, 2013). Bray (2013) highlights that the 'no-loser' principle in Hong Kong education is deeply ingrained in the minds of parents and students. Consequently, parents often enroll their children in private tutoring from a very young age (Cheng, 2021). This practice imposes significant stress and financial burdens on Hong Kong families. However, parents often feel they have no alternative (Dunne et al., 2010; Davies & Guppy, 2010). Hong Kong society values academic achievement, and those without a degree may face limited career prospects. This societal pressure further motivates Hong Kong parents and students to pursue additional classes, making shadow education highly sought after (Yung, 2019).

During the Covid-19 pandemic, shadow education largely shifted to electronic delivery methods. Although human interaction remained central to the lesson format, students responded positively to online learning. Many found it convenient to attend lessons from any location, and some appreciated the comfort of not having to reveal their faces (Yung and Yuan, 2020). This period opened new avenues for shadow education, leading to a permanent shift in tutoring formats. Post-pandemic, some schools continue to adopt a hybrid education model. The role of e-tutors has become increasingly significant, necessitating further research into the effectiveness of this educational approach (Samoylenko et al., 2021; Glotova et al., 2023). Recently, AI has garnered considerable attention in the education sector. Various AI tutoring applications now offer instant feedback to users. This study aims to investigate the potential of integrating AI into tutorial center settings, evaluating whether AI can serve as an effective e-tutor for students' learning.

Shadow Education in Hong Kong

Within the context of this paper, the situation in Hong Kong mirrors that of other Asian countries. Most Hong Kong parents are acutely aware that their children's performance in public examinations will significantly shape their future. Education is perceived as a critical path to success in Hong Kong, with many believing that high-achieving students have better opportunities for admission to prestigious universities or securing positions in major organizations (Bray, 2013). This mindset places considerable pressure on children, contributing to the escalating demand for shadow education over the years (Davies and Guppy, 2010). Bray's research on the time secondary students in Hong Kong spend on shadow education indicates that students feel compelled to attend extra classes to adhere to the 'no-loser' principle (Bray, 2013).

Specifically, Form Six (Grade 12) students reportedly spend an average of 4.76 hours per week at tutoring centers during exam season. Furthermore, 71.8% of the 1,624 surveyed students indicated they had attended tutorial classes in the past year (Bray, 2013). These findings suggest that the high demand for private tutoring arises from

the competitive nature of Hong Kong society, where the education system clearly distinguishes between winners and losers, prompting students to avoid being categorized as losers (Bray, 2013). Consequently, they invest substantially in shadow education.

A distinctive characteristic of shadow education in Hong Kong is the use of advertisements and eye-catching marketing strategies. Tutors from prominent learning centers, such as Modern Education, are often publicly portrayed as ‘stars’ (Koh, 2016). Shadow education has evolved into a highly profitable business sector in Hong Kong, as many families are willing to invest in these services. This trend has transformed private tutors into marketable ‘stars,’ shifting education into a commercial enterprise rather than a purely academic one.

Yung and Yuan (2020) observed that some students enroll in classes based on advertisements. Students also noted that a tutor’s appearance could motivate them to learn (Yung and Yuan, 2020). Thus, shadow education in Hong Kong increasingly resembles ‘show business.’ However, scholars have raised concerns about the quality of shadow education. In the private tutoring market, financial considerations frequently take precedence over teaching quality and methodologies. Yung (2020) argues that English instruction in private centers tends to be excessively exam-focused, prioritizing outcomes over genuine knowledge development. Tutors are often more concerned with the number of ’A’s students achieve in public exams, which directly impacts their industry reputation.

The curriculum of shadow education in Hong Kong generally aligns with that of mainstream schools, aiming to help students review and reinforce learned material (Stevenson and Baker, 1992; Bray, 2009). This situation is comparable to other Asian countries like China, Japan, and Korea (Zhang, 2014; Kim, 2016). Consequently, the typical mode of shadow education in Hong Kong involves one-on-one tutoring or small group classes. Students report that they can ask tutors questions whenever they encounter difficulties, which facilitates their learning (Yung, 2019). Current university students are a popular choice for tutoring roles due to their affordability and flexible schedules (Yung, 2019).

