

Research on the Influencing Factors and Construction Strategies of College Students' Trust in Teaching AI

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ABSTRACT

The in-depth integration of artificial intelligence (AI) technology in the education sector is driving profound transformations in the landscape of higher education. As a key vehicle, the effectiveness of teaching AI fundamentally depends on the trust of its users. This study focuses on college students, systematically exploring the multi-dimensional influencing factors of their trust in teaching AI and constructing targeted strategies accordingly. By integrating the Technology Acceptance Model (TAM) and human-computer trust theory, a four-dimensional analytical framework encompassing technological attributes, individual characteristics, environmental contexts, and interaction experiences is established. The study finds that technological reliability, practicality, and transparency at the technological level; AI literacy and technological acceptance at the individual level; institutional support and teacher guidance at the environmental level; and personalization and feedback mechanisms at the interaction level collectively influence trust formation. Based on these findings, this paper proposes systematic trust-building strategies from four dimensions—technological optimization, individual empowerment, environmental construction, and institutional safeguards—providing theoretical references and practical guidance for promoting the sound development of teaching AI.

Keywords: *Teaching AI, Trust, Influencing factors, Technology Acceptance Model, Trust construction, Higher education.*

1. INTRODUCTION

In the digital wave, artificial intelligence technology, as a leading driving force, is reshaping the teaching and learning paradigms in higher education [1]. Educational AI, as an integrated application of AI technology in educational scenarios, has gradually evolved from a marginal auxiliary tool to one of the core elements supporting educational transformation [2]. Its potential applications in personalized learning path planning, automated assessment and feedback, intelligent Q&A, and management offer new possibilities for resolving the tension between large-scale education and personalized cultivation.

However, the complexity of embedding technology into educational practice warns us that

its success is by no means inevitable. User psychological acceptance, particularly the key variable of "trust," constitutes the core intermediary for translating technological potential into real-world benefits [3]. Trust is the psychological willingness of an actor to rely on an entity and exhibit vulnerability despite facing uncertainty, information asymmetry, and potential risks [4]. For college students, teaching AI is not a value-neutral tool but a "quasi-actor" deeply involved in their knowledge construction, ability development, and academic experience [5].

Currently, the practice of introducing teaching AI in Chinese universities is in its ascendancy, but students' trust states exhibit significant contradictions: as "digital natives," they harbor natural curiosity while also harboring deep concerns about the "black box" nature of algorithms,

data privacy and security, and the risk of decision-making errors [6]. If this lack of trust persists, it may result in superficial application of teaching AI or even trigger negative use or resistance among students [7]. Therefore, systematically analyzing the formation mechanism of college students' trust in teaching AI and exploring scientifically feasible trust-building paths hold significant theoretical value and practical urgency.

2. MULTI-DIMENSIONAL INFLUENCING FACTORS OF COLLEGE STUDENTS' TRUST IN TEACHING AI

Based on foundational frameworks such as the Technology Acceptance Model and human-computer trust theory, combined with the particularities of educational scenarios, this study delves into the key factors influencing college students' trust in teaching AI from four dimensions.

2.1 Technological Attribute Dimension: The Objective Basis of Trust

Technological attributes are the most direct basis for trust establishment, with students forming judgments about AI technological capabilities through direct interaction. System performance reliability is the primary factor, with the stability, response speed, and decision-making accuracy of teaching AI constituting hard indicators of trust. Research shows that a 10% reduction in system failure rates can increase user trust by approximately 15% [8]. Taking intelligent grading systems as an example, continuous scoring errors can directly lead to trust collapse.

The practicality and ease of use of functions are equally critical. According to the Technology Acceptance Model, perceived usefulness and ease of use significantly influence adoption willingness [9]. Specifically, teaching AI needs to meet the following conditions: functional design should align with real learning needs, such as personalized recommendation algorithms based on students' learning behaviors and knowledge mastery; interaction interfaces should conform to user habits to lower usage thresholds. For instance, the speech recognition accuracy of language learning AI needs to exceed 95% to gain user recognition.

