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AI Chatbots in English Language Teaching and Learning: A Critical Review

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Abstract

AI chatbots are an AI-driven platform. AI chatbots help students set goals and improve their English learning outcomes by leveraging data through machine learning. Machine learning is one of the applications of AI. It is the process of using mathematical models of data to help computers learn without direct instruction. Machine learning algorithms improve their performance over time as they have more data. Machine learning is similar to how students learn English on their own. Students' English ability improves over time as they are able to learn on their own and are exposed to English (outside the classroom). This article details an innovative approach to English learning based on machine learning. It also introduces the potential of a student-centered approach that incorporates the use of AI chatbots.

Keywords: AI chatbots, Machine Learning, Student Centered Learning, English learning

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INTRODUCTION

The unbridled explosion of AI chatbots and the post-COVID-19 era have fueled the demand for English learning on online learning platforms (Annamalai, Rashid, et al., 2023). AI chatbots have become an essential tool to enhance English education. AI chatbots can provide personalized support. The support and feedback from chatbots are real-time and instantaneous. As technology continues to evolve, it is inevitable that businesses will integrate and use AI chatbots. This shift has highlighted the need for English students to be employable after graduation. The future of English education is shaped by the changes in AI chatbots (Nawaz & Gomes, 2019). These changes have the potential to create more personalized, engaging, and effective learning experiences. And ultimately, support students to adapt to the new demands of the 4.0 workforce. It is important to address the challenges associated with AI chatbots. Universities need to ensure that all students have the support they need to engage with AI chatbots. Continuous evaluation and improvement of AI chatbots is essential to maintain high standards of English language education.

English is the dominant language in global communication (Crystal, 2003). English plays a key role in developing economies like Vietnam. The importance of English in scientific research, technological advancement, professional fields (Warschauer, 2000). In Vietnam, AI

chatbots are increasing due to the competitive job market and the demands of international employers. This has significantly increased the skills of English graduates. Advances in AI chatbots are transforming English learning. Chatbots provide personalized learning experiences. Chatbots are accessible and engaging. Chatbots also help learners improve their language proficiency and enhance their employability. The future of English learning lies in integrating AI technologies with a student-centered approach. By leveraging the potential of AI chatbots, students can create more effective and comprehensive English learning opportunities. AI chatbots empower students to thrive in a globalized world.

The post-COVID-19 era has seen an increase in investment in AI technologies, including chatbots (Annamalai, Rashid, et al., 2023). As organizations realize their potential in improving work efficiency, employees are required to be skilled in using AI chatbots. In every sphere of life, investment in AI has led to the development and deployment of more sophisticated AI chatbots. Chatbots can handle a variety of tasks and interactions. This paper presents an in-depth analysis of the impact of AI chatbots on English language learning. The sudden shift to remote learning due to Covid 19, coupled with rapid advances in AI, has significantly changed the English language education landscape. This paper explores the similarities between machine learning and student-centered learning methodologies. This paper examines the benefits and challenges of AI chatbots and the growing need for digital learning solutions.

THEORETICAL FRAMEWORK

Self-directed learning is becoming increasingly important in a globalized and digital world. For English as a Second Language (ESL) students, motivation plays a key role in guiding their learning journey. This theoretical framework explores four types of theories: Learning Theoríe, Motivational Learning Theories, Computer Science Theories, and Stephen Krashen's Second Language Acquisition (SLA) Theory.

Learning theories

Constructivism believes that learners are active agents in their own educational journey (Freeman et al., 2014). Learners engage with content, construct their own understanding, and seek knowledge through experience and interaction. This approach contrasts with traditional educational models. Traditional education is about passive learners receiving information from teachers or textbooks. Constructivism encourages learners to question, explore, and synthesize information in order to seek knowledge (Hunter, 2015). Technology provides a variety of tools and platforms to create dynamic learning environments. These environments simulate real-world contexts and provide interactive elements. For example, AI chatbots allow students to experiment and explore without being constrained by physical resources. Integrating technology into constructivist learning environments transforms these principles into innovative learning experiences.

Learning motivation theories

Motivation is a complex human phenomenon (Lin & Chang, 2023). Motivation is influenced by internal desires, external factors, and social context (Annamalai, Eltahir, et al., 2023). Theories that drive motivation include *Self-determination Theory, Expectancy-Value*

Theory, and *Social Cognitive Theory*. These four theories all provide valuable insights into different aspects of motivation. Integrating these theories provides a comprehensive understanding of what drives human behavior. These theories also emphasize the importance of intrinsic motivation and efficacy. Social influences affect the alignment of tasks, interests, and personal goals. By applying these principles in self-studying English, students can create an environment that promotes motivation, learning engagement.

