Integrating AI in High School Chinese Education: A Survey

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Abstract

This survey paper explores the interdisciplinary integration of artificial intelligence (AI) in high school Chinese education, focusing on its potential to revolutionize teaching practices by blending traditional Chinese studies with modern AI advancements. The paper is structured into several sections, each examining different aspects of AI integration: AI-generated art, poetry pedagogy, and educational technology. The findings highlight AI's capacity to personalize learning, enhance creative expression, and improve engagement, while also addressing the challenges of data privacy, bias, and the digital divide. Key insights include the importance of culturally adaptive educational models and the need for robust ethical frameworks to guide AI's responsible use. The survey underscores the necessity for comprehensive teacher training and professional development to effectively implement AI tools in educational settings. Case studies demonstrate successful AI integration in curricula, offering lessons on scalability and best practices. Despite AI's transformative potential, the paper emphasizes the need for ongoing research to address ethical considerations and ensure equitable access to AI technologies. The conclusion calls for a balanced approach that leverages AI's benefits while maintaining human-centered educational values, advocating for continued innovation to maximize AI's impact on high school Chinese education.

1 Introduction

1.1 Structure of the Survey

This survey examines the integration of artificial intelligence (AI) in high school Chinese education through a structured approach. The introduction highlights the interdisciplinary nature of blending traditional Chinese language studies with AI advancements, followed by a discussion on the necessity for new educational models that adapt to these technologies. The transformative potential of AI in education is explored, emphasizing its benefits.

The second section provides a comprehensive overview of core concepts, including AI-generated art, poetry pedagogy, and educational technology, while assessing the current state of high school Chinese education and the role of AI in modern practices.

The third section focuses on AI in art education, addressing public perceptions of AI-generated art, comparisons between AI and human creations, and the enhancement of emotional engagement and creativity through AI.

The fourth section discusses AI tools in poetry pedagogy, highlighting their educational benefits and impact on student engagement.

The fifth section analyzes educational technology, discussing advancements, tools, and platforms that facilitate AI integration, along with AI-driven personalization and feedback mechanisms.

The sixth section presents case studies of successful AI integration in Chinese language curricula, offering insights into innovative practices and lessons learned.

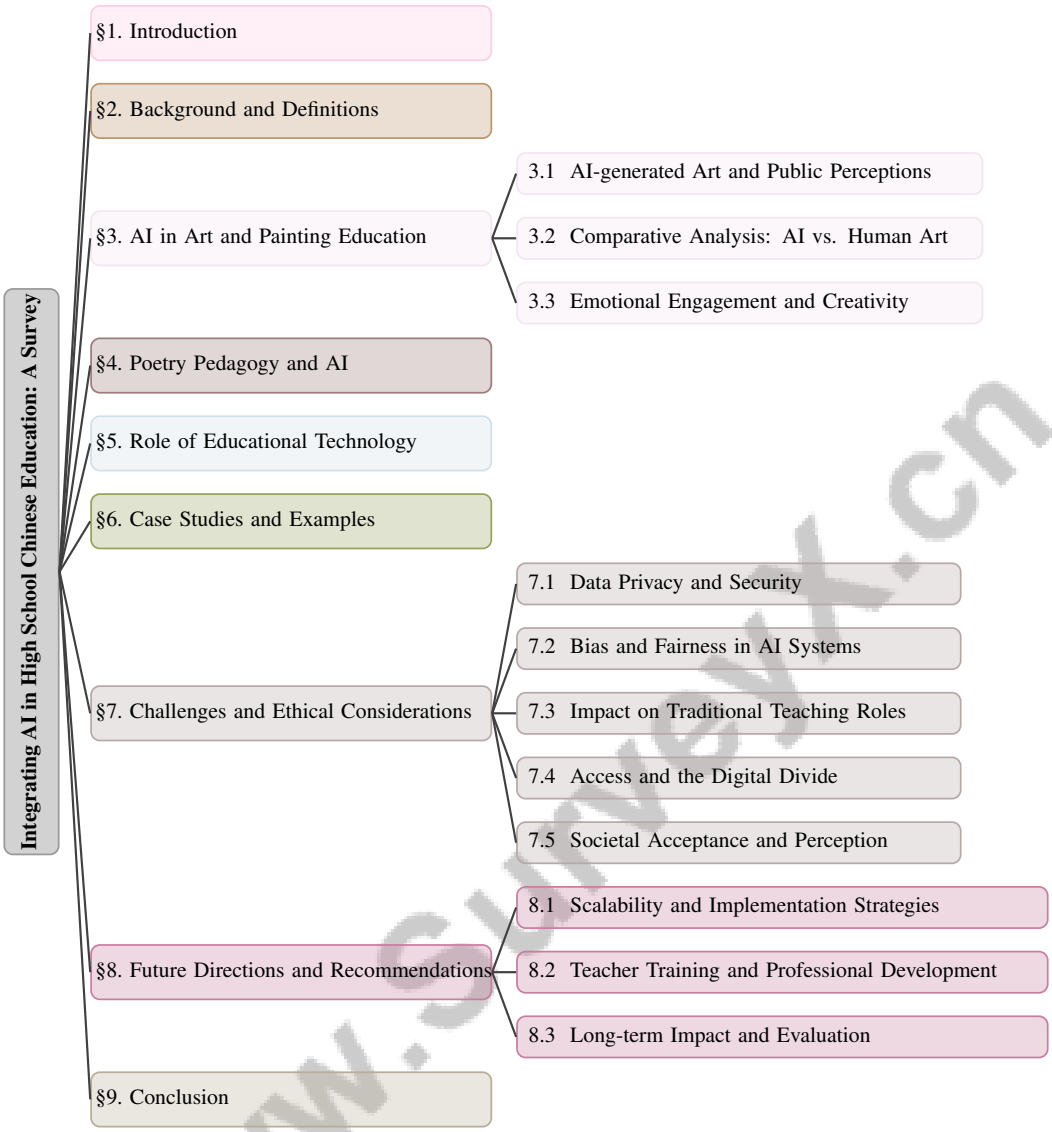

Figure 1: chapter structure

The seventh section identifies challenges and ethical considerations, including data privacy, bias, impacts on traditional teaching roles, access issues, and societal acceptance.

The survey concludes with a discussion on future directions and recommendations for advancing personalized education through big data and AI integration. It emphasizes critical areas such as scalability of educational technologies, the necessity for teacher training, long-term impacts on student outcomes, and robust evaluation strategies. The findings underscore the urgent need for ongoing research and innovation to fully harness AI's potential in creating tailored learning experiences that meet individual student needs [1, 2, 3].

1.2 The Need for New Educational Models

Integrating artificial intelligence (AI) into educational settings necessitates innovative educational models that effectively leverage these technologies to enhance learning experiences. This need arises from the gap between the aspirational goals of AI and their current practical applications in education [4]. As AI technologies evolve, they present opportunities and challenges that require adaptive educational frameworks [5]. For instance, the incorporation of AI tools such as ChatGPT

AI-generated, for reference only.

into curricula illustrates AI's transformative potential in pedagogical practices while also raising concerns regarding data privacy and algorithmic bias [2].

