

Research on Optimization of Individualized Learning Path of University English Based on Artificial Intelligence

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Abstract: With the wide application of artificial intelligence (AI) in the field of education, the optimization of individualized learning path of university English has become the key to improve teaching quality. This article focuses on the AI-based individualized learning path of university English. Through theoretical analysis, combined with individualized learning theory, AI related technology and university English learning theory, this article analyzes the elements of constructing individualized learning path of university English based on AI, including learner characteristics analysis, learning goal setting, learning resource integration and learning strategy selection. Then, optimization strategies are put forward, such as dynamically adjusting the learning path according to the learning data, providing support with intelligent interaction, and building a individualized evaluation feedback system based on AI. The research shows that using AI to optimize the individualized learning path of university English can help meet the individual differences of students, improve the learning effect, provide scientific and effective guidance for university English language teaching (ELT) practice and promote the teaching quality.

1. Introduction

With the acceleration of globalization, the importance of university ELT is increasingly prominent [1]. However, the traditional university ELT model often adopts a "one size fits all" approach, which is difficult to fully meet the individual learning needs of students, resulting in uneven teaching results [2]. With the rapid development of information technology, AI is gradually integrated into the field of education, which brings new opportunities and challenges to the reform of university ELT [3].

With its powerful data processing and analysis capabilities, AI can accurately capture students' learning characteristics and provide strong support for the construction of individualized learning paths [4]. The so-called individualized learning path aims to tailor the exclusive learning plan according to the individual differences of students, such as learning style, knowledge base and learning progress, so as to improve the learning effect and efficiency [5]. Therefore, it is of great theoretical and practical significance to study the optimization of individualized learning path of university English based on AI.

Theoretically, this study is helpful to further enrich and improve the theoretical system of individualized learning and deepen the understanding of the integration mechanism of AI and language learning [6]. From a practical point of view, optimizing individualized learning path is expected to improve the common problems existing in current university ELT, such as students' low learning enthusiasm and poor learning effect, and provide practical ways to improve the quality of university ELT. This article will deeply discuss the optimization of individualized learning path of university English based on AI, analyze the relevant theoretical and technical basis, clarify the construction elements, and put forward targeted optimization strategies.

2. Related theoretical and technical basis

Individualized learning emphasizes learner-centered, fully respects learners' individual differences, and advocates tailoring learning content, methods and progress according to each

learner's unique learning style, hobbies, knowledge reserve and learning progress. In the field of language learning, there are significant differences in learners' language talent, learning motivation and cognitive style. Individualized learning theory holds that only by conforming to these differences can learners' greatest potential be stimulated [7]. This theory provides the core guiding ideology for the construction of individualized learning path of university English, emphasizing that learning path should adapt to individual's unique needs.

In the field of education, many technologies of AI play a key role. Machine learning algorithm can analyze a large number of students' learning data and tap students' learning patterns and potential needs. Natural language processing technology enables natural language interaction between people and computers. When applied to English learning, intelligent language dialogue system can simulate real language environment and help students practice oral English and listening [8]. In addition, intelligent recommendation technology can accurately push suitable learning resources, such as related English articles and exercises, according to students' learning characteristics, and help to achieve effective matching of individualized learning resources.

University English learning has its own characteristics and laws. It not only requires students to master basic language knowledge, such as vocabulary and grammar, but also needs to cultivate comprehensive language application ability, including listening, speaking, reading, writing and translation [9]. At the same time, university English learning is influenced by many factors, such as students' autonomous learning ability, learning environment and learning motivation, which will all have an effect on the learning effect.

3. Elements of constructing individualized learning path of university English based on AI

(1) Analysis of learners' characteristics

There are significant individual differences among learners, and these differences are an important basis for constructing individualized learning paths. The main individual differences include learning style, knowledge base, learning motivation and interest. Through AI technology, accurate analysis of learners' characteristics can be realized. Taking learning style as an example, some students prefer visual learning, and can better understand knowledge through images and charts; However, some students prefer auditory learning and are more receptive to audio explanations. Understanding these characteristics can provide students with more suitable learning resources and ways.

(2) Learning goal setting

University English learning goals are diverse and hierarchical, which can be roughly divided into basic goals, improving goals and expanding goals. The basic goal is to enable students to master basic English language knowledge and skills, such as a certain amount of vocabulary, basic grammar and simple listening, speaking, reading and writing skills; The improvement goal focuses on improving students' comprehensive language use ability in various scenarios; Expanding goals encourage students to have a deep understanding of English-speaking countries' culture and academic frontiers. Table 1 shows the learning objectives at different levels and their specific requirements in detail:

According to the characteristics of learners, the individualized learning goals can be determined. For students with weak foundation but strong learning motivation, they can focus on the achievement of basic goals first and step by step; For students who have a good foundation and have a strong interest in English, they can directly set the improvement goal and advance to the expansion goal in time.

Table 1 University English Learning Objective Levels

Objective Level	Vocabulary Requirement	Grammar Proficiency	Communication Ability Requirement	Reading Comprehension Ability Requirement	Writing Ability Requirement
Basic	3,000 - 4,000	Familiarity	Ability to engage	Ability to	Ability to write

Objective	commonly used words	with basic grammar rules	in simple daily conversations, such as greetings, shopping, asking for directions, etc.	understand short practical texts, such as menus, announcements, product descriptions, etc.	short essays with correct format and fluent sentences, such as simple diaries, emails, etc.
Advanced Objective	5,000 - 6,000 words	Proficient use of complex grammar, such as subjunctive mood, inverted sentences, etc.	Ability to communicate fluently in general social and academic settings, such as post-lecture discussions, simple communication in business negotiations, etc.	Ability to understand longer and moderately difficult articles, such as news reports, popular science articles, etc.	Ability to write well-structured and content-rich argumentative or expository essays, such as opinions on social phenomena, introductions to technological products, etc.
Extended Objective	Over 6,000 words	Mastery of all types of grammar usage	Ability to deeply participate in English communication and discussions in professional fields, such as academic seminars in medicine, law, engineering, etc.	Ability to understand English original works and professional literature, such as medical classics, interpretations of legal provisions, etc.	Ability to write academic papers following academic paper norms, such as medical research papers, legal case analyses, etc.

