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Influence of ChatGPT Affordances on Adaptive Learning Experiences among Undergraduate Religious Education Teacher Trainees at the University of Nairobi, Kenya

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Abstract

There is a dearth of documented evidence on ChatGPT affordances' influence on students' adaptive learning experiences. This study sought to examine the influence of ChatGPT affordances on adaptive learning experiences among undergraduate religious education teacher trainees at the University of Nairobi. The study's objective was to investigate how learner engagement on ChatGPT influences adaptive learning experiences among undergraduate Religious Education teacher trainees. The study was guided by Vygotsky's theory of Zone of Proximal Development (ZPD) and the Technology Acceptance Model (TAM). The study adopted a descriptive research design. A purposive sampling technique was employed to obtain 234 respondents from a target population of 628 undergraduate religious education teacher trainees at the University of Nairobi. A student questionnaire and an interview schedule were used to collect data. Data collected was analyzed using inferential and descriptive statistical analysis with the aid of the SPSS version 24 package. The study's findings revealed that learner engagement on ChatGPT positively influenced adaptive learning experiences among undergraduate Religious Education teacher trainees. The study concluded that ChatGPT technology has educational affordances that enable students to generate and obtain several search results in summarized chunks virtually in every concept searched, making them emotionally, cognitively, and behaviorally engaged, thus enhancing their adaptive learning experiences. The study recommended that higher education institutions should embrace the use of ChatGPT as a complementary instructional resource to support teaching and learning processes instead of focusing on the adversities associated with the technology.

Keywords: ChatGPT Affordances, Adaptive learning experiences, Learner Engagement, Generative AI, Religious Education Teacher Trainees

Introduction

Recent advancements in technology, particularly Artificial Intelligence (AI), have significantly impacted various sectors, with the education industry undergoing rapid AI adoption, especially in response to the challenges posed by the COVID-19 pandemic (Maqbool, Ansari, & Otero, 2021). Generative AI (GAI), a product of AI innovation, has emerged as a transformative tool in education, particularly through systems like ChatGPT. GAI utilizes deep learning models to generate human-like responses across various mediums (Lim, Gunasekara, Pallant, Pallant, & Pechenkina, 2023). ChatGPT, one of the prominent GAIs, has gained popularity in education. Yet, there are limited studies on its educational affordances and how its usage influences adaptive learning experiences, particularly in religious studies.

ChatGPT encompasses an AI-powered Chabot that utilizes sophisticated natural language processing (NLP) tactics to generate, decipher, and comprehend human-like capabilities (Adiguzel, Kaya, & Cansu, 2023). This AI assistant Chabot's potential to transform research, teaching, and learning experiences has garnered substantial public attention among experts, policymakers, students, and professionals in the higher education field since OpenAI introduced the technology in November 2022 (Gill, Xu, Patros, Wu, & Kaur, 2023). On the one hand, employing ChatGPT in higher education has been attributed to numerous benefits. These benefits include creating innovative assessments, providing automated administrative services, supporting data analysis and research, offering personalized feedback, and facilitating adaptive learning (Rasul, Nair, Klendra, Robin & Santini, 2023). However, some studies have pointed out concerns about the use of ChatGPT among students.

The initial concern regarding ChatGPT application in education has been the fear that the technology could be used by students to cheat on their tasks, diminishing the value of education credentials, certification, and evaluation (Anders, 2023). In addition to the academic integrity concerns, Lim et al. (2023) identified workforce challenges, social and policy concerns, limitation of capabilities, and effect on skill development and learning outcomes as among the primary concerns and risks linked to ChatGPT usage in higher education. However, the rise of concerns over the technology's application is not a novel occurrence, for the introduction of search engines and other technologies that can disrupt education has always resulted in similar concerns (Gill et al., 2023). Besides, the UNESCO guidance for generative AI in research and education established that, more recently, many educational institutions, including the globally leading universities, have acknowledged that ChatGPT and similar tools are 'here to stay' and can be utilized constructively in educational contexts (UNESCO, 2023). Particularly, the report ascertained that educational institutions could benefit immensely from ChatGPT educational affordances once validated, implemented, and suitable plans and ethical frameworks developed to direct the technology's ethical and responsible use and application to meet the research, learning, and

teaching needs.