Understanding the factors influencing teachers' trust in AI-based educational technology (AI-EdTech) is crucial for developing models sensitive to individual and contextual factors, thereby enhancing educators' ability to utilize AI tools effectively [6]. Furthermore, exploring creative thinking patterns through educational data mining offers insights into optimizing personalized learning experiences [1], aligning with the goal of fostering creativity essential for navigating an AI-driven world [7].

The complexities of identifying creative thinking patterns from educational data further emphasize the need for adaptable models [8]. Additionally, the lack of accessible, customizable educational tools for instructors without extensive technical knowledge limits personalized teaching potential [9]. Addressing this issue requires models that empower educators to design and implement AI-driven interventions tailored to their specific contexts.

Considering diverse perspectives, including those of individuals with disabilities, is essential in developing inclusive and equitable AI applications [10]. This approach is part of a broader effort to create educational models responsive to the diverse needs of learners and educators.

Ultimately, the necessity for innovative educational models accommodating AI advancements is evident. To prepare students and educators for evolving challenges and opportunities in an AI-enhanced educational environment, models must be flexible, inclusive, and responsive. This adaptability will facilitate the integration of innovative AI applications—such as personalized learning platforms, intelligent tutoring systems, and automated assessment tools—while addressing ethical considerations and societal impacts. By equipping instructors with the tools and knowledge to create customized AI-driven learning experiences, we can foster a dynamic and supportive educational landscape that meets diverse learner needs [11, 9, 12, 13].

1.3 AI's Impact on Education

Artificial intelligence (AI) is revolutionizing educational practices by personalizing learning experiences, improving access to education, and enhancing teaching efficiency. Research demonstrates AI's ability to tailor educational content to individual learners, optimizing knowledge acquisition and retention [3]. The Self-Directed Teaching framework exemplifies this potential, providing an interactive and personalized learning environment that significantly boosts student engagement and retention [14].

AI technologies transform teaching and learning processes by enabling education personalization and immediate feedback, which are critical for improving educational outcomes. Integrating AI tools into educational settings supports diverse and innovative teaching methods, allowing educators to effectively address the unique needs of each student [15].

Ethical considerations surrounding AI applications in education necessitate collaborative efforts to develop fair and inclusive systems. It is essential to integrate diverse perspectives in AI governance to ensure responsible and equitable technology use [16]. The exploration of AI's potential benefits for marginalized groups, such as blind artists, underscores the importance of inclusivity in AI-driven educational practices [10].The following sections are organized as shown in Figure 1.

2 Background and Definitions

2.1 Core Concepts and Definitions

The integration of artificial intelligence (AI) in high school Chinese education is anchored in pivotal concepts, including 'AI-generated content' (AIGC), which notably involves AI-generated art. Technologies such as Midjourney enhance educational experiences and user engagement but pose challenges, particularly for diverse users like blind artists [10]. AIGC utilizes 'prompt inference' and 'text-to-image generation,' raising significant intellectual property issues in educational settings.

In educational technology, 'Knowledge Tracing' (KT) models are crucial for tracking and predicting students' knowledge states based on their assessment responses, especially in Multiple Choice Questions (MCQs). Traditional KT models often overlook nuanced insights, but advances like the Concept map-driven Response Disentanglement method (CRKT) enhance prediction accuracy and

provide actionable feedback, advancing personalized education through sophisticated data mining [17, 18, 19, 1, 8]. Educational data mining and domain-specific knowledge bases further refine these models, promoting personalized learning. 'Intelligent Tutoring Systems' (ITS) offer adaptive learning paths and automated question generation, supported by AI teaching assistants and learning companions, essential for collaborative learning environments.

'Poetry pedagogy' involves teaching poetry through methodologies enriched by AI tools that enhance creative expression and comprehension, aligning students' primary Discourses with the secondary Discourse of school learning for meaningful engagement [20]. AI integration in poetry education fosters interdisciplinary learning and highlights ethical considerations in pedagogy [21].

The term 'educational technology' covers a spectrum of tools and methodologies, including AI-based educational technology (AI-EdTech), which requires building teachers' trust for effective integration [6]. However, integration faces challenges due to inadequate training, insufficient technical support, and lack of clear documentation for educators, especially with tools like ChatGPT.

Generative Artificial Intelligence (GenAI) is transforming education by offering personalized learning support through adaptive ITS, utilizing large language models like GPT-4 for dynamic content generation, real-time feedback, and customized learning pathways. This technology enhances learning through interactive dialogue systems tailored to individual needs, but raises ethical challenges, including transparency, privacy, and potential biases, necessitating careful examination of its educational impact and the cultivation of AI literacy [22, 23]. Understanding these core concepts is vital for effectively integrating AI into high school Chinese education, ensuring practices remain innovative, inclusive, and responsive to technological advancements.

2.2 Current State of High School Chinese Education

High school Chinese education is currently shaped by the intersection of traditional teaching methodologies and rapid technological advancements, notably AI and educational technology. Recent studies highlight a growing interest in AI applications in education, focusing on intelligent tutoring systems, natural language processing for language acquisition, and personalized learning through adaptive technologies, which enhance instructional practices and aim to improve student engagement and outcomes [24, 12, 13, 25]. Despite AI's potential, its integration into Chinese language education is limited by conventional models emphasizing rote learning and standardized testing over critical thinking and creativity, restricting the adoption of AI technologies that could enrich learning experiences.

Government policies and private educational enterprises further complicate AI technology development and implementation in Chinese education, creating an environment where innovative practices struggle to gain traction [24]. Trainee teachers face challenges in utilizing digital training environments essential for navigating modern educational contexts [26]. The absence of effective methodologies for measuring creativity, a critical 21st-century skill, underscores the limitations of current practices and the need for innovative approaches leveraging AI's capabilities [8].

The integration of AI-EdTech in K-12 settings is emerging, with teachers expressing cautious optimism tempered by concerns about trust and efficacy [6]. Existing educational technology methodologies face challenges such as content conflicts and language translation disruptions, hindering seamless AI tool adoption [27].

Cultural perceptions and accessibility issues significantly influence Chinese education, as seen in the interactions of blind artists with generative AI art tools [10]. These challenges highlight the necessity for culturally relevant and accessible AI applications catering to diverse learner needs.

2.3 AI in Modern Educational Practices

Artificial intelligence (AI) is increasingly shaping modern educational practices by providing innovative tools and methodologies that enhance teaching and learning. AI's integration into education is characterized by its ability to personalize learning and foster creative expression. AI-generated content (AIGC), especially in prompt inference, is transforming content creation and consumption within educational contexts, particularly in art and creativity in high school Chinese education [28]. This transformation is supported by various AI paradigms, including data-based, logic-based, and knowledge-based AI, each contributing uniquely to educational outcomes [4].

A significant aspect of AI's educational role is adaptive learning technologies, which employ data mining to enhance personalized learning experiences [1]. These technologies enable dynamic generation of educational materials tailored to diverse learning needs, thereby improving engagement and outcomes [2]. AI's role is further enriched by frameworks emphasizing the iterative learning process to effectively use AI tools like ChatGPT, focusing on information seeking, capability exploration, and integration support [17].

AI integration also involves addressing ethical considerations and ensuring equitable access to AI technologies. Frameworks differentiating between teaching about AI, teaching for AI, and teaching with AI emphasize collaboration between AI tools and educators, crucial for creating personalized educational exercises that engage students through simulations, mentoring, co-creation, and critique [9].

