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RESEARCH ARTICLE

Investigating the Role of Artificial Intelligence in Developing Free Writing and Self-Authorship Skills for Female Kindergarten Teachers: ChatGPT as a Model

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ABSTRACT

This study investigates the role of artificial intelligence in developing free writing and self-authorship skills among female kindergarten teachers, using ChatGPT as a generative AI model. Employing an experimental methodology, the research utilized a quasi-experimental design involving a single group and assessed differences through pre- and post-test measurements. The sample comprised 45 female kindergarten teachers from the second and third levels. A comprehensive training program was crafted, focusing on the effective utilization of ChatGPT to enhance specific skills in free writing and authorship. This program consisted of 15 interactive training sessions designed to foster engagement and collaboration among participants. The Free Writing and Self-Authorship Skills Test was administered to assess the teachers' competencies both before and after the training. Statistical analysis, using the paired samples t-test, revealed significant differences favoring post-training scores. The results indicated marked improvements in the teachers' abilities in areas such as planning for free writing, producing written content, and performing editing and revision tasks. The findings underscore the substantial impact of integrating ChatGPT into the professional development of female kindergarten teachers, enhancing their free writing and self-authorship capabilities.

INTRODUCTION AND LITERATURE REVIEW

Generative AI models represent sophisticated platforms designed to generate a wide range of outputs by leveraging vast datasets, neural networks, and deep learning algorithms. Depending on the type of model, these systems can create images, generate text, translate between text and visual outputs, synthesize speech and audio, or even produce original video content. Among these applications, language models have emerged as particularly transformative, offering significant advancements in text generation and natural language processing (Kim et al., 2024). The impact of generative AI, however, extends beyond language, influencing numerous domains such as image, video, and music creation, marketing content, and translation. Moreover, multi-functional models integrate several of these capabilities into a unified system. A defining characteristic of generative AI models is their reliance on artificial neural networks, which simulate human cognitive abilities-sometimes exceeding them-and demonstrate the potential for profound influence across various fields (Linkon et al., 2024).

Recently, generative AI models, particularly language models, have garnered significant attention from researchers, educators, and students alike (Ferrara et al., 2024). This interest stems from their remarkable capabilities in diversifying learning contexts, fostering various avenues for self-directed

learning, and providing timely feedback, support, and guidance. Additionally, these models excel in generating and analyzing text while demonstrating the ability to learn autonomously and build upon prior experiences and learning inputs. Generative AI produces responses and solutions based on the knowledge it has gained from previously input human data, showcasing its potential to transform educational practices (Pack & Maloney, 2023).

One of the most prominent generative language models is ChatGPT (Generative Pre-Trained Transformer), launched by OpenAI on November 30, 2022. Remarkably, ChatGPT attracted over a million users within just a week of its release, and by January 2023, the number of active users surged to 100 million, making it the fastest-growing application in history in terms of user adoption. By January 2024, OpenAI announced that 100 million people were using ChatGPT weekly (Firaina and Sulisworo, 2023). ChatGPT stands as one of the most advanced language models ever created, employing deep learning techniques and artificial neural networks to understand and generate language. Its exceptional ability to engage in sophisticated conversations allows it to provide coherent and contextually relevant responses, as well as generate textual content across functional and creative domains (Baskara, 2023). Thanks to its extensive training on a diverse array of textual data, ChatGPT excels at answering questions and simulating human-like interactions, offering solutions grounded in profound knowledge (Rospigliosi, 2023).

Fui-Hoon et al. (2023) indicate that ChatGPT has brought about significant disruptions and changes in the educational landscape. ChatGPT can serve as an assistant in various learning and teaching activities. For students, it can aid in a wide range of tasks, including information retrieval, answering questions related to specific topics, and enhancing writing across different languages. For teachers, Bozkurt (2023) sees that ChatGPT can assist in creating lesson plans, preparing educational materials (such as texts, slides, and assessments), reviewing and grading assignments, and providing feedback to students. Since ChatGPT relies on large language models, it can be utilized to generate educational content, personalize learning experiences, and enhance student engagement, ultimately improving the overall efficiency and effectiveness of educational delivery in academic research.

