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Computer Security Research Based on Artificial Intelligence

Liping Xie

Beijing Dongfang Decai School, Beijing City, China

Abstract: This paper explores the application of artificial intelligence in smart classrooms for elementary Chinese language education. It elaborates on AI's capabilities in intelligent lesson preparation, instruction delivery, and homework grading, as well as its advantages in supporting personalized learning. The study proposes teaching strategies encompassing pre-class intelligent guidance, in-class intelligent interaction, and post-class intelligent reinforcement. It further outlines supporting measures across three dimensions—teacher training, school management, and home-school collaboration—aiming to enhance the quality of elementary Chinese language instruction and advance the development of smart education.

Keywords: Artificial Intelligence; Elementary Chinese language; Smart classroom; Teaching strategies; Personalized learning

1. Introduction

In this era of rapid technological advancement, artificial intelligence is profoundly transforming the field of education. As a foundational subject, traditional teaching models for elementary Chinese language education face significant challenges. Integrating artificial intelligence to build smart classrooms can provide students with richer learning resources and personalized learning experiences, sparking their interest in learning and enhancing their Chinese language proficiency. Exploring AI-based teaching strategies for smart classrooms in elementary Chinese language education holds substantial practical significance.

2. Functions and Advantages of Artificial Intelligence in Smart Chinese Language Classrooms for Primary Schools

2.1 Intelligent Teaching Assistance Functions

2.1.1 Intelligent Lesson Preparation

Leveraging vast educational resource databases, artificial intelligence enables precise matching of high-quality teaching materials. When teachers input lesson titles or teaching themes, the system rapidly filters compatible lesson templates, renowned teaching designs, and supplementary reading materials—covering differentiated content across various textbook editions[1]. For textbook analysis, the AI automatically deconstructs text structures, extracting key vocabulary for character recognition/writing modules, core questions for reading comprehension, and training points for composition modules. It aligns teaching requirements with curriculum standards for each knowledge point. When generating personalized lesson plans, the system adjusts teaching difficulty levels based on student data—such as the class's overall literacy foundation or reading proficiency—and embeds targeted teaching method suggestions. This ensures lesson preparation aligns closely with practical teaching needs, significantly reducing the time teachers spend gathering resources and finalizing

lesson plans.

2.1.2 Intelligent Instruction

Artificial intelligence enhances classroom teaching through interactive display features. Virtual scene rendering technology transforms textual descriptions into interactive dynamic visuals. For instance, passages depicting pastoral landscapes generate 3D scenes featuring crops and farming tools. Students can click scene elements to trigger related text explanations or audio descriptions. Multimedia resources are intelligently pushed and automatically activated based on teaching progress. When explaining ancient poetry, synchronized musical recitations and thematic illustrations appear; during paragraph analysis, relevant animated clips are retrieved to aid comprehension. Interactive display tools support real-time operation. When introducing new characters, teachers can access stroke decomposition animations demonstrating the complete writing process from initial to final strokes. Clicking on character components displays other characters sharing the same component, helping students establish knowledge connections and transforming abstract linguistic concepts into intuitive sensory experiences.

2.1.3 Intelligent Homework Grading and Feedback

Artificial intelligence significantly enhances the efficiency and accuracy of homework grading. For character and vocabulary assignments, the system identifies errors in stroke order or structural proportions, marks specific incorrect locations, and provides correction examples. Reading comprehension grading compares students' answers to reference answers for semantic alignment, assessing the completeness of information extraction and the validity of reasoning. Composition grading not only corrects character and punctuation errors but also analyzes sentence fluency and paragraph logic, pointing out redundant or missing elements in expression. Feedback includes detailed error statistics, such as specific words with pinyin errors or distribution of lost points in reading comprehension. It also recommends targeted exercises for each student's weaknesses—for instance, providing sentence pattern drills for those misusing conjunctions. This approach reduces teachers' repetitive grading workload while delivering more personalized feedback.

