A Study on the Factors Influencing Learning Outcomes of English Majors in "Artificial Intelligence and Innovative Applications" Course

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Abstract: This study explores the factors influencing learning outcomes among English majors enrolled in the "Artificial Intelligence and Innovative Applications" course. Using a qualitative research approach, this study conducted semi-structured interviews with 10 English majors to examine their learning motivations, experiences, and outcomes. Key findings indicate that learning motivation, effective teaching design, foundational knowledge, and teacher guidance significantly impact student performance in AI course. Approximately 70% of students demonstrated a shift from initial resistance to proactive learning after recognizing the practical relevance of AI, while 80% emphasized the importance of hands-on practice and collaborative learning in enhancing their understanding. Additionally, the study highlights the unique strengths of English majors, such as strong reading comprehension and critical thinking skills, which facilitate their adaptation to AI technologies. However, the study also identifies several challenges, including limited technical support, small sample size, and a lack of longitudinal data. The findings underscore the need for targeted curriculum design that leverages the strengths of language students while addressing their unique challenges in AI education. This study provides valuable insights for educators and curriculum designers seeking to improve the effectiveness of AI courses for non-technical students.

Keywords: Artificial Intelligence (AI); English Majors; Learning Outcomes; Curriculum Design; Language Education

1. Introduction

As digitalization and intelligent transformation accelerate, the fourth industrial revolution driven by generative artificial intelligence (AI) is reshaping multiple sectors, including the economy, politics, and education. In recent years, AI's role in education has expanded rapidly, becoming a strategic priority for many nations. By 2022, 15 countries worldwide have incorporated AI education into their national curricula [1]. Based on the Notice of the Ministry of Education of the PRC on Publishing the Record-filing and Approval Results of Undergraduate Programs in Regular Higher Education Institutions in 2021, Chinese higher education institutions have responded proactively, with 440 universities offering undergraduate programs in artificial intelligence and 248 institutions providing degrees in intelligent science and technology [2]. This initiative highlights the urgent need to cultivate a robust AI talent pipeline, a critical component of China's vision to become a global leader in education.

For educators, integrating AI into the classroom represents both a challenge and an opportunity. AI technologies can transform traditional teaching methods, making learning more interactive and personalized, while also fostering critical thinking and digital literacy [3]. This transformation is particularly relevant for English language education, which has evolved from early computer-assisted language learning (CALL) to the current AI-driven era. The introduction of the "Artificial Intelligence and Innovative Applications" course into English major curricula reflects this trend. Unlike traditional computer science courses, this program focuses not on complex programming but on practical AI applications that enhance students' efficiency in language learning, communication, and professional development.

For instance, students learn to utilize AI tools for translation, listening practice, and speaking exercises, which not only improve language proficiency but also prepare them for cross-cultural communication in their future careers.

However, the adaptation of English majors to technology-oriented courses presents unique challenges. Traditionally, English majors focus on reading, writing, translation, and literary analysis, relying on memorization and textual interpretation rather than technical skills [4]. This difference can hinder their performance in courses that emphasize hands-on practice and logical reasoning. Additionally, conventional assessment methods often emphasize theoretical knowledge over practical application, potentially overlooking students' ability to use AI tools effectively in real-world contexts. Therefore, a comprehensive evaluation of how English majors adapt to and benefit from technology-focused courses is essential for optimizing curriculum design and improving learning outcomes.

To address these challenges, this study aims to explore three key research questions: 1) How do English majors perceive the benefits and challenges of the "Artificial Intelligence and Innovative Applications" course? 2) What factors influence their learning outcomes in this course? 3) What unique impacts does an English language background have on their ability to learn technology-oriented content? Understanding these aspects can guide educators in refining course design and teaching methods, ensuring that AI courses better align with the needs and capabilities of language students.

The significance of this research is twofold. Theoretically, it aims at bridging gaps in the current literature by providing empirical insights into the interdisciplinary integration of AI and language education. Practically, it offers valuable guidance for curriculum designers and educators seeking to improve the effectiveness of AI courses for humanities students, ultimately enhancing the employability and technological literacy of future graduates.