Moreover, the advancements in generative language AI, exemplified by models like ChatGPT, indicate a continuous potential for enhancing and developing language and communication. These innovations open new horizons for leveraging AI capabilities across various fields, including machine translation, content creation, and the generation of creative texts. However, the human role remains essential in guiding this technology to ensure that its maximum benefits are realized while mitigating potential risks. The reliance of generative AI on its users as information sources may exacerbate existing biases in the field, raising concerns about accountability.

The skills of authorship and free writing are essential for kindergarten teachers, as they play a crucial role in developing innovative materials and educational activities tailored to the needs of young children. These educators often rely on creating and crafting stories and educational scenarios, as well as employing improvisational techniques that align with the dynamic learning environments (Su et al. 2023). Such practices not only enhance children's imagination but also stimulate their creative thinking. In this context, generative artificial intelligence can serve as an effective tool for training kindergarten teachers to develop their skills in free writing and self-authorship. By utilizing advanced technological tools, such as the GPT model, teachers can acquire new abilities that enable them to produce engaging and inspiring educational content. This, in turn, contributes to improving the learning experience for children and enhancing their capacity to express their thoughts and ideas (Ali, 2024).

Free writing and self-authorship represent a written activity in which kindergarten teachers express themselves openly and freely on topics of their choosing without constraints. Through this process, teachers write whatever comes to their minds to produce a preliminary draft. This practice encourages them to explore and elaborate on their ideas and articulate their perspectives, thereby encompassing the topic of writing while allowing space for the formation and organization of thoughts. This type of writing reflects the teachers' personalities, linguistic abilities, and the nature of their ideas (Pramita, 2023).

In this context, it is important to note that free writing represents a distinct writing style that contrasts with constrained writing. It provides kindergarten teachers with the opportunity to write freely and spontaneously, allowing for the creation of a preliminary draft that can be revised and

edited later. The primary purpose of free writing is not an end in itself; rather, it serves as a method to encourage teachers to maintain a continuous writing flow and to express themselves flexibly and naturally. Consequently, it acts as an effective tool for developing overall writing skills, as this approach promotes immediate and ongoing expression of thoughts and feelings without any initial constraints. The text produced through free writing can be subjected to editing and refinement in subsequent stages after the writing process.

According to the study by Victor et al. (2023), generative artificial intelligence models in education open unprecedented avenues across various domains, including translation, text production, and image generation, while also enhancing opportunities for creativity and innovation among kindergarten teachers. Additionally, Zhao et al. (2024) suggests that potential benefits of these models include facilitating personalized and interactive learning experiences for children and providing continuous feedback to enhance teaching processes. Generative artificial intelligence can also deliver immediate feedback on activities and assessments created by kindergarten teachers, aiding children's understanding of their mistakes and enabling prompt corrections. In their research, Barros et al. (2023) indicate that artificial intelligence models are capable of automating a diverse range of educational content, including assessments, learning materials, and interactive activities, thereby alleviating the time and effort burden on teachers. Furthermore, the study by Ausat et al. (2023) reveals that AI-powered virtual teachers can offer individualized support to children, guiding them through complex concepts, which provides a valuable resource for continuous learning at any time. Bhimavarapu (2023) aimed to determine whether generative artificial intelligence could enhance human productivity in writing. The study hypothesized that generative artificial intelligence would have a positive impact on human productivity in the field of writing. Based on the results obtained, it was concluded that the use of generative artificial intelligence indeed led to an improvement in writing productivity, as it reduced the number of errors and shortened the time spent on writing.

In consideration of the aforementioned insights, it is evident that generative artificial intelligence, particularly models like ChatGPT, holds significant potential to transform educational practices, especially for female kindergarten teachers. The ability of these models to facilitate free writing and authorship skills underscores their relevance in enhancing pedagogical strategies. As research demonstrates, the integration of AI tools can streamline the writing process, reduce errors, and save valuable time, thereby fostering a more creative and productive teaching environment. Furthermore, the emphasis on the importance of human oversight in guiding these technologies ensures that the benefits are maximized while minimizing inherent biases. Ultimately, this evolving landscape invites further exploration into the effective application of generative AI in educational settings, paving the way for innovative approaches to teaching and learning.

