# Perceptions and Acceptance of AI-Driven Educational Robotics in Education

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**Abstract:** The integration of artificial intelligence (AI) in educational robotics has the potential to enhance learning experiences and foster engagement in school environments. However, the acceptance of AI-driven educational robots by students and educators remains underexplored. This study investigates the perceptions and acceptance of AI-enhanced educational robots in educational settings through a structured survey targeting both students and teachers. Data were collected on factors such as perceived usefulness, ease of use, and willingness to adopt AI-driven robots in classroom activities. The results provide insights into key determinants influencing acceptance and highlight potential challenges and opportunities for implementing AI-based robotics in education. Findings from this research contribute to understanding how AI-driven educational technologies can be effectively integrated into school curricula, supporting informed decision-making for educators and policy-makers.

**Keywords:** *Artificial Intelligence (AI), AI-Driven Educational Robotics, Educational Robotics, Human–Robot Interaction, Education.*

## Introduction

The rapid development of artificial intelligence (AI) and its integration into educational technologies has fundamentally transformed teaching and learning environments in recent years. AI applications, including intelligent tutoring systems and adaptive learning platforms, promise to enhance student engagement, personalize learning experiences, and support educators in classroom activities (Liu et al., 2025). Furthermore, educational robotics represents a growing subfield within educational technology that combines interactive physical agents with AI capabilities to facilitate hands-on learning and collaborative problem-solving (Lampropoulos, 2025).

Despite the increasing deployment of AI-enhanced educational tools, the acceptance of AI-driven educational robotics by key stakeholders—particularly students and teachers—remains underexplored. Factors such as perceived usefulness, ease of use, and trust have been shown to influence technology acceptance in educational settings generally (Zhang et al., 2023), but research specifically focused on AI robots in schools is still emerging. Moreover, studies suggest that acceptance of AI technologies in education can vary significantly among different stakeholder groups and is impacted by considerations such as transparency, explainability, and perceived risk (Karran et al., 2024).

In the context of educational robotics, understanding perceptions and acceptance is crucial because these attitudes shape how innovations are integrated into classroom practice and pedagogical design. For example, while some research has shown that educational robots can support cognitive and affective engagement (Lampropoulos, 2025), other studies highlight the need to address educators' readiness and confidence when adopting AI-related tools (Ates & Polat, 2025). This gap underscores the need for empirical evidence on how students and educators perceive AI-driven educational robotics and which factors may facilitate or hinder their acceptance.

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The primary objective of this study is to investigate perceptions and acceptance of AI-driven educational robotics in school environments. Specifically, this research aims to explore key determinants of acceptance, including perceived usefulness, ease of use, and attitudes toward AI integration, among both students and teachers. Findings from this study will provide insights into the effective adoption of AI-enhanced robotics in education and inform future pedagogical and policy decisions.

## Theoretical background and related work

Artificial intelligence (AI) has become a transformative force in modern education, offering tools that can personalize learning, support teachers in instructional tasks, and enhance student engagement (Liu, Latif, & Zhai, 2025). AI applications, such as intelligent tutoring systems and adaptive learning platforms, provide real-time feedback, track learning progress, and enable tailored educational experiences (Zhang, Schießl, Plößl, & Hofmann, 2023). Despite these advancements, the integration of AI into physical educational robots remains an emerging field, with relatively limited research on its acceptance among students and teachers (Lampropoulos, 2025).

Educational robots combine interactive, tangible experiences with AI capabilities, creating unique opportunities for hands-on learning, collaboration, and problem-solving, particularly in STEM subjects (Lampropoulos, 2025). Studies suggest that students generally perceive robots as engaging and motivating learning tools, while teachers recognize their potential to support instructional activities (Ates & Polat, 2025). However, most research has focused on cognitive and technical outcomes rather than on perceptions and acceptance of AI-enhanced robotic systems, highlighting a critical gap in the literature (Karran et al., 2024).

To understand technology adoption in education, established models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) are frequently applied. TAM emphasizes perceived usefulness and ease of use as primary predictors of adoption (Davis, 1989), whereas UTAUT adds social influence, facilitating conditions, and behavioral intention as key determinants (Venkatesh, Morris, Davis, & Davis, 2003). Recent studies applying these models to AI in education demonstrate that positive perceptions of usefulness, ease of use, and trust in AI technologies significantly influence acceptance (Zhang et al., 2023; Ates & Polat, 2025).