2. Literature Review

2.1 Development of AI-Related Courses in Higher Education

Currently, AI-related courses are experiencing rapid growth in universities worldwide. From an international perspective, various global organizations have been actively promoting AI literacy. For instance, UNESCO has been vigorously advocating for the enhancement of public AI literacy [5]. In the United States, national-level policy documents have been introduced to underscore the importance of AI education, fostering the widespread adoption of AI courses [6]. In China, universities have also been proactive in the construction and promotion of AI curricula. For example, "Artificial Intelligence Applications" course in Shenzhen Polytechnic University has achieved remarkable results, establishing a unique talent development framework that significantly enhances students' practical skills and innovative thinking [7]. However, the majority of current AI courses are still concentrated in general education and applied professional fields. In contrast, the integration of AI into foundational disciplines such as physics, mathematics, chemistry, and history remains underexplored [8]. This indicates that, despite the growing significance of AI in higher education, there is still substantial room for improvement in curriculum design, teaching methodology innovation, and interdisciplinary application.

2.2 Impact of Interdisciplinary Courses on Learning Outcomes of Language Majors

Learning outcomes are typically influenced by a range of interconnected factors.

First, learning motivation serves as the primary driver for student engagement [9]. If students possess a strong interest in course content and can clearly perceive the relevance of their studies to future career development, they are more likely to invest significant time and effort into their studies. For English majors, this motivation often arises from curiosity about emerging technologies, a desire to delve deeper into language studies, and the practical need to apply knowledge in real-world contexts. When courses effectively spark this interest and help students recognize the connection between learning and career opportunities, their overall engagement and academic performance tend to improve significantly [4].

Second, course design plays a critical role in determining student learning outcomes [10]. Courses with clear structure, appropriate difficulty, and practical relevance enable students to gradually master complex skills,

reducing the risk of academic frustration. For example, modular course designs allow students to first establish a solid foundational understanding before progressing to more challenging tasks, thereby building their confidence. Additionally, aligning course content with students' academic backgrounds and practical needs not only enhances their interest but also substantially improves overall learning effectiveness. Effective teacher-student interaction is equally essential. By incorporating thought-provoking questions, group discussions, and hands-on practice, instructors can guide students in applying theoretical knowledge to practical problems, fostering innovative thinking and critical analysis [11].

2.3 Current Research Gaps and the Innovations of This Study

Despite the increasing body of research on AI applications in education, studies specifically addressing the unique needs of English major students remain relatively scarce. Most existing studies focus on general education [12], lacking in-depth exploration of how to effectively integrate AI courses into English major curricula or how to leverage the linguistic strengths of these students. While international studies have made significant progress in technology adoption, they often overlook the specific learning requirements and linguistic competencies of English majors. Meanwhile, domestic research, although advancing in interdisciplinary curriculum practice, still faces challenges in systematically designing course frameworks and conducting long-term evaluations of teaching effectiveness.

This study aims to fill these gaps from the unique perspective of English majors. It comprehensively analyzes the specific learning needs of English majors in AI courses, exploring effective methods for acquiring and applying AI knowledge tailored to their strengths. Additionally, it acknowledges the linguistic advantages and technical learning challenges faced by these students, proposing innovative instructional designs and curriculum optimization strategies to enhance their AI literacy and practical skills. This approach not only aims to improve overall teaching outcomes but also provides valuable insights and practical guidance for future interdisciplinary research.

3. Methodology

3.1 Research Design

This study adopts a qualitative research design, utilizing semi-structured interviews to gain in-depth insights into the learning experiences and challenges faced by English majors enrolled in the "Artificial Intelligence and Innovative Applications" course at Guangdong University of Science and Technology. This approach was chosen to capture the nuanced perspectives of students, providing rich, context-specific data that quantitative methods might overlook. The study aims to identify the factors influencing their learning outcomes and the effectiveness of the AI course in supporting their professional development.