Algorithmic transparency and explainability are key to overcoming "black box" obstacles. Research finds that providing decision explanations can increase trust by over 30% [10]. Specific measures

include visualizing reasoning processes, such as displaying the generation logic of learning paths through knowledge graphs; explaining decision bases in natural language, such as detailing key elements of scoring criteria.

Data security and privacy protection are the bottom-line requirements for trust. Teaching AI needs to process large amounts of sensitive data, necessitating the implementation of data minimization collection and purpose-limited use [11]. Specific safeguards include end-to-end encryption, anonymization processing, and regular security audits, which can significantly enhance users' sense of data security.

2.2 Individual Characteristic Dimension: The Subjective Filter of Trust

Students' personal traits significantly influence their acceptance and trust levels of teaching AI. AI literacy and cognitive levels encompass three tiers: basic cognition (understanding AI principles), critical thinking (identifying limitations), and application ability (effectively using tools). Surveys show that students who have received AI general education exhibit 25% higher trust levels than those who have not [12].

Technological attitudes and usage experiences play important moderating roles. Early adopters focus more on functional innovation, while conservative users prioritize system stability. Individual technological anxiety levels and innovative traits influence initial trust levels, with successful AI usage experiences significantly raising the trust baseline.

Professional backgrounds and learning goals lead to differences in trust focus. Science and engineering students emphasize algorithmic accuracy, humanities and social science students focus on ethical compliance, and art students value creative support. Meanwhile, exam-oriented students prioritize score improvement effects, while ability-oriented students value the quality of process guidance.

2.3 Environmental Context Dimension: The Social Construction of Trust

Trust formation is profoundly influenced by organizational environments and social cultures. Institutional support and system construction include infrastructure, technical training systems, and incentive policies. For example, a well-

established digital learning innovation fund and institutionalized safeguards can reduce usage risks and enhance user confidence [13].

The key influence of teachers' roles cannot be overlooked. As authoritative figures in educational scenarios, teachers' attitudes and behaviors have model effects. Research shows that when teachers actively integrate AI tools and provide professional guidance, student trust increases by over 40% [14]. Teachers need to play dual roles as "technology guides" and "value gatekeepers."

Peer effects and group norms function through social identification mechanisms. Word-of-mouth propagation and usage demonstrations within learning communities generate conformity effects. Establishing AI learning groups and organizing experience-sharing sessions can promote the formation of a positive usage culture.

2.4 Interaction Experience Dimension: The Dynamic Calibration of Trust

Trust is continuously verified and adjusted during sustained use. The friendliness of interaction design includes interface aesthetics, operational smoothness, and feedback timeliness. For example, gamified design enhances learning interestingness, and instant feedback mechanisms strengthen user control. Interaction design should adhere to the "minimum cognitive load" principle to reduce psychological consumption during use.

The level of personalized services directly influences trust depth. Teaching AI needs to transition from "standardization" to "personalization," including learning content adaptation, dynamic progress adjustment, and customized feedback methods. Adaptive learning platforms can adjust question difficulty in real-time based on students' answers, with such personalized experiences significantly enhancing trust.

Error correction and improvement mechanisms are crucial for maintaining trust. Systems need to establish comprehensive error handling processes, providing appeal channels and manual review mechanisms when decision-making errors occur. For example, allowing users to raise objections to AI suggestions and recording feedback for algorithm optimization enhances users' sense of control and trust.

3. SYSTEMATIC CONSTRUCTION STRATEGIES FOR TRUST IN TEACHING AI

Based on the above analysis of influencing factors, it is necessary to synergistically advance trust system construction from multiple levels to form an organic trust cultivation ecosystem.

3.1 Technological Optimization Strategies

Enhancing system performance standards is foundational. Benchmark testing specifications for educational AI performance should be established, including key indicators such as response time (<1 second), accuracy (>95%), and fault tolerance rate (<0.1%) [15]. A continuous optimization mechanism should be established, using A/B testing to compare the effects of different algorithms and ensure system stability and reliability.