2.2 Advantages of Personalized Learning Support

2.2.1 Learning Style and Proficiency Assessment

Artificial intelligence generates comprehensive evaluations by continuously tracking student learning behaviors. It records response speeds during classroom exercises, preferred learning resource types, and interaction patterns to analyze distinct learning styles such as visual, auditory, or kinesthetic. Proficiency assessments span multiple dimensions: literacy evaluates reading accuracy and writing standardization; reading assesses information extraction, reasoning, and judgment capabilities; expression analyzes fluency in oral and written communication. By synthesizing behavioral data and response performance, these evaluations precisely pinpoint each student's strengths and weaknesses in knowledge mastery, providing clear reference points for subsequent personalized instruction.

2.2.2 Personalized Learning Path Planning

Based on assessment outcomes, AI crafts tailored learning plans for each student. For those with weak literacy foundations, the system prioritizes foundational content like pinyin recognition games and stroke tracing exercises to gradually enhance character recognition and writing skills. Students with stronger reading abilities receive advanced reading materials and critical thinking prompts to foster deeper comprehension. Learning resource recommendations dynamically adjust based on student progress. Upon achieving target character recognition accuracy, the system automatically adds word collocation exercises. After consecutive reading comprehension successes, it pushes more challenging text analysis tasks, ensuring content consistently matches student abilities and accommodates individual differences in learning pace and depth.

2.2.3 Real-Time Monitoring and Adjustment of Learning Process

Artificial intelligence continuously tracks student learning states and optimizes strategies in real time. During class, it records data such as answer accuracy rates and interaction frequency. When signs of distraction are detected, it automatically pushes brief word pairing games or sentence completion exercises to refocus attention. Post-class exercises monitor response times and revision logs. If repeated errors occur in

a specific question type, the system immediately retrieves micro-video explanations or example analyses of relevant knowledge points to help students instantly address gaps. The system adjusts subsequent task arrangements based on monitored learning progress—such as slowing difficulty escalation or increasing repetitions of similar exercises—ensuring students maintain learning efficiency at a pace suited to their individual needs.

3. AI-Based Teaching Strategies for Smart Chinese Language Classes in Primary Schools

3.1 Pre-Class: Intelligent Guidance to Spark Interest and Prepare Students

3.1.1 Intelligent Pre-Reading Task Design

Intelligent pre-reading tasks break away from traditional text formats, generating diverse content tailored to primary students' cognitive characteristics. Engaging audio guides feature character-based narration that transforms text excerpts into storytelling, with pauses at key questions embedded in the reading to prompt reflection. Animated video explanations focus on new vocabulary and contextual background, using cartoon characters to demonstrate stroke order and dynamic visuals to depict historical settings. Interactive mini-games—such as character recognition challenges and sentence assembly—transform preview objectives into gamified tasks, like dragging radicals to form characters and unlocking levels. Task difficulty dynamically adjusts based on student performance history. Students with weaker foundations start with basic recognition tasks, while stronger learners can tackle comprehensive comprehension challenges.

3.1.2 Intelligent Learning Resource Recommendations

Intelligent learning resource recommendations operate on dual dimensions: linking to preview content themes while matching student interests and preferences. For animal imagery in texts, related fairy tales or science articles are recommended; for classical poetry themes, similar verses and accessible analyses are suggested. The system tracks resource preferences—frequent comic clicks yield more illustrated materials, while video viewing increases animated interpretations. Resources span varying difficulty levels, from quick-read shorts to in-depth explorations, catering to diverse learning needs.

3.1.3 Intelligent Preview Feedback

Intelligent preview feedback visualizes results through data visualization, generating personalized preview reports that highlight mastered knowledge points and areas needing reinforcement—such as character recognition accuracy and text summary completeness. Reports use star ratings or progress bars to intuitively display completion status, accompanied by brief prompts indicating key focus areas. Classwide feedback compiles common issues, such as high error rates for specific character types or widespread misunderstandings of particular passages, providing clear guidance for teachers to adjust classroom focus. Feedback is simultaneously sent to student devices, enabling students to proactively identify their learning gaps.