Consequently, the current study's research question is as follows:

- What is the role of artificial intelligence in developing free writing and self-authorship skills for female kindergarten teachers using the ChatGPT model?

METHODOLOGY

Research design

This study is a quantitative investigation that employed an experimental approach utilizing a quasi-experimental design with both pre- and post-tests to assess the effectiveness of the generative linguistic intelligence model, ChatGPT, in enhancing free writing and authorship skills among female kindergarten teachers. Pre- and post-tests were administered to evaluate participants' free writing and authorship skills before and after the implementation of the research program, comparing the differences between the mean scores of the two measurements. The assessed free writing skills included planning, content production, and editing and revision.

Research participants

A total of 45 female kindergarten teachers participated in this study. They were selected from 15 kindergarten institutions across the governorates of Al-Ahsa (8 institutions) and Dammam (7 institutions) in Saudi Arabia during the second semester of 2023. From each institution, 3 teachers were purposefully selected, ensuring an equal distribution. The participants were identified through

a targeted selection process involving prior communication between the researchers and the teachers. Initially, some teachers from each institution were contacted directly, and they were subsequently relied upon to nominate additional participants for the study. In the selection process, care was taken to ensure that all participants had comparable years of experience, job titles, and age, and that they all held a teaching qualification. Given the geographic spread of the institutions and the logistical challenges of in-person training, the training program was delivered remotely via the Microsoft Teams platform. This selection process aligns with the principles of purposive sampling, often employed in educational research to ensure participants meet specific criteria relevant to the study's objectives. By leveraging personal networks and peer nomination, the study aimed to enhance trust and engagement among participants, a key factor in ensuring the validity of the interventions tested.

Ethical Considerations

Ethical considerations were a fundamental aspect of this study, ensuring the protection of female kindergarten teachers participating in the study rights and well-being throughout the research process. Ethical clearance was obtained from the Research Ethics Committee at King Faisal University under the reference number KFU-REC-2023-ETHICS1895, validating the study's procedures and confirming adherence to ethical standards. All participants were fully informed about the study's purpose, procedures, and their role within the research. Participants were assured of their right to withdraw from the study at any time without any repercussions. Additionally, confidentiality was strictly maintained; no identifying information about the participants was included in the research data, and all data was anonymized and securely stored. The researchers also ensured that the online training sessions conducted via Microsoft Teams adhered to privacy protocols, with clear communication regarding how data from these sessions would be used solely for research purposes. The well-being of participants, particularly given the remote nature of the study, was a priority, and care was taken to ensure that their participation did not impose any undue burden on their professional or personal responsibilities.

Study Tools

Free Writing and Authorship Skills Test:

The test was developed to measure the free writing and authorship skills of the female kindergarten teachers participating in the study through quantitative assessment. The primary skills targeted by the test included planning for free writing, content production, and editing and revision. Since the specific writing skills outlined in the current study fall under the category of free writing, a scoring rubric was designed to facilitate the evaluation of qualitative skills. The test included collaborative free writing skills centered on a single writing topic, which was implemented in group settings rather than individually. Each group of teachers chose a topic for their free writing, limited to a maximum of five pages, utilizing the generative linguistic intelligence model, ChatGPT, under the guidance of a trainer.

To ensure the validity of the test, it was reviewed by five specialists for content validity. Additionally, the test was piloted with five kindergarten teachers, who were asked to write on an open topic of their choice, limited to three pages. The pilot group was permitted to rely on the generative linguistic intelligence model, ChatGPT, using mobile phones or tablets for writing. The pilot study revealed that the correlation coefficients for each skill score and the total score for the relevant domain were statistically significant at the 0.05 level, indicating good internal consistency for the test. The internal consistency of the test domains was also verified by calculating the correlation coefficients between each domain score and the overall test score, which were also significant at the 0.05 level.

To verify the test's reliability, a test-retest method was employed. The test was administered to the pilot sample of five kindergarten teachers and then re-administered three weeks later. The correlation coefficient between the mean scores of the first and second applications for each sub-domain and the overall test score was calculated, yielding an overall correlation coefficient of 0.87, reflecting an acceptable level of reliability. The duration of the test was set at one hour, based on the feedback from experts who reviewed the test for content validity.