The development of educational AI is influenced by government policy, private sector innovation, and regional implementation variations, illustrating the complex interplay of factors shaping AI integration in curricula [24]. AI's role in current practices is exemplified by its integration into learning and writing processes, as seen with tools like ChatGPT [5]. The study of personalized and equitable learning experiences in educational technology underscores the need to address inherent curriculum recommendation method issues [27].

3 AI in Art and Painting Education

3.1 AI-generated Art and Public Perceptions

The emergence of AI-generated art has significantly influenced public perceptions of creativity, prompting a reevaluation of artistic authorship and expression. Tools such as Midjourney and DALL-E 2 challenge traditional notions of originality and artistic value, sparking debates about AI's role in the creative sphere [29]. The ReDiffuse method exemplifies the complexities in determining whether artworks contributed to training diffusion models, highlighting critical copyright issues in AI-generated art [30].

Public attitudes toward AI-generated art are influenced by emotional responses and societal implications, with online discussions revealing a range of perspectives from skepticism to acceptance [31]. This dialogue underscores a transformative shift in art, as generative AI introduces novel forms of creation [32]. Despite AI's innovative potential, a preference for human-created artworks persists due to their perceived authenticity and emotional resonance [33].

The experiences of blind artists using AI tools emphasize the need for inclusivity in AI art technologies, advocating for frameworks that accommodate diverse user experiences and equitable access to creative resources [10]. Viewing AI as a co-creative partner, rather than merely a tool, is crucial for fostering collaborative artistic processes that enrich creative expression [34].

As illustrated in Figure 2, the key themes in AI-generated art and public perceptions encompass public attitudes, methodological challenges, and inclusivity in AI art technologies. This figure highlights the dichotomy between skepticism and acceptance, the preference for human-created art, and the emotional responses elicited by AI art. Methodological challenges include copyright issues, confounding bias, and the integration of creative coding. Inclusivity emphasizes the experiences of blind artists and the importance of co-creative processes.

Current methodologies in creative coding environments highlight challenges faced by programmers in utilizing generative AI flexibly, underscoring the need for more adaptable systems to support diverse creative endeavors [35]. Additionally, confounding bias in AI-generated art, particularly regarding the influence of art movements on learning artists' styles, complicates the accurate representation of artistic expression [36].

The dynamic nature of public perception surrounding AI-generated art reflects the complexities and opportunities presented by its integration into the artistic domain. As AI technologies advance, their impact on creative expression becomes a focal point of discussion, raising debates about authorship, aesthetic appreciation, and ethical considerations in artistic practices. While many users express positive sentiments toward AI-generated art, concerns about its socio-cultural implications, especially the potential risks of displacing human creativity, remain significant. Studies reveal that perceptions of AI-generated content are reshaping community dynamics on platforms like Pixiv, indicating a growing

acceptance of AI art alongside traditional human-created works. This evolving landscape suggests that AI not only inspires new forms of artistic collaboration and innovation but also raises critical questions about the nature of creativity and the value attributed to human versus machine-generated art [37, 38, 39, 40, 31].

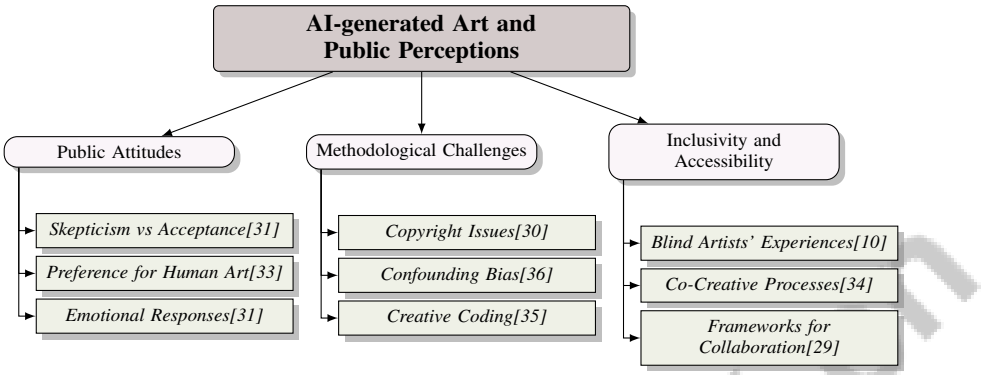

Figure 2: This figure illustrates the key themes in AI-generated art and public perceptions, focusing on public attitudes, methodological challenges, and inclusivity and accessibility in AI art technologies. It highlights the dichotomy between skepticism and acceptance, the preference for human-created art, and the emotional responses elicited by AI art. Methodological challenges include copyright issues, confounding bias, and the integration of creative coding. Inclusivity emphasizes the experiences of blind artists and the importance of co-creative processes.

3.2 Comparative Analysis: AI vs. Human Art

The introduction of AI in art creation has sparked significant dialogue regarding the distinctions and intersections between AI-generated and human-created artworks, focusing on the aesthetic and conceptual richness of each form [41]. Advanced models like Collaborative Neural Painting (CNP) facilitate AI-generated art creation without reference images, allowing for an arbitrary number of strokes, enhancing creativity and flexibility [42]. This contrasts with traditional human art, which is deeply embedded in personal history and emotional resonance [43].

A central challenge is the legitimacy and perceived value of AI-generated art compared to human-created works [39]. AI art often does not conform to traditional copyright frameworks, raising ownership and protection concerns [32]. Initiatives like GenP5 and P52Style bridge this gap by integrating generative procedural art with diffusion models, facilitating easier access to AI tools for artists [35]. This integration fosters a collaborative environment where AI and human artists can explore new creative possibilities.

The bias favoring human-created art over AI-generated art is a core issue, with individuals often perceiving human art as more authentic and emotionally resonant [33]. Public opinion reflects this bias, as laypeople attribute greater authorship to users and data contributors than to AI models or companies [37]. The concept of 'fluidity of prompt interpretation' is proposed as a new metric for evaluating creativity in image generators, allowing for nuanced comparisons between different models [34].

AI's capacity to replicate human-like artistic processes is exemplified by employing deep Q-networks (DQN) to create nuanced control policies for humanoid robots, enabling them to produce sketches reminiscent of human artists [44]. However, despite these advancements, AI-generated art often lacks the emotional depth found in human-created works, as the closed nature of big data used for training tends to prioritize popular emotions over individual expressions [45]. The use of directed acyclic graphs (DAGs) to quantify confounding bias offers a systematic approach to understanding how art movements influence art generation, highlighting the complexities of capturing artistic nuances [36].

In educational contexts, the differences between human and AI capabilities in interpreting prompts from AI-generated art underscore the potential for collaboration and enhancement of creative educational practices [28]. As AI continues to evolve in the art domain, the discourse surrounding its role in artistic creation will likely intensify, prompting further exploration of its impact on artistic practices and cultural perceptions.

3.3 Emotional Engagement and Creativity

Artificial intelligence (AI) is reshaping art education by enhancing emotional engagement and fostering creativity through innovative and interactive approaches. AI-generated art, capable of evoking a range of emotional responses, presents new avenues for creative exploration in educational settings [29]. The engaging nature of AI-generated art, especially when delivered in interactive formats, allows users to modify their artistic experiences, thereby boosting engagement and improving educational outcomes [35].