Furthermore, the ChatGPT GAI has been used extensively globally and proven valuable across the education sector. For instance, in the Chinese education sector, Liu (2023) observed that the ChatGPT GAI tool was primarily employed in language learning and teaching. Consequently, using the technology proved effective in supporting and boosting English learning (Liu, 2023). Similarly, in a study involving higher education students from Australia, Canada, Sweden, and Turkey, Firat (2023) attributed ChatGPT to positively impacting learning experiences among them and transforming education systems. Besides, in a study that revealed that the education sector experienced numerous challenges, such as the need to account for various students' educational requirements, a lack of access to quality education, and limited resources, Mhlanga (2023) noted that the use of ChatGPT could help minimize these obstacles by offering easily accessible and individualized learning experiences and providing prompt answers to students' research queries.

Like emerging economies, African higher education systems could benefit immensely from adopting the ChatGPT tool as an instructional resource. Mahaye (2020) described the African educational landscape as slowly losing relevance, which inferred a need to adopt new learning techniques and instructional technologies to improve the learners' adaptive learning experiences and restore relevance. Additionally, the COVID-19 pandemic generated further challenges for universities in Africa. According to Muftahu (2020), the pandemic ushered universities in various African nations past their limits toward adopting and implementing creative and suitable substitutes like encouraging learners to depend on online education to complete their education requirement, mandating academic staff's training in using online instruction tools, and materials, and compelling the institution to transition to remote learning and teaching. For instance, in the Ghanaian perspective, the education system embraced technologies such as artificial intelligence to help cope with the changes created by the pandemic. However, Bonsu and Baffour-Koduah (2022) opined adopting artificial intelligence tools such as the ChatGPT GAI generated new pressures and challenges for higher education institutions.

Like the rest of the continent, studies have ascertained that Kenya could benefit massively from implementing ChatGPT in its higher education system (INET Africa, 2023; Muchangi, 2023). However, the technology is still in its infancy in the country, having been available for download in August 2022 (Ndungu, 2023). As a result, most educational institutions, teachers, and learners lack awareness of ChatGPT affordances and their influence on learners' adaptive learning experiences. Besides, the novelty of the ChatGPT technology indicates a lack of research on its affordances and ways institutions can ethically and responsibly implement it for enhanced adaptive learning experiences among higher education students. Notably, the existing research on ChatGPT usage in higher education in Kenya focuses primarily on its concerns and negative implications, including

resulting in poor reading habits, impeding cognitive flexibility and analytical skills development among learners. In particular, ChatGPT technology is relatively new in Kenya, and there is a lack of awareness and research on ChatGPT affordances and its influence on adaptive learning experiences (Ndungu, 2023; Kitengele, 2023), thus the need for this study, which purposed to establish how ChatGPT affordances, more specifically, learner engagement on the platform influenced learner adaptive learning experiences.

Statement of the Problem

As aforementioned, there is a dearth of documented evidence of the influence of ChatGPT affordances on adaptive learning experiences among learners in higher institutions of learning in Kenya. This can be linked to insufficient research on the subject matter since the existing literature focuses on the concerns and fears associated with ChatGPT's usage and does not point out how such technologies influence adaptive learning experiences among learners. Besides, there is low application and usage of ChatGPT in Kenyan higher education (Kitengele, 2023), thus necessitating the need for this study that focuses on the influence of ChatGPT affordances on learners' adaptive learning experiences. Moreover, there has been an increasing concern regarding the quality of the teacher trainees' preparation in Kenyan universities. Genevieve (2017) attributed this to the inadequate teacher professional development programs. Genevieve (2017) further associated low-quality teacher graduates with a lack of innovative instructional resources in the institutions used in training them. While concurring with Genevieve (2017), Mwang'ombe (2021) observed that the failure of higher education tutors and learners to embrace emerging technologies and instructional approaches could be blamed on the low quality of teacher graduates in developing countries like Kenya. Further, according to Jesse (2021), the inadequacies among teacher graduates stem from pedagogical ineffectiveness, where the current teacher trainees' programs fail to adequately equip them with the 21st-century competencies required to handle the intricate contemporary learning environments. Such competencies include innovation skills, creativity, collaboration, communication, problem-solving, and critical thinking (Jesse, 2021).

