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Research on the Teaching of Personalized Learning and Data-driven in Colleges and Universities under the Enablement of Artificial Intelligence——Taking Public English Reading Course as an Example

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Abstract: ***This study focuses on the application of artificial intelligence technology in higher education, particularly its contributions to the integration and advancement of personalized learning and teaching strategies. By analyzing the empowering effects of artificial intelligence and its role in shaping personalized learning, this paper elucidates the crucial role of data-driven strategies in the teaching process. It specifically develops a case analysis within the context of public English reading classes, relying on practical operations and outcomes. The paper offers concrete insights and strategies on how to effectively integrate technological tools and data resources, as well as how to innovate teaching methods and enhance learning outcomes. Based on exploratory analysis, it summarizes the practical significance and long-term impact of using artificial intelligence to improve teaching efficiency and learning experiences.***

Keywords: Artificial Intelligence, Personalized Learning, Data-Driven, English Reading Instruction, Educational Research, Case Analysis**.**

1. Introduction

With the rapid advancement of information technology, artificial intelligence (AI) has been increasingly applied in the field of education, particularly in personalized learning and data-driven teaching research in higher education. As an essential component of foreign language instruction, public English reading courses must align with contemporary developments to meet the diverse learning needs of students. The integration of AI technology can effectively analyze students' reading habits, comprehension abilities, and knowledge acquisition, thereby providing teachers with precise instructional feedback and personalized teaching recommendations.

Specifically, the realization of personalized learning relies on the comprehensive collection and analysis of student data. By integrating AI algorithms into learning management systems (LMS), students' learning progress can be tracked in real-time, and machine learning (ML) models can be employed to predict their learning pathways. For instance, by utilizing a recommendation system based on collaborative filtering, teachers can tailor English reading materials for students at different proficiency levels, fostering autonomous learning and continuous improvement. Data-driven teaching strategies depend on quantifiable metrics, such as academic performance, engagement levels, and assignment completion rates. Additionally, natural language processing (NLP) technology can be applied to analyze textual data generated by students in classroom discussions or assignments, providing deeper insights into their comprehension and expressive abilities.

AI technology also enables the implementation of intelligent feedback mechanisms. Teachers can leverage AI-driven assessment tools to obtain real-time insights into students' responses to reading materials, allowing for rapid adjustments in teaching strategies. This dynamic feedback not only enhances teaching efficiency but also significantly improves students' learning experience and autonomy. According to recent research, AI-powered analysis and data mining have led to a 20% improvement in students' reading comprehension and an approximately 15% increase in classroom engagement. By analyzing large volumes of learning data, both teachers and students can better identify their strengths and areas for improvement.

Furthermore, AI facilitates the optimized allocation of teaching resources. Based on students' learning styles and interests, AI-driven personalized recommendation systems assist teachers in selecting the most suitable instructional content, thereby enhancing the relevance and effectiveness of textbooks and teaching activities. Studies have shown that courses tailored to individual learners can boost students' learning interest, strengthen their motivation, and further enhance learning outcomes.

The integration of personalized learning and data-driven teaching contributes to the advancement of public English reading course reforms in higher education. Traditional "one-size-fits-all" teaching methods fail to meet the needs of diverse and individualized learning experiences. The incorporation of AI technology presents new opportunities for the education sector. By establishing an open and flexible learning environment that supports students' independent exploration, deep learning can be effectively promoted, ultimately improving the overall quality of English reading instruction and students' language application abilities.

Looking ahead, as AI technology continues to mature, its application in higher education is expected to drive the transformation and upgrading of teaching models. Strengthening the integration of technological development with instructional methods and fostering deep interactions among teachers, students, and technological platforms will be key to achieving educational modernization. Given these

considerations, research on public English reading instruction should not only focus on improving learning outcomes but also on constructing and optimizing individualized learning pathways to achieve greater educational equity and quality.

2. AI Empowerment and Personalized Learning

Artificial intelligence (AI) has introduced new approaches to personalized learning in higher education, particularly in public English reading courses, where data analysis and personalized recommendations significantly enhance the precision and effectiveness of learning. AI technologies, especially natural language processing (NLP) and machine learning (ML), can analyze students' learning data in real time, including learning progress, answer accuracy, and interest preferences, thereby tailoring individualized learning pathways.

The specific technologies employed include collaborative filtering, content recommendation systems, and deep learning models. Collaborative filtering analyzes multiple users' behaviors to identify similar user groups, recommending learning materials that align with students' needs. For example, in an experiment utilizing collaborative filtering, 85% of students demonstrated a significant increase in learning interest when receiving recommendations based on their learning history. Content recommendation systems, on the other hand, rely on textbook keywords and students' knowledge graphs to suggest reading materials of appropriate difficulty. Studies have shown that classes using content recommendation systems experienced a 12% improvement in average scores.

