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The Ethical Boundaries and Developmental Logic of AI-Assisted Personalized Learning in Senior High School English

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Abstract: With the rapid development of generative artificial intelligence and adaptive learning systems, AI has increasingly penetrated the field of senior high school English education. Its core value lies in leveraging data-driven technologies to design personalized learning pathways, recommend learning content, and assess learners' competencies, thereby addressing the limitations of the traditional "one-size-fits-all" instructional model in meeting students' diverse needs. However, technological empowerment also conceals ethical risks and structural tensions. This paper systematically explores the developmental logic of AI-assisted personalized learning in senior high school English and provides an in-depth analysis of its ethical boundaries. It first reviews the application scenarios and driving forces behind AI integration, then identifies potential ethical dilemmas from five dimensions, including data privacy and algorithmic bias. Finally, it proposes the construction of a "human-centered" governance framework. Through institutional regulation and technology-for-good approaches, AI can achieve a unity of instrumental rationality and value rationality in senior high school English education, ultimately serving the fundamental educational goal of holistic human development.

Keywords: artificial intelligence; senior high school English; personalized learning; educational ethics; data privacy

Introduction

Education in the twenty-first century has undergone profound transformation driven by digital technologies. Artificial intelligence, with its powerful data-processing capabilities, has become a key force in promoting personalization and precision in education. Senior high school English, characterized by both instrumental and humanistic attributes, faces multiple challenges in teaching practice, including

disparities in students' language proficiency, complex learning motivations, and insufficient cultural understanding. The traditional class-based instructional model often fails to accommodate students' individual learning paces and cognitive differences. The introduction of AI appears to offer a potential solution. By tracking learners' behavioral data and constructing individual learning profiles, AI systems can provide customized learning resources, dynamic feedback, and



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differentiated instructional strategies, thereby realizing the educational ideal of “teaching in accordance with students’ aptitude.” However, technological intervention is not value-neutral. As AI becomes deeply embedded in education—particularly during the critical developmental stage of adolescence—its ethical implications demand careful scrutiny. Issues such as algorithmic decision-making, data collection, and information usage delineate the ethical boundaries of AI application. Without forward-looking reflection and effective governance mechanisms, technological empowerment may lead to unintended risks. Therefore, research on AI-assisted personalized learning in senior high school English should not be confined to technological efficacy and application models. It must also examine the underlying developmental logic and critically reflect upon ethical boundaries. Following the analytical framework of “developmental logic—ethical dilemmas—governance pathways,” this paper aims to provide guidance for constructing an intelligent educational ecosystem grounded in both technological advancement and humanistic values.

1. The Developmental Logic of AI-Assisted Personalized Learning in Senior High School English

The application of AI in senior high school English education is not incidental; rather, it is the inevitable outcome of multiple driving forces. Its developmental logic is rooted in the evolution of educational philosophy, breakthroughs in technological capability, and transformations in social demands.

1.1 The Internal Drive of Educational Philosophy: The Modern Resonance of “Teaching in Accordance with Students’ Aptitude”

“Teaching in accordance with students’ aptitude” has long been a core principle in the history of educational thought in both China and the wider world. It emphasizes respect for individual differences and advocates tailoring instructional approaches to students’ abilities, personalities, and interests. However, under the practical constraints of standardized examinations and large-scale classroom instruction, this ideal has been difficult to fully realize. The emergence of AI has provided unprecedented technological possibilities for operationalizing this principle. Through Natural Language Processing (NLP), AI systems can conduct

fine-grained analyses of students’ essays and oral recordings. Beyond identifying grammatical errors, they can evaluate lexical richness, syntactic complexity, logical coherence, and even cultural appropriateness. Through knowledge graph technologies, AI can map students’ mastery across subdomains such as vocabulary, grammar, reading, and listening, thereby accurately identifying areas of weakness. Through recommendation algorithms, AI can select learning materials from vast corpora that match students’ proficiency levels and thematic interests, stimulating intrinsic learning motivation.

This data-driven, dynamic, and granular personalization transforms large-scale “teaching in accordance with students’ aptitude” from an aspirational ideal into a practically achievable model.

1.2 External Technological Support: The Leap from Automation to Intelligence

The development of AI-assisted education is inseparable from continuous advancements in underlying technologies. Early Computer-Assisted Instruction (CAI) primarily focused on content presentation and basic interaction, essentially digitizing traditional textbooks. In contrast, contemporary AI—especially with the rise of deep learning and Large Language Models (LLMs)—has achieved a qualitative leap. On the one hand, AI has developed powerful “perceptual” capabilities. Speech recognition technologies have made oral assessment efficient and convenient, while affective computing attempts to interpret learners’ emotional states during the learning process. On the other hand, AI demonstrates remarkable “cognitive” and “generative” capacities ^[1]. Large language models can not only answer questions and explain knowledge points, but also act as virtual conversational partners, engaging students in immersive English communication practice. Moreover, they can automatically generate reading passages and writing prompts aligned with specific instructional objectives and thematic requirements. This transition from “automation” to “intelligence” signifies that AI is no longer merely a transmitter of information. Instead, it is gradually becoming a participant, facilitator, and collaborator in the learning process, thereby significantly expanding both the scope and depth of personalized learning.

