An Examination of Studies on the Use of Chatbot Technology in the Field of Education

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Abstract – Today, it is observed that technologies are rapidly advancing and being utilized in educational environments. Among these technologies, chatbots, which have gained significant popularity with ChatGPT, play a crucial role in enhancing learning experiences. Chatbots offer numerous opportunities to support learning performance, increase engagement, and provide extracurricular feedback and assistance to students. These chatbots are capable of interacting with users in a natural language format, enabling seamless communication. They are designed to follow predefined patterns, answer questions, and provide guidance within their defined scope. This article aims to examine the existing research on the utilization of chatbots in educational environments to shed light on the significance of their implementation. To achieve this objective, 19 articles and papers related to the field were analyzed using Google Scholar, incorporating keywords such as 'chatbot+education' and 'chatbot in education'. The articles and papers were subjected to a descriptive analysis, covering sections such as the subject, purpose, methodology, results, discussion, and recommendations. Based on the review, it was observed that many studies focused on the usability and product design of chatbots in education. The samples used in these studies predominantly comprised university-level participants, with limited applications targeting larger student populations. It is anticipated that the data and results presented in this study will serve as a guide to identify existing applications and research gaps in the utilization of chatbots in education.

Keywords – Chatbot, Chatbot Technology, Chatbots In Education, Educational Chatbot Usage,

I. INTRODUCTION

The development of new technologies such as artificial intelligence continues rapidly. These technologies are used in many fields, including education. Among these technologies are chatbots. Chatbots provide many opportunities in learning environments. They are an important technology that supports learning performance, increases engagement, enhances the learning experience, and provides support during students' extracurricular feedback and corrections. Chatbots can interact with users through natural language and maintain communication through natural language. Chatbots are systems that follow a predetermined flow

according to their type, can answer questions and provide guidance according to defined patterns. It can be said that chatbots have components that will deeply affect learning-teaching processes. In which areas and how this technology, which is based on technologies such as artificial intelligence, machine learning, natural language processing ([1], [2], [3] , [4], [5] , [6]), is used in education is an issue that needs to be examined. The aim of this study is to examine the studies on the use of chatbots in education.

II. MATERIALS AND METHOD

This study aims to examine the research conducted on the use of chatbot technologies in education through Google Scholar. The research design employed in this study is descriptive survey. Descriptive survey studies seek to describe the current state of the subject under investigation as it exists. For this study, 19 articles and papers related to the field and containing the keywords 'chatbot+education' and 'chatbot in education' were analyzed using Google Scholar. The analysis focused on descriptive aspects, including the subject, purpose, methodology, results, discussion, and recommendations sections of the articles and papers. The review was conducted on January 15, 2023."

III. RESULTS

National and international studies on the use of chatbots in education were collected and their methodological tendencies were examined. The methodological trends observed in the analyzed studies included usability testing, experimental methods, case studies, qualitative methods (such as needs analysis), descriptive surveys, mixed methods, and product design.

Essel et al. [7] applied a pretest-posttest quasi-experimental design, representing a 2 × 2 design (experimental and control groups) with undergraduate students, to investigate the impact of a virtual teaching assistant (chatbot) that automatically responds to student questions. In a study by Abbas et al. [8], a mixed-design approach was adopted to address the decline in the utilization of the Lifelong Learning Center at the University of Leeds in the United Kingdom. Gonçalves et al. [9] adopted a case study research method in their study. Several studies focused on product development, such as Khalil and Rambech [10] and Sharma et al. [11].

Chatbots have been utilized to provide various instructional enhancements in different learning domains. Furthermore, the use of chatbot systems that provide educational support to the entire institution is more commonly observed. In the field of education, Paschoal et al. [12] examined chatbots as a learning partner that supports the teaching of a second language, recommends educational resources, and addresses students' concerns. Gonçalves et al. [9] investigated the process and outcomes of chatbot implementation in student support processes in three higher education institutions in Brazil. Similarly, Chen et al. [13] examined the effectiveness of a pedagogical chatbot in higher education, aiming to provide students with immediate and interactive assistance, and discussed its potential challenges and disadvantages. Chang et al. [14] developed chatbot technology that adopts lecture-based teaching to address the lack of interactivity and personalized feedback in traditional nursing courses and evaluated its ability to resolve the mentioned issues. Yildiz Durak [15] conducted research aimed at applying chatbot technology as a guidance tool in a visual design course and modeling its effects on visual design self-efficacy, participation, satisfaction, and learner autonomy. González et al. (2022) asked Software Engineering students to record their learning experiences in a course and created an Artificial Intelligence Virtual Assistant combined with a recommendation system to help future students make the most of these recordings. Sharma et al. [11] described the design and implementation process of a chatbot that aims to assist maritime trainees in learning Collision Avoidance Regulations.

In addition to system development studies, it can be observed that tools integrated into applications such as Telegram, WhatsApp, Slack, and Facebook Messenger are utilized. Heryandi (2020) and Khalil & Rambech [10] created chatbots using Telegram services capable of processing academic information.

IV. DISCUSSION

The aim of this research was to examine the studies on the use of chatbots in education. The findings of the study emphasized that chatbots can facilitate distance learning, particularly in online learning processes (e.g. [15], [16], [17]). Chatbots can provide feedback in educational environments and offer teaching and support services to students. They enable fast access to desired learning materials and can act as intermediaries in language teaching for writing and speaking tasks. In this context, research has highlighted that chatbots, especially AI-supported chatbots, can function as intelligent

teaching systems, providing personalized learning paths for students.

The responses generated by chatbots in education depend on the underlying technology used. For instance, Villegas-Ch et al. [18] and Yuan et al. [19] developed AI-based chatbot designs, while Yildiz Durak [17] implemented a rule-based chatbot design. However, it is worth noting that chatbot integration is mostly observed within applications like Telegram, WhatsApp, Slack, and Facebook Messenger (e.g., [10], [15], [17]).

V. CONCLUSION

Chatbots have been used in educational environments for different learning areas. Different technologies work in the background of chatbots. In the literature, it is emphasized that chatbot technologies based on artificial intelligence design will contribute to personalized learning processes. Nowadays, chatbots can help students to be involved in educational processes, increase their performance and follow their educational processes.

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