Development of the Training Program for Female Kindergarten Teachers:

The construction of the current research program was based on relevant studies presented in the introduction and literature review sections. The program's content focused on utilizing the generative linguistic intelligence model, ChatGPT, to enhance free writing and authorship skills among the participating teachers. The goal of the training program was to develop these skills in female kindergarten teachers.

The program consisted of 15 training sessions, each lasting between one hour and one and a half hours. Teaching methods suitable for free writing and authorship skills were proposed, incorporating the use of the generative linguistic intelligence model, ChatGPT. Additionally, the delivery style of the program was aligned with the Microsoft Teams platform to ensure compatibility and accessibility for participants.

This combination of a rigorously tested assessment tool and a well-structured training program aligns with best practices in educational research, ensuring that the interventions are both valid and reliable, thereby enhancing the overall credibility of the study's findings.

Data collection and analysis

The data collection process for this study involved the implementation of a training program designed to develop free writing and authorship skills among female kindergarten teachers. The program was delivered remotely using Microsoft Teams due to the geographic dispersion of participants and the logistical challenges of conducting in-person sessions. The training focused on enhancing specific writing skills such as planning, content production, and editing and revision.

To assess the impact of the training program, both pre- and post-tests were administered to the participants. These tests were designed to evaluate their proficiency in free writing and authorship skills prior to and following the intervention. The pre-test provided a baseline measurement of participants' abilities, while the post-test allowed for an assessment of the progress made after the completion of the program.

The data collected from these tests were analyzed using quantitative methods. Descriptive statistics, such as means and standard deviations, were computed to summarize the overall performance of participants in both the pre- and post-tests. Additionally, paired t-tests were conducted to examine the significance of the differences between the pre-test and post-test scores, allowing the researchers to determine whether the observed improvements were statistically significant. This analysis provided insights into the effectiveness of the training program in developing free writing and authorship skills among the participants.

RESULTS AND DISCUSSIONS

Results of the Free Writing and Self-Authoring Skills Test for Female Kindergarten Teachers:

The results of this study, which focused on Investigating the Role of Artificial Intelligence in Developing Free Writing and Self-Authorship Skills for Female Kindergarten Teachers: ChatGPT as a Model, revealed significant insights into the effectiveness of AI-based tools in enhancing these educational skills. Table 1 shows the test results.

Table (1): The differences between the teachers' scores in the pre- and post-measurements of the Free Writing and Self-Authorship Skills Test (N = 45 / df = 44).

Field	Measurement	Mean	Standard Deviation	t-test value	Significance level	Direction of differences
Planning for Free Writing	Pre-measurement	7.22	0.78	27.52	0.01	Post-measurement
	Post-measurement	17.11	1.05			
Producing Free Content	Pre-measurement	13.50	1.36	36.95	0.01	
	Post-measurement	24.48	1.25			

Field	Measurement	Mean	Standard Deviation	t-test value	Significance level	Direction of differences
Editing and Review	Pre-measurement	6.02	0.79	16.81	0.01	
	Post-measurement	14.17	0.86			
Overall Test Score	Pre-measurement	26.74	1.47	30.65	0.01	
	Post-measurement	55.76	1.96			

The quantitative results presented in Table 1 indicate a statistically significant improvement in the scores of female kindergarten teachers in free writing and self-authorship skills following the implementation of the training program. The post-training program scores were notably higher than the pre-training scores, demonstrating the positive impact of the program on the participants' writing skills. This improvement highlights the effectiveness of the training program in enhancing these critical educational skills among kindergarten teachers.

The findings demonstrate that the t-test values for the differences in the teachers' performance across the three key skill areas-planning for collaborative free writing, producing free content, and editing and reviewing-along with the overall test score, were statistically significant at the 0.01 level. These results highlight the effectiveness of the training program using ChatGPT in enhancing the participants' abilities in all measured domains, further supporting the role of artificial intelligence, specifically ChatGPT, in facilitating meaningful improvements in free writing and self-authorship skills. The statistical significance of these findings underscores the transformative potential of AI-based interventions in educational contexts, particularly in empowering educators to develop and refine their writing capabilities.