Self-determination theory was developed by (2022). This theory suggests that individuals are motivated by intrinsic motivation rather than external pressure. The theory identifies three core psychological needs that are necessary to drive motivation. These three needs are autonomy, competence, and relatedness. Autonomy refers to an individual's need to feel in control of their actions and decisions. When students engage in activities because they are rewarding, they feel a sense of autonomy. This intrinsic motivation leads to higher engagement and satisfaction than external rewards or pressures. For example, a student who chooses to study a subject because of genuine interest is more likely to engage deeply and perform better. When students perceive themselves as competent, they are more likely to accept challenges and persevere in the face of difficulty. This sense of competence is reinforced through feedback and support. For example, students who receive feedback and support are more motivated to continue practicing and striving. When students feel supported, their intrinsic motivation is enhanced. This need for relatedness is particularly evident in student-centered learning.

The expectancy-value theory was developed by Eccles and Wigfield (2002). This theory consists of two main components: expectancy and value. Individuals make decisions and engage in tasks based on their beliefs about their abilities. Expectancy refers to an individual's belief about the possibility of success. This belief is influenced by experiences, self-perceptions, and feedback from others. For example, a student who believes that he or she can master English will invest time and effort in learning. Value includes the importance of the task. Value can be divided into four subcomponents: intrinsic value, achievement value, utility value, and cost. Students who enjoy English will find intrinsic value in using English outside the classroom. If students consider themselves experts in the field of English, they may value mastering English skills. Students value learning English because it is necessary for their desired career path. Learning English simply and not meeting the development of technology 4.0 requires a lot of effort and can be considered too time-consuming. Similar things can reduce the ability to participate in learning.

Social cognitive theory was developed by Bandura (2012). The theory emphasizes the role of observational learning, self-efficacy, and social influence. Individuals learn and are motivated through the interaction of personal, behavioral, and environmental factors. English language learners can observe native speakers speaking English, memorize vocabulary, pronunciation, and practice. English language learners can solve complex communication problems if given many opportunities to practice. These help students develop strong confidence in problem solving. Supportive teachers and peers can boost students' confidence and motivation to achieve academic success.

Theories of computer science

Computer science theory is a rich canvas (Walter, 2024). It encompasses concepts ranging from algorithms and automata to complexity theory and cryptography. These theories provide an intellectual framework for understanding the capabilities and limitations of computers. They speak to the fundamentals of software design, artificial intelligence, and cybersecurity. By exploring the foundational theories of computer science, English students can better use AI chatbots. This drives innovation and shapes the future of digital English learning.

Stephen Krashen's theory of second language acquisition (SLA)

Stephen Krashen is a renowned figure in the field of second language acquisition (SLA) (Krahnke & Krashen, 1983). He is known for his influential theories that have shaped our understanding of how individuals acquire language. His work has had a profound impact on language teaching methods. This work has guided educators in creating more effective learning environments for language learners. Krashen's theories include: the acquisition-learning hypothesis, the monitoring hypothesis, the input hypothesis, the natural order hypothesis, and the affective filter hypothesis. His theories emphasize the importance of exposure to comprehensible input. The importance of affective factors in language acquisition and the distinction between acquisition and learning. By applying Krashen's principles to English language learning contexts, students can create more effective learning environments for themselves.

A CASE STUDY AT A PUBLIC UNIVERSITY

This paper used a mixed-methods research approach. This approach provided a comprehensive assessment of the impact of student-centered learning strategies through feedback and AI chatbot support. By integrating both quantitative and qualitative research techniques, the study provided insights into AI chatbots. Chatbots contribute to student engagement, learning outcomes, and learning experiences. AI chatbots as a valuable tool for facilitating self-directed, personalized learning experiences. As students explore their own English learning strategies with AI chatbots, chatbots support improved self-directed learning and learning outcomes.

Methodology for a comprehensive assessment of the impact of AI chatbots on student-centered learning strategies. The study sampled 211 students from classrooms at HUIT. The 211 students were diverse in terms of gender, experience, and English proficiency.

A survey was administered to a sample of 211 students. The survey consisted of three separate sections: Personal Information, Assessment of the Impact of AI Chatbots on Learning Experience, and Assessment of the Impact of AI Chatbots on Student Engagement and Academic Achievement. The survey took approximately five minutes to complete.

Furthermore, an in-depth interview was conducted with eight students, selected from the 211 students initially surveyed. The interview was designed to delve into aspects of the Student-Centered Learning Strategy using AI Chatbot Feedback and Support. The interview took approximately ten minutes to complete. The interview was designed to uncover insights that may not have been fully captured by the quantitative survey. The interview consisted of a total of 20 questions. The interview was divided into five parts: i) Students' perceptions of the utility of Chatbots for self-learning, ii) Influence of Chatbots on self-regulation strategies, iii)

Role of Chatbots in promoting personalized learning, iv) Support of Chatbots for developing metacognitive skills, and v) Comparison of the effectiveness of Chatbots and instructor support for self-learning.