Libraries such as GenP5 and P52Style exemplify tools that empower artists to condition art creation and manipulate styles through user-friendly interfaces, significantly enhancing emotional engagement and creativity [35]. These tools democratize art creation, expanding access to artistic experiences for individuals who may have previously faced barriers, thus promoting inclusivity and diversity in artistic expression [29].

Despite these advancements, genuine creativity necessitates an understanding of context and emotional depth, which AI currently lacks [33]. Research indicates a preference for human-created art due to its perceived authenticity and emotional resonance, emphasizing the communicative aspects valued by audiences [33]. Nevertheless, AI's role in art education is further enhanced by its ability to improve accessibility and understanding of visual arts through automated tools [32].

The perception of AI as a co-creative partner rather than merely a tool is crucial for fostering collaborative artistic processes that enhance creative expression [39]. AI's adaptability to complex artistic tasks, as demonstrated by methods generating human-like sketches, underscores its potential to augment traditional art education practices [36].

4 Poetry Pedagogy and AI

The convergence of poetry pedagogy and artificial intelligence (AI) offers transformative potential for educational practices by enhancing learning experiences. This section explores AI tools incorporated into poetry pedagogy, detailing their functionalities and contributions to teaching and understanding poetry, thereby fostering creativity and engagement in educational contexts. Figure 3 illustrates the integration of AI in poetry pedagogy, highlighting various AI tools alongside ethical considerations and educational benefits. The figure categorizes the innovative tools and resources utilized, the ethical challenges encountered, and the educational advantages gained, emphasizing aspects such as personalized learning, student engagement, and creative expression. This visual representation not only complements the discussion but also reinforces the significance of these AI tools in enriching the pedagogical landscape of poetry.

4.1 AI Tools in Poetry Pedagogy

The incorporation of AI into poetry pedagogy enriches the teaching and comprehension of poetry through innovative tools that enhance creative expression. Applications like ChatGPT aid in idea generation and writing quality, creating an interactive learning environment [5]. These tools enable prompt inference, allowing educators to explore AI's creative applications in poetry education [28]. AI-generated art is often likened to 'fast-food-style' production, efficient yet potentially lacking in emotional depth compared to traditional art [45]. This perspective facilitates discussions on creativity and artistic expression, particularly in distinguishing AI-generated content from human-created art. Frameworks assessing AI-generated art based on emotional alignment and user intent highlight AI's potential to empower self-expression in poetry education [46].

Ethical considerations are paramount when integrating AI-generated content into poetry pedagogy, especially concerning intellectual property rights, privacy, and social impacts [39]. Educators must navigate these challenges to maintain an ethical learning environment that respects creators' rights and educational integrity. Tools such as the GenP5 library and P52Style exemplify innovative methods for inspiring poetic expression and interpretation in students [35]. These resources provoke critical thought about art and authorship.

As illustrated in Figure 4, the integration of AI tools in poetry pedagogy highlights not only the innovative tools available but also the ethical considerations and educational integration methods that are crucial for effective teaching. Integrating poetic inquiry with educational practices enhances the

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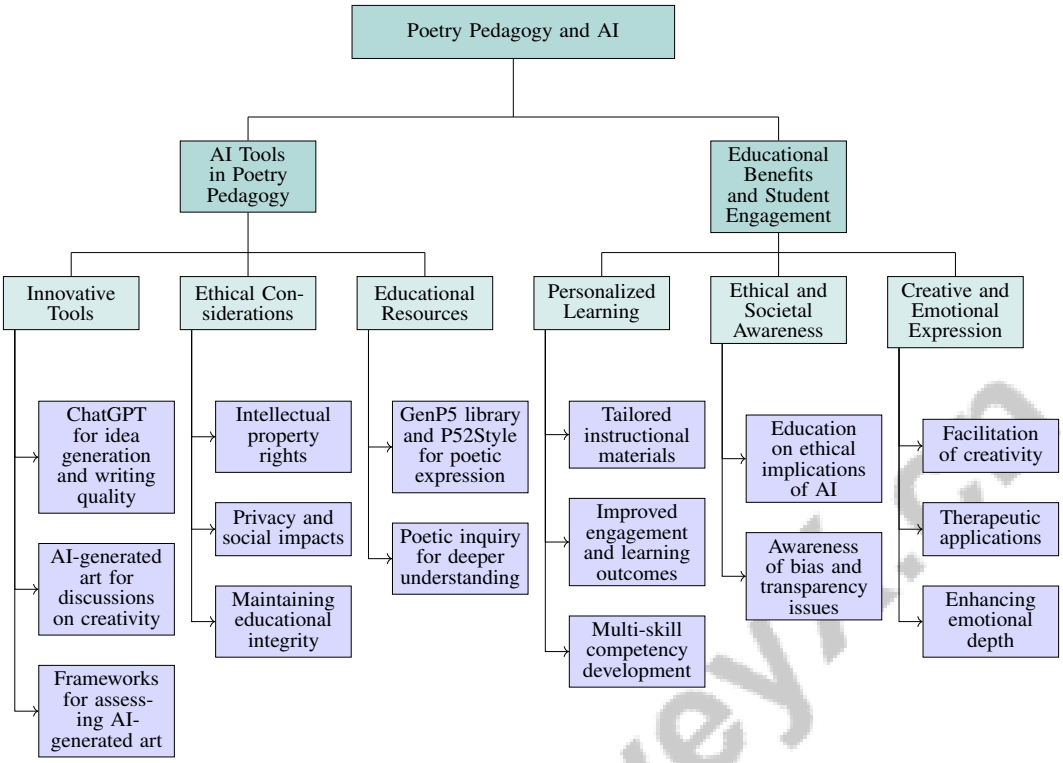

Figure 3: This figure illustrates the integration of AI in poetry pedagogy, highlighting AI tools, ethical considerations, and educational benefits. It categorizes the innovative tools and resources used, the ethical challenges faced, and the educational advantages gained, emphasizing personalized learning, student engagement, and creative expression.

use of AI tools in poetry pedagogy [7]. By constructing chains of generated images and captions from a seed image and measuring divergence points from the original prompt, educators can deepen students' understanding of the creative process and its implications for poetry education [34].

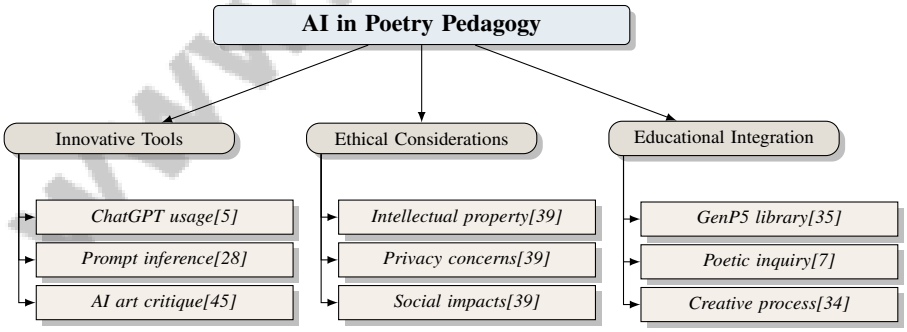

Figure 4: This figure illustrates the integration of AI tools in poetry pedagogy, highlighting innovative tools, ethical considerations, and educational integration methods.

