

AI-Empowered Personalized Learning: Applications, Opportunities, and Challenges in University English Education

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Abstract: Artificial Intelligence (AI) brings revolution to teaching practices at various areas, including higher education. Personalized learning system based on AI has the potential to meet the diversified needs for learners, improve learning effectiveness, and promote autonomous learning in higher education English teaching. This paper studies applications of AI-based technologies in University-level English language education, including important potentials and concerns. Through cases based on empirical researches, algorithm designs and teaching scenarios from Chinese universities, the contribution of the paper is to put forward the teaching, technological and ethical concerns on offering personalized teaching on the basis of AI technologies in Chinese context. It thus ends by presenting selective suggestions for succeeding AI application in post-secondary English education while sustaining humane and communication-oriented learning values.

Keywords: artificial intelligence, personalized learning, university English education, adaptive systems, higher education reform

1. Introduction

Adaptive learning is one of the critical methodologies of personalized learning in the digital age. Artificial intelligence (AI) facilitates the creation of the learning environment according to the requirement of each learner. In university English teaching, particular in non-native English teaching environments like China, learners exhibit high diversity of language ability and learning and communication styles. Finally, intelligent systems like intelligent tutoring systems (ITS), natural language processing and recommendation systems can potentially adapt to, and mitigate against, this variability; but integration of such intelligent systems engenders worry about data privacy, pedagogical fidelity, and the opacity of algorithms[1].

While a large range of studies attest how adding AI tools to language learning may introduce breakthrough changes, at the same time, in the light of the warnings provided above, universities need to ensure a proper pedagogical structure alongside technological assimilation to guarantee that crucial humanistic aspects of language teaching, such as critical thought, inventiveness, empathy, remain untouched by technology. In this paper, quantitative data and qualitative data through classrooms experiences in Chinese universities are used to explain both the potential and constraints of applying artificial intelligence to English teaching[2].

2. AI Technologies in University English Learning

2.1 Intelligent Tutoring Systems (ITS)

ITS model provides tailored feedbacks and individualized content ordering with adaptive sequences based on learners' interaction. Duolingo and iFLYTEK's Smart English Learning Platform utilizes the Reinforcement Learning algorithm to estimate the learners performance and create tailored training with difficulty level on-the-fly. ITS can run language tasks from vocabulary learning all the way to reading comprehension at tailored difficulty[3].

Another experiment was carried out with 137 English major students at one mid-level Chinese university. A 12 weeks intensive English learning program is offered. It was found that compared to the control group, students who had used an intelligent tutoring system (ITS) retained the vocabulary in test results for 17.8% more and the average completion time of each task reduced by 12.5% without lowering the comprehension scores, a more accurate indicator of their engagement and task efficiency. This implies that the ITS allows a better memory consolidation while at the same time the learning is facilitated to obtain, without effort, greater productivity in a short time. Results demonstrate the effectiveness of the ITS as an adjunct to teaching language skills, a more encouraging and effective component within teaching-learning processes.

2.2 Natural Language Processing (NLP)

Natural Language Processing (NLP) based tools provides immediate response and feedback for the students' writing and speaking. Grammarly, and ChatGPT provide corrections and alternative phrasing. Those NLP tools employ transformer

architecture such as BERT and GPT4, to extract grammatical, syntactic and semantic characteristics from students' input[4].

In a controlled in-class study (Liu et al., 2023), a pair of cohorts comprising 215 second year undergraduate students, each are randomly assigned to the NLP aided group and the control group, respectively, which involves weekly review of one another. The NLP group outperformed the control group in producing student argumentative writing with an average increase of 15.3 points in argumentative writing rubric scores in areas of coherence, range of vocabulary, and coherence and cohesion in structure.

2.3 Learning Resources Recommenders

For these recommendations for learning resources, recommender systems for AI learning environments use collaborative filtering and content-based profiling to suggest learner-candidate resources for the students. The function depicted in Equation models an adaptive reading system's scoring function:

Scoring Function for AI Recommender Systems in Adaptive Learning

$$\text{Score}_{ij} = \alpha \cdot \text{Interest}_{ij} + \beta \cdot \text{Difficulty}_{ij} + \gamma \cdot \text{LearningGap}_{ij}$$

By comprehensively considering learners' interests, the suitability of resource difficulty, and the learning gaps that need to be filled, the AI adaptive learning recommendation system applying this Equation can provide students with more accurate and personalized learning resources, thereby enhancing learning efficiency and promoting students' learning agency[5].

3. Case Study: Tsinghua University AI-English Learning Program

Tsinghua University has been carrying out a pilot use of this all-round AI English reading and writing project for non-English majors in 2021. The reading assistant system includes a biometric reading tracker, semantic pattern analysis, and automatic summary tools. Users' reading states are analyzed by real-time tracker such as eye movements or the reading speed of the cursor moving to gauge user attentiveness[6].

Outcomes from a sample of 312 students indicated:

83% reported increased engagement;

Reading speed improved by an average of 21.8%;

Writing task completion rate increased by 18.4%;

67% of participants preferred AI-enhanced feedback over instructor-only comments.

Teachers also noted a large savings on manual grading time (down 28%), allowing them to focus more time on interactions and oral exams, speeding up the grading process, while simultaneously creating a more engaging learning experience. Interviews performed in a focus group with students also report an impression that students learned more autonomy over their own pace and depth of learning. The students felt that this mode of delivery has put them in more of a leading role in their education where they get to really shape a degree around their own tastes and study habits.

4. Opportunities

AI presents a variety of scalable solutions for addressing long-standing pedagogical limitations:

Customization at Scale: Students can customize their online learning process, select their own speed of learning and get focused remediation in the areas that students struggle in language acquisition, i. e., listening, reading, writing, and speaking[7].

Potential also exists to integrate the AI for Speech recognition to assist students with disabilities and multilingual NLP platforms to help international students attending English Medium instruction (EMI). Also, gamification using AI gives motivation to student's learners and minimises attrition of poorer groups.

5. Challenges

While AI offers clear pedagogical benefits, its implementation is fraught with risks:

Algorithm Bias: If the data is biased, the model will "play favorites," easily missing errors in certain dialect expressions or ignoring the common mistakes of niche groups. This is especially pronounced for users with limited available data.

Dehumanization: The emergence of AI-driven auto-grading/ auto-writing assistant systems threatens to deplete the diversity of teacher-student collaboration.

Resource Inequalities: It can be difficult for institutions in every university to have the resources (like the devices, the infrastructure or the necessary knowhow) required to maintain the complex AI tools. In short, an AI resource gap exists.

A particularly important challenge is that of misinterpreting AI outputs, in which they use suggestion, interpretation, and advice as if it were somehow given as gospel truth, ignoring the reality that these elements are far from absolute; the evidence towards changing an AI suggested action should only be followed if those pieces of evidence are well supported.

As AI tools are already so common, and not uncommon in circumstances that not all will have been foreseen, learners (and all instructors) need to ensure that they teach digital literacy skills explicitly: this can never be underestimated and should play a primary part in lessons. These principles extend beyond students and their work, even when we employ those tools.

6. Conclusion

With its potential to individualize instruction, increase student agency, and simplify assessment, AI personalized learning is at the forefront of higher education innovation in university English. The potential of AI personalized learning to achieve the goals of higher education reforms, however, is hinged on its “willful, purposive, and critical deployment”. Colleges and Universities should be mindful that AI will be an enhancer of true learning—not a substitute for human interaction that is the core of language learning.

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