Deepening explainable AI research is a breakthrough focus. Explanation algorithms tailored to educational scenarios need to be developed, such as conceptual relevance analysis; multimodal explanation systems combining visualization and natural language should be constructed; and an explanation quality assessment system should be established to ensure accuracy and comprehensibility [10].

Improving security protection systems is a safeguard. Blockchain technology should be adopted for data traceability, and federated learning should be used for model training without data leaving its domain. Regular penetration testing and security drills should be conducted, and emergency response plans for data breaches should be established to solidify the trust foundation from a technological perspective [11].

3.2 Individual Empowerment Strategies

Constructing an AI literacy cultivation system is fundamental. A tiered curriculum system needs to be designed: a general education tier for popularizing basic knowledge, a professional tier for cultivating application abilities, and an advanced tier for training critical thinking [12]. Through project-based learning, students can enhance their cognitive levels and technological acceptance during actual use.

Innovating training models enhances effectiveness. Diversified forms such as workshops, micro-courses, and practical drills should be

adopted, and a "digital mentor" system should be established where senior students guide junior students in using AI tools. Detailed usage guides and troubleshooting manuals should be produced to significantly reduce learning costs and technological anxiety.

Cultivating human-computer collaboration thinking is key. Case teaching should be used to demonstrate the complementarity of AI and human strengths, debate competitions should be organized to discuss ethical boundaries of AI applications, and students' critical thinking and responsible usage awareness should be cultivated to establish healthy technological and usage perspectives.

3.3 Environmental Construction Strategies

Improving institutional support systems provides organizational safeguards. A dedicated teaching AI management department should be established, medium- and long-term development plans should be formulated, and an "innovation sandbox" mechanism should be established to pilot new technologies in controlled environments [13]. AI application effectiveness should be incorporated into teaching evaluation systems to form a positive incentive cycle.

Strengthening teacher team building plays a guiding role. AI competency certification training for teachers should be conducted, interdisciplinary teaching seminars should be organized, and AI teaching innovation awards should be established to encourage experience sharing [14]. Inter-school cooperation networks should be built to promote the dissemination and exchange of best practices.

Cultivating a positive usage culture creates an atmosphere. AI education application case competitions should be held to showcase successful experiences, online-offline integrated learning communities should be established to promote peer support, and industry experts should be invited to give lectures to broaden the horizons of teachers and students, forming a sound usage ecosystem.

3.4 Institutional Safeguard Strategies

Establishing an ethical review framework regulates development. Ethical guidelines for educational AI should be formulated, clarifying principles such as fairness, accountability, and transparency [11]. An interdisciplinary ethics committee should be established to conduct pre-

assessment and continuous supervision of AI applications to ensure compliance.

Standardizing data governance mechanisms protects rights. Data ownership relationships should be clarified, graded authorization usage rules should be formulated, and a data lifecycle management system should be established [11]. Regular compliance audits should be conducted to ensure standardized operations in all aspects of data collection, storage, use, and destruction.

Improving quality assessment systems promotes enhancement. Multi-dimensional assessment indicators should be constructed, including technological performance, teaching effects, and user experience. Third-party assessment agencies should be introduced to ensure objectivity, and a continuous improvement mechanism should be established to feed assessment results back into product optimization [15].

4. CONCLUSION

This study systematically analyzes the complex causes of college students' trust in teaching AI, revealing that it results from the interplay of four-dimensional factors: technological attributes, individual characteristics, environmental contexts, and interaction experiences. The proposed construction strategy system emphasizes the coordinated advancement of consolidating technological foundations, cultivating rational subjects, creating supportive cultures, and building institutional safeguards, aiming to form a dynamically balanced trust cultivation ecosystem.

Future research can conduct large-scale empirical investigations based on this framework to quantify the weights of various factors and group differences. With the emergence of new forms such as generative AI, trust mechanisms regarding content authenticity and creativity urgently need exploration. The dynamic evolutionary trajectory of trust during long-term use is also a valuable research direction. Only by continuously focusing on and nurturing trust—this key link—with a systematic mindset can we ensure that teaching AI truly empowers the high-quality development of higher education.

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