3.2 In-Class: Smart Interaction, Enhancing Engagement and Effectiveness

3.2.1 Smart Scenario Creation

Smart scenario creation leverages virtual reality technology to build immersive learning environments. Historical story scenes are recreated through 3D visuals that bring ancient marketplaces and imperial court settings from texts to life. Students can “step into” these scenes to observe details, such as the layout of the Chu Kingdom palace and character attire showcased in the teaching of “Yanzi's Mission to Chu.” Mythological worlds blend animation with interactive elements. In lessons like “Pangu Creating the World,” students can “participate” in the creation process through gesture controls. Interactive elements within these scenarios—such as triggering dialogues by clicking characters or displaying explanations by touching objects—deepen students' understanding of the text.

3.2.2 Intelligent Interactive Q&A

The intelligent Q&A system supports both voice and text interactions. Students can pose questions anytime, receiving instant responses. Unanswered queries are automatically logged and flagged for teacher attention. The Q&A process incorporates guided feedback: when answers are incomplete, follow-up questions or contextual clues prompt further thinking. For instance, when asked to explain the emotion conveyed in a poem, students are prompted to analyze it in light of the poet's background. The system logs all Q&A content, identifies frequently asked questions, and displays

popular discussion points on the classroom screen to stimulate collective thinking.

3.2.3 Intelligent Support for Collaborative Learning

Intelligent support for collaborative learning begins with optimized grouping. Heterogeneous teams are automatically formed based on students' academic proficiency and personality traits, ensuring each group includes members with diverse strengths. Tasks are decomposed into sub-tasks based on lesson content, clearly defining roles such as data collector, viewpoint recorder, and presentation leader. The system captures real-time discussion keywords, issues gentle reminders when discussions stray off-topic, and pushes relevant inspirational materials when thinking becomes stagnant. During the presentation phase, multimedia editing tools enable groups to transform discussion outcomes into text-image, audio, or simple animation formats.

3.2.4 Real-Time Learning Data Monitoring and Analysis

Real-time learning data monitoring covers the entire classroom process, recording details such as student response times, answer revision counts, and interaction frequency. Analysis results are presented through dynamic charts: answer accuracy curves reflect real-time knowledge mastery, while engagement heatmaps display individual student participation levels. The system flags anomalies—such as repeated incorrect answers or prolonged inactivity—automatically alerting instructors. Data refreshes every five minutes, enabling teachers to monitor classroom dynamics and adjust teaching pace or activity design flexibly.

3.3 After Class: Smart Reinforcement, Knowledge Consolidation and Extension

3.3.1 Smart Assignment Placement and Personalized Recommendations

Smart assignments employ tiered design: foundational-level tasks focus on core knowledge consolidation (e.g., character copying, text excerpt memorization); advanced-level assignments emphasize comprehension and application (e.g., sentence pattern imitation, brief reading reflections). Advanced-level assignments develop comprehensive skills, such as creating story sequels or designing thematic handwritten newsletters[3]. Assignments combine traditional written tasks with interactive activities, like recording text recitations or illustrating comprehension through diagrams. Personalized recommendations correlate with classroom performance: students with high error rates on specific question types receive targeted practice, while high-performing students are recommended age-appropriate reading materials or writing technique guides.

3.3.2 Intelligent Homework Grading and Error Analysis

Intelligent grading enables multidimensional assessment: objective questions receive instant scoring with error annotations, while subjective responses are graded based on completeness and fluency. Error analysis generates personalized error collections organized by knowledge points, labeling mistake types (e.g., character/word errors, comprehension gaps, or expression flaws) with explanatory notes. The system identifies underlying weaknesses behind errors—for instance, frequent synonym confusion prompts recommendations for vocabulary differentiation practice—providing clear direction for future review.

3.3.3 Personalized Learning Tutoring and Q&A

Personalized learning tutoring offers round-the-clock support. Students receive relevant answers to queries through text explanations supplemented with examples. For instance, questions about metaphor usage display illustrative sentences from texts with component breakdowns. The system proactively pushes tailored guidance based on learning data. For instance, if recent character mastery is weak, it sends memory techniques; if writing scores are low, it offers paragraph organization tips. Q&A records are automatically saved, forming a personal question bank for easy review.

