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Investigating the impact of utilizing artificial intelligence systems on language learners' productivity

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Abstract
The aim of this research is to "study the effect of using artificial intelligence systems on learners' learning efficiency". This is a descriptive-survey and applicable research, and of correlation type in terms of the relationships between variables. To achieve this goal, a statistical population consisting of 200 English language instructors and teachers in Tehran and a sample of 135 people were studied using the accessible method. Data collection was carried out using a questionnaire whose validity was confirmed by experts and its reliability by Cronbach's alpha coefficient. SmartPLS3 statistical software was used to analyze the data and test the hypotheses. The findings of this study show that blockchain technology, visualizations, intelligent teaching systems, adaptation and personalization systems have a positive and significant impact on the efficiency of English language learning, while the impact of assessment and evaluation and robot teachers on improving the efficiency of language learning has been rejected, and it seems that from the educators and lecturers' viewpoint, these systems cannot directly replace the teaching staff.

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Extended abstract

Introduction

With the industrial growth of societies and the advancement of technology, humanity achieves new inventions every day and tries to use them. In the light of technological progress and the emergence of new concepts of artificial intelligence, this knowledge has also entered a new stage of its life, in such a way that today, human hope for the realization of the long-standing dream of creating an artificial human has increased (Lee et al., 2024).

In today's digital age, e-learning has become an essential part of educational systems around the world, and new technologies in education have caused tremendous changes. Artificial intelligence systems offer a promising solution to the challenges associated with error detection and correction in educational content. These intelligent systems have the ability to analyze large volumes of data and identify inconsistencies, inaccuracies, and grammatical errors that may exist in digital learning resources (Sadr & Khani, 2024).

Using advanced algorithms and natural language processing techniques, artificial intelligence systems can effectively detect and correct errors and ensure the delivery of accurate and reliable educational content. In addition, artificial intelligence systems can significantly reduce the workload of educators and content producers. By automatically detecting and correcting errors, they can focus on developing engaging and innovative educational content instead of spending valuable time on tedious correction tasks. The need to detect and correct errors in educational content is undeniable. The introduction of AI systems presents an exciting opportunity to revolutionize e-learning by ensuring accurate and error-free delivery of educational content. By harnessing the power of AI, we can create a more efficient and effective learning environment that empowers language learners and teachers alike (Huang et al., 2023).

In summary, this study can help educators and learners to fully utilize the potential of AI in language teaching and make the learning process more effective and enjoyable for everyone. Finally, considering the above, the purpose of the present study is to answer the question: what is the impact of using AI systems on language learners' learning efficiency?

Theoretical foundations

Definition of artificial intelligence

Artificial intelligence is generally referred to as any hardware or software program that exhibits behavior that appears intelligent, or the ability of a digital computer or a robot controlled by a computer to perform tasks typically attributed to intelligent beings. Typically, this term refers to the project of developing and designing systems equipped with human thinking systems; such as the ability to think, discover meanings, generalize, draw conclusions, and learn from past experience (Takhshid, 2021).

Some of the points that psychologists use to describe human intelligence have been effective in assigning intelligence to computer performance. These points, which can also be useful for understanding artificial intelligence, include the ability to adapt to new situations, learn, reason, solve problems, perceive, and use language. Another useful definition for describing artificial intelligence is the one provided by the European Commission's Artificial Intelligence Expert Group; as follows: "Artificial intelligence systems are systems of software (and sometimes even hardware) designed by humans to act, when given a complex task, physically or digitally, by understanding their environment by acquiring data and analyzing and interpreting the acquired structured or unstructured data, reasoning based on the findings or by analyzing the information they have obtained from this data, and deciding to perform the best action with the aim of performing the initial task." Artificial intelligence systems can

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learn symbolic rules or numerical models. They can also adapt their behavior based on analyzing the impact of their previous actions on the environment (Takhshid, 2021).

Learning English

There are different opinions on the definition of bilingualism; from a minimum familiarity (a few words) to complete mastery of two languages. Bilingualism is sometimes interpreted as the ability of an individual to use two different languages, and a bilingual is considered to be an individual who is proficient in two languages to the extent that he can use each of the two languages alternately and in place of the other, as necessary (Sharadgah & Sa'di, 2022).

Sometimes bilinguals are defined as those who use two or more languages in their daily lives. From the definition of bilingualism, it can be seen that there is no difference between bilingualism and multilingualism. Hagen, while calling the phenomenon of bilingualism relative, considers the ability to fully express oneself in a second language and to transfer concepts to a second language as a criterion for bilingualism. Bilingualism can also be divided into two categories: additive and subtractive; in the first category, the addition of a second language to a person's first language has a positive effect on their cognitive and social skills, and in the second case, learning a second language leads to a deterioration in the person's first language (Sharadgah & Sa'di, 2022).