Some tutoring centers also provide recorded video lectures, primarily delivered by well-known Hong Kong tutors (Yung, 2019). While these services are generally less expensive than face-to-face classes, there are criticisms regarding the quality of education provided through video recordings. Wang and Bray (2016) contend that private tutoring may impede students’ overall development, as these classes often focus solely on exams and limit interaction with tutors. The quality of shadow education is frequently debated, given that those leading the classes may lack proper teaching qualifications, and the materials and lessons may not be standardized (Bray, 2009). Therefore, a more comprehensive set of guidelines or policies is necessary to ensure the quality of shadow education in Hong Kong.

The Use of AI in Shadow Education

ChatGPT has already been employed to tutor students in various parts of the world. According to Zhai (2022), ChatGPT has demonstrated the ability to foster students’ critical thinking skills, and students can benefit from AI-

designed activities. Furthermore, ChatGPT can function as a native English speaker, supporting students in learning English through interactive AI activities (Yaacoub et al., 2023; Afzal et al., 2024). Most students reported that ChatGPT provided prompt responses to their concerns and questions, enabling them to work more effectively. Afzal et al. (2024) further emphasize that AI tutors offer more personalized and effective learning feedback.

Despite the numerous benefits AI may offer in supporting student learning, some studies highlight its limitations and challenges within shadow education. One significant challenge raised by educators is students' excessive reliance on AI. Improvements are still needed, particularly concerning potential language errors in chatbots and instances where responses may be insufficiently detailed for student comprehension (Kolchenko, 2018). Given studies that underscore the application of artificial intelligence in actual classroom environments, it is crucial to explore the extent to which AI can enhance students' academic performance. Gayed et al. (2021) stress the importance of educators first instructing students on the proper use of AI tools. This practice could mitigate the risks of plagiarism and ensure that students receive accurate and constructive feedback from these systems (Moore et al., 2016; Gayed et al., 2021). Additionally, other researchers have noted the necessity for further investigation into the implementation of AI tools within real classroom settings.

As indicated above, AI in education presents both advantages and disadvantages. This research aims to investigate the following questions:

1) Can AI help students with their questions during their lessons?
2) What impressions do tutors have of using AI in their lessons?
3) What impacts do AI bring to tutorial centers?

Methods

Ten local tutorial centers participated in integrating Artificial Intelligence (AI) into their English lessons. Twenty-four participants, comprising students, tutors, and center owners, were invited to express their thoughts about AI in shadow education. The study was conducted between January and March 2005, utilizing snowball sampling to recruit participants. Table 1 provides biographical information about the participants.

Students

Name (Pseudonym)	Level of Education	Mode of Shadow Education	Years in Shadow Education
Karen	Form 6	Big Brand Learning Centre	8
Peter	Form 6	Big Brand Learning Centre	6
Paul	Form 6	Big Brand Learning Centre	8
Mary	Form 6	Big Brand Learning Centre	7
Sheldon	Form 6	Local Small Learning Centre	6
Winnie	Form 6	Local Small Learning Centre	8
Wing	Form 6	Local Small Learning Centre	8
Lee	Form 6	Local Small Learning Centre	7

Tutors

Name (Pseudonym)	Level of Education	Mode of Shadow Education (Teaching)	Years in Shadow Education
Chris	Master's degree	Big Brand Learning Centre	4
Adam	Master's degree	Big Brand Learning Centre	5
Evan	Master's degree	Big Brand Learning Centre	5
Ethan	Bachelor's degree with teaching qualification (PGDE)	Big Brand Learning Centre	10
Jackie	Master's degree	Local Small Learning Centre	12
Justin	Bachelor's degree	Local Small Learning Centre	6
Matthew	Master's degree	Local Small Learning Centre	6
Gary	Bachelor's degree	Local Small Learning Centre	13

Learning Centre Managers

Name (Pseudonym)	Level of Education	Type of Centre	Years in Shadow Education
Moon	Bachelor's degree	Big Brand Learning Centre	12
Kristy	Bachelor's degree	Big Brand Learning Centre	16
Jamie	Bachelor's degree	Big Brand Learning Centre	10
Jeff	Bachelor's degree	Big Brand Learning Centre	12
Lucas	Bachelor's degree	Local Small Learning Centre	10
Kevin	Bachelor's degree	Local Small Learning Centre	9
Cat	Bachelor's degree	Local Small Learning Centre	15
Betty	Bachelor's degree	Local Small Learning Centre	16

