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A Review Study on the Dialectical Relationship Between Artificial Intelligence (AI) Technology and Students' Quality of Life (QOL)

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Abstract
In the context of comprehensive digital transformation in higher education, Artificial Intelligence (AI) has transcended its role as a mere technical tool to become an environmental factor that shapes the living and learning ecosystem of students. This paper provides an in-depth and comprehensive review of the relationship between AI and students' Quality of Life (QOL), based on a systematic analysis of international and domestic studies from 2018 to 2025. The findings indicate that AI affects QOL through a "dialectical paradox" mechanism: it simultaneously enhances learning performance and healthcare safety through personalization, while also generating existential risks such as cognitive dependency, real-world social isolation, and technostress. The paper further clarifies the theoretical foundations of AI and QOL, and proposes a new conceptual framework of "AI co-living competence" to ensure sustainable development for students.

Keywords: Artificial Intelligence, Digital Transformation, Mental Health, Quality of Life, Social Impact, University Students

1. Introduction

In the early decades of the 21st century, humanity is witnessing an unprecedented surge of the Fourth Industrial Revolution, with Artificial Intelligence (AI) as its core driving force. No longer confined to laboratories or science fiction scenarios, AI has deeply permeated and become an indispensable part of the operational structure of modern society. For the younger generation—especially university students, who are the most technologically adaptive social group—the presence of AI not only transforms the ways they learn and work but also profoundly reshapes how they perceive, experience, and evaluate their own lives.

The current landscape of higher education is undergoing profound transformations. On the one hand, the trends of personalization and digitalization in education are opening up tremendous opportunities for students to access global knowledge, optimize their individual potential, and manage their health through smart medical applications. On the other hand, students are facing unprecedented challenges: competitive pressure from automation, the intrusion of algorithms into personal privacy, and complex psychological consequences such as the fear of missing out (FOMO), loneliness in a hyper-connected world, and technostress. These factors directly and multi-dimensionally affect "Quality of Life" — a concept that encompasses not only material satisfaction but also mental well-being, satisfaction in social relationships, and a sense of safety within one's living environment. Empirical research shows that although many studies have addressed the application of AI in education or the impact of social media on young people, there remains a lack of comprehensive research that deeply analyzes the dialectical relationship between AI technology and the multidimensional structure of students' Quality of Life (QOL), especially within the specific context of Vietnam. This raises an important question: Does the superior convenience of AI truly lead to a happier life for students, or is it quietly trading off the core values of human experience?

In response to this urgent need, this paper focuses on conducting a comprehensive review of the relationship between AI technology and students' quality of life. The study is built upon data from scientific research, combined with the analysis and synthesis of reputable academic sources both domestically and internationally. Its objective is to provide a holistic overview, clarify both theoretical and practical foundations, and thereby propose directions for educational management and student support in the digital era.

2. Background

Concept: The definition of Artificial Intelligence (AI) has undergone a long evolution alongside technological development. In 1950, Alan Turing laid the philosophical foundation with his paper "Computing Machinery and Intelligence" and the Turing Test, shifting the focus from the metaphysical question "Can machines think?" to the verification of intelligent behavior. The term "Artificial Intelligence" was officially introduced in 1956 at the Dartmouth Conference by John McCarthy, defined as the science and engineering of creating intelligent machines.

In the modern context, Russell and Norvig (2010) [14] define AI as the design of "intelligent agents" capable of perceiving their environment and acting to maximize objectives. Building upon these perspectives and the ISO/IEC 22989:2022 standard, this study defines AI technology as a system of advanced computational technologies (including machine learning, natural language processing, and generative AI) capable of performing complex cognitive tasks. More importantly, AI is considered a proactive "socio-technical agent" that actively participates in shaping students' living and learning environments. Development history: The history of AI is marked by cycles of rapid growth and decline, often referred to as "AI winters."

Early stage (1950–1974): A period of optimism with programs such as chess-playing systems and the chatbot ELIZA (1966), which simulated a psychotherapist.

Expert systems era (1980–1987): The development of rule-based systems (e.g., MYCIN, XCON) designed to solve specific problems.

Machine learning and Big Data era (1990–2010): Milestones such as Deep Blue defeating Kasparov (1997), along with the explosion of the Internet and probabilistic algorithms.

Deep learning and generative AI era (2010–present): Breakthroughs in multilayer neural networks and the Transformer architecture (2017). The emergence of ChatGPT (2022) marks a turning point, bringing generative AI into everyday life, enabling the creation of complex content and natural interaction. This is the primary technological context of this study. Classification and Applications: Based on capability, AI can be categorized into: Narrow AI (Weak AI – currently prevalent, such as Siri and ChatGPT), General AI (Strong AI – a future concept), and Super AI. In students' daily lives, AI appears in three main application domains:

Learning: Virtual assistants (e.g., ChatGPT, Claude) and adaptive learning platforms (e.g., Duolingo, Khanmigo) help personalize learning pathways and support research.

Health: Mental health support chatbots (e.g., Woebot, Wysa) and wearable health-monitoring devices.