3.2 Research Methods

The primary data collection method for this study was semi-structured interviews, allowing for flexible yet focused conversations that address both predetermined themes and emerging topics. This approach enabled the researchers to explore participants' thoughts, feelings, and attitudes in detail while allowing for the spontaneous discussion of issues not initially anticipated. This method is particularly effective for understanding complex educational experiences, as it provides participants with the freedom to express their perspectives without the constraints of a rigid questionnaire.

3.3 Participants

The participants in this study were 10 English majors (juniors) from Guangdong University of Science and Technology, including 6 females (60%) and 4 males (40%), with an average age of 21 years (see Table 1). These students were selected based on their enrollment in the "Artificial Intelligence and Innovative Applications" course, ensuring that all participants had direct experience with the course content. The diverse backgrounds of the participants provided a comprehensive view of the challenges and opportunities associated with integrating AI into language studies.

3.4 Data Collection

Data collection was conducted in April of 2025, through one-on-one semi-structured interviews, which were carried out via face-to-face conversations and online Tencent Meeting and recorded using mobile devices. With the participants' consent, each interview lasted

30-40 minutes, covering five kinds of themes such as 1) Personal background and learning motivation and expectation; 2) Course content and instructional design experience; 3) Learning engagement and learning behaviour; 4) Factors affecting learning effectiveness; and 5) Overall evaluation and recommendations for course learning. The raw audio data was subsequently transcribed using the Doubao speech-to-text conversion tool, yielding approximately 10,000 words of text, which were then manually reviewed for accuracy and clarity.

Table 1. Demographic Characteristics of Participants

Participant ID	Gender	Year Level	Age	Interview Duration	Interview Mode
P1	Male	Junior	20	34 Minutes	Offline
P2	Female	Junior	20	35 Minutes	Online
P3	Female	Junior	21	30 Minutes	Online
P4	Female	Junior	20	30 Minutes	Online
P5	Female	Junior	21	35 Minutes	Online
P6	Male	Junior	21	30 Minutes	Online
P7	Male	Junior	20	40 Minutes	Offline
P8	Male	Junior	21	30 Minutes	Offline
P9	Female	Junior	22	40 Minutes	Online
P10	Female	Junior	21	35 Minutes	Offline

3.5 Data Analysis

Thematic analysis was employed to systematically examine the interview transcripts. This approach involved multiple readings of the texts to identify recurring themes, patterns, and key insights related to the research questions. The analysis focused on capturing both the explicit statements and the underlying attitudes and motivations of the participants, ensuring that the findings accurately reflected their experiences. This process also included the careful categorization and coding of data to ensure consistency and reliability in the interpretation of results.

3.6 Ethical Considerations

Ethical considerations were a fundamental part of this research. Participants were fully informed about the purpose, methods, and potential implications of the study before interviews commenced. Informed consent was obtained from all participants, ensuring they understood their rights, including the ability to withdraw from the study at any point without penalty. To protect privacy, all personal identifiers were removed during data transcription and analysis, and all recorded data were securely stored. The researchers strictly adhered to principles of confidentiality and respect for participant autonomy throughout the study.

4. Findings

4.1 Personal Background and Learning Motivation

Among the 10 interviewees, most students had limited prior knowledge of artificial intelligence before enrolling in the "Artificial Intelligence and Innovative Applications" course. Approximately 60% of the students (6 individuals) perceived AI primarily as an auxiliary tool for handling routine tasks or enhancing learning efficiency. For instance, P1 directly stated, "*In my view, AI is just a supportive tool."* [P1] Similarly, P8 mentioned, "*I understand AI as a convenient and intelligent software that can help us complete tasks we might be reluctant to do ourselves."*[P8]

However, as the course progressed, students' learning motivations shifted significantly. A majority of the students (70%, 7 individuals) gradually recognized the importance of AI for English majors. For example, P1 moved from initial resistance to acceptance, stating, "*At first, I resisted it, but over time, I came to accept it, realizing that this is a practical skill English majors should master."*[P1] Additionally, P3 noted that the instructor's encouragement in class helped her transition from passive to active learning: "*My instructor paid special attention to me in class, and this encouragement became a driving force for my active learning."*[P3]