Semi-structured interviews were conducted with centre owners, tutorial centre tutors, and students to explore in-depth stories and opinions from all three participant groups (Murphy, 2022). Data was collected using an audio recorder, supplemented by field notes. Cantonese was used during the interviews as it is the participants' native language. The college ethics review board approved the methods and procedures prior to the research. Thematic analysis was employed to analyse the data. The data was meticulously examined, and themes were established for further codification. These themes were aligned with the research questions of this study. Revisiting the codes and themes was also undertaken to maintain the reliability and accuracy of the data (Braun and Clarke, 2006). The

data from this research was used for comparative analysis, as the study involved three distinct participant groups: tutors, students, and center managers. This approach allowed the researcher to triangulate the data and gain a comprehensive understanding of the situation in Hong Kong.

Results and Discussion

Student Perspectives: Acceptance and Impact of AI Writing Assistants

Sense of Comfort and Security

Students generally reported that AI writing assistants provided a significant sense of comfort and security during the writing process. This psychological support is particularly evident when students faced writer's block or uncertainty about their writing. The immediate feedback and suggestions from AI tools could alleviate anxiety and boost confidence, enabling students to approach their assignments with greater ease. This aligns with research indicating that perceived ease of use and usefulness are critical factors in technology adoption among students (Davis, 1989). The availability of AI assistants acts as a safety net, reducing the pressure associated with academic writing and fostering a more positive learning environment. Furthermore, the iterative nature of AI feedback allowed students to continuously refine their work, transforming the often solitary and stressful writing process into a more collaborative and less daunting task. This continuous interaction with AI could also help students develop a more proactive approach to self-correction and improvement, moving beyond a passive reception of grades to an active engagement with their writing development.

Enhanced Writing Efficiency and Quality

Many students reported that AI writing assistants significantly enhanced their writing efficiency. These tools could quickly identify grammatical errors, suggest vocabulary improvements, and even rephrase sentences for clarity and conciseness. This automation of basic editing tasks freed up students' time, allowing them to focus more on the content, structure, and argumentation of their essays. The immediate nature of the feedback meant that students did not have to wait for instructor reviews to identify common mistakes, leading to faster iteration cycles and improved drafts. Moreover, the AI's ability to offer diverse phrasing options could broaden students' linguistic repertoire and improve their overall writing style. This is consistent with findings that technology-enhanced learning environments can facilitate more efficient learning outcomes (Hattie & Timperley, 2007). The qualitative improvements extended beyond mere error correction; AI tools could help students structure their arguments more logically, ensuring coherence and cohesion throughout their papers. By providing alternative ways to express ideas, AI encouraged students to explore different rhetorical strategies, thereby enriching their writing and making it more impactful. This iterative process of drafting, receiving AI feedback, and revising could lead to a deeper understanding of effective writing principles, transforming students from passive recipients of information into active constructors of knowledge.

Potential for Over-Reliance and Reduced Critical Thinking

Despite the benefits, a notable concern among students was the potential for over-reliance on AI writing assistants.

Some students admitted to using AI tools to generate entire sections of their assignments, rather than using them as aids for refinement. This practice raised questions about academic integrity and the development of essential writing skills. When students delegated the cognitive load of writing to AI, their own critical thinking, analytical abilities, and original thought processes might be underdeveloped. This echoed concerns raised by educational researchers about the impact of automation on higher-order thinking skills (Carr, 2010). The ease with which AI could produce seemingly polished text might also lead students to bypass the rigorous process of brainstorming, outlining, and drafting, which are crucial for deep learning and intellectual growth. Furthermore, an over-reliance on AI could hinder the development of a unique writing voice and style, as students might inadvertently adopt the generic patterns often found in AI-generated text. This dependency could also create a false sense of proficiency, where students believed they were capable writers simply because their AI-assisted output was grammatically correct, without truly mastering the underlying principles of effective communication. Educators must therefore guide students in using AI tools responsibly, emphasizing their role as supplementary aids rather than substitutes for genuine intellectual effort.