Social & Entertainment: Content recommendation algorithms (e.g., TikTok, Facebook) shape information consumption habits and social interactions. the convergence of AI and SCM and articulates the foundations of intelligent and adaptive supply chains.

3. Literature Review

In the field of healthcare—a fundamental pillar of Quality of Life—AI is driving a revolution from being a "support tool" to becoming an independent "diagnostic agent." In 2020, McKinney and colleagues published a groundbreaking study in Nature titled "International evaluation of an AI system for breast cancer screening." The researchers trained and tested an AI system on two large-scale datasets: 25,856 women in the United Kingdom and 3,097 women in the United States. The experimental results showed that the AI system achieved superior performance compared to human experts: reducing false positive rates by 5.7% on U.S. data and 1.2% on U.K. data; while also reducing false negative rates by 9.4% and 2.7%, respectively.

McKinney's study [11] is not only significant in medical terms but also profoundly influences people's perception of safety, including that of students. With the advancement of medical technologies, students today can access highly accurate diagnostic and health-monitoring services, thereby reducing anxiety about illness. Following this trend, in 2024, Laboratorios Rubio conducted an in-depth analysis titled "The Role of Artificial Intelligence in Personalized Medicine," confirming the capability of machine learning algorithms to analyze genetic data and medical records in order to propose "tailored" treatment methods. This explains the growing tendency of students to proactively manage their personal health through AI applications (such as wearable devices and nutrition apps), shifting from a passive approach to a preventive one, thereby improving physical aspects of Quality of Life (QOL).

However, the overall impact of AI on health is not entirely positive. The convenience of technology often comes with lifestyle-related consequences. In 2024, a research team from Southern University (Thailand) conducted a survey of 446 students on "The impact of screen time on sleep quality and academic performance." The alarming results showed that 48.4% of students had excessive screen time. The study found a strong positive correlation between overuse of digital devices (often integrated with AI algorithms designed to retain user engagement) and poor sleep quality, disrupted circadian rhythms, and increased levels of anxiety and depression. This serves as evidence that AI can indirectly deteriorate physical health, creating a vicious cycle that negatively affects students' mental health and academic performance.

Students' Quality of Life is strongly influenced by expectations regarding future careers and financial security. In this aspect, international studies have identified both positive and negative impacts of AI.

In 2019, Daron Acemoglu and Pascual Restrepo [1] published the seminal work "Automation and New Tasks," analyzing U.S. economic data over a 30-year period (1987–2017). The authors clarified two parallel mechanisms: the "displacement effect," where machines take over human jobs, and the "reinstatement effect," where technology creates new tasks. However, the findings indicate that the pace of automation has outstripped the creation of new jobs, leading to wage stagnation and a decline in labor share, particularly among medium-skilled workers. For students, this research highlights the root of existential concerns about job displacement, affecting their sense of financial security within the structure of Quality of Life (QOL).

Complementing this perspective, a 2023 report by Goldman Sachs, "The Potentially Large Effects of Artificial Intelligence on Economic Growth," estimates that approximately 300 million full-time jobs worldwide could be affected by generative AI. Although AI is projected to increase global GDP by 7%, the pressure placed on students is immense: they are compelled to engage in a continuous "skill-upgrading race" to avoid being left behind.

However, from an optimistic perspective, Nick Drydakis (2025) [5], in a study published in IZA World of Labor, introduced the concept of "AI capital." The research shows that individuals with strong AI skills tend to earn higher wages and have broader employment opportunities. This underscores the role of digital competence as a key determinant of QOL: students who master AI are more confident and hold positive expectations for the future, whereas a lack of such skills becomes a source of insecurity and disadvantage. Artificial intelligence has been widely applied to specific supply chain functions. Prior studies demonstrate AI's effectiveness in demand forecasting, inventory optimization, and logistics plan In Vietnam, research on the impact of AI is also developing rapidly, reflecting the specific context of a country undergoing strong digital transformation.

Policy and application environment: In 2024, the Institute for Policy Studies and Media Development (IPS) published the report "Artificial Intelligence Policies in Vietnam." The report indicates that Vietnam ranks 59th out of 193 countries globally in the AI readiness index, but still lacks specific legal frameworks on AI ethics and data privacy protection. This places Vietnamese students in an open digital environment with insufficient safeguards, posing potential risks to data security—an important factor affecting Quality of Life (QOL). A UNESCO (2025) report on Vietnam's AI readiness also highlights challenges related to digital infrastructure and the lack of a coherent legal framework.

Impact on learning and cognition: A study by Dang Van Em *et al*. (2024) [6] at Vietnam National University, Ho Chi Minh City, involving 584 students, revealed a notable "practice gap": while 98.1% of students are aware of ChatGPT, 89.2% use it only for basic tasks such as searching and translation. This suggests that the potential of AI to enhance learning performance has not been fully exploited.