In terms of motivational differences based on course focus, students on different academic tracks displayed distinct motivations. Business-oriented students (30%, 3 individuals) prioritized applying AI in real-world professional contexts. For example, P7 said, "*I chose this course mainly to improve my English*

learning efficiency and to enhance my overall English skills, including listening, speaking, reading, and writing." [P7] In contrast, education-focused students (70%, 7 individuals) were more concerned with leveraging AI to enhance teaching effectiveness. For instance, P5 stated, *"I hope to gain foundational AI knowledge through this course, as an English major, I expect it to assist me in language research."*[P5]

4.2 Course Content and Teaching Design Experience

Student feedback on course difficulty varied significantly. Approximately 40% of the students (4 individuals) felt the course difficulty was moderate and manageable through regular class participation. For example, P6 remarked, "*The course difficulty is moderate and quite suitable for me. AI is essentially a supportive tool, and with careful study, it is easy to master."*[P6] However, 60% of the students (6 individuals) found the course challenging, especially as it progressed into more complex concepts and practical applications. P5 noted, "*While I gained a lot from the course, I often struggled to keep up with the content as the lessons became more complex."*[P5]

Regarding teaching design, the majority of students (80%, 8 individuals) agreed that hands-on practice and group discussions significantly enhanced their learning outcomes. For instance, P3 mentioned, "*The assignments in this course pushed me to actively explore various AI software, which served as a massive database offering me numerous resources."*[P3] Similarly, P7 emphasized the importance of practical tasks, saying, "*Group competitions, like the AI advertising design challenge, not only improved my AI tool application skills but also strengthened my teamwork abilities."*[P7]

4.3 Learning Investment and Study Behavior

In terms of learning investment, a significant portion of students (70%, 7 individuals) reported that their study time was primarily concentrated in the classroom, with limited self-study outside class. For instance, P3 stated, "*Most of my learning happens during class. If I pay attention in class, I can fully absorb the content without much outside review."*[P3] However, 30% of students (3 individuals) indicated that they actively sought additional resources while completing assignments to ensure high-quality work. P3 further noted, "*When working on assignments, I make a conscious effort to research additional materials to improve the quality of my submissions."*[P3]

Additionally, 80% of students (8 individuals) emphasized the importance of group collaboration and classroom interaction in maintaining their learning motivation. For example, P5 mentioned, "*Group discussions allow us to share our learning experiences, which not only deepens our understanding but also enhances our teamwork skills."*[P5] P7 added, "*Group competitions are particularly effective as they boost our practical AI skills and foster a strong sense of collaboration and teamwork."*[P7]

Nevertheless, 20% of students (2 individuals) admitted that their learning investment outside of class remained limited due to time constraints and academic pressure. For example, P4 explained, "*With a heavy course load, I rarely have time to independently explore AI tools. I usually only do so when faced with assignments or exams."*[P4]

4.4 Factors Influencing Learning Outcomes

Several key factors were identified as significantly impacting learning outcomes, including teaching quality, personal foundational skills, learning resources, and the overall learning environment. 90% of the students (9 individuals) emphasized the critical role of teacher guidance in shaping their learning experience. P6 highlighted, "*The guidance provided by the instructor is crucial. Detailed explanations and in-class demonstrations significantly aid our understanding and mastery of AI tools."*[P6]

Moreover, 80% of the students (8 individuals) acknowledged the importance of their foundational skills. P4 noted, "*If your foundational skills are weak, it can be challenging to keep up with the instructor's pace and manage practical exercises effectively."*[P4]

Additionally, 70% of the students (7 individuals) cited group collaboration as a key factor in their learning success. P1 remarked, "*Teamwork and personal foundational skills have a major impact on learning outcomes. Complex tasks are difficult to complete alone, but with group support, the work becomes more efficient."*[P1] P5 further pointed out, "*In group work, team members can complement each other's knowledge gaps, resulting in a more*

comprehensive understanding of the material."[P5]

Finally, 50% of the students (5 individuals) identified technical support and equipment as critical to their learning experience. P8 noted, "*If the equipment is slow or the network is unstable during AI practice sessions, it can severely disrupt the learning process and diminish student interest."*[P8]

