

Reviewing the Influence of AI-related Technologies on the Intrinsic Motivation of Students to Learn English as a Second Language

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Abstract. In the age when AI is prevalent in the world, teachers will use AI tools more frequently to teach students in educational contexts. With the assistance of AI, students tend to show more interest in learning English. This paper is to review the influences of AI-related technologies on the intrinsic motivation of students to learn English as a second language, drawing upon two perspectives, including the positive influences and negative ones. In terms of the benefits of AI technologies on student intrinsic motivation in learning English, it can be concluded from the reviewed research papers that AI can foster student engagement and teacher-student interactions, enhance personalized learning and student autonomy, as well as reduce learner anxiety. From the negative side, this paper also finds from the articles that AI could also cause over-reliance on technology as well as a lack of human connection, which may hinder student motivation in learning English. Lastly, this paper points out the future research directions, including the situations where students lack intrinsic motivations to learn English when using AI tools, as well as how to solve the adverse effects caused by AI tools.

1 Introduction

In the age of a digital world, educators have tried to apply a wide variety of AI technologies in teaching English to students of other languages (TESOL). Some common AI tools that assist students in learning English are chatbots, text-to-speech, speech-to-text, augmented reality (AR) and virtual reality (VR). Researchers have done a large quantity of research on the influences of these AI tools. A comparison experiment demonstrates that learning based on AI can promote students' motivation [1].

This paper aims to review the impacts of these AI-related technologies on the intrinsic motivation of students to learn English as a second language. The theories that this paper is based on are self-determination theory (SDT), which is “a macro-theory of human motivation, emotion, and development that takes interest in factors that either facilitate or forestall the assimilative and growth-oriented processes in people” [2]. According to the theory, there are three essential psychological factors that can drive the intrinsic motivation of students, which are “autonomy”, “relatedness”, and “competence” [3]. A large amount of empirical research

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indicates that intrinsic motivation contributes to student engagement and autonomous learning in the field of education. Therefore, SDT has a profound impact on classroom practice. Intrinsic motivation refers to “behaviors done in the absence of external impetus that are inherently interesting and enjoyable” [2]. To improve students' internal interest in learning English, teachers must adapt their teaching methods and personalize their teaching content frequently. However, the invention of AI and its application in education challenges the traditional form of teaching, making a significant difference to the conventional teaching practices in the educational system.

This review paper focuses on two aspects of the influences of AI on students' intrinsic motivation to learn English as a second language: positive influences and negative influences. In addition, this paper also analyses the possible solutions to counteract the adverse effects of AI tools on students' motivation.

2 Positive influences

2.1 Fostering student engagement and teacher-students interaction

Student engagement and interactions between teachers and students are two crucial factors that promote students' confidence and motivation in learning. Multiple authors have mentioned that AI can improve students' engagement in learning English as a second language.

To start with, AI tools can motivate students by enhancing student engagement and facilitating teacher-student interaction. Annamalai et al. conclude from their research that chatbots use text, audio, and visual cues to engage learners, improving retention and interaction [4]. For instance, the presence of the Nao robot introduces a ‘dynamic element’ to the classroom, which breaks traditional learning patterns and sparks curiosity [5]. Nao facilitated active learning through interactive exercises such as oral comprehension and filling in missing words. This active role is more engaging than the passive reception of information.

Besides, as Zhao mentions, AI platforms can integrate badges, progress tracking and rewards in students' learning systems to motivate students [6]. On top of this, Zhao and Khattak et al. both state that AI tools such as speech recognition and grammar checkers can offer instant feedback, helping students correct errors immediately and stay engaged [6,7]. While primarily a pedagogical affordance, the ability of AI to give immediate, real-time corrective feedback (e.g., through tools like Grammarly for writing or speech analysis for pronunciation) supports motivation [8]. This feedback loop helps students see progress quickly, reinforcing their efforts and encouraging persistence.