3.3.4 Intelligent Learning Achievement Display and Evaluation

The Intelligent Learning Outcomes Display Platform aggregates diverse student work—assignments, drawings, recordings, etc.—displayed by theme with interactive features like likes and comments. The evaluation system encompasses multiple dimensions: teacher assessments focus on knowledge mastery and skill development, peer evaluations emphasize creativity and expression, while self-assessments guide reflection on the learning process. The system synthesizes all evaluations into growth curves, visually illustrating progress trajectories. These highlight

strengths and areas for improvement, motivating students to recognize their strengths and drive continuous advancement.

4. Implementation Measures for AI-Based Smart Classroom Teaching Strategies in Elementary Chinese Language Education

4.1 Teacher Training and Professional Development

AI technology training establishes a tiered curriculum system. Foundational courses focus on operating the intelligent teaching platform, covering basic functions such as account management and resource retrieval. Through simulated operations, teachers become familiar with the interface and tools. Advanced courses delve into practical application scenarios, using elementary Chinese language case studies to demonstrate how to adjust system parameters to align with teaching content. Training combines theory with hands-on practice, incorporating group exercises to resolve operational queries on-site. Pedagogical innovation is fostered through regular workshops analyzing differences between traditional and AI-enhanced classrooms, exploring how AI reconfigures teaching processes. Expert-led sessions guide teachers in integrating technology with instructional objectives. Novel teaching models are encouraged for replication and dissemination. Teacher collaboration is organized through subject-based research groups, formed by grade level or discipline with defined responsibilities and cycles. An experience-sharing system compiles application cases and challenges, facilitating solution discussions. Cross-grade resource sharing mechanisms curate exemplary designs and courseware for reference. Activities blend online and offline formats, documenting research outcomes and organizing model lesson observations.

4.2 School Management and Support

Hardware infrastructure meets smart teaching requirements, with classrooms equipped with interactive whiteboards and student terminals in quantities matching class sizes. High-speed wireless networks cover the campus to ensure smooth data transmission. Dedicated servers store data and resources, maintained and upgraded by technical staff with regular equipment inspections. Software resources undergo a screening mechanism where teaching management evaluates suitability, prioritizing platforms compatible with textbooks and featuring user-friendly operation. Resource libraries are categorized by grade and unit, incorporating lesson preparation tools and interactive software with keyword search functionality. Regular feedback collection eliminates poorly adapted software while introducing high-quality resources. Institutional frameworks and incentive mechanisms provide clear direction, establishing application assessment standards that incorporate usage frequency and effectiveness into performance evaluations. Specialized rewards recognize outstanding teachers, with exemplary cases recommended for awards. A tolerance-for-error mechanism offers guidance during exploratory phases, fostering an innovative atmosphere.

4.3 Home-School Collaboration and Communication

Parent training balances practicality and accessibility, featuring workshops on tool functionality and video demonstrations of student workflows. Operational guides explain parental access permissions and support methods. One-on-one guidance is provided for older parents to overcome technical barriers. The home-school communication platform enables information sharing through modules like learning data push notifications and feedback messages. Regularly distribute weekly learning reports summarizing data such as preview completion rates and interactive participation levels, accompanied by interpretations. Set up interactive sections to collect parent feedback, with dedicated personnel compiling and forwarding it to relevant departments for response and resolution. The platform interface is designed to be simple and user-friendly for parents of all ages.

5. Conclusion

Artificial intelligence injects new vitality into smart primary school Chinese language classrooms, delivering functional advantages and personalized support. By implementing scientific teaching strategies and enhancing safeguards such as teacher training, school management, and home-school collaboration, teaching effectiveness can be significantly improved. Moving forward, continuous exploration and innovation are essential to better leverage AI in primary Chinese language education, fostering students' holistic development and propelling education toward new heights.

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