4.5 Overall Evaluation and Improvement Suggestions

Overall, the students' evaluations of the course were largely positive. 90% of the students (9 individuals) expressed satisfaction with the course's practical design and applicability. For example, P1 commented, "*Overall, I am satisfied with this course. It is highly practical and useful in both daily life and academic settings."*[P1]

However, several students also suggested areas for improvement. For example, P2 recommended, "*Instead of focusing solely on widely known AI concepts, the course should emphasize practical exercises and encourage independent exploration."*[P2] P8 also highlighted the need for better technical support, stating, "*While the hands-on sessions are effective, excessive AI software registration adds to the learning burden, and the course could benefit from more focused content."*[P8]

Overall, the students generally appreciated the course, but they also recognized the need for further improvements in teaching methods, course content, and practice arrangements to better meet the needs of English majors.

5. Discussion

5.1 Comparison of Findings with Existing Literature

The findings of this study are generally consistent with existing literature on the effectiveness of interdisciplinary AI courses. Previous research has emphasized that learning motivation is a primary driver of academic success. For instance, UNESCO (2022) highlighted that students are more likely to engage deeply when they clearly perceive the connection between their studies and future career opportunities [1]. This aligns with the findings of this study, where 70% of the participants reported a shift from initial resistance to proactive learning after realizing the practical value of AI for English majors. For example, P1 mentioned that they initially resisted learning AI but gradually accepted it upon recognizing its practical benefits. This observation is also consistent with the study by Saddhono et al. (2024), which found that the sustainability of learning motivation is closely linked to students' perceived utility of the content they are learning [3].

Additionally, this study found that hands-on practice and group discussions significantly enhance learning outcomes, which is also supported by prior research. Miao et al. (2021) in their work noted that practical exercises and collaborative learning not only increase student engagement but also significantly improve their understanding and application of complex concepts [5]. Similarly, about 80% of the students in this study indicated that hands-on activities and group discussions substantially improved their understanding of AI concepts. This supports the findings of Grabe and Zhang (2013), who argued that interactive and context-rich learning environments significantly enhance student engagement and knowledge retention [4].

5.2 Key Mechanisms Influencing Learning Outcomes

Several critical mechanisms influencing English majors' learning outcomes in AI courses were identified in this study.

First, teacher guidance was found to be a crucial factor, with 90% of students emphasizing the importance of clear, structured instruction in reducing cognitive load and building learning confidence. This is consistent with the findings of Maher (2004), who noted that effective teacher support can significantly reduce students' cognitive barriers and improve overall learning outcomes [10].

Second, a strong foundational knowledge base was identified as a key determinant of student success. About 80% of the students indicated that having a solid foundation in both language and technology was essential for effectively mastering the course content. This finding aligns with the study by Li et al. (2024) on the logic and practice of general AI education, which found that students with a stronger foundational knowledge are more likely to excel in interdisciplinary courses [7].

Additionally, peer collaboration and mutual support emerged as critical mechanisms.

Approximately 70% of the students reported that teamwork not only facilitated a deeper understanding of complex concepts but also fostered a positive learning environment, enhancing their motivation. This reflects Vygotsky's (1978) social learning theory, which posits that collaborative learning environments significantly boost student motivation and engagement [11].

5.3 Optimization of Curriculum Design

This study also highlights the importance of curriculum optimization. While 90% of the students expressed overall satisfaction with the practical design of the course, many also suggested improvements. For example, some students recommended placing greater emphasis on practical applications rather than purely theoretical content. This aligns with the views of Alasadi and Baiz (2023), who argued that technology-focused courses should prioritize practical skills over abstract concepts to better prepare students for real-world challenges [12].

Furthermore, 50% of the students identified technical support and stable infrastructure as critical to their learning experience. Sullivan et al. (2023) also highlighted that technical issues, such as slow systems and unstable networks, can significantly impact student satisfaction and overall learning outcomes [8]. Addressing these technical challenges through targeted infrastructure improvements can further enhance the effectiveness of AI courses for English majors.