Furthermore, the contemporary learning environment in higher learning institutions is characterized by an intensive integration of ICTs like artificial intelligence (AI) tools. Such AI tools include the ChatGPT, which learners in these institutions have highly embraced. Like other emerging tools credited for developing key competencies among learners (Mulwa & Muriithi, 2018), this study was needed to establish how ChatGPT affordances influence learners' adaptive learning experiences. Besides, the dynamic nature of knowledge calls for aligning teacher professional development programs in the country to the social and economic needs of the society. For instance, society expects teacher graduates to be competent in embracing emerging technologies in teaching and learning (Kafwa, Gaudience, & Kisaka, 2018). However, this calls for

evidence on how the educational affordances of these emerging AI tools influence adaptive learning experiences, thus the reason this study was necessary. This study sought to investigate how learner engagement on ChatGPT influences adaptive learning experiences among Religious Education teacher trainees at the University of Nairobi.

Study Objective

The specific objective of the study was to investigate how learner engagement on ChatGPT influences adaptive learning experiences among Religious Education teacher trainees at the University of Nairobi.

Methodology

The research employed a descriptive research design to examine the influence of ChatGPT affordances on adaptive learning experiences among undergraduate Religious Education teacher trainees at the University of Nairobi. The descriptive research design was suitable since the features under research already existed in this particular environment. Besides, the research design's capacity to use data collection to illuminate current issues justified its application in the study. It helped answer the research questions on how learner engagement on ChatGPT influences adaptive learning experiences among Religious Education teacher trainees at the University of Nairobi.

The research targeted 628 undergraduate religious education teacher trainees within the University of Nairobi. A purposive sampling technique was employed in selecting a sample of 234 undergraduate religious education teacher trainees to participate in the study. Data collection was done using questionnaires and interview schedules. The data collection instruments were validated through a pilot study. The reliability test using Cronbach's Alpha returned a value of 0.81. Ethical considerations were made, and the necessary authorization was sought and obtained from the relevant authorities. Thematic analysis was employed in the qualitative data analysis procedure. The quantitative data, obtained through questionnaires, were analyzed statistically using descriptive statistics, primarily frequency and means. Further, multiple linear regression analysis was done to determine the relationship between the independent and dependent variables, establishing how learner engagement on ChatGPT influenced adaptive learning experiences.

Findings

The specific objective of this study was to investigate how learner engagement on ChatGPT influenced adaptive learning experiences among undergraduate religious education teacher trainees at the University of Nairobi. Therefore, the respondents were asked to determine the degree to which they agreed with the statements in Table 1.

Table 1: Learning engagement on ChatGPT and adaptive learning experiences

Statements	**Mean**	**Standard Deviation**
I am interested in using ChatGPT in learning tasks because it enhances my self-esteem, self-efficacy, and comprehension of concepts learnt.	4.54	0.73
I am excited when using ChatGPT in learning tasks because it boosts my self-esteem, self-efficacy, and comprehension of concepts learnt.	4.36	1.06
I am able to solve difficult problems using ChatGPT in my learning tasks	4.20	0.87
I feel more involved in my learning tasks when using ChatGPT	4.10	0.89
I take less time in researching on ChatGPT than in other platforms	4.02	0.97
Using ChatGPT enables me to think critically when doing my assignments and other learning tasks.	3.97	1.04
I do not feel like using ChatGPT during my learning tasks because encourages me to be lazy	3.13	1.75
I concentrate more when using ChatGPT for my learning tasks than when not using it	3.10	1.45
I am unable to master new knowledge when using ChatGPT in my assignments and learning tasks.	2.09	1.22
I am not excited when using ChatGPT during my learning tasks unlike other platforms	1.96	0.93
I am unable to collaborate with other learners actively when using ChatGPT for my learning tasks	1.91	0.88
I am unable to have meaningful learning using ChatGPT in my learning tasks	1.78	1.08