Examining the efficiency of language learners' learning based on artificial intelligence teaching methods

With the world becoming more digital, we are witnessing a significant change in education, in which the combination of humans and technology opens doors to new opportunities. Educational environments and the field of education are also affected by transformative technologies, or in other words, education; and educational centers need to adapt to the use of new technologies and digital transformation, which further strengthens teaching and learning (Ronaghi & Feiz, 2021).

“Smart education” as a global scenario is a byproduct of a smart environment where teachers and learners interact with technology. Such a smart system facilitates educational services and ultimately makes them customer-centric. Smart education provides users with e-learning technologies, software, and Internet-based hardware systems. Many educational environments around the world have successfully implemented smart education systems and facilitated the optimal use of learning tools. Therefore, considering that smart education technologies such as the Internet of Things and artificial intelligence are becoming one of the most popular approaches to achieving educational goals, they have enabled the transition from education to smart education and have played an important role in creating a smart educational environment. Given these conditions, educational environments must constantly embrace change and face technological trends if they want to build a good future for their customers. They should also strive to improve the quality of education and move in step with the development of technology by applying new methods in the teaching and learning process (Zhai & Wibowo, 2023.)

Research Method

This research is applicable in terms of its purpose, and descriptive-survey in terms of its research method. The statistical population of the research is 200 English language instructors and teachers in Tehran, from which a sample of 135 people was selected by an accessible method, and a questionnaire was distributed among them. The research data collection tool was a standard questionnaire. In this research, structural equation modeling with the help of the partial least squares method and PLS software was used to examine the hypothesis testing and model accuracy. PLS is a variance-based approach that requires fewer conditions

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compared to similar structural equation techniques such as LISREL and EMON, and its main advantage is that it requires fewer samples compared to LISREL modeling.

Research findings

Given the benefits of artificial intelligence as an emerging technology in smart educational environments that is ushering in a new era in this field, the aim of this research is to investigate the impact of applicable components of artificial intelligence systems on English language learning in smart educational environments. The seven components related to artificial intelligence that the researcher has investigated to verify the effectiveness of these systems are:

1- Smart teaching systems,
2- Assessment and evaluation,
3- Adaptation and personalization systems,
4- Teacher robots and chatbots,
5- Visualizations,
6- Blockchain.

In the present study, a researcher-made questionnaire was designed and the impact of the above components on English language learning was measured, which is presented in the following research findings. According to the results obtained from the path coefficient (indicating the intensity and type of relationship between two latent variables) and the t-statistic, it can be seen that blockchain technology, visualizations, intelligent teaching systems, adaptation, and personalization systems have a positive and significant effect on the efficiency of English language learning. In contrast, the effect of assessment and evaluation and robot teachers on improving the efficiency of language learning has been rejected, and it seems that from the perspective of instructors and lecturers, these systems cannot directly replace the entire teaching staff.

Discussion and Conclusion

The results of the present study showed that blockchain technology, visualizations, intelligent teaching systems, adaptation, and personalization systems have a positive and significant effect on the efficiency of English language learning; while the effect of assessment and evaluation and robot teachers on improving the efficiency of language learning has been rejected, and it seems that from the perspective of instructors and lecturers, these systems cannot directly replace the teaching staff. These results are in line with the results of Dadkhah et al., (2024), Niko (2024), Herdina & Ain (2024), and Ayotunde et al., (2023).

Personalization with artificial intelligence is carried out through data mining, learning analysis, and creating interaction in a personalized learning space, and is now also used in educational environments. Other tasks of these systems are to support teachers in designing learning and teaching, and using academic data to monitor and guide students. In the component of teacher robots and chatbots, teacher simulation is one of the most important goals of artificial intelligence. Teacher robots or AI-based teaching assistants are humanoid robots with conversational capabilities that have excellent problem-solving performance and can teach actually or virtually.

Visualizations have added new opportunities and benefits to the education process. Therefore, learners enjoy the learning experience in virtual learning environments and are better engaged in learning. For example, some experiments are expensive or dangerous, or it is not possible to physically be present in certain historical environments; in this case, artificial intelligence comes to the aid of education and makes the environment and conditions accessible using emerging visualization technologies. In visual environments, learners develop and strengthen

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their understanding, skills, and experiences without facing the fear of failure, danger, or any other negative consequences. Another capability of AI is its use in blockchain. The use of blockchain in reputable educational environments is expanding. Issuing and storing electronic certificates and diplomas is the most widespread area in which blockchain technology is used. Another widespread application of blockchain in education is recording learner records. Blockchains can also make the work of educators easier by using smart contracts (learner curriculum management).