Developing a Generative AI-based Chatbot for Supporting Learners in Open and Distance Learning

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Open and distance learning has become increasingly popular by providing flexible learning opportunities to a diverse range of students. However, one of the challenges faced in this mode of education is the lack of agile student support and guidance. To address this issue, the integration of generative Albased technologies, particularly chatbots, presents a promising solution. In this study, we aim to develop a generative Al-based chatbot tailored specifically for open and distance learning milieus. Using a design-based research method, we try to explore the specific requirements and preferences of students and educators to tailor the chatbot's functionalities. After analysis, exploration and evaluation, a chatbot with the capacity to establish meaningful interactions will be developed. After assessing the acceptability of the chatbot among students and educators, we will assess the chatbot's effectiveness in improving student motivation, learning outcomes, and overall educational experience, valuable insights can be gained for further refinement.

Introduction

In recent years, there has been a growing interest in the application of AI in education, particularly in the form of chatbots. Chatbots, such as ChatGPT, have shown promise in various fields, including healthcare, education, and language learning (Bozkurt & Sharma, 2024; Dempere, 2023; Haghighi et al., 2023; Yang et al., 2022). Generative AI-based chatbots are artificial intelligence systems that utilize generative models to produce human-like responses in conversations with users. These chatbots are capable of generating text, responses, and engaging in dialogue that simulates natural human conversation. By leveraging advanced natural language processing (NLP) techniques, generative AI-based chatbots can understand user input, process information, and generate contextually relevant and coherent responses (Talanquer, 2023). In the context of open and distance education settings, generative AI-based chatbots can play a significant role in enhancing the learning experience for students and educators (Wu & Yu, 2023). By offering personalized assistance, answering queries, providing educational support, and facilitating engagement, these chatbots can contribute to improving student outcomes and promoting active learning.

The potential of Al chatbots in enhancing students' online learning experiences has been recognized, with studies suggesting their effectiveness as instructional tools (Neo et al., 2022; Neo, 2022). Furthermore, the use of Al chatbots in providing educational support and transforming the learning process has been highlighted (Adıgüzel et al., 2023). Research has also shown that generative Al-based chatbots have the potential to improve user engagement, provide accurate information, and offer valuable insights in diverse fields such as medicine, psychology, and business (Krumborg et al., 2023; Hwang & Kim, 2021). The ability of these chatbots to reason, engage in meaningful conversations, and adapt to user needs makes them valuable tools for enhancing communication and interaction in various contexts (Dempere, 2023; Kuhail et al., 2022).

Leveraging the advancements in AI technology, such as natural language processing and multimodal user interaction, the chatbots can be tailored to assist online learners in their learning process, provide educational support, and enhance their overall online learning experience. AI-based chatbots have gained significant attention in various fields, including education. The potential of AI chatbots to enhance online learning experiences has been recognized, with studies indicating their effectiveness as instructional tools (Wu & Yu, 2023). The acceptance of AI chatbots in educational settings is influenced by factors such as perceived ease of use and usefulness (Chocarro et al., 2021). Moreover, the impact of AI chatbots on students' learning outcomes is a crucial area of investigation, requiring further research to understand the effects of AI chatbots on academic performance (Neo et al., 2022).

The Current Study

The current study aims to develop a generative AI-based chatbot specifically designed for open and distance education settings. The study is carried out at Anadolu University Open Education System, one of the leading institutions in the field of open and distance education in the world. Generative AI-based chatbots, which can be used and trained through web content management systems such as WordPress, can be used to provide support services in different sectors. In this context, a generative AI-supported chatbot application through WordPress, a web content management system, integrated into ChatGPT-4 to produce text outputs in the Anadolu University Open Education System.

Research Design

In line with the main objective of the study, a design-based research approach was used in this study to develop a generative AI-based chatbot for student support services in open and distance learning. Design-based research is a systematic and flexible research process that follows cyclical steps of analysis, design, development and implementation to improve various applications in real learning environments (Wang & Hannafin, 2005). Furthermore, according to McKenney and Reeves (2020), design-based research is a type of research that provides an in-depth understanding of a problem before designing and designing a solution to a problem encountered in practice. For this research, McKenney and Reeves' general model for conducting design-based research was used (2020, p.86). This model basically consists of three main stages. In the first stage, the analysis stage, it was aimed to analyze the problem situation in the literature, identify the problems related to the subject and evaluate the subject in all aspects. In the second stage, the design stage, possible solutions to the research problem were investigated and preliminary designs and developments were put forward to solve the problem. In the last stage, the effectiveness of the proposed solutions was evaluated by conducting an evaluation with the implementation. Within this context, the following issues and research questions were generated: 1). Design: What constitutes the features and architecture of a chatbot intended to aid open and distance learners? 2). Inclusion: To what extent does the chatbot effectively address user input? 3). Examination: How are the questioning patterns of learners characterized through interactions with the chatbot? 4). Practice: How do open and distance learners articulate their experiences with the chatbot?

Preliminary Findings

To develop a generative Al-based Chatbot Application for use in Open and Distance Education Settings, several key steps were considered based on relevant literature. Regarding to relevant literature, the general design features of chatbots are examined and the suggestions for chatbot design for educational environments are analyzed. Then, focus group interviews were conducted with four experts working in the field of student support for distance learners. In addition, a focus group interview was conducted with three instructors working in the field of distance education on the content, scope, process, chatbot use and design of support for distance learners. In line with this process, a preliminary design was created at the end of the first cycle (Figure 1).

Figure 1

The Designed Main Webpage



By following preliminary findings informed by the relevant literature and relevant experts a generative AI-based chatbot application draft was developed (Figure 2). Utilization of AI-based chatbots in open and distance education presents a transformative opportunity to enhance student support and engagement. While the potential benefits are substantial, careful attention must be paid to the design and implementation of these technologies to maximize their effectiveness.

Figure 2

The Designed Webpage and the Chat Window

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Based on the results of the first iteration, the following steps are to be followed for this ongoing study. Firstly, the researchers will identify the specific requirements and preferences of students and educators to tailor the chatbot's functionalities accordingly. Secondly, the chatbot will be redesigned with the capacity to establish meaningful interactions with users and persuade them effectively (Chang, 2023). This involves creating a chatbot that can engage users in conversations, provide relevant information, and guide them through the learning process in a persuasive manner. Thirdly, Natural Language Processing (NLP) features will be utilized to enable the chatbot to understand and generate human-like responses (Neo, 2022). NLP capabilities are essential for ensuring effective communication between users and the chatbot in educational contexts. Fourthly, to ensure acceptability and usability of the AI chatbot among students and educators a test will be conducted (Nadarzynski et al., 2019; Neo, 2022). Understanding the barriers and facilitators to engagement with AI chatbots is crucial for ensuring the chatbot's effectiveness and acceptance in open and distance education settings. As a last, for further refinement an overall evaluation for assessing the chatbot's effectiveness in improving student motivation, learning outcomes, and overall educational experience will be conducted.

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