4.2 Educational Benefits and Student Engagement

AI's integration into poetry education significantly enhances educational benefits and student engagement by facilitating personalized learning experiences and fostering creativity. AI tools empower educators to create tailored instructional materials, improving engagement and learning outcomes. This dynamic environment encourages students to explore poetry as a relevant form of expression, transforming their self-perception and confidence [9]. AI in poetry pedagogy supports multi-skill competency development, enhancing emotional intelligence and critical thinking [7]. By providing

AI-generated, for reference only.

personalized learning experiences and improving assessment methods, AI in education (AIED) offers transformative potential for both students and educators.

Incorporating AI into poetry education enhances engagement through personalized experiences and addresses the critical need to educate students about ethical implications and societal challenges associated with generative AI technologies, such as bias and transparency [11, 9, 47, 23]. Critical engagement with AI technology ensures that students are aware of the ethical dimensions of their creative endeavors, aligning with broader educational goals of integrating ethics into AI education. AI tools also facilitate creativity and emotional self-expression, offering new avenues for therapeutic applications and enhancing the emotional depth of educational experiences. While AI-generated works may lack traditional art's authenticity [39], interdisciplinary project-based learning methods enabled by AI can significantly enhance student engagement and ethical awareness.

The integration of AI in poetry education offers numerous advantages that enrich traditional teaching methods, including personalized learning experiences, improved classroom management, and the promotion of critical creativity and self-expression among students. AI technologies facilitate adaptive learning, enable innovative pedagogical approaches, and support diverse learning styles, fostering a more engaging and effective educational environment [12, 25, 7, 48, 9]. By creating a more personalized, engaging, and ethically informed learning environment, AI tools have the potential to transform poetry pedagogy and inspire students to explore new creative horizons.

5 Role of Educational Technology

5.1 Technological Advancements and Tools

Recent advancements in educational technology, particularly AI, have significantly enhanced personalized learning. The Collaborative Neural Painting (CNP) method, utilizing a Transformer-based architecture with a novel attention mechanism, exemplifies how AI can foster creativity in educational settings [42]. Similarly, the CRKT method in Knowledge Tracing (KT) uses both chosen and unchosen responses with concept maps to refine understanding of student learning paths, thus improving personalized learning experiences [19]. AI tools such as ChatGPT facilitate dynamic interactions and real-time feedback, enhancing engagement and learning outcomes [5]. Furthermore, a topic-based bibliometric framework categorizes AI in education (AIEd) research, emphasizing its interdisciplinary applications [12]. The culturally adaptive learning framework highlights the importance of cultural factors in educational technology, supporting the development of culturally responsive AI tools [49]. The Rule-based Insight Discovery for Creativity Patterns (RBD-CPP) method provides insights into creative thinking patterns, enabling educators to design creativity-fostering interventions [8]. Additionally, analyzing user activity through video recordings of interactions with digital training environments yields valuable data on engagement and learning processes, further integrating technology into pedagogy [26].

5.2 Tools and Platforms for Innovative Teaching

AI-driven tools and platforms are revolutionizing innovative teaching methods. The POT framework, which collects data from reflective diaries, stimulated recalls, and focus-group interviews, provides insights into participants' experiences, fostering innovative teaching practices [48]. Educational technology platforms, increasingly utilizing AI, create interactive learning experiences by facilitating personalized learning and providing real-time feedback. This is achieved through advanced technologies such as data mining, which enhance interactivity [9, 1]. Methods like PREREQ for inferring prerequisite relations among educational concepts empower educators to create customized learning pathways, optimizing educational outcomes [50]. AI also facilitates new pedagogical approaches, such as collaborative and peer-assisted learning. By analyzing student interactions and learning patterns, educators can implement targeted interventions that promote collaboration, including personalized exercises and adaptive tutoring systems, transforming traditional teaching methods [13].

5.3 AI-Driven Personalization and Feedback

AI is transforming education by enabling personalized learning and providing real-time feedback tailored to individual needs. The Recent-Performance Factors Analysis (R-PFA) model enhances

predictive accuracy through recent performance data, ensuring timely educational interventions [51]. AI methodologies leveraging labeled and unlabeled data to infer prerequisite relationships between concepts, such as using video playlists, minimize manual annotation [50]. The CKC (Concept-Knowledge Conception) model elucidates the relationship between learners' conceptions and learning processes, essential for personalized feedback [52]. The CRKT method predicts student knowledge states through detailed response analysis, providing actionable feedback for adaptive learning pathways [19]. AI-driven personalization is further exemplified by algorithms like the Contextual Multi-Armed Bandit (CMAB), which adaptively assigns technology versions based on student features, maximizing outcomes through real-time personalization [53]. Scalable adaptive learning models dynamically adjust recommendations based on learner feedback, showcasing AI's potential for immediate, contextually relevant feedback [54]. Studying user interactions within digital training environments while minimizing researcher bias offers insights into effective personalized learning experiences [26]. Emphasizing data curation and structured Knowledge Bases to provide personalized insights into student creativity underscores AI's transformative role in education [8]. By leveraging these technologies, educators can create environments that meet diverse learner needs while fostering creativity and innovation.

6 Case Studies and Examples

6.1 Case Studies and Practical Applications

The application of artificial intelligence (AI) in education is demonstrated through various case studies, showcasing its effectiveness and outcomes. The PREREQ system is notable for inferring concept prerequisite relations, particularly in data-scarce environments, which optimizes curriculum design by accurately mapping educational dependencies [50]. In the realm of educational technology, Kraker et al. identified 13 distinct research areas, illustrating the field's complexity and AI's diverse applications [18]. The Pixiv platform further exemplifies AI's utility by enabling explicit tagging of AI-generated content, which enhances user engagement and provides insights into AI tool acceptance within creative communities [40].

AI's impact on teacher education is highlighted through digital training environments for trainee teachers, demonstrating AI's role in professional development and teaching practice enhancement [26]. Additionally, generative AI tools like GenP5 and P52Style significantly enhance creative coding experiences, facilitating innovative art-making processes in educational settings [35]. The use of a Kaggle educational dataset to evaluate creative thinking patterns illustrates AI's capability in mining educational data to uncover insights into student behaviors, thus informing targeted interventions to promote creativity [8].

These case studies collectively underscore AI's transformative potential in education, improving learning experiences, supporting teacher development, and fostering creativity. As AI technologies continue to evolve, their influence on education is expected to expand, unlocking innovative opportunities for personalized learning, adaptive teaching methods, and enhanced classroom management, which are crucial for addressing challenges such as student engagement and retention [12, 25, 13, 4].

6.2 Innovative AI Integration in Chinese Language Curriculum

Integrating artificial intelligence (AI) into the Chinese language curriculum represents a transformative approach that enhances language learning and cultural understanding. Emerging methodologies leverage AI to create interactive and engaging educational experiences tailored to diverse student needs. For instance, AI is employed to analyze Chinese art and literature, enriching students' contextual understanding of cultural artifacts through datasets detailing attributes such as authorship and techniques [55].