AI CHATBOTS IN LANGUAGE LEARNING

AI, in its broadest sense, is the performance of digital computers and robots on tasks performed by humans (Rapp et al., 2021). The development of AI is expected to be able to simulate human thought processes such as reasoning, integration, and analysis. AI includes various fields such as machine learning and deep learning (Janiesch et al., 2021). Machine learning uses learning algorithms to extract insights from data without being explicitly programmed. Deep learning is a subset of machine learning, Deep learning simulates the structure and function of the human brain to process different types of information.

The history of AI chatbots dates to the 1960s. Joseph Weizenbaum developed the first chatbot ELIZA (Rajaraman, 2023). ELIZA used pattern matching techniques to simulate conversation. In the following decades, more sophisticated chatbots emerged. Examples include SHRDLU and PARRY in the 1970s and 1980s (Shum et al., 2018). SHRDLU and PARRY demonstrated the ability to understand and respond to natural language queries.

The 1990s and 2000s saw the rise of popular chatbots such as SmarterChild and AIBO. SmarterChild and AIBO were primarily used for customer service applications on platforms such as AOL Instant Messenger. In the 2010s, more sophisticated chatbots such as LaMDA and Mitsuku emerged. LaMDA and Mitsuku could create coherent and realistic conversations.

In the 2020s and beyond, chatbots are increasingly capable of understanding human language and are expected to play a more important role in many aspects (Rajaraman, 2023). Researchers continue to push the boundaries of AI development. It is necessary to redefine concepts such as intelligence, reasoning, and perception. This will help to exploit the full potential of AI and ensure its benefits to society.

AI has transformed human cognition. AI chatbots have the potential to improve productivity and solve complex social problems (Labadze et al., 2023). AI chatbots come in various forms designed for specific purposes. AI chatbots include text-to-speech, voice-to-text, and text-to-image. Platforms such as ChatGPT, Microsoft Copilot, and Maika AI etc. provide a wide range of functions to meet different user needs.

In education, AI chatbots are increasingly used to enhance the learning experience. Chatbots have provided learners with personalized feedback that adapts to their individual needs. However, the abundance of AI-generated materials poses both challenges and opportunities in English education (Bednar & Welch, 2020). These challenges require universities to navigate and effectively utilize AI resources. The widespread adoption of AI chatbots across a variety of self-study English areas highlights their versatility and potential. AI chatbots are a powerful tool for streamlining processes, improving efficiency, and driving innovation.

STUDENT-CENTERED LEARNING (SCL)

The concept of student-centered learning (SCL) originated in the progressive educational movements of the 20th century. SCL was advocated by influential philosophers such as John Dewey, Paulo Freire, Jean Piaget, Anita Harrow, and Lev Vygotsky. These thinkers advocated

SCL because SCL prioritizes the abilities, needs, and interests of individual students. SCL contrasts with traditional teacher-centered approaches (Singhal, 2017) . SCL places students at the forefront of the learning process, empowering them to take an active role both in and out of the classroom.

In essence, SCL represents a shift in educational philosophy from passive reception to active participation. SCL emphasizes the importance of experiential learning (Estes, 2004). SCL also emphasizes critical thinking, problem solving, self-reflection, and the pursuit of knowledge relevant to career paths. SCL aims to foster lifelong learning skills. This skill is essential in a rapidly changing world.

In an era of rapidly evolving technology, traditional teaching methods are no longer relevant. Traditional methods face challenges in keeping up with the evolving landscape of knowledge dissemination. The advent of AI has changed the way information is accessed, processed, and applied. SCL empowers students in line with the needs of a technology-driven society. Active learning is at the core of SCL. SCL enables students to gain a deeper understanding of concepts and enhance their learning effectiveness (Singhal, 2017). SCL also aims to instill in students the mindset and skills necessary for lifelong learning. AI and automation are reshaping industries and the job market, the ability to adapt, learn, and innovate is becoming increasingly important.

The rise of AI chatbots and automation technology has led to concerns about job displacement. In the field of English language learning, students are required to develop skills that go beyond what machines can replicate. SCL encourages students to develop critical thinking, creativity, and adaptability. SCL helps students confidently navigate the complexity of information (Ang et al., 2001).

SCL is not only a pedagogical approach but also a research topic in psychology (Hannafin et al., 2014). Researchers explore the cognitive, emotional, and motivational factors that influence learning outcomes. By understanding SCL, universities can adjust their teaching strategies to optimize student engagement and achievement.

As technology continues to shape the educational landscape, SCL remains a relevant and effective approach to empowering learners. SCL promotes active learning, fosters lifelong learning, and addresses the impact of AI and automation. SCL equips students with the skills and mindsets needed to thrive in an ever-changing world. As universities continue to explore the possibilities of SCL, it is essential to recognize the philosophical and psychological underpinnings of SCL. This maximizes its potential to enhance student learning and success.