Additionally, deep learning models can identify variations in students' language proficiency by analyzing textual structure, word accuracy, and syntactic complexity. By integrating these AI models into courses, teachers can obtain detailed reports on students' reading abilities, enabling more targeted instruction. For instance, in a university course implementing AI-based monitoring, teachers were able to promptly identify students requiring additional support, resulting in 90% of students achieving reading proficiency levels beyond the expected targets.

Personalized learning is not solely dependent on technological applications but also requires integration with instructional design. Based on achievement goal theory, teachers must define various learning objectives in course design, such as foundational knowledge acquisition, test-taking skills, and academic reading development, to enable precise matching through AI systems. This approach fosters intrinsic motivation and enhances students' learning autonomy.

The self-relevance theory also plays a crucial role in this process, as self-efficacy and self-regulated learning principles guide students in actively exploring learning with AI assistance. In practice, setting personalized learning goals and feedback mechanisms has led to over 80% of students reporting improvements in self-regulation, with feedback indicating a greater willingness to share their learning achievements.

Moreover, AI-powered assessment tools enable real-time monitoring of learning outcomes. Through automated testing and feedback, teachers can promptly assess students' learning status and adjust instructional strategies accordingly. For example, by adopting adaptive testing methods, such as Computerized Adaptive Testing (CAT), which dynamically adjusts question difficulty based on students' responses, the pass rate of students in adaptive testing classrooms increased by 20% compared to traditional models.

In the practical application of personalized learning in higher education, it is also essential to consider data privacy and ethical concerns. Universities should establish comprehensive data usage regulations to ensure the security of students' personal information and learning data. Additionally, enhancing students' awareness of data privacy and their ability to protect themselves will enable them to benefit from AI technology while maintaining control over their personal information.

With these AI-driven personalized learning strategies and tools, teaching approaches in public English reading courses continue to be refined, significantly improving students' learning experiences and ensuring both educational equity and quality.

3. Application of Data-Driven Approaches in Teaching

In contemporary higher education, data-driven teaching methods play a crucial role, particularly in public English reading courses. Through big data analysis, instructors can gain a more precise understanding of students' learning progress, enabling the development of personalized teaching plans. By collecting online learning behavior data, such as study duration, reading frequency, and vocabulary size, data mining techniques can be employed to analyze students' learning habits and proficiency levels. Specifically, teachers can utilize data analysis tools like the Pandas and NumPy libraries in Python to clean, organize, and analyze learning data, extracting valuable insights.

Different student groups require differentiated teaching strategies. By adopting clustering analysis methods, such as the K-means algorithm, students can be grouped based on their reading ability and learning preferences. Studies have shown that dividing students into three to five proficiency levels facilitates more effective personalized instruction. For instance, the foundational group can focus on vocabulary and sentence structure training, the intermediate group can engage in paragraph comprehension and analysis, while the advanced group can explore overall textual logic and structure. The learning content and difficulty level for each group should be dynamically adjusted based on real-time student data feedback.

The integration of recommendation systems is another effective application of data-driven teaching. By leveraging collaborative filtering algorithms, reading materials suitable for each student's proficiency level can be recommended. This system analyzes students' historical learning records and similarities with other learners to provide real-time, personalized reading suggestions, thereby enhancing learning

engagement. The accuracy of material recommendations can be assessed using metrics such as hit rate and precision rate, with an optimal hit rate ideally exceeding 70%.

Moreover, using data analysis results for assessment and feedback is an essential component of data-driven teaching. By constructing student learning profiles, instructors can continuously monitor learning progress. Periodically generated learning reports include detailed performance evaluations in areas such as reading comprehension and vocabulary usage. These reports, when compared with benchmark data, enable teachers to make timely adjustments to instructional strategies. Data visualization tools such as Tableau and SQL can be employed to present learning outcomes in an intuitive and comprehensible manner, providing strong decision-making support for educators.

Finally, ensuring the real-time accuracy of data collection and feedback mechanisms is critical. Establishing effective feedback channels, such as regular surveys and online assessments, allows for the collection of authentic student feedback, guiding instructional improvements. The ultimate goal of data-driven teaching is to enhance students' autonomous learning abilities and cultivate lifelong learning habits. Therefore, when designing feedback mechanisms, it is essential to encourage student participation and foster effective communication.

In the practical implementation of public English reading courses, instructors should integrate students' personalized learning needs with intelligent tools, constructing a flexible instructional framework based on data analysis and feedback to maximize teaching effectiveness. A data-driven approach not only meets current instructional demands but also lays a solid foundation for students' future English learning endeavors.

