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Exploration of the Cultivation of Digital Literacy and Competence in Undergraduate Education under the Influence of Artificial Intelligence

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ABSTRACT
AI technologies with big data and deep learning are reshaping undergraduate education. It offers tech opportunities for personalized teaching and precise management, but also poses challenges like students' intellectual indolence, reduced critical thinking, and academic integrity risks. Based on the OBE concept, this paper explores cultivation paths for digital literacy and core competencies in undergraduate education. It suggests constructing a digital literacy education system for core competency outcomes, establishing a human-machine review and support mechanism for collaborative teaching, and guiding students from tech dependence to innovative application to shift undergraduate education from knowledge dissemination to competency cultivation and ensure educational objectives in the AI era.

KEYWORDS
Artificial intelligence; Digital literacy; Human - machine collaboration; OBE concept

1 Introduction

Human society has entered the AI era, and generative AI models like DeepSeek, Kimi, and Doubao are evolving and popular. Artificial intelligence is a technological and application system that mimics, extends, and expands human intelligence through algorithms and has core capabilities like adaptive adjustment and autonomous decision-making. Generative AI, with personalized interaction and efficient problem- solving, can quickly create and process content, becoming a core digital age tool.

Education is an important AI-empowered scenario. The Education Powerhouse Construction Plan (2024 – 2035) advocates accelerating large AI education models and promoting their integration with education. Currently, AI has penetrated undergraduate learning in areas like course learning, thesis writing, etc., and has become a significant academic aid. However, investigations show that technological convenience has brought new educational management challenges. Some students overly rely on AI-generated content, abandon independent thinking, and have weak academic norms and deteriorating autonomous learning capabilities, which is an urgent issue. Undergraduate education demands resolution. Reconstructing educational management models based on the Outcome-Based Education (OBE) concept is urgent. OBE, centered on student development and oriented towards learning outcomes, emphasizes alignment between teaching and training objectives, offering a new way to tackle AI-era educational challenges. Traditional educational management models face tests during technological iterations. Students' tech dependence makes cultivating an academic atmosphere harder, the "information cocoon" complicates mental health work, and academic integrity education is a core challenge. Relying on OBE, educational management should shift from normative constraints to competency cultivation.

In the AI era, a scientific and systematic guidance framework for undergraduate education management development is needed. By designing scientific mechanisms, AI's advantages in personalized guidance and management efficiency can be fully used. Meanwhile, students' information literacy, critical thinking, and innovation capabilities should be cultivated. Strengthen technological empowerment and educational management integration. Integrate network communication theory, optimize online-offline interaction, implement precise management, and construct a new paradigm for undergraduate education management in the AI era.

2 Challenges of Artificial Intelligence to Undergraduate Education

2.1 Intellectual Laziness and Weakening of Academic Competence

The wide use of generative AI in universities makes some undergraduates overly dependent on technology. Their independent thinking and exploration abilities decline, leading to "technology-dependent thinking." In class discussions, students search for viewpoints via AI and reorganize them. When preparing papers or speeches, they directly use AI-generated frameworks, skipping core academic processes. In thesis writing, some students splice AI-generated paragraphs, resulting in logical issues, ambiguous concepts, and lack of evidence, and the articles lack personal argumentation and independent thinking. Additionally, students may fail to detect basic data or factual errors. Over time,

they equate rapid output with profound thinking, and their academic writing and knowledge - comprehension abilities decline. This intellectual indolence spreads from learning to practice. Social practice reports and research projects, which should be based on fieldwork, are now done by relying on AI for frameworks and conclusions. Some reports are complete, but students can't explain core information, resulting in "formatted results" without real investigation, undermining the educational function of practice courses.