AI further personalizes learning experiences via adaptive learning technologies, using sophisticated algorithms to tailor educational content to individual learners. These tools offer real-time feedback and interactive experiences, significantly boosting engagement and supporting language skills development through natural language processing and intelligent tutoring systems [12, 13, 14, 47, 23]. Intelligent tutoring systems (ITS) utilize large language models to facilitate customized learning pathways, generating dynamic content and providing automated feedback tailored to individual needs [24, 12, 23]. These systems address challenges such as pedagogical accuracy and learner engagement

while exploring future advancements in multimodal AI integration and emotional intelligence. AI-driven platforms also incorporate multimedia resources, enhancing cultural richness and promoting creative expression in the curriculum.

While AI integration enriches linguistic and cultural education, it necessitates careful consideration of ethical issues like privacy and transparency, alongside efforts to ensure equitable access to AI technologies. This integration aims to leverage AI's potential to support diverse educational tasks while addressing practical challenges and ethical dilemmas, fostering a more inclusive learning environment [56, 47]. Developing inclusive educational models responsive to diverse learner needs is crucial for maximizing AI-enhanced learning experiences.

The innovative integration of AI into the Chinese language curriculum has the potential to transform educational practices by delivering personalized experiences, enhancing engagement through culturally relevant content, and utilizing data-driven insights to optimize academic performance. This approach benefits students by tailoring educational experiences to unique learning styles and equips educators with advanced tools for crafting customized curricula, paving the way for future advancements in personalized education [24, 1]. As AI technologies evolve, their application in language education is likely to expand, offering new opportunities for innovation and improvement in educational outcomes.

6.3 Lessons Learned and Best Practices

Integrating artificial intelligence (AI) into educational settings has yielded valuable insights and best practices essential for guiding future implementations. A key lesson is the necessity of aligning AI tools with pedagogical goals to enhance educational effectiveness, requiring a thorough understanding of the educational context and learner needs to develop impactful AI-driven solutions [10].

Successful AI implementations emphasize collaborative learning environments that utilize AI to enhance interaction and engagement among students. Tools such as intelligent tutoring systems (ITS) and adaptive learning technologies effectively create personalized pathways that cater to individual needs, fostering inclusive educational experiences [19]. These systems enable targeted interventions and real-time feedback, improving overall learning outcomes.

Addressing ethical considerations, particularly regarding data privacy and algorithmic bias, is critical for building trust among educators and students. Ensuring transparency and equity in AI systems involves implementing robust data governance frameworks and engaging diverse stakeholders in the development and deployment of AI technologies [47].

Moreover, continuous professional development for educators is vital for maximizing the benefits of AI integration. Training programs should equip teachers with the necessary skills to effectively utilize AI tools, focusing on technical competencies and the ability to critically evaluate and adapt technologies to specific teaching contexts [6].

The insights gained from AI integration underscore the importance of interdisciplinary collaboration in advancing educational innovation. By fostering a culture of creativity and experimentation, educational institutions can develop novel AI-driven solutions that address complex learning challenges [8].

7 Challenges and Ethical Considerations

The integration of artificial intelligence (AI) in education involves navigating numerous challenges and ethical considerations, extending beyond technological aspects to encompass moral responsibilities in safeguarding student welfare and promoting equity. Key issues include data privacy and security, bias and fairness in AI systems, impacts on traditional teaching roles, access and the digital divide, and societal acceptance of AI technologies.

7.1 Data Privacy and Security

AI's use in education raises significant data privacy and security concerns, essential for maintaining ethical standards and protecting student information. Technologies like those for curriculum recommendations necessitate addressing biases to ensure fairness [27]. Ambiguities in copyright law and

AI-generated works pose risks to original creators, highlighting the need for robust frameworks to protect intellectual property [11, 39, 57, 58]. Additionally, accessibility challenges for individuals with disabilities require ongoing evaluations of AI tools to enhance usability, as cultural perceptions can impact technology effectiveness [31, 59]. Educational institutions must remain vigilant about biases and continuously evaluate AI-generated content, ensuring ethical AI integration that empowers educators to create personalized learning experiences while protecting students' rights [11, 9, 60, 56].

7.2 Bias and Fairness in AI Systems

AI in education faces challenges related to bias and fairness, crucial for equitable learning opportunities. Inherent biases in AI systems, often from historical data and algorithmic design, can skew educational outcomes [28]. The absence of comprehensive ethical guidelines complicates addressing these biases [58]. Prompt-based AI tools can manifest biases in content generation [46], and socio-cultural nuances in art are often overlooked, resulting in biased representations [36]. Output quality variability based on user input further complicates fairness, underscoring the need for diverse datasets [32]. Cultural factors also influence teachers' perceptions of AI, affecting adoption [6]. Robust ethical frameworks and diverse datasets are essential for responsible AI use, creating inclusive learning environments that maximize AI's potential while addressing ethical challenges [11, 9].

7.3 Impact on Traditional Teaching Roles

AI integration is reshaping traditional teaching roles, particularly in content creation and pedagogy. As AI-generated content (AIGC) becomes more prevalent, educators face challenges in adapting their roles. Mixed feelings about AI-generated works suggest a shift in teaching creativity [61]. AI's capacity to automate content creation offers opportunities for personalized learning but may diminish educators' traditional roles, necessitating a reevaluation of responsibilities in fostering creativity and critical thinking [40]. Educators must develop new skills to integrate AI technologies effectively, addressing biases and ethical implications. AI's impact extends to student assessment, requiring adaptations in evaluation strategies to acknowledge AI's contributions while prioritizing student creativity [11, 9, 47]. Leveraging generative AI, instructors can design personalized experiences that enhance creativity [9, 8].

7.4 Access and the Digital Divide

AI integration in education highlights challenges related to access and the digital divide, especially in regions with inadequate infrastructure [60]. These challenges necessitate educational models that are technologically advanced and culturally relevant, ensuring AI-enhanced opportunities are accessible to all students. In areas lacking infrastructure, limited access to AI tools exacerbates educational disparities, hindering personalized learning strategies [11, 24, 12, 60]. Developing culturally relevant content is crucial for effective AI integration, requiring collaboration with local educators to ensure technologies meet community needs [11, 9, 13, 14]. Bridging the digital divide requires comprehensive policies to enhance infrastructure and provide affordable technology access, recognizing cultural factors influencing adoption [49, 5, 26, 62, 17]. Collaboration among governments, educational institutions, and private sectors is vital for investing in infrastructure and training programs.

7.5 Societal Acceptance and Perception

Societal acceptance and perception of AI in education are influenced by transparency in AI processes and implications for creative tasks. Studies indicate a strong demand for transparency, reflecting societal attitudes where acceptance hinges on understanding and trust [38]. AI's encroachment into creative domains raises questions about creativity and human agency [63]. Users express complex views on AI-generated art, recognizing both its potential to democratize creativity and risks to socio-cultural impact. Public perceptions regarding AI and robot rights shape societal acceptance, necessitating understanding of normative debates [64]. Individual responses based on personal attitudes complicate generalizability, indicating societal acceptance is influenced by personal and cultural factors [33]. Knowledge of AI's legal aspects leads to critical perspectives on its job market impact, highlighting the need for research into AI's broader implications in education [57].