(3) Integration of learning resources

University English learning resources are rich and diverse, covering textbooks, online courses, English learning apps, English broadcasting, English film and television dramas and other types, with a wide range of sources, including schools, educational institutions and online platforms. Using AI to realize individualized matching of learning resources is the key. For example, by semantically tagging learning resources and combining students' learning goals and characteristics, we can accurately push resources for them. If students are in the stage of improving their goals and are interested in business English, the system can push online courses related to business English, business scene dialogue practice resources, etc., to ensure that the resources obtained by students are highly compatible with their own needs and improve learning efficiency.

(4) Selection of learning strategies

Common university English learning strategies include cognitive strategies, metacognitive strategies and social strategies. Cognitive strategies such as vocabulary memory methods and reading skills; Metacognitive strategies include learning plan making, self-monitoring and evaluation; Social strategies involve cooperative learning with others and participation in English corner. Choose appropriate learning strategies according to learners' characteristics and learning goals. For students with strong autonomy, we can focus on the cultivation of metacognitive strategies, guide them to make reasonable learning plans and supervise themselves. For students who are extroverted and like to communicate, social strategies may stimulate their learning motivation, such as encouraging them to participate in English club activities more. By accurately choosing learning strategies, students can be helped to build an efficient individualized learning path.

4. AI-based individualized learning path optimization strategy for university English

(1) Dynamic adjustment of learning path

With the help of AI technology, students' university English learning process is tracked in all directions. Online learning platform can record students' learning behavior data in real time, such as the duration of course viewing, the completion time of homework, and the situation of test answering. In addition, we can also use speech recognition and analysis technology to collect data such as pronunciation accuracy and fluency in students' oral practice. Through these multi-dimensional data collection, we can fully understand the students' learning status.

According to the collected data, the system can analyze students' learning progress, knowledge mastery and learning difficulties. For example, if it is found that students have a high error rate in many tests of a certain grammar knowledge point, it means that students have not mastered the knowledge point, and the learning path should be adjusted in time to re-push relevant learning resources such as explanation videos and special exercises for students. Table 2 shows the learning path adjustment measures corresponding to common learning data:

Table 2 Learning Data and Learning Path Adjustments

Learning Data Performance	Learning Path Adjustment Measures
Vocabulary test correctness rate below 60% for two consecutive times	Increase vocabulary learning resources, such as pushing vocabulary memory skills videos and vocabulary special practice applets
Average score in listening exercises below 70 points	Provide more listening materials of the same difficulty level, accompanied by listening text analysis, and recommend listening skills courses
Frequent grammar errors in writing exercises	Arrange grammar reinforcement courses, push grammar special practice questions, and provide writing correction services

(2) Intelligent interactive support

In university English learning, AI has realized a variety of intelligent interactive ways. Intelligent chat robot can answer students' English learning questions at any time, whether it is vocabulary analysis, grammar explanation or writing ideas guidance. In addition, virtual language learning partners practice dialogue with students by simulating real language scenes to help students improve their oral expression ability. Intelligent interaction can adjust the content and mode of interaction in real time according to students' feedback, and then optimize the learning path. For example, when students communicate with virtual language learning partners, if there are frequent expression jams or mistakes, the system will automatically reduce the difficulty of the dialogue, or focus on explaining and practicing the students' mistakes.

(3) Evaluation feedback optimization

Traditional university English evaluation mainly takes regular exams and homework, which has some problems such as single evaluation method and untimely feedback. This kind of evaluation method is difficult to reflect students' learning process and progress comprehensively and in real time, which is not conducive to students' timely adjustment of learning strategies.

The evaluation feedback system based on AI can realize diversified and real-time evaluation. In addition to the traditional paper-and-pencil test, students' online learning behavior, classroom participation and oral performance can also be comprehensively evaluated. At the same time, the system can give targeted feedback and suggestions according to the individual situation of students. Through this individualized evaluation and feedback system, students can understand their own learning situation more clearly, and teachers can optimize teaching accordingly, so as to jointly promote the optimization of individualized learning path of university English.

5. Conclusions

This article focuses on the optimization of individualized learning path of university English based on AI, aiming at solving the problem that traditional university ELT is difficult to meet the individual needs of students. Through the study of relevant theories and technical foundations, it is

clear that individualized learning theory, AI technology and university English learning theory play an important supporting role in constructing individualized learning path.

In the aspect of constructing elements, accurate learner characteristic analysis is the foundation, so as to set individualized learning goals, adjust appropriate learning resources and choose appropriate learning strategies, and build a framework for students' individualized learning paths. Strategies such as dynamic adjustment of learning path, intelligent interactive support and evaluation feedback optimization further improve this path, making it more flexible, interactive and scientific. The research results show that optimizing individualized learning path of university English based on AI can effectively solve the disadvantages of traditional teaching, meet students' diverse learning needs and improve learning efficiency and quality. This not only helps to stimulate students' enthusiasm and initiative in learning English, but also provides teachers with more targeted teaching guidance basis and promotes teaching and learning to learn from each other. Future research can aim at these problems, explore more effective solutions, further deepen the application of AI in the optimization of individualized learning path of university English, and promote the development of university ELT reform to a higher level.

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