2.2 Technological Dependence and Adverse Shifts in Learning Psychology

While AI offers learning convenience, it subtly distorts students' learning motivation and psychology. After long-term use of AI as a task-completion tool, students change from "active learners" to "task executors." Their learning objectives shift from understanding knowledge and mastering skills to completing tasks and getting high scores, and core learning qualities like curiosity, the spirit of inquiry, and perseverance are gradually eroded. In the classroom, interactive. When faced with open-ended questions, students no longer think by integrating course content, personal experiences, and logical reasoning. Instead, they directly rely on AI for answers. They can quickly respond to complex questions but without independent processing. Their "psychological sense of ownership" in learning declines, and they may develop an avoidance mindset towards challenging learning activities. Technology dependence distorts students' self-perception of their abilities. After long-term reliance on AI for assignments, students misjudge their academic capabilities, thinking the tool can solve all problems. In closed-book exams or classroom presentations without AI, they lack confidence and feel anxious. In interdisciplinary comprehensive courses, their ability to integrate knowledge and analyze deteriorates due to long-term AI dependence, leading to a "competence imbalance". Moreover, instant feedback from AI encourages students' short-sighted behavior. To save time and avoid setbacks, they take the "optimal path" provided by AI, abandoning the process of overcoming learning bottlenecks. In laboratory courses, students directly use AI-generated experiment report templates and... TA analysis frameworks. Adopted without understanding core elements like experimental principles, error sources, and conclusion derivations. This impetuous mindset undermines students' long-term dedication and deep-learning capabilities.

2.3 Diminishment of Critical Thinking and Risks in Value Judgment

AI tools lower the information access threshold but weaken students' abilities to distinguish information sources, argumentation logic, and value stances, leading to a deficiency in critical thinking and a decline in autonomous value judgment. In course papers, students directly cite AI-generated historical cases and data, often with errors, and can only say "generated by AI" when questioned. In social science courses, students regard AI-generated conclusions as authoritative, ignoring algorithm biases. In relevant assignments, some students unconsciously adopt Western-centric narratives, showing weak value analysis. In classroom teaching, it's shown as students' excessive reliance on "standard answers." When faced with open-ended questions, students prefer fixed answers from AI rather than formulating their own views through group discussions and multi-angle analyses. In debate courses, students' viewpoints are homogeneous and rely on single-source AI-generated evidence. This stifles innovation and shifts thinking from "problem-discovery" to "answer-acceptance".

The black-box nature of algorithms intensifies cognitive risks. When AI generates content on controversial topics, implicit biases are hard to detect. Without a critical stance, students equate technical outputs with facts, forming skewed perceptions, which affect academic norms and students' value formation.

2.4 Violations of Academic Integrity and Weakening of Ethical Awareness

Academic integrity is the principle of undergraduate education. AI makes academic misconduct more covert and technical. In university thesis reviews, some theses pass plagiarism detection but have logical inconsistencies, hasty arguments, and unclear data sources. Investigation shows students use AI to generate content and modify it to avoid detection. The authenticity of students' academic expression is at risk, seriously endangering the academic environment. AI-generated content has reliability issues due to biases in algorithm training data and corpus limitations, leading to factual, logical, and denominational errors. When students use such texts as academic evidence, their conclusions lack a scientific basis, misleading research, and undermine knowledge accumulation.

The weakening of ethical awareness is shown in the change of students' view on academic responsibility. They see AI-completed tasks as just "outputs" instead of self-capability reflections. In course - design assignments, some students submit well -structured and fluent proposals but can't explain the core logic, indicating AI generation. When students use technology as a substitute, their academic responsibility and rigor decline.

The training corpora of international mainstream AI models have specific value orientations. Without critical analysis, students may unconsciously accept content inconsistent with China's values, causing deviations in academic expression

and value identification. This weakening of ethical awareness is a cognitive imbalance in students' understanding of the "knowledge, value, and tools" relationship.

3 Countermeasures in Undergraduate Education

Outcome-Based Education (OBE), centered on student development, using the backward design approach to construct and advance competence, is the core way to reduce AI's impact and improve undergraduate education quality. Based on this concept, undergraduate education can promote systematic reforms in five aspects:

3.1 Constructing a Digital Literacy System and Defining Outcome Orientation

Universities should use the OBE concept to define core digital literacy outcome goals in the AI era and integrate them into the curriculum system. For students with different foundational knowledge, organize "AI and Future Literacy" workshops, emphasizing both "tool utilization skills" and "risk identification capabilities." These workshops should teach basic skills like literature retrieval and data processing, and embed core content like algorithm bias identification and information authenticity assessment, cultivating learners who are "proficient in technology utilization with critical thinking." All teaching activities should be designed around pre-determined outcomes. Encourage students to use technology efficiently in the digital environment, manage learning actively, and improve digital literacy and professional competence.