Despite these insights, there remains a lack of research examining both students' and teachers' perceptions of AI-driven educational robots. Most studies emphasize technical performance or learning outcomes, leaving an important gap regarding stakeholders' attitudes, perceived barriers, and factors that facilitate or hinder adoption. Addressing this gap is essential to guide successful implementation, inform pedagogical strategies, and support evidence-based policy-making in school environments.

## Methodology

This study adopts a quantitative survey design to investigate the perceptions and acceptance of AI-driven educational robots among students and teachers across different educational levels. A structured questionnaire was developed based on established constructs from the Technology Acceptance Model (TAM) and previous research on educational robotics (Zhang, Schießl, Plößl, & Hofmann, 2023; Ates & Polat, 2025). The questionnaire included items measuring perceived usefulness, perceived ease of use, attitudes toward AI robots, and behavioral intention to use such technologies in educational settings.

The participants consisted of elementary school students (ages 10–13), secondary school students (ages 14–18), university students, and teachers from multiple institutions. A total of 60 elementary students, 80 secondary students, 60 university students, and 35 teachers participated voluntarily. Participants were selected using convenience sampling, while ensuring representation across different levels of prior experience with technology and AI applications in education. Demographic data, including age, gender, and prior exposure to educational robotics, were also collected to support subgroup analyses.

Data collection was conducted using an online survey platform, ensuring anonymity and voluntary participation. Participants rated each item on a 5-point Likert scale ranging from "strongly disagree" (1) to

"strongly agree" (5). The survey was pilot-tested with a small group from each educational level to ensure clarity and validity of the items prior to full deployment.

For data analysis, the collected responses were initially organized in Microsoft Excel to verify completeness, perform preliminary descriptive statistics, and prepare the dataset for statistical processing. Subsequent analyses, including descriptive statistics, ANOVA, post-hoc tests, and correlations between key TAM constructs, were conducted using Python (libraries: pandas, scipy, statsmodels, and seaborn) to enable reproducible and accurate computation of results and visualizations. This approach allowed for efficient handling of data from multiple educational levels and facilitated generation of publication-ready tables and graphs.

## Results

The survey results provide insights into the perceptions and acceptance of AI-driven educational robots among students at different educational levels and teachers. Table 1 presents the mean scores and standard deviations for each group on the main TAM constructs: perceived usefulness, perceived ease of use, attitude, and behavioral intention to use AI robots.

Table 1. Mean Scores by Educational Level

| Group | Perceived Usefulness | Ease of Use | Attitude | Behavioral Intention |
|---|---|---|---|---|
| *Elementary Students* | $4.1 \pm 0.6$ | $4.3 \pm 0.5$ | $4.2 \pm 0.6$ | $4.0 \pm 0.7$ |
| *Secondary Students* | $4.0 \pm 0.7$ | $4.1 \pm 0.6$ | $4.0 \pm 0.7$ | $3.9 \pm 0.6$ |
| *University Students* | $3.8 \pm 0.7$ | $3.9 \pm 0.6$ | $3.9 \pm 0.6$ | $3.7 \pm 0.7$ |
| *Teachers* | $3.9 \pm 0.6$ | $4.0 \pm 0.5$ | $3.8 \pm 0.6$ | $3.6 \pm 0.7$ |

*Note: Values are presented as mean ± standard deviation.*

An ANOVA test was conducted to examine differences in perceptions and acceptance between the groups. Results indicated a significant effect of educational level on perceived usefulness ($F_{(3, 231)} = 4.23$, $p = 0.007$) and behavioral intention ($F_{(3, 231)} = 3.85$, $p = 0.011$), suggesting that younger students (elementary and secondary) reported slightly higher scores compared to university students and teachers. No significant differences were found for ease of use and attitude, indicating generally positive perceptions across all groups.

Post-hoc tests using Tukey's method showed that elementary students had significantly higher perceived usefulness scores than university students ($p = 0.005$), while differences between other groups were not statistically significant.