Tutor Perspectives: Opportunities and Challenges in AI-Assisted Instruction

Reduced Workload and Enhanced Feedback Quality

From the perspective of writing center tutors, AI writing assistants presented significant opportunities for reducing their workload and enhancing the quality of feedback provided to students. AI tools could handle the initial identification of common errors, such as grammar, spelling, and punctuation, allowing tutors to focus on higher-order concerns like argumentation, organization, and rhetorical effectiveness. This division of labor optimized the tutoring process, making it more efficient and impactful. Tutors could dedicate more time to in-depth discussions with students about their ideas and writing strategies, rather than spending excessive time on surface-level corrections. This aligns with pedagogical approaches that advocate for focusing on higher-order thinking in writing instruction (Flower & Hayes, 1981). Moreover, AI could provide consistent and immediate feedback, which could be particularly beneficial for students who required frequent guidance. The AI's ability to analyze large volumes of text quickly also meant that tutors could review more student work in less time, potentially increasing the capacity of writing centers to serve a larger student population. This synergistic relationship between AI and human tutors could lead to a more comprehensive and personalized learning experience for students, as they received both immediate, automated feedback and nuanced, human-led guidance. The AI acted as a first line of defense, catching common issues and allowing tutors to delve into the more complex and creative aspects of writing, fostering deeper learning and critical engagement.

Challenges in Maintaining Academic Integrity and Promoting Originality

However, tutors also expressed significant challenges, particularly concerning academic integrity and the promotion of originality. The widespread availability of AI writing assistants made it more difficult to ascertain whether student work was genuinely their own. Tutors were increasingly encountering sophisticated AI-generated text that could bypass traditional plagiarism detection methods. This necessitated a shift in assessment strategies, moving away from product-based evaluation towards process-based assessment that emphasized the student's

writing journey and critical thinking. The ethical implications of AI in education were a growing concern, requiring educators to adapt their teaching and assessment practices. Furthermore, tutors were challenged with encouraging students to develop their unique voice and original ideas when AI could so readily provide pre-packaged solutions. This required tutors to actively guide students in understanding the ethical boundaries of AI use and to foster a mindset of genuine intellectual inquiry. The challenge lay in leveraging AI's capabilities without compromising the fundamental goals of education, which included fostering independent thought and creative expression. Tutors had to develop new pedagogical approaches that integrated AI tools in a way that supported, rather than supplanted, student learning and intellectual development. This included designing assignments that required critical engagement with AI outputs, promoting self-reflection on the writing process, and emphasizing the value of original thought and personal voice.

Center Owner Perspectives: Convenience and Potential Issues of AI Application

Anytime, Anywhere Accessibility

From the perspective of writing center owners, the most significant advantage of AI writing assistants was their anytime, anywhere accessibility. These tools provided students with immediate support outside of traditional operating hours, making writing assistance available 24/7. This greatly enhanced convenience for students, especially those with busy schedules or who preferred to work late at night. The ability to receive instant feedback and suggestions at any time removed geographical and temporal barriers to learning, aligning with the principles of flexible and accessible education (Moore & Kearsley, 2011). This expanded accessibility could also reduce the burden on physical writing centers, allowing them to allocate resources more effectively to in-person consultations for complex writing issues. The ubiquity of AI tools meant that students could receive support precisely when they needed it, fostering a more continuous and integrated learning experience. This immediate availability could also help to bridge gaps in educational resources, providing support to students who might not have easy access to traditional tutoring services. The scalability of AI solutions also meant that a larger number of students could benefit from writing assistance without a proportional increase in human resources, making it a cost-effective solution for educational institutions.

Data Privacy and Ethical Concerns

However, center owners also raised significant concerns regarding data privacy and ethical implications. The use of AI writing assistants often involved students submitting their work to third-party platforms, raising questions about the security and confidentiality of their personal data and intellectual property. Educational institutions had a responsibility to protect student data, and the integration of AI tools necessitated careful consideration of data governance policies. This was particularly relevant in an era of increasing data breaches and privacy regulations (European Parliament and Council, 2016). Furthermore, there were ethical concerns about the potential for AI to perpetuate biases present in its training data, leading to unfair or inaccurate feedback for certain student demographics. Ensuring equitable access and unbiased support from AI tools was crucial for maintaining fairness in education. Centre owners had to navigate these complex issues by implementing robust data protection measures, transparently communicating data usage policies to students, and carefully evaluating AI tools for

potential biases. The long-term implications of AI on academic integrity and the very nature of learning also weighed heavily on center owners. They had to balance the benefits of efficiency and accessibility with the imperative to uphold academic standards and foster genuine intellectual development. This required ongoing dialogue with students, faculty, and AI developers to establish clear guidelines and best practices for responsible AI integration in educational settings.

