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Research on Artificial Intelligence Empowering College English Writing Teaching

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ABSTRACT

To explore the application of artificial intelligence (AI) technology in college English writing teaching and its impact on students' writing abilities, a questionnaire survey was conducted among students from multiple universities. The results show that AI provides significant assistance in basic functions such as grammar checking, vocabulary replacement, and text polishing, but it still needs improvement in semantic understanding and professional context adaptability. The degree of students' awareness of AI is closely related to their frequency of use, initiative, and perception of writing ability improvement. The frequency of teachers' guidance also has a positive impact on students' behavior of using AI and their ability improvement. Students are concerned that over-reliance on AI may affect their own ability development and suggest improving the professionalism and accuracy of AI-generated content. Therefore, it is necessary to enhance students' cognitive ability of AI and optimize the professional adaptability of AI tools. Teachers should transform into cognitive coaches and build a three-dimensional integrated educational ecosystem of "technology-ethics-ability" to promote the rational application of AI technology in English writing teaching.

Keywords: *Artificial intelligence (AI), College English writing teaching, Application impact, Cognitive ability, Educational ecosystem.*

1. INTRODUCTION

Against the backdrop of the booming development of artificial intelligence technology, the field of education is undergoing profound changes. As an important link to improve students' language expression ability and academic literacy, college English writing teaching has also ushered in new opportunities for innovative development. At present, the academic community has conducted in-depth research on the paths and effects of artificial intelligence empowering college English writing from multiple dimensions, providing important references for teaching practice. However, with the in-depth integration of technology and teaching, many complex problems have been exposed in practice, which urgently need further exploration and solution. Therefore, this study will systematically analyze the actual effects and existing problems of artificial intelligence empowering college English writing teaching through questionnaire surveys, aiming to provide a basis for optimizing teaching strategies and improving teaching quality, thereby promoting the in-depth integration of artificial intelligence and education and helping to achieve high-quality development of education.

2. RESEARCH DESIGN

2.1 Research Participants

This study selected students from multiple universities across the country as survey respondents, covering both undergraduate and junior college levels, and including students from freshman to senior years, to ensure that the survey results are widely representative.

2.2 Research Tool

This study adopted a self-designed "Questionnaire on the Application of AI Technology in College English Writing Teaching (Student Version)", which consists of 22 questions covering four dimensions: personal information,

used to understand students' basic background; cognition and exposure to AI technology, to explore students' familiarity with AI technology and the ways they learn about it; the application of AI technology in English writing learning, to grasp the frequency of students' use of AI to assist writing and their functional preferences; and opinions and suggestions on the application of AI technology, to collect students' evaluations and expectations of AI-assisted writing.

2.3 Data Collection and Analysis Methods

Questionnaires were distributed through an online questionnaire platform, and SPSS statistical software was used to input and analyze the data. The main methods included descriptive statistical analysis, Pearson correlation analysis, and cross (chi-square) analysis, aiming to explore in depth the current application status, existing problems, and influencing factors of AI technology in college English writing teaching.

3. ANALYSIS AND DISCUSSION OF RESEARCH RESULTS

3.1 AI in College English Writing: Empowerment and Challenges

The research results show that AI technology presents a significant dual attribute of "tool-subject" in college English writing teaching. On one hand, as an efficient auxiliary tool, it demonstrates clear empowering effects in basic functions such as grammar checking (59.03%) and vocabulary expansion (60.48%), which echoes Özçelik and Ekşi's research conclusion that ChatGPT provides personalized writing guidance[1]. On the other hand, its performance in inspiring high-order writing thinking (50.16%) and adapting to professional contexts (21.94%) reveals technical limitations, confirming Jiang and Ma's criticism of the insufficient semantic understanding ability of AI correction systems[2]. This contradictory phenomenon indicates that the application of current AI technology in the education field is still in a stage of "ability-responsibility" mismatch: its data processing capability far exceeds that of human teachers, but there are obvious shortcomings in teaching links with higher cognitive complexity such as context perception and logical reasoning. This technical tension requires educators to re-examine the teaching ethics of human-machine collaboration. As Amos[3] warned, the issue of "effort distribution" in academic writing collaboration is transformed into how teachers guide students to correctly view the boundaries of AI assistance in teaching scenarios.

3.2 Data-driven Writing Improvement: Correlation and Causality

Pearson correlation analysis reveals a significant correlation between preferences for using AI functions and improvements in writing ability, but this correlation requires deeper causal analysis. The positive correlation between grammar checking functions and grammatical accuracy ($r=0.390$) indicates that the real-time feedback mechanism can effectively shorten the path for learners from incorrect cognition to correct output, which is consistent with Khoo and Kang's[4] theory of proactive learner empowerment. However, the weak correlation between model essay generation functions and overall writing scores ($r=0.232$) suggests that mere imitation of examples may lead to mental inertia. This difference indicates that the functional design of AI tools needs to embed more guiding scaffolding mechanisms, such as adding critical analysis prompts in model essay generation functions, to transform technology use into deep learning behavior.