Moreover, Manimurasu demonstrates that AI tools such as text-to-speech and speech-to-text support diverse learners, including those with disabilities, ensuring equitable engagement in class by facilitating the interactions between teachers and students [9]. Additionally, Dai and Wu found that students who interacted with a conversational bot demonstrated a higher engagement grade than those who did not, especially in practicing oral English proficiency [10]. Lastly, chatbots can handle routine tasks such as quizzes, freeing teachers to concentrate on personalized feedback and deeper discussions [4].

2.2 Enhancing personalization and autonomy

Each student has their own pace of learning and different learning needs. AI tools can provide personalized learning experiences for students. Researchers find that AI-powered conversational bots can provide personalized and adaptive feedback, further improving

learners' engagement [5,10]. The study of Liu and Yue demonstrates that the AI system analyses individual student data such as homework completion, test scores, and wrong-question types to identify specific strengths and weaknesses, which provides teaching plans and personalized learning resources [11]. For example, a student struggling with grammar receives targeted grammar exercises. Satisfying individual learning needs effectively enhance students' learning interest and participation, making learning feel more purposeful and manageable. The "teaching by learning" English teaching model supported by big data is noted for its remarkable counseling effects, especially for students with weak English foundation [11]. Providing these students with targeted guidance allows them to experience success in their specific areas of difficulty, helping build confidence based on students' competence. The model also incorporates an instant feedback mechanism that continuously monitors student progress. This allows for timely adjustments to teaching strategies and provides opportunities for positive incentives for students who show remarkable progress. This dynamic, responsive system helps maintain student engagement and motivation by making them feel supported and recognized for their efforts.

Moreover, Zhao also argues that AI-driven learning platforms can enhance students' engagement by allowing learners to progress at their own pace [6]. For instance, tools like Baidu AI Cloud can customize exercises and feedback to improve students' learning motivation. AI technologies can be used to give personalized instructions, recognize students' learning patterns, draw conclusions, and provide individual advice via data analysis and algorithm adaptation, creating a personalized and customized learning path for each student [12]. Personalized learning materials produced by AI can meet the unique learning needs of students with various language proficiency levels and learning preferences, which can further motivate students with diverse learning needs.

AI-related technologies can also enhance students' self-regulation and autonomy. It is acknowledged that AI tools are effective in helping students with goal setting, clarifying learning objectives, and developing strategies [8]. This fosters a sense of autonomy and learning independence, which are key components of intrinsic motivation. Besides, Annamalai et al. point out that learners can learn English anytime and anywhere, which strengthens their self-regulation and enhances their motivation [4].

2.3 Reducing learner anxiety and social pressure

Students are distinct in their characteristics and personalities. For students who are introverted and shy to speak, AI tools can function as a very effective tool to help them overcome the mental obstacle. According to Annamalai et al. and El Shazly, AI-related technologies can reduce learner anxiety and social pressure, especially for English speaking practice [4, 13]. Crompton et al. point out that AI provides a safe environment for learners who often fear making embarrassing mistakes in front of peers [8]. Interacting with an AI partner like a chatbot or voice assistant reduces the social anxiety associated with speaking and making errors. Annamalai et al. state that AI tools can improve students' competence and confidence in that chatbots enable students to practice English in a non-judgmental environment, which can reduce their fear of making mistakes [4]. El Shazly has a similar insight to Annamalai et al. but focuses more on the impact on oral speaking [4, 13]. Liu et al. and Zhou et al. also find that AI chatbots can reduce learners' speaking anxiety by enabling them to learn, play and interact with peers at the same time, thus improving their oral proficiency in English [11]. Zhang points out that a convolutional neural network-based learner emotion recognition method can enhance responsive and empathetic interaction between students and robots, which can reduce students' anxiety levels and make the learning process feel more natural and supportive [14]. A learning environment that "understands" a student's feelings can build trust and encourage continued participation.