A study by Truong Tuan Linh (2025) [16], using the Technology Acceptance Model (TAM) on 3,550 students, found that "mobility and convenience" are the strongest drivers of AI usage, surpassing even "perceived usefulness." This finding warns of a trend toward passive AI usage, where students seek immediate convenience rather than developing deeper thinking skills. This issue is reinforced by Nguyen Thi Phuong Hoa (2024) [12], who pointed out that overreliance on ChatGPT for verbatim copying may lead to the erosion of writing skills and independent thinking among students.

Health and psychological aspects: Domestic studies have also recorded negative impacts similar to international trends. Duong Trang Huyen *et al*. (2025) demonstrated that perceived stress plays a mediating role in the relationship between social media use and insomnia among students. Nguyen Thi Nhu Quynh (2024) reported that up to 56.8% of nursing students experience poor sleep quality due to nighttime phone use. These findings confirm that pressures from the digital environment directly affect both the physical and mental health of Vietnamese students.

Summary: The literature review shows that although many individual studies exist, there is still a lack of an integrated research framework that evaluates the overall impact of AI on the multidimensional Quality of Life of students (including academic, health, social, and safety aspects) within the specific context of higher education in Vietnam. This gap is what the present study aims to address.

4. The dialectical relationship between Artificial Intelligence (AI) and students' Quality of Life (QOL)

The synthesis of theoretical foundations and practical evidence shows that the relationship between AI and students' Quality of Life (QOL) is not a one-way linear relationship, but rather a paradoxical dialectical interaction. AI plays a dual role: it is both a source of support and a source of pressure.

In the field of education, AI demonstrates a strong constructive role through its capacity for personalization. Generative AI tools such as ChatGPT act as "cognitive assistants," helping students instantly answer questions, summarize complex materials, and suggest creative ideas. This enhances learning performance, reduces academic pressure, and increases students' sense of control over their learning process—key positive components of Quality of Life (QOL).

However, the downside of this convenience is the risk of "cognitive offloading." When students become overly dependent on AI to solve problems, they tend to reduce their own cognitive effort, leading to the erosion of core skills such as critical thinking and independent writing. A study by Truong Tuan Linh (2025) [16] indicates that the motivation of "convenience" often outweighs "actual usefulness," resulting in passive use of AI. Consequently, students may achieve high grades (short-term outcomes) but feel a lack of real competence and a diminished sense of achievement—an essential component of well-being.

AI provides significant reassurance in healthcare through applications for early diagnosis and monitoring vital signs. The accuracy of AI in medicine (as shown in studies such as McKinney, 2020) enables students to manage their health more scientifically.

However, the paradox lies in the fact that the very use of technological devices (which underpin AI applications) can harm physical health. A sedentary lifestyle and excessive screen time can lead to vision problems, musculoskeletal issues, and particularly sleep disorders. "Technostress"—the stress caused by constant connectivity and information overload—is also a major factor contributing to declining mental health, creating a state of chronic fatigue and negatively affecting overall Quality of Life (QOL).

AI and social media algorithms help students expand their networks, find communities with shared interests, and maintain connections more easily. This meets the fundamental need for belonging in the hierarchy of needs.

However, recent studies (Phang *et al*., 2025) [13] have highlighted the darker side of this connectivity. When students seek emotional support from AI (such as chatbots) or become immersed in virtual interactions, they tend to withdraw from real-life relationships. Attention-optimizing algorithms create "echo chambers," trapping students within homogeneous viewpoints, thereby reducing empathy and real-world social communication skills. Instead of alleviating loneliness, AI may exacerbate feelings of social isolation in real life, diminishing the richness of students' emotional and social lives.

AI creates economic opportunities (AI capital) but also generates concerns about security. Students face new risks such as deepfake scams, harassment through manipulated images, and surveillance by AI systems in educational institutions (e.g., facial recognition, exam monitoring). The constant feeling of being monitored, along with the risk of losing control over personal data, creates a persistent sense

of insecurity, thereby reducing the dimensions of safety and freedom within the structure of Quality of Life (QOL).

5. Conclusions

The review of studies and analysis of theoretical foundations has outlined a multidimensional picture of the relationship between Artificial Intelligence and students' Quality of Life. It can be affirmed that AI is not merely a technical tool but a significant environmental variable that profoundly and comprehensively impacts all four pillars of QOL: This relationship is dialectical in nature, involving clear trade-offs: convenience comes at the cost of cognitive dependency; virtual connectivity at the expense of real-world social isolation; and opportunities for personalization at the risk of privacy intrusion. AI holds great potential to enhance Quality of Life if used as an empowering tool, but it may also diminish QOL if it becomes a source of addiction and control.

Based on these findings, the paper proposes several recommendations. First, for students, there is a need to shift from passive consumption to active mastery of technology, developing "AI co-living competence," which includes critical thinking, digital emotional management, and privacy protection skills. Second, for universities and educational administrators, it is essential to build a balanced learning environment where technology is intelligently integrated but does not entirely replace human interaction. Policies supporting digital mental health and AI ethics education should also be implemented to help students navigate safely in the digital era. This study contributes to the theoretical framework on the social impact of AI and provides a scientific basis for future empirical research aimed at measuring and evaluating the specific extent of AI's impact on different groups of students in Vietnam.

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