8 Future Directions and Recommendations

8.1 Scalability and Implementation Strategies

Achieving scalability in AI applications within education is pivotal for their widespread adoption and potential transformation. Scalable models like PREREQ, which learn efficiently from limited labeled data, are instrumental in crafting personalized learning paths and promoting educational equity across diverse institutions [50]. Future research should enhance AI output explainability to build trust among educators and students [10]. Ensuring accessibility for underrepresented groups is crucial to inclusivity, while integrating creative practices across disciplines can enrich educational experiences by leveraging AI's interdisciplinary potential [7].

Developing ethical guidelines for AI in education is vital to ensure responsible technology deployment, focusing on fairness and inclusivity. Comprehensive frameworks should guide AI tool deployment, integrating ethics into AI education. Enhancing AI output interpretability and efficiency in real-time applications will support seamless AI tool integration, providing immediate feedback and fostering engagement [65]. Multimodal AI systems incorporating emotional intelligence, alongside hybrid models that blend human creativity with AI efficiency, can enhance scalability by accommodating diverse learning styles through personalized content delivery [9, 12, 13, 14].

Ensuring fairness and transparency in AI applications is essential for promoting educational equity. Robust fairness assessment tools and algorithms with fairness constraints can mitigate biases, creating equitable learning environments [66]. Engaging stakeholders in AI development and enhancing transparency will support the scaling of AI technologies in educational settings [47].

8.2 Teacher Training and Professional Development

Comprehensive teacher training and professional development are essential for effectively integrating AI into educational practices. As AI technologies like ChatGPT evolve, equipping educators with the necessary skills and knowledge is crucial for responsible implementation [5]. Bridging the gap between technical knowledge and pedagogical application is critical, necessitating accessible and relevant training materials [17].

Future research should focus on developing culturally sensitive training programs that enhance teachers' understanding and trust in AI-based educational technologies (AI-EdTech) [6]. These programs must address diverse educational contexts, enabling educators to navigate AI integration confidently. Emphasizing multidisciplinary approaches will align AI applications with educational theories and practices, fostering collaboration between educators and AI developers [4].

Training programs should emphasize AI tools that assist in prompt inference and creativity, essential for fostering an innovative learning environment [28]. The role of educators in guiding students through AI-enhanced creative processes must be underscored, as effective methods and tools for fostering creativity are critical [8]. Additionally, research should explore the implications of lay perceptions for copyright law concerning AI-generated outputs, informing training programs to navigate legal and ethical considerations in AI education [37].

Future studies could optimize computational aspects of AI methods and expand image classes in experiments to enhance robustness, improving AI-driven educational practices [34]. Refining language switching strategies and exploring additional methods could enhance curriculum recommendations, contributing to effective teacher training programs [27]. Longitudinal studies should track changing attitudes towards AI in education and investigate artistic mediums and individual differences [33].

8.3 Long-term Impact and Evaluation

The long-term integration of AI into educational settings has profound implications for pedagogical practices and policy development. Robust evaluation methods are essential to assess AI technologies' impact on educational outcomes and student engagement. Table 1 presents a comprehensive overview of prominent benchmarks used in the evaluation of AI technologies, highlighting their significance in advancing research within educational and artistic domains. Silva et al. emphasize the development of benchmarks and models to improve detection and attribution of AI-generated artworks, providing a foundation for future research and policy-making in this domain [67]. This foundation is crucial for understanding the broader implications of AI-generated content in educational curricula.

Benchmark	Size	Domain	Task Format	Metric
AI-ArtBench[67]	185,015	Art	Classification	F1-Score, Accuracy
SemArt[55]	21,384	Art Analysis	Multi-modal Retrieval	R@1, R@5
KDViz[18]	91	Educational Technology	Knowledge Domain Visualization	Readership Count, Co-readership Matrix

Table 1: Table illustrating key benchmarks utilized in the evaluation of AI technologies within educational and artistic domains. The table presents detailed information on benchmark size, domain focus, task format, and evaluation metrics, providing a comprehensive overview of the datasets employed in current research efforts.

Future research should expand datasets to include a wider range of artworks and contextual information, refining models to enhance AI technologies' accuracy and adaptability in educational settings [68]. This approach ensures AI tools remain relevant and effective, supporting personalized learning experiences tailored to individual student needs.

The ReDiffuse method's ability to identify images in training datasets highlights long-term implications for copyright protection and potential influences on policies regarding AI-generated art [30]. Such considerations are crucial for developing ethical frameworks governing AI use in education, ensuring responsible and equitable implementation.

Nguyen et al. stress the necessity of cohesive ethical principles to guide AI development and implementation in education (AIED), ensuring educational technologies are ethical by design [58]. This ethical foundation is vital for fostering trust and acceptance of AI technologies among educators and students, ultimately enhancing AI integration's long-term impact on educational practices.

Evaluating the long-term effects of AI technologies, such as ChatGPT, on academic standards and student engagement is essential to ensure these tools enhance educational quality rather than detract from it [5]. Comprehensive methodologies that account for the dynamic nature of AI technologies and their influence on learning processes are necessary for effective evaluation.

The Learning Equality - Curriculum Recommendations paradigm illustrates AI's potential to enhance personalized learning experiences by addressing challenges in educational technology [27]. Continuous evaluation and adaptation of AI tools are paramount to ensure effectiveness and alignment with educational goals.

9 Conclusion

The integration of artificial intelligence (AI) into high school Chinese education represents a significant opportunity to revolutionize educational methodologies, underscoring the importance of aligning technological progress with core educational values. This survey highlights AI's capacity to customize learning experiences, reduce teacher burdens, and enhance student participation, while also pointing out the critical need for thoughtful implementation to address ethical and practical challenges.

The findings stress the importance of culturally responsive educational technologies to facilitate effective adoption by educators and students. The complex dynamics of AI development in education, influenced by governmental policies and private sector initiatives, necessitate a comprehensive understanding of both market trends and educational objectives. Models like CRKT illustrate AI's potential to improve predictive accuracy in educational settings, emphasizing the need for continuous research and technological innovation.

Generative AI holds promise for advancing intelligent tutoring systems by improving educational effectiveness, fairness, and engagement. Nonetheless, substantial challenges remain before these benefits can be fully realized. Identifying successful data mining strategies for personalized education suggests further investigation in less explored areas to maximize AI's positive impact on educational outcomes.

References

[1] Zhang Xiong, Haoxuan Li, Zhuang Liu, Zhuofan Chen, Hao Zhou, Wenge Rong, and Yuanxin Ouyang. A review of data mining in personalized education: Current trends and future prospects, 2024.

[2] Hui Luan, Peter Geczy, Hollis Lai, Janice Gobert, Stephen JH Yang, Hiroaki Ogata, Jacky Baltes, Rodrigo Guerra, Ping Li, and Chin-Chung Tsai. Challenges and future directions of big data and artificial intelligence in education. *Frontiers in psychology*, 11:580820, 2020.

[3] Tuomi Ilkka. *The impact of artificial intelligence on learning, teaching, and education*. European Union, 2018.

[4] Tony Bates, Cristóbal Cobo, Olga Mariño, and Steve Wheeler. Can artificial intelligence transform higher education?, 2020.

[5] Mohanad Halaweh. Chatgpt in education: Strategies for responsible implementation. *Contemporary educational technology*, 15(2), 2023.