5.4 Adaptability and Potential of English Majors to AI Courses

This study also attaches importance to the adaptability and potential of English major students in AI courses. Despite the traditional focus of English curricula on textual analysis and language theory, this study found that English majors, when provided with appropriate support, can effectively master AI technologies. Many students noted that their language skills, such as reading comprehension and critical thinking, enabled them to quickly grasp AI concepts and apply them in practical contexts. This is consistent with the observations of Grabe and Zhang (2013), who argued that language students possess strong reading and analytical skills, which can help them better understand complex technical content [4].

What is more, the ability to effectively use English for AI tool operation was identified as a significant advantage. This finding aligns with the work of Zhang Jingbei et al. (2024), who noted that language students possess unique advantages, such as cultural awareness and critical thinking, which can support their success in interdisciplinary fields [6].

Overall, the adaptability and potential of English major students in AI courses underscore the importance of tailored curriculum design that considers the specific needs and strengths of these students. Such targeted approaches not only enhance learning outcomes but also better prepare students for the rapidly evolving digital landscape.

6. Conclusion

6.1 Summary of Key Findings

This study explored the factors influencing learning outcomes among English majors enrolled in the "Artificial Intelligence and Innovative Applications" course. The findings revealed several critical insights.

Firstly, learning motivation was identified as a key determinant of success in AI courses. Students who perceive a clear connection between AI skills and their future career prospects tend to exhibit higher levels of engagement and motivation. In this study, 70% of the participants reported a shift from initial resistance to proactive learning after recognizing the practical benefits of AI for English majors.

Secondly, the importance of effective teaching design, including hands-on practice and collaborative learning, emerged as a critical factor. Approximately 80% of students emphasized the value of practical exercises and group discussions in deepening their understanding of AI concepts.

Thirdly, foundational knowledge and teacher guidance were found to be essential mechanisms influencing learning outcomes. 90% of the students identified structured instruction and supportive guidance as critical to their success, while 80% emphasized the importance of having a strong foundational knowledge base.

Finally, this study highlighted that English majors possess unique strengths, such as strong reading comprehension and critical thinking skills, which can facilitate their adaptation to AI courses. These skills enable them to quickly grasp complex technical concepts and apply them in practical contexts. This adaptability

underscores the need for targeted curriculum design that leverages these strengths to enhance learning outcomes.

6.2 Limitations and Future Directions

Despite its valuable insights, this study has several limitations that should be addressed in future research.

First, the small sample size is a significant limitation. This study focused on a limited sample of 10 English majors, which may not fully capture the diverse experiences and challenges faced by this group. Future studies should consider larger, more diverse samples to enhance the generalizability of the findings.

Second, the qualitative focus of this study, while providing rich, context-specific insights, may lack the statistical power needed for broader generalizations. Future research could incorporate quantitative methods to complement these findings and provide a more comprehensive understanding of learning outcomes.

Third, technological limitations also impacted the findings. Some students reported that technical issues, such as unstable networks and outdated equipment, significantly influenced their learning experiences. Future studies should explore the impact of technological infrastructure on learning outcomes more systematically.

Finally, this study captured student perspectives at a single point in time. Longitudinal studies are needed to assess how learning outcomes evolve over multiple semesters and to identify long-term impacts on student success.

In summary, this study highlights the critical role of motivation, effective teaching design, and foundational knowledge in supporting English major students' adaptation to AI courses. By addressing the identified limitations and building on these initial findings, future research can further enhance our understanding of how to optimize AI education for language students.

Acknowledgments

This study is funded by 2025 Dongguan Philosophy and Social Sciences Planning General Project (Project Name: A Study on the Influencing Factors of AIGC on Learning Engagement Among College Students in Dongguan. Grant No.: 2025CG86), 2023 China Ministry of Education Industry-University Cooperation and Collaborative Education Project (Project Name: Research on the Cultivation of Information Literacy of College English Teachers Based on Digital Multimedia Language Laboratory. Grant No.: 230706030310820) and 2025 Guangdong University of Science and Technology University-Enterprise Horizontal Research Project (Project Name: A Study on Improving English Listening and Speaking Skills of Cultural Media Practitioners from the Perspective of New Media. Grant No.: GKY-2025HX-007).

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