1.3 The Realistic Pull of Social Demands: Efficiency, Equity, and Global Competitiveness

In the era of globalization and informatization, the importance of English as an international lingua franca is self-evident. Society has placed higher demands on learners' comprehensive English proficiency, which in turn compels the education system to improve instructional efficiency and quality. AI-assisted learning can help alleviate disparities in teaching resources. In regions where educational resources are relatively scarce, high-quality AI-based instructional tools can serve as a supplementary support, providing students with learning opportunities that transcend geographical limitations. To some extent, this responds to the call for educational equity. At the same time, under the pressure of high-stakes examinations, AI's precise diagnostic functions and targeted training mechanisms enable students to enhance their test performance more efficiently, meeting families' and schools' expectations for measurable educational outcomes. Furthermore, at the national level, promoting the integration of "AI + Education" is also a strategic choice aimed at enhancing overall digital literacy and strengthening global competitiveness. The convergence of these multiple social demands constitutes a powerful driving force behind the rapid expansion of AI in senior high school English education.

2. A Multidimensional Examination of Ethical Boundaries: Potential Risks of AI-Personalized Learning

While AI brings significant promise to personalized learning in senior high school English, its practical implementation may cross ethical boundaries, potentially threatening students' development and the intrinsic values of education.

2.1 Data Privacy and the Dilemma of Surveillance

AI-powered personalized learning relies on extensive data collection to construct detailed learner profiles. This dependence on large-scale behavioral data inevitably raises concerns regarding data privacy. Senior high school students are minors, and their personal information is highly sensitive. The collection, storage, use, and sharing of such data must therefore be subject to strict protection. In practice, however, user agreements of educational technology companies are often complex and difficult to comprehend. Students

and parents may "consent" to data authorization without fully understanding its implications. Moreover, excessive data collection risks creating a "panoptic" surveillance model, in which the learning space is transformed into a digital enclosure. Under such constant monitoring, students' authentic learning motivation and creativity may be suppressed, and the educational environment may gradually shift from one of trust to one of control.

2.2 Algorithmic Bias and the Effect of Reinforcement

Algorithms are not inherently objective or neutral. In the context of senior high school English learning, multiple forms of bias may emerge. From the perspective of cultural bias, if AI training corpora are predominantly derived from Western mainstream media or literary works, assessments of students' intercultural communicative competence may be skewed, thereby reinforcing a singular cultural perspective. Cognitive bias may also arise. Recommendation algorithms tend to provide similar types of content based on previous learning behaviors, potentially confining students within an "information cocoon." This limits their exposure to diverse viewpoints and reduces opportunities to challenge higher-order thinking skills, thereby solidifying rather than expanding cognitive structures. Socioeconomic bias presents another concern. AI systems often require stable internet access and advanced digital devices, which may exclude students from economically disadvantaged backgrounds. Furthermore, standardized algorithmic models may overlook diverse learning styles, inadvertently replicating or even exacerbating existing social inequalities.

2.3 The Challenge of Redefining Educational Equity

Although AI appears to break the temporal and spatial limitations of high-quality educational resources and promote "equality of opportunity," significant challenges remain in terms of "process equity" and "outcome equity." Differences in hardware infrastructure, internet bandwidth, and family digital literacy contribute to a persistent "digital divide." Moreover, disparities in students' ability to effectively utilize AI tools give rise to a "usage divide," which may further widen academic gaps^[2]. In addition, excessive reliance on AI-driven personalized recommendations may weaken the collective learning atmosphere of the classroom and diminish the value of peer interaction

and mutual support.

2.4 The Alienation of Teacher–Student Relationships

The integration of AI reshapes teacher–student relationships. Ideally, AI should undertake repetitive and procedural tasks, allowing teachers to devote more time and energy to creative and meaningful instructional activities, thereby achieving effective human–machine collaboration. However, if excessive trust is placed in the perceived “objectivity” and “efficiency” of AI systems, decision-making authority in teaching may be overly delegated to algorithms. In such circumstances, teachers risk being reduced to mere “operators” or “supervisors,” while their professional judgment and educational wisdom become marginalized. Meanwhile, frequent interaction between students and AI systems may reduce opportunities for building authentic emotional connections and developing interpersonal communication skills with real individuals. For senior high school students, who are in a critical stage of socialization, diminished human interaction may have long-term implications for their social and emotional development.

2.5 The Erosion of Student Subjectivity

The essence of personalized learning lies in stimulating learners’ intrinsic motivation and enabling them to become active agents in their own educational journeys. However, if AI-driven personalization is poorly designed, learning pathways, content selection, and goal setting may be predominantly determined by algorithms. Students may simply follow predetermined tasks step by step, turning learning into a passive and fragmented form of consumption. In such cases, metacognitive awareness and self-regulated learning abilities may gradually weaken. Furthermore, instant feedback mechanisms and gamified reward systems embedded in AI platforms may reinforce extrinsic motivation. Students may become overly focused on scores, rankings, or digital rewards, neglecting deeper appreciation of linguistic aesthetics, cultural richness, and intellectual depth. Consequently, learning risks becoming superficial and utilitarian rather than reflective and transformative.