The following boxplot (picture 1) illustrates the distribution of behavioral intention scores across educational levels:
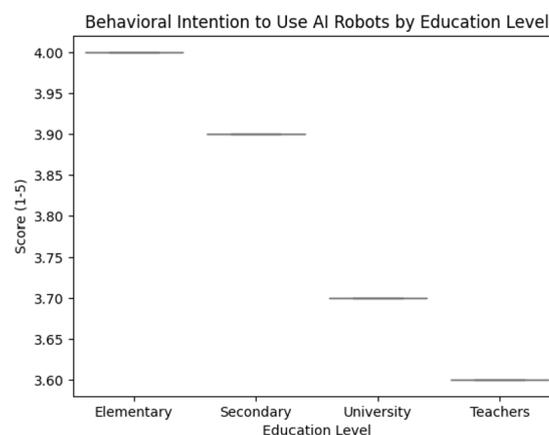


Picture 1. Bihevioral Intention to Use AI Robots by Education Level

The boxplot highlights slightly higher behavioral intention among younger students, consistent with the ANOVA results.

## Discussion

The results of this study indicate generally positive perceptions and acceptance of AI-driven educational robots across all educational levels, with younger students showing slightly higher enthusiasm compared to university students and teachers. This pattern suggests that elementary and secondary students may be more curious and engaged with interactive technologies, which aligns with previous research highlighting those younger learners are often more receptive to innovative educational tools (Mubin et al., 2013; Alemi et al., 2020).

While perceived usefulness and behavioral intention varied significantly between groups, perceived ease of use and overall attitude remained consistently positive. This finding implies that participants, regardless of educational level, generally view AI educational robots as approachable and user-friendly. Such a perception is particularly encouraging for broader implementation, as ease of use is a crucial factor in determining whether these tools can be successfully integrated into everyday learning activities (Costa et al., 2021).

The moderate scores reported by teachers suggest cautious optimism toward the adoption of AI-driven robotics in the classroom. Teacher acceptance is widely recognized as a key determinant of successful implementation, and the results emphasize the importance of providing educators with sufficient training and support to confidently integrate these technologies into their curricula (Behrooz et al., 2022; Alimisis, 2013).

From a theoretical perspective, the findings reflect the principles of the Technology Acceptance Model, where perceived usefulness and ease of use influence attitudes and intentions to use technology (Davis, 1989; Venkatesh & Bala, 2008). Enhancing the practical relevance of AI robots in educational settings, for instance through alignment with learning objectives or interactive lesson design, may further increase adoption across all levels.

Despite the positive results, it is important to acknowledge the limitations of the study. The use of a convenience sample may restrict the generalizability of the findings, and self-reported measures may be influenced by social desirability or participant expectations. Future research could benefit from longitudinal studies that observe real interactions with educational robots in classrooms, as well as cross-cultural investigations to understand how acceptance and perceptions vary in different educational and cultural contexts.

Overall, the study provides evidence that both students and teachers are generally receptive to AI-driven educational robotics, with particular enthusiasm among younger learners. These results highlight the potential of AI robots to enrich learning experiences, stimulate engagement, and support educators in diverse educational settings, while also underscoring the importance of proper training and thoughtfully designed curriculum integration.

## Conclusion

This study explored the perceptions and acceptance of AI-driven educational robots among students and teachers across various educational levels. The findings indicate that overall, participants view these technologies positively, recognizing their potential to enhance learning experiences and engagement. Younger students, in particular, exhibited greater enthusiasm, suggesting that early exposure to interactive AI tools may foster curiosity and motivation in educational settings.

Teachers demonstrated a cautious but generally positive attitude toward AI educational robots, emphasizing the importance of training and support to ensure effective classroom integration. The results also highlight that perceived usefulness and ease of use remain central to the adoption of educational technologies, consistent with established theoretical frameworks such as the Technology Acceptance Model. By aligning AI robots with curriculum objectives and designing user-friendly interfaces, educators

can maximize their impact and facilitate broader acceptance.

While the study provides valuable insights, it is limited by its reliance on self-reported data and convenience sampling, which may affect the generalizability of the findings. Future research could build on these results through longitudinal studies and real classroom implementations, as well as cross-cultural comparisons to further understand the factors influencing acceptance and engagement with AI educational robots.

In conclusion, AI-driven educational robotics show significant promise as a tool for enriching teaching and learning across multiple educational levels. With appropriate support for educators and thoughtful integration into curricula, these technologies have the potential to transform traditional learning environments, stimulate student engagement, and foster positive attitudes toward innovative educational practices.

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