3.3 Teacher Reconstruction: From Instructor to Cognitive Coach

The significant positive correlation between the frequency of teacher guidance and students' AI usage behavior ($X^2=55.562$, $p<0.001$) subverts the myth of technical autonomy. When teachers provide detailed guidance, the proportion of students who "use AI every time" increases to 20.41%, while the lack of guidance leads to 26.76% of students "rarely using" AI. This phenomenon shows that teachers' professional judgment is still a key variable in the integration of technology into teaching. Wang's[5] teaching reform practice further proves that teachers need to transform from traditional knowledge instructors to cognitive coaches. By designing a three-stage task chain including "error identification-logical reconstruction-context adaptation", AI tools can be transformed into a teaching catalyst for promoting the development of high-order thinking. This role transformation requires teachers to have technical critical thinking, being able to recognize its limitations in professional context adaptation (49.68%) and semantic understanding (30.65%) while affirming the advantages of AI.

3.4 Paradox of Autonomous Learning: Technical Dependence and Ability Development

The positive correlation between students' concerns about "excessive dependence on AI" (74.03%) and actual usage frequency (X^2=61.894, $p<0.001$) forms a paradoxical picture: the more students understand AI, the more frequently they use it, and the more they worry about ability degradation. This phenomenon reveals the "ability compensation trap" in technology use—short-term efficiency improvement may come at the cost of long-term ability development. To solve this paradox, it is necessary to construct a metacognitive training system including "usage frequency monitoring-reflective logs-alternative solution design" to help students establish a self-regulation mechanism for technology use. The qualitative research by Xu et al.[6] provides empirical support for this, proving that guiding students to compare AI-generated content with their own ideas can effectively cultivate critical thinking and avoid technical dependence.

3.5 Technical Mirror of Educational Equity: Differences in Levels and Resources

The significant differences in AI usage frequency and cognitive depth between junior college students and undergraduate students (X^2=73.257, $p<0.01$) reflect the digital divide in educational resource allocation. The low AI usage frequency of junior college students (43.48% self-rated as medium level) forms a vicious circle with their weak basic academic ability, while undergraduate students achieve ability advancement through independent exploration. This hierarchical differentiation requires education policy makers to re-examine the issue of technology inclusiveness. By developing "cognitive scaffolding" AI tools for students with basic academic abilities and designing hierarchical and progressive technology integration teaching plans, the ability gap in technology empowerment can be bridged. At the same time, teachers need to take on more of the role of "technology translators" in junior college teaching, transforming abstract AI feedback into specific and operable learning paths.

3.6 Resolution of Ethical Dilemmas: from Discipline to Empowerment

Issues of data privacy (46.13%) and algorithmic bias (45.16%) brought by AI technology constitute ethical hidden dangers in teaching practice. The current commonly adopted discipline-based response strategies (such as prohibiting the use of specific functions) can avoid risks in the short term but may inhibit the release of technical potential. This study advocates a shift to an empowerment-based ethical governance framework: through embedded privacy education modules, developing AI tools with transparent error correction mechanisms, and constructing reflective learning files containing "error types-improvement directions-ability transfer", ethical constraints can be transformed into an opportunity to promote the development of learners' digital literacy. This paradigm shift not only responds to Emerson's[7] ethical demands for AI-enhanced collaboration but also provides practical wisdom for educational technology governance.

4. THOUGHTS AND SUGGESTIONS

4.1 Constructing a Teaching Model: Driven by "Cognitive Scaffolding"

Constructing an AI writing teaching model driven by "cognitive scaffolding" is a key strategy to improve students' writing ability. Specifically, a teaching model with three layers can be designed: the basic layer utilizes AI's grammar checking and vocabulary expansion functions to help students establish grammatical schemas through real-time feedback[8]; the development layer transforms AI-generated content into materials for stimulating critical thinking through a ternary dialogue mechanism of "AI suggestions-self-reflection-peer review"[9]; the advanced layer creates a professional context adaptation training platform, which combines domain expert systems to contextualize AI-generated content and solve the problem of accuracy in professional expression. This hierarchical design can meet students' needs at different writing ability levels, thereby achieving gradual improvement from basic to advanced abilities.

4.2 Redefining the Role of Teachers

The role of teachers in AI-assisted writing teaching needs to be redefined, and schools and educational management departments should build

a systematic teacher training system to strengthen AI application capabilities. Teachers should transform from traditional knowledge transmitters to cognitive coaches, helping students master the use of AI tools through progressive guidance scripts, and gradually shift to metacognitive guidance as students' abilities improve. This role transformation is also of great significance for the teaching development of vocational college teachers in the era of artificial intelligence, as vocational college teachers also face similar role transformation needs. At the same time, the training content should include basic theoretical knowledge of AI technology, such as machine learning principles and natural language processing mechanisms, to help teachers understand the operating logic of AI; and focus on practical training of tools, carrying out function demonstrations and operation exercises for mainstream AI writing auxiliary tools, so that teachers can master the use skills proficiently. In addition, establishing a teachers' professional learning community and optimizing the practical wisdom of integrating AI into teaching through action research can promote teachers to deeply integrate pedagogical content knowledge (PCK) and technological knowledge (TK). This dual-track guidance strategy can not only improve students' writing ability but also enhance teachers' professional confidence in technology application.