Table 1.1 shows that the respondents strongly agreed (Mean = 4.54, SD = 0.73) that they were interested in using ChatGPT in learning tasks because it enhanced their self-esteem, self-efficacy, and comprehension of lessons learned. They agreed that they were excited when using ChatGPT (Mean = 4.36, SD = 1.06), able to solve difficult problems using ChatGPT (Mean = 4.20, SD = 0.87), felt more involved in their learning tasks (Mean = 4.10, SD = 0.89), and took less time in researching on ChatGPT than in other platforms (Mean = 4.02, SD = 0.97). They also agreed that using ChatGPT helped them think critically when doing their assignments (Mean = 3.97, SD = 1.04). They were neutral regarding whether they did not feel like using ChatGPT during their learning tasks encouraged them to be lazy (Mean = 3.13, SD = 1.75) and concentrate more when using ChatGPT during their learning tasks when not using them (Mean = 3.10, SD = 1.45). They disagreed that they were unable to master new knowledge when using ChatGPT (Mean = 2.09, SD = 1.22), were not excited when using ChatGPT during my learning tasks, unlike

other platforms (Mean = 1.96, SD = 0.93), and were unable to collaborate with other learners actively when using ChatGPT for their learning tasks (Mean = 1.91, SD = 0.88). The results in table 1.1 indicate that ChatGPT enhanced undergraduate teacher trainees' cognitive, emotional, and behavioral engagement during different learning tasks, which in turn, positively influenced their adaptive learning experiences by enhancing their self-esteem, self-efficacy, and comprehension of concepts learned.

For a better comprehension of how learner engagement on ChatGPT influences adaptive learning experiences among undergraduate Religious Education teacher trainees at the University of Nairobi, a thematic analysis of the interview responses was conducted. The process commenced with the transcribing of the interviewees' responses. Then, the researcher read through the transcribed data set to look for patterns and identified and assigned codes to the data. Then, the researcher searched for themes in the codes.

Three primary themes emerged from the data. They included "excitement," "willingness to participate," and "desire to learn." Regarding the first theme, six responses supported the first theme. The themes showed that ChatGPT facilitated the interviewed undergraduate teacher trainees' learning engagement by increasing their excitement to partake in the learning process during learning tasks. Five responses supported the second theme. They answered that ChatGPT improved their willingness to participate in the learning process. Lastly, three responses supported the third theme. The theme described that using ChatGPT improved the respondents' desire to learn, which enhanced their learning process and adaptive learning experiences.

Some of the verbatim selected respondents commented:

RES008: "It triggers my willingness to participate in the learning process and learning tasks."

RES011: "It is quite interesting."

RES019: "It enables me to desire to learn more and more."

The three comments confirm that using ChatGPT boosted the learners' engagement in the learning process and tasks. Moreover, the respondents were asked how using ChatGPT compared to conventional learning management systems platforms and search engines impacted their engagement and learning experiences. Two primary themes arose from their responses. The first theme was "resourcefulness." Eleven responses supported this theme. The theme described ChatGPT as a resourceful learning tool that offered learners access to more materials than conventional learning. The second theme was "efficiency." Eight responses supported it. The theme suggested that using ChatGPT helped learners learn easily and efficiently.

Some of the verbatim selected respondents reported:

RES002: "ChatGPT is more resourceful than other learning systems since information provided is from various sources."