MACHINE LEARNING VS. HUMAN LEARNING

Machine Learning (ML) is at the forefront of modern technological advancements (Vanneschi & Silva, 2023). ML revolutionizes many industries by allowing computers to learn from data without being explicitly programmed. ML is a system that learns from examples through a process of self-improvement, using statistical tools to predict outcomes based on input data. In essence, ML seeks to emulate the human learning process. Individuals gain knowledge through experience, observation, guidance, and emotion. Programmers meticulously write rules based on a logical foundation and guide the machine's output. However, as systems become more complex, this becomes increasingly unsustainable.

ML provides a paradigm shift. This model allows machines to learn from data and generate rules automatically, reducing the burden of manually writing rules (Sarker, 2021). The iterative process of perceiving input data and corresponding outputs has the potential to continuously improve over time.

The essence of machine learning lies in the ability to learn and reason from examples (Hagendorff & Wezel, 2020). This is like the learning process of humans. Just as humans rely on past experiences to make predictions, machines analyze data to generate insights and predict outcomes. However, like humans, machines face challenges. These challenges include unfamiliar situations, the importance of data, and powerful algorithms.

The goal of machine learning is to learn from available examples and reason effectively (Vanneschi & Silva, 2023). This learning process depends on careful selection and management of data. The quality and relevance of input data deeply affects the learning outcomes of machines.

In self-learning English, integrating AI chatbots brings a new approach to learning. This empowers learners to access information and derive knowledge autonomously. Traditionally, learners rely on expert guidance from teachers and instructors to acquire new knowledge. Each instructor has their own strengths and perspectives. This traditional learning model may not be sustainable in the face of the constant change of AI (Jackson, 2019).

Learning with AI chatbots provides solutions to the challenges. AI chatbots provide learners with on-demand access to information and promote self-directed learning. Learners are engaged in the self-learning process. Learners actively seek information, ask questions, and draw inferences independently (Nisbet & Shucksmith, 2017). This way of learning not only enhances learning ability but also promotes critical thinking and problem-solving skills.

The self-learning process involves carefully selecting and evaluating data provided by AI chatbots. Learners must independently distinguish relevant information from a huge pool of data. Learners must also learn how to leverage AI chatbots as tools to support knowledge discovery and reasoning (Chang et al., 2023). When learners ask questions, AI chatbots contribute to the learning process and iterative refinement. AI chatbots help shape the path for self-education.

ML represents a transformative force in the education sector (Belda-Medina & Calvo-Ferrer, 2022). ML offers unparalleled opportunities for personalized and self-directed learning. By leveraging AI chatbots, students can access information, ask questions, and more. However, the success of ML depends on the thoughtful integration of technology with pedagogical principles.

CONCLUSION

The integration of AI chatbots into SCL has significantly changed the traditional methods. This paper has investigated how AI chatbots affect students' motivation, competence, and satisfaction. These factors are important components of effective self-learning. By understanding these perspectives, universities can better prepare students to meet future career challenges.

Students' interactions with AI chatbots significantly impact their individual learning process. AI chatbots affect students' cognition, motivation, and learning attitudes. AI chatbots provide content that is tailored to each student's learning style and pace. This is important for

effective knowledge acquisition and retention. This personalized approach enhances students' self-learning ability and fosters lifelong learning habits.

AI chatbots are associated with increased student motivation and satisfaction. Chatbots help build language proficiency and confidence in using English. Positive reinforcement and immediate feedback from chatbots can make learning more engaging and enjoyable. This boosts motivation.

AI chatbots provide personalized learning experiences. Chatbots respond to the needs of individual students. Some students may focus on grammar. But others prioritize communication skills. AI chatbots improve language knowledge and comprehension. Chatbots increase student satisfaction and improve learning outcomes.

AI chatbots enhance students' self-learning, critical thinking, and ability to ask questions. These are essential skills for lifelong learning. These tools encourage students to take responsibility for their own learning. AI chatbots promote independence and a proactive approach to acquiring new knowledge. This self-directed approach is especially important in the changing demands of the workforce.

Taking an empirical perspective, this paper empirically investigated the effectiveness of AI chatbots in enhancing student engagement and satisfaction. This approach provided quantitative data to support the integration of AI chatbots into the English language curriculum. The data demonstrated the impact of chatbots on students' educational experiences.

The comparative perspective explored the diverse and contextual factors surrounding the use of AI chatbots. The comparative perspective considered students' subjective experiences, beliefs, and values. Qualitative analysis shed light on the multifaceted role of AI chatbots in English language learning. The data provided insights into how these tools can be designed to meet students' needs and preferences.

This paper combined both perspectives. This paper bridged the gap between empirical evidence and contextual understanding. This approach ensured that the implementation of AI chatbots was more comprehensive.

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