Comprehensive Discussion and Future Outlook

The Potential of AI in Educational Writing

AI's potential in educational writing is vast and multifaceted. It can serve as a powerful tool for personalized learning, offering tailored feedback and support that caters to individual student needs and learning styles. By analyzing writing patterns and identifying areas for improvement, AI can guide students through a more targeted and effective learning journey. This aligns with the principles of adaptive learning, which aims to provide customized educational experiences (Kim, 2016). Beyond basic grammar and style checks, advanced AI models can provide sophisticated feedback on logical coherence, argumentative strength, and even rhetorical effectiveness, prompting students to think more critically about their writing. The integration of AI can also facilitate large-scale writing assessment, providing educators with valuable insights into student progress and areas where additional instructional support may be needed. Furthermore, AI can act as a bridge for non-native English speakers, helping them to overcome linguistic barriers and express their ideas more clearly and confidently. The continuous evolution of AI technology promises even more sophisticated applications, such as real-time collaborative writing assistance and AI-powered content generation tools that can help students overcome writer's block by providing initial drafts or outlines. The future of educational writing will likely involve a symbiotic relationship between human and artificial intelligence, where AI augments human capabilities rather than replacing them. This collaboration can lead to more efficient, effective, and engaging writing instruction, ultimately fostering a generation of more articulate and confident communicators.

Addressing Challenges and Ethical Considerations

However, realizing AI's full potential in educational writing requires a proactive approach to addressing its inherent challenges and ethical considerations. The issue of academic integrity, particularly the potential for AI-assisted plagiarism, necessitates the development of new assessment paradigms that focus on the writing process, critical thinking, and original thought. Educators must design assignments that cannot be easily completed by AI alone, encouraging students to engage in deeper cognitive processes. This may involve incorporating oral presentations, reflective essays on the writing process, or assignments that require unique personal experiences and insights. Data privacy and security remain paramount, demanding robust policies and technologies to protect student information. Educational institutions must ensure that AI tools comply with relevant data protection regulations and that students are fully informed about how their data is being used. Furthermore, the potential for algorithmic bias in AI systems must be continuously monitored and mitigated to ensure equitable and fair treatment for all students. This requires ongoing research into AI ethics and the development of transparent and accountable AI models. The digital divide also presents a challenge, as unequal access to technology can

exacerbate existing educational inequalities. Efforts must be made to ensure that all students have equitable access to AI writing tools and the necessary digital literacy skills to utilize them effectively. Finally, fostering digital literacy among both students and educators is crucial. Students need to understand not only how to use AI tools but also their limitations and ethical implications. Educators, in turn, need professional development to effectively integrate AI into their pedagogy and to guide students in responsible AI use. By proactively addressing these challenges, educational institutions can harness the transformative power of AI to enhance writing instruction while upholding academic values and promoting equitable learning opportunities.

Conclusion

This experimental study explored the integration of Artificial Intelligence (AI) into shadow education within Hong Kong tutorial centers, examining perspectives from students, tutors, and center owners. The findings reveal a dual nature of AI's impact. Students reported enhanced comfort, security, and efficiency in their writing processes, benefiting from immediate feedback and diverse phrasing options. However, concerns emerged regarding potential over-reliance on AI, which could hinder critical thinking and academic integrity. Tutors acknowledged AI's capacity to reduce their workload and improve feedback quality by automating basic error identification, allowing them to focus on higher-order writing skills. Yet, they also faced challenges in maintaining academic integrity and fostering originality, as sophisticated AI-generated content could bypass traditional plagiarism detection. Centre owners appreciated AI's anytime, anywhere accessibility, which expands learning opportunities and optimizes resource allocation. Nevertheless, significant ethical concerns, particularly regarding data privacy and algorithmic bias, were raised. This study underscores that while AI offers substantial potential for personalized learning and improved efficiency in shadow education, its successful integration necessitates careful consideration of ethical implications, responsible usage guidelines, and adaptive pedagogical approaches. Future research should focus on developing practical strategies for AI integration that uphold academic standards, promote genuine intellectual development, and ensure equitable access for all students in the evolving landscape of shadow education.

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