3 Negative influences and possible solutions

3.1 Over-reliance on technology and lack of human connection

Despite the benefits that AI tools can bring in facilitating students' motivation in learning English as a second language, problems still exist when AI tools are used too much in learning contexts. Three authors mentioned the challenge of using AI in teaching English that over-reliance on AI tools would easily cause a lack of human connection. According to self-determination theory, the concept of relatedness, which refers to the experience of connection to others [3]. Having sufficient connection to other individuals such as peers or teachers can make students more motivated in learning [4]. This means a learning environment full of connection can benefit students through their interactions with others. Annamalai et al. find that a blended learning environment provides more benefits for students as combining chatbots with face-to-face teacher interactions helps clarify doubts and address complex questions [4]. Some authors point out that there is an emotional gap between students and AI robots in that chatbots may lack emotional empathy with students. In addition, Zhao also mentions that over-reliance on AI-related technology will cause a reduction in individualized engagement of learners and the emotional support they can gain from real human interaction [6]. Furthermore, Liu and Yue point out that long-term exposure to learning content with continuous technological errors without timely correction will make students prone to developing bad habits and affect students' learning rhythm across the whole semester, thus reducing their confidence of learning [15]. Léon-Henri et al. also noted that factors like typing speed and audio comprehension could affect the experience for some individuals, indicating that the motivational boost is not entirely uniform and depends on individual learner differences [5].

3.2 Potential solutions to the negative influence

Non-technical solutions can be integrated into the technological teaching and learning environment to mitigate the adverse effects brought by over-reliance on technology. To improve students' individualized engagement, teachers are essential for fostering relatedness and social presence [4]. For instance, teachers can observe and supervise students' learning behaviours (e.g., class engagement, problem-solving behaviours, group discussions participation) regularly to ensure that students can develop good habits of learning as they use AI tools to learn English [15]. Also, students can keep diaries daily in which they can record their learning experiences, challenges, thoughts and feelings to help teachers tell students' learning needs and mental status [15].

Concerning the technical method to deal with the drawback, Zhang mentions that AI technology equipped with a convolutional neural network for facial expression recognition can detect a learner's emotional state in real-time (e.g., happy, bored, focused, sad) [14]. This function allows a smart learning system to adapt dynamically. For example, If the system detects boredom or confusion, it can automatically adjust the learning interface to re-engage the student and maintain a positive emotional state. By intervening before negative emotions like frustration or sadness lead to disengagement, the technology helps sustain motivation. Zhang also emphasizes building a comprehensive "learner model" that includes not just cognitive data like knowledge level but also affective states, emotion type and intensity [14]. This model allows for hyper-personalized interactions. The learning content and the way it is presented can be tailored not only to what the student knows but also to how they are feeling, making the experience more relevant and supportive, which boosts intrinsic motivation.

4 Conclusion

This paper reviews three positive influences and one negative influence of AI on intrinsic motivation. The advantages include fostering student engagement and teacher-students interaction, promoting personalization and autonomy, and reducing learner anxiety as well as social pressure. Regarding the benefits, firstly, AI-related technologies can foster student engagement in learning English as well as teacher-student interactions [4-7, 9, 10]. Secondly, AI tools can improve students' personalization and autonomy in learning English (4, 6, 10, 12, 15). Thirdly, AI technologies can also help learners build confidence and reduce their anxiety and social pressure in English speaking (4, 13, 14). Conversely, the disadvantage involves over-reliance on technology and a lack of human connection. The negative influence concluded in this paper is the over-reliance on AI technology and lack of human connection (4-6, 11, 15).

Overall, these influences are not predetermined by the technology itself but by how it is used. Through the examination of these articles, even though AI can benefit learners in cultivating their intrinsic motivation, human educators should also play the dominant role in the AI-assisted learning process. It is also found that academic journals mentioning positive influences of AI technology on students' motivation of learning English are far more than those having insights into the negative influences. Although many journals have insights on the advantages, only few journals have mentioned the drawbacks of AI tools on students' motivation of learning English. Further research can explore some challenges that students may face during their use of AI tools to learn English in class and how to address these problems. Filling this research gap can assist researchers in identifying how AI tools can be integrated more effectively in human teaching to help students build confidence in learning English as a second language.

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