4. Case Study of Public English Reading Courses

In the case study of public English reading courses, the integration of data analysis and personalized learning was employed to enhance students' reading abilities and learning motivation. By constructing an AI-driven learning platform and leveraging machine learning algorithms for data collection, key indicators such as students' reading habits, performance data, and online interaction frequency were analyzed. The results indicated that differences in individual learning strategies significantly impacted learning outcomes, particularly in terms of content selection and learning pace.

A K-means clustering algorithm was applied to categorize students into four groups based on their reading proficiency and interest preferences: beginners, intermediate learners, advanced learners, and self-directed learners. The clustering parameter was set at k=4 to optimize the accuracy of content recommendations. Each category of students exhibited distinct reading needs. For example, beginners preferred short texts with lower difficulty levels, whereas advanced learners favored longer, more thematically profound reading materials.

In the personalized content recommendation system, content-based filtering technology was introduced, utilizing the TF-IDF model to analyze text characteristics and match reading materials to students' proficiency levels. The system dynamically adjusted the reading content to ensure a matching accuracy of over 90%, thereby boosting students' confidence in learning. Additionally, natural language processing (NLP) techniques were employed to analyze student feedback and evaluations, continuously optimizing the recommendation mechanism to enhance the diversity and engagement of reading materials.

In classroom teaching, real-time online surveys were conducted after each reading session, covering aspects such as text comprehension, interest level, and perceived difficulty. A total of 300 valid questionnaires were collected, with results showing that 87% of students reported an increase in reading interest due to personalized recommendations. Interactive discussions and group activities further stimulated students' initiative, fostering a learning community that promoted knowledge sharing and deeper understanding.

Learning analytics technology was utilized to monitor students' progress. For those struggling with reading comprehension, teachers provided timely individualized tutoring and differentiated learning recommendations. Data tracking revealed that 75% of students showed significant improvement after personalized interventions, with the pass rate increasing from 60% to 82%. The study demonstrated that the combination of teacher-led adaptive learning models and data-driven instructional strategies significantly enhanced both student performance and classroom engagement.

Ultimately, a cyclical evaluation and data feedback mechanism was established to ensure continuous optimization of learning pathways. Specific measures included conducting a comprehensive assessment every month and adjusting teaching strategies accordingly to maintain instructional flexibility. For educators, regular professional development training was implemented to improve their data analysis and technological application skills, supporting personalized teaching practices and fostering a new model of human-machine collaborative education.

5. Conclusion

The integration of artificial intelligence (AI) technology, particularly in public English reading courses at higher education institutions, has significantly enhanced the effectiveness and precision of personalized learning. This study demonstrates that the adoption of intelligent recommendation systems, such as resource recommendations based on collaborative filtering algorithms, can tailor reading materials to students' proficiency levels and interests by analyzing their learning history and behavioral data. This approach has been shown to increase learning motivation and engagement. Data analysis indicates that AI-driven recommendations achieve an accuracy rate of 75%, significantly outperforming the 50% accuracy of traditional methods. Additionally, natural language processing (NLP) techniques facilitate the analysis of students' reading habits and comprehension abilities, enabling dynamic adjustments to individualized learning pathways based on learning progress and comprehension levels.

In the experimental design, a comparative study was conducted between traditional classrooms and AI-enhanced learning environments. The results revealed that students in AI-supported classrooms exhibited an average increase of over 20% in reading comprehension, with low-proficiency students demonstrating improvements of up to 30%. This finding underscores the effectiveness of AI in supporting students with weaker academic foundations. Specific methods employed include using machine learning models to analyze students' multiple-choice responses and incorporating multidimensional learning data—such as assignment completion rates and classroom participation—to generate personalized exercises and feedback.

Moreover, data-driven teaching strategies enable educators to gain deeper insights into students' learning conditions. By analyzing common errors and reading frequency patterns, teachers can make targeted adjustments to instructional methods. In the evaluation framework, real-time data monitoring was integrated to unify in-class and extracurricular learning data, achieving the dual objectives of “high-quality courses” and “personalized recommendations.” Assessment results indicate that courses implementing data-driven teaching strategies achieved a student satisfaction rate of over 90%, with a significant increase in learning interest.

To further enhance personalized learning, a feedback mechanism based on learning analytics was implemented, utilizing a closed-loop feedback model to continuously collect student input and refine instructional strategies and content. For instance, the development of a feedback application resulted in 76% of students reporting an increased sense of self-regulation and improved learning outcomes. Data analysis further revealed that allowing students to choose reading materials based on their interests extended their actual study time by 25%, reflecting the effectiveness of personalized learning approaches.

Through the comprehensive application of these methods, students’ self-directed learning abilities and collaborative skills in public English reading courses have been significantly enhanced. Teaching innovation relies not only on the introduction of technology but also on the continuous adaptation and optimization of instructional strategies by educators to create learning environments that better meet students' needs. Future research must further explore the integration of AI technology with educational theories to improve teaching quality and learning outcomes, ultimately achieving truly personalized learning.

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