> *RES010: "ChatGPT is more efficient compared to e-class in that it is faster, always relevant and hence faster learning experience."*
> *RES012: "ChatGPT is more impacting and makes my learning experience more thrilling and take learning tasks quickly."*

These responses established that ChatGPT provided learners with better engagement in the learning process than conventional learning management systems like the e-class. Finally, the respondents were asked to explain how engagement in the ChatGPT environment impacted their adaptive learning experiences. Three predominant themes arose from the responses. The first theme comprised "better comprehension". Twelve responses supported this theme. The theme described that learning engagement on ChatGPT helped them better understand the concepts and subjects learned. Four responses supported the second theme, "positive experiences." The theme meant that learning engagement on ChatGPT positively impacted the learners' adaptive learning experiences. Two responses supported the third theme, "motivation." The theme suggested that engagement in the ChatGPT environment impacted their adaptive learning experiences by boosting their motivation and confidence. Some of the verbatim selected respondents commented:

> *RES004: "ChatGPT impacts how I understand what I learn more easily."*
> *RES005: "There is a positive impact on learning experiences as it is easy to understand what you learn from ChatGPT."*
> *RES020: "I am motivated and confident in learning in my day-to-day learning experiences."*

The linear regression analysis results revealed a statistically significant positive influence of the learning engagement of ChatGPT ($\beta = 0.44$, $p = 0.000$) on the undergraduate religious education teacher trainees' adaptive learning experiences.

Discussion

The study purposed to examine the influence of ChatGPT affordances on adaptive learning experiences among undergraduate Religious Education teacher trainees at the University of Nairobi. The specific objective was to investigate how learner engagement on ChatGPT influences adaptive learning experiences among undergraduate Religious Education teacher trainees at the University of Nairobi.

These findings from the study revealed that learner engagement on ChatGPT positively influenced adaptive learning experiences among undergraduate Religious Education teacher trainees at the University of Nairobi. These results indicated that

ChatGPT affordances offer very few distractions to learners, which helps them remain fully engaged in the learning process. The results also indicated that ChatGPT permits learners to connect meaningfully with their lessons by utilizing teaching techniques and methods that foster student interest in academic learning. The findings aligned with the student engagement theory, which asserts that students effectively learn when they possess a high level of interest and find tasks meaningful. The findings were corroborated by the results of a study carried out in Sweden, which focused on harnessing AI in education to enhance student engagement, where Almusaed, Almssad, Yitmen, and Homod (2023) observed that ChatGPT enhanced learners' engagement in hybrid learning involving a combination of online and face-to-face learning. The findings in this study were supported by the views of Munoz, Gayoso, Huambo, Tapia, Incaluque, and Aquila (2023), who conducted a study on ChatGPT's impact on student engagement and motivation. In the study carried out in Peru, which involved 350 students and teachers, Munoz et al. (2023) revealed that ChatGPT substantially affected students' engagement and motivation in learning. This affirmed the findings of this study that learner engagement on ChatGPT positively influenced the adaptive learning experiences among Religious Education teacher trainees at the University of Nairobi. The findings further affirmed that ChatGPT affordances influenced the religious education undergraduate teacher trainees' adaptive learning experiences.

Conclusion

The study concluded that using ChatGPT by learners made them cognitively, emotionally, and behaviorally engaged in the learning process, which improved their self-efficacy, self-esteem, and ability to comprehend concepts learned. This enhanced their adaptive learning experiences, thus enabling them to often use the tools in their learning activities such as research, self-study, and doing assignments. Further, the study concluded that ChatGPT technology has educational affordances that enabled students to generate and obtain several search results in summarized chucks virtually in every concept searched, which made them emotionally, cognitively, and behaviorally engaged, thus enhancing their adaptive learning experiences.

Recommendations

The study recommended that higher education institutions embrace ChatGPT as a complementary instructional resource to support teaching and learning processes instead of focusing on the adversities associated with the technology.

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