These findings partially align with the study by Herbold et al. (2023), which concluded that ChatGPT generates free-topic articles that are rated higher in quality compared to those written by humans. The writing style in AI-generated models exhibits linguistic features that differ from those found in human-written articles. In contrast, these results diverge from the findings of Bašić et al. (2023), which indicated that the performance of students using ChatGPT as an assistant for writing articles was not superior compared to students employing traditional writing methods. This study noted that students using ChatGPT did not produce high-quality content, did not write faster, and did not achieve higher scores than those of the original text.

The results of this study regarding the development of free writing skills among female kindergarten teachers can be attributed to the effectiveness of the training program based on the generative language intelligence model, ChatGPT. The program included various activities, educational procedures, and applications that significantly contributed to enhancing the participants' skills. The training program utilized ChatGPT as an intelligent and interactive writing partner, aiding participants in formulating and suggesting ideas, enriching their texts with essential and sub-elements, and providing recommendations on organizing and structuring textual components. Additionally, it facilitated the reception of feedback and comments, which supported the participants in producing high-quality free writing. The training program incorporated interactive activities focused on free writing skills, employing teaching methods and techniques suited to the nature of these skills. This approach allowed participants to apply their skills practically and meaningfully. Furthermore, the free writing activities included in the training program, grounded in the generative language intelligence model of ChatGPT, were designed to enhance social interaction and collaboration among participants during the sessions. This collaborative environment fostered shared experiences during the planning, writing, and reviewing stages, ultimately contributing to the development of their writing skills. Through the comprehensive support provided by ChatGPT as an assistant, the participants were able to refine their capabilities in crafting free texts of high quality. The combination of innovative teaching strategies and AI assistance created an engaging learning experience that empowered the teachers to improve their writing skills effectively.

CONCLUSIONS

This study investigated the role of artificial intelligence, specifically the generative language intelligence model ChatGPT, in developing free writing and self-authorship skills among female kindergarten teachers. The findings indicated a statistically significant improvement in the participants' writing skills after the implementation of the training program, highlighting the effectiveness of AI-assisted learning in enhancing educational practices. The integration of ChatGPT as an interactive writing partner allowed the teachers to formulate ideas, enrich their texts, and organize their writing effectively. The training program employed a variety of interactive activities and teaching methods tailored to foster collaboration and social interaction among participants. This collaborative environment facilitated shared experiences during the writing process, enhancing their ability to plan, produce, and revise their written work. The results align with previous research that recognizes the potential of AI in improving writing quality, while also providing a contrasting perspective to studies that found no significant benefits in using AI tools. The positive outcomes of this study underscore the importance of incorporating innovative technologies in educational settings to support skill development. In conclusion, the implementation of a structured training program leveraging ChatGPT has proven to be a valuable approach in nurturing free writing and self-authorship skills among kindergarten teachers. Future research should explore the long-term effects of such interventions and the applicability of AI tools across different educational contexts to further validate their impact on teaching and learning outcomes.

Limitations of the Study

While this study has provided valuable insights into the role of artificial intelligence, specifically ChatGPT, in developing free writing and self-authorship skills among female kindergarten teachers, there are certain limitations that need to be acknowledged:

Sample Size and Generalizability: The study involved a relatively small sample of 45 participants, which limits the generalizability of the findings to a broader. The participants were all from kindergarten institutions in two regions of Saudi Arabia, meaning the results may not be applicable to educators in other geographic locations or educational settings.

Limited Scope of AI Tools: The study focused solely on ChatGPT as the model for artificial intelligence. While ChatGPT is a powerful tool, the study did not compare its effectiveness with other AI-based writing aids, which could have provided a more comprehensive understanding of AI's potential in education.

Dependence on Technology: The study's methodology relied on the use of Microsoft Teams for remote delivery of the training program. This could have introduced variability in participants' experiences depending on their familiarity with the platform and access to stable internet, potentially affecting the outcomes of the training.

Cultural and Linguistic Context: Since the study was conducted in Saudi Arabia with a specific cultural and linguistic context, the findings may not fully translate to different regions or educational systems, especially in non-Arabic-speaking countries.

Future research could address these limitations by including larger and more diverse samples, extending the duration of the intervention, and exploring how different levels of technological proficiency influence the effectiveness of AI in educational settings.

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