4.3 AI Learning Mechanism: Use-Reflection-Transfer

To solve the problem of students' over-reliance on AI technology, it is suggested to establish an AI learning cycle mechanism of "use-reflection-transfer" and take multiple measures to guide students to cultivate autonomous learning ability. Teachers need to clarify the auxiliary role of AI in daily teaching, and teach students to view AI correctly through classroom explanations and case analyses, so as to cultivate critical thinking. When assigning writing tasks, students are required to complete the first draft independently, and then use AI to revise and improve it. Transferable writing tasks without AI assistance can be designed to evaluate the effectiveness of students' transformation of AI-assisted abilities into independent writing abilities through performance assessment. This cyclic mechanism can help students maintain autonomy in technology use while improving their critical thinking ability.

4.4 Differentiated Teaching: Level Adaptation-Ability Advancement

In view of the differences in AI usage among students at different levels, it is suggested to develop a differentiated teaching plan of "level adaptation-ability advancement" and promote AI optimization and upgrading to develop professional characteristic resources. For junior college students, the "scaffolded AI teaching method" can be adopted, which decomposes complex writing tasks into operable micro-skill units, each equipped with targeted AI tools and operation guidelines[10]; for undergraduate students, "inquiry-based AI writing projects" are implemented to cultivate students' comprehensive abilities of using AI for literature review, data analysis and argumentation through problem-solving in real academic scenarios. In addition, AI developers and professionals in the education field should establish close cooperation mechanisms to optimize AI functions according to the needs of college English writing teaching, increase investment in the construction of professional English corpora, and improve the accuracy and adaptability of AI in professional English writing. For example, for English writing in civil aviation, AI can accurately provide professional vocabulary, specific sentence patterns and standardized expressions in the aviation field. Improve AI interaction design, enhance intelligent tutoring functions, and develop personalized learning functions to customize exclusive learning paths and practice content according to students' writing level, learning progress and professional needs, providing differentiated support.

4.5 Educational Ecosystem: Technology-Ethics-Ability

To resolve the ethical risks of AI technology, it is suggested to build a three-dimensional integrated educational ecosystem of "technology-ethics-ability" and formulate scientific and reasonable norms and guidelines for AI-assisted English writing teaching. Specific measures include: developing embedded digital literacy courses that integrate privacy protection, algorithm bias identification and academic integrity education into daily writing teaching; designing AI tools with explanation functions to enable students to understand the logic of algorithm decision-making and cultivate technical critical thinking[7]; establishing an ethical review framework for AI-assisted writing to clarify the boundaries of teachers' ethical responsibilities when guiding

students to use AI; constructing learning files containing "technology usage records-ability development trajectories-ethical decision-making cases" to provide students with continuous reflection materials[2]. At the same time, schools and educational departments should clarify the principles of using AI in different teaching links, standardize teachers' teaching methods using AI, and ensure the effectiveness of teaching activities. Establish an evaluation mechanism for AI-assisted teaching effects, regularly collect feedback from teachers and students, evaluate the effects from multiple dimensions, and adjust teaching strategies and AI application methods according to the evaluation results to promote the complementary advantages of AI technology and traditional teaching and drive the continuous improvement of college English writing teaching quality.

4.6 Improvement Mechanism: Data-Driven-Practice Verification

To continuously optimize AI-assisted writing teaching, it is suggested to establish an improvement mechanism of "data-driven-practice verification". Specifically, a long-term tracking database for AI-assisted writing teaching can be established to record students' AI usage behavior and writing ability development trajectories at different learning stages; carry out Design-Based Research to iteratively optimize AI tools and teaching strategies in real teaching scenarios; construct a comprehensive evaluation system including "technical effectiveness-teaching appropriateness-ethical compliance" to provide a scientific basis for the educational application of AI technology[11]; regularly release white papers on AI educational applications, summarizing practical data, theoretical progress and policy suggestions to guide the application of technology back to empowering the essence of education. This mechanism can ensure that the application of AI technology in education always focuses on the development of students' abilities and provide data support for educational policy-making.

5. CONCLUSION

Although artificial intelligence (AI) plays a significant auxiliary role in basic functions such as grammar checking in college English writing teaching, it has limitations in cultivating high-order thinking and faces issues like students' technological dependence and unequal distribution of educational resources. The study suggests promoting the three-dimensional integration of "technology-ethics-ability" through strategies such as constructing hierarchical teaching models, reconstructing teachers' roles, and establishing learning cycle mechanisms, so as to achieve the in-depth integration of AI technology and teaching and upgrade the empowerment of the essence of education. In the future, it is necessary to strengthen systematic empirical research to verify the effectiveness of these strategies.

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