3.2 Integrate Algorithmic Values into Teaching

Ideological and political courses should take technological value identification and moral judgment as core elements, construct a value guidance system for the AI era, and offer special topics on "AI and Social Ethics". Through case studies and simulations, enable students to compare different manifestations of the same issue in various technological systems and understand the value logic. The teaching should focus on "forming judgment ability", allowing students to think independently and make value judgments autonomously and sensitively in complex technological ethics issues, achieving the integration of technological application and value guidance.

3.3 Establish a Human-machine Collaborative Teaching Review Mechanism

It is crucial to establish a collaborative review mechanism led by teachers and assisted by technology and integrate it into the OBE continuous improvement process to realize the value of AI teaching assistance. AI can undertake efficiency-oriented tasks as a teaching assistant. Workflows involve tasks such as handling questions, identifying assignment structures, and issuing academic early warnings. Teachers are in charge of content quality control and value calibration to safeguard the core bottom line of education. The platform's learning data can evaluate student outcomes and provide feedback for teaching design optimization, forming a "outcome setting, teaching implementation, evaluation feedback, continuous improvement" dynamic closed loop, enabling technology to support the OBE concept.

3.4 Innovating AI-Empowered Teaching Paradigms and Fostering Competence

Currently, undergraduate students face great employment pressure. The gap between undergraduate education and industrial requirements and the outdated curriculum content are obvious. AI's reshaping of occupational structures and competencies requires non-computer science students to have basic digital literacy, making curriculum system reform urgent.

Universities can help students tackle employment challenges from four dimensions: first, conduct career education on "technological transformation and future careers" to form a technology-empowered employment outlook; second, integrate AI ethics and data privacy protection into the literacy framework to enhance. (1) Strengthen a sense of responsibility and normative awareness. (2) Organize cross-disciplinary "AI + Majors" lectures and enterprise visits to broaden interdisciplinary perspectives. (3) Pay attention to students' psychological utilization of technology, strengthen guidance to reduce technology anxiety and boost employment confidence.

3.5 Deepen the Cultivation of AI Innovation and Application Capability

Based on consolidating digital literacy, guide students to expand AI's innovative application scenarios, turning technical capabilities into future core competitiveness.

A. Forward-looking Perspective: Foster students' use of AI to analyze social trends and simulate decision-making,

improving their ability to anticipate and assess complex issues.

B. Interdisciplinary Innovation: Guide students to deeply integrate AI tools with their majors. For example, humanities and social science students can use text mining and empirical research for data analysis to establish new research paradigms.

C. Strategic Implementation Capability: Through project-based learning, train students to design human-machine collaboration solutions for full-process technology applications in real-world scenarios. The goal is to cultivate leading talents who are proficient in AI technology and can creatively explore application scenarios.

4 Conclusion

The rapid development of AI has greatly transformed undergraduate education. Advantages like personalized learning support and teaching resource optimization provide technological impetus for new educational management models. Nevertheless, issues such as intellectual indolence, the weakening of critical thinking, and risks to academic integrity also present serious challenges to traditional education models. In this context, systematic reform based on the OBE concept has become an inevitable choice for undergraduate education.

Educators must center on students' core competencies and literacy objectives, and conduct reverse-design of teaching and management processes. Moreover, it is necessary to transform AI from a "shortcut substituting for thinking" into a "scaffold facilitating competence growth." Through the construction of an education system integrating digital literacy, the establishment of human-machine collaborative teaching mechanisms, and the indicative guidance for students to apply technology, the potential of technology can be fully unleashed to serve as a driving force for students' comprehensive development.

In the future, the integration of AI and education will deepen. Only by adhering to the "student development-centered" educational purpose and grasping the core goals of value guidance and competence cultivation in technology empowerment can we turn AI into a key force for high-quality undergraduate education and fulfil the task of fostering virtue through education.

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