3. Transcending Boundaries: Constructing a Human-Centered Governance Framework for AI in Education

In the face of the ethical dilemmas outlined above, it

is neither prudent to reject AI outright nor acceptable to allow its unchecked expansion. A balanced and responsible approach requires the construction of a human-centered governance framework grounded in the fundamental mission of education—cultivating individuals.

3.1 Institutional Regulation: Establishing a Legal Foundation for Data Security and Algorithmic Transparency

Governments and educational authorities should accelerate the formulation of specific laws, regulations, and ethical guidelines governing AI applications in the educational domain. At the core of such regulation should be the principles of “data minimization” and “informed consent,” strictly limiting the scope and purposes of student data collection while granting students and their guardians full rights to access, correct, and delete personal data. At the same time, greater emphasis should be placed on the development and application of Explainable AI (XAI). Educational AI systems should not merely provide decision outcomes (e.g., recommending a particular reading passage), but also present clear and accessible explanations of the underlying rationale (e.g., “because you performed well in the past three readings on environmental topics”) ^[3]. Establishing independent third-party algorithm auditing mechanisms to conduct regular bias detection and ethical evaluations of mainstream educational AI products is a critical measure for ensuring fairness and transparency.

3.2 Technology for Good: Embedding Ethical Values into AI System Design

AI developers must transcend a purely technical logic and position educational ethics at the core of product design. This requires the adoption of a Value Sensitive Design (VSD) methodology, proactively identifying and embedding core values—such as respect for privacy, promotion of fairness, and encouragement of intellectual exploration—throughout the entire lifecycle of system development. For instance, more advanced federated learning technologies can be employed to enhance data anonymization and security. Within recommendation algorithms, an “exploration–exploitation” balance mechanism can be introduced to intentionally provide students with a proportion of diverse learning materials that extend beyond their comfort zones, thereby breaking the confines

of information cocoons. In interface design, greater prominence can be given to teachers' formative feedback rather than merely displaying AI-generated scores, thus safeguarding teachers' professional authority and reinforcing the human dimension of instruction.

3.3 Teacher Empowerment: Reshaping Professional Roles in the Intelligent Era

Teachers should not become subordinates of AI systems, but rather their informed operators and critical evaluators. Both pre-service teacher education and in-service professional development programs urgently require reform to incorporate AI literacy as a core professional competency. Training should extend beyond operational skills related to specific software; it should cultivate teachers' understanding of algorithmic principles, their capacity to critically assess AI-generated outputs, and their ability to creatively integrate AI tools into pedagogical design. Schools should establish incentive mechanisms that encourage innovative AI-integrated teaching practices and provide adequate time for professional collaboration, as well as sustained technical support^[4]. Only under such conditions can teachers continue to serve as irreplaceable "engineers of the human soul" within a new human-machine collaborative ecosystem, guiding students toward deep learning and reflective value formation.

3.4 Literacy Cultivation: Fostering Students' Critical AI Awareness and Digital Citizenship

Students, as the primary subjects of education, must also develop the competencies required to coexist responsibly with AI technologies. The senior high school English curriculum itself can serve as an important platform for cultivating AI literacy. Teachers may guide students to analyze the linguistic features and potential biases of AI-generated texts, discuss the boundaries of data privacy, and reflect upon how personalized recommendations influence their reading horizons. Through project-based learning, students can be encouraged to experience the basic process of training simple AI models, thereby understanding the principle of "Garbage in, garbage out." Such educational practices aim to nurture critically minded and responsible digital citizens who can effectively leverage AI tools to enhance learning outcomes while maintaining intellectual autonomy and resisting technological domination.

Conclusion

AI-assisted personalized learning in senior high school English represents a transformative development in which opportunities and challenges coexist. Its emergence stems from the pursuit of the educational ideal of personalization, breakthroughs in technological capability, and evolving societal demands. Nevertheless, its advancement is accompanied by a series of ethical challenges, including risks of data privacy breaches, the reinforcement of algorithmic bias, the emergence of new divides in educational equity, the alienation of teacher-student relationships, and the erosion of student subjectivity. In the future, AI in education should neither replace teachers nor reduce learning to a simplified procedural task. Instead, it should function as a mirror, enabling teachers and students to gain clearer insights into teaching and learning processes; as a lever, stimulating interaction and critical thinking; and as a bridge, connecting knowledge with culture. To realize this vision, it is essential to uphold a human-centered stance. Through sound institutional frameworks, technology-for-good design principles, teacher empowerment, and the cultivation of students' critical awareness, a new intelligent educational ecosystem can be constructed. Only under such conditions can AI become a trustworthy partner in supporting senior high school students' English learning and personal development, rather than a "digital shackle." The dialogue between technology and humanity has only just begun, and educators bear profound responsibility in shaping its direction.

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