[6] Olga Viberg, Mutlu Cukurova, Yael Feldman-Maggor, Giora Alexandron, Shizuka Shirai, Susumu Kanemune, Barbara Wasson, Cathrine Tømte, Daniel Spikol, Marcelo Milrad, Raquel Coelho, and René F. Kizilcec. What explains teachers' trust of ai in education across six countries?, 2024.

[7] Carl Leggo. Poetry in the academy: A language of possibility. *Canadian Journal of Education/Revue canadienne de l'éducation*, 41(1):69–97, 2018.

[8] Nasrin Shabani. Towards mining creative thinking patterns from educational data, 2022.

[9] Ethan Mollick and Lilach Mollick. Instructors as innovators: A future-focused approach to new ai learning opportunities, with prompts, 2024.

[10] Gayatri Raman and Erin Brady. Exploring use and perceptions of generative ai art tools by blind artists, 2024.

[11] Selin Akgun and Christine Greenhow. Artificial intelligence in education: Addressing ethical challenges in k-12 settings. *AI and Ethics*, 2(3):431–440, 2022.

[12] Xieling Chen, Di Zou, Haoran Xie, Gary Cheng, and Caixia Liu. Two decades of artificial intelligence in education. *Educational Technology & Society*, 25(1):28–47, 2022.

[13] Nil Goksel and Aras Bozkurt. Artificial intelligence in education: Current insights and future perspectives. In *Handbook of Research on Learning in the Age of Transhumanism*, pages 224–236. IGI Global, 2019.

[14] Tejas Satish Gotavade. Artificial intelligence ecosystem for automating self-directed teaching, 2024.

[15] Eric Eaton, Sven Koenig, Claudia Schulz, Francesco Maurelli, John Lee, Joshua Eckroth, Mark Crowley, Richard G Freedman, Rogelio E Cardona-Rivera, Tiago Machado, et al. Blue sky ideas in artificial intelligence education from the eaai 2017 new and future ai educator program. *AI Matters*, 3(4):23–31, 2018.

[16] Abhishek Gupta, Connor Wright, Marianna Bergamaschi Ganapini, Masa Sweidan, and Renjie Butalid. State of ai ethics report (volume 6, february 2022), 2022.

[17] Mei Tan and Hariharan Subramonyam. More than model documentation: Uncovering teachers' bespoke information needs for informed classroom integration of chatgpt, 2023.

[18] Peter Kraker. Educational technology as seen through the eyes of the readers, 2015.

[19] Soonwook Park, Donghoon Lee, and Hogun Park. Enhancing knowledge tracing with concept map and response disentanglement, 2024.

[20] Sue Dymoke. 'poetry is not a special club': how has an introduction to the secondary discourse of spoken word made poetry a memorable learning experience for young people? *Oxford Review of Education*, 43(2):225–241, 2017.

[21] Eric Eaton, Sven Koenig, Claudia Schulz, Francesco Maurelli, John Lee, Joshua Eckroth, Mark Crowley, Richard G. Freedman, Rogelio E. Cardona-Rivera, Tiago Machado, and Tom Williams. Blue sky ideas in artificial intelligence education from the eaai 2017 new and future ai educator program, 2017.

[22] Lixiang Yan, Samuel Greiff, Ziwen Teuber, and Dragan Gašević. Promises and challenges of generative artificial intelligence for human learning, 2024.

[23] Subhankar Maity and Aniket Deroy. Generative ai and its impact on personalized intelligent tutoring systems, 2024.

[24] Jeremy Knox. Artificial intelligence and education in china. *Learning, Media and Technology*, 45(3):298–311, 2020.

[25] Jiahui Huang, Salmiza Saleh, and Yufei Liu. A review on artificial intelligence in education. *Academic Journal of Interdisciplinary Studies*, 10(3), 2021.

[26] Simon Flandin, Marine Auby, and Luc Ria. Studying how trainee teachers use an online learning environment: resituating interviews supported by digital traces, 2016.

[27] Xiaonan Xu, Bin Yuan, Yongyao Mo, Tianbo Song, and Shulin Li. Curriculum recommendations using transformer base model with infonce loss and language switching method, 2024.

[28] Khoi Trinh, Joseph Spracklen, Raveen Wijewickrama, Bimal Viswanath, Murtuza Jadliwala, and Anindya Maiti. Promptly yours? a human subject study on prompt inference in ai-generated art, 2024.

[29] Kevin Roose. An ai-generated picture won an art prize. artists arent happy. 2022.

[30] Jingwei Li, Jing Dong, Tianxing He, and Jingzhao Zhang. Towards black-box membership inference attack for diffusion models, 2024.

[31] Semen Dmitrievich Bosonogov and Alena Vladimirovna Suvorova. Perception of ai-generated art: Text analysis of online discussions. , 529(0):6–23, 2023.

[32] Celine Melanie A Dee. Examining copyright protection of ai-generated art. *Delphi*, 1:31, 2018.

[33] Lucas Bellaiche, Rohin Shahi, Martin Harry Turpin, Anya Ragnhildstveit, Shawn Sprockett, Nathaniel Barr, Alexander Christensen, and Paul Seli. Humans versus ai: whether and why we prefer human-created compared to ai-created artwork. *Cognitive research: principles and implications*, 8(1):42, 2023.

[34] Aditi Ramaswamy, Melane Navaratnarajah, and Hana Chockler. It's a feature, not a bug: Measuring creative fluidity in image generators, 2024.

[35] Jiaqi Wu and Eytan Adar. Exploring bridges between algorithmic and ai-generated art, 2025.

[36] Ramya Srinivasan and Kanji Uchino. Quantifying confounding bias in generative art: A case study, 2021.

[37] Gabriel Lima, Nina Grgić-Hlača, and Elissa Redmiles. Public opinions about copyright for ai-generated art: The role of egocentricity, competition, and experience, 2025.

[38] Johnathon Hall and Damian Schofield. The value of creativity: Human produced art vs. ai-generated art. *Art and Design Review*, 13(1):65–88, 2024.

[39] Taylor Darewych. The impact of authorship on aesthetic appreciation: A study comparing human and ai-generated artworks. *Art and Society*, 2(1):67–73, 2023.

[40] Yiluo Wei and Gareth Tyson. Understanding the impact of ai-generated content on social media: The pixiv case. In *Proceedings of the 32nd ACM International Conference on Multimedia*, pages 6813–6822, 2024.

[41] Faizan Farooq Khan, Diana Kim, Divyansh Jha, Youssef Mohamed, Hanna H Chang, Ahmed Elgammal, Luba Elliott, and Mohamed Elhoseiny. Ai art neural constellation: Revealing the collective and contrastive state of ai-generated and human art, 2024.

[42] Nicola Dall'Asen, Willi Menapace, Elia Peruzzo, Enver Sangineto, Yiming Wang, and Elisa Ricci. Collaborative neural painting, 2023.

[43] Peter Kun, Matthias Freiberger, Anders Sundnes Løvlie, and Sebastian Risi. Ai-generated art perceptions with genframe – an image-generating picture frame, 2024.

[44] Raul Fernandez-Fernandez, Juan G. Victores, and Carlos Balaguer. Deep robot sketching: An application of deep q-learning networks for human-like sketching, 2024.

[45] Chengyun Huo and Donghyuk Choi. Exploring emotional representation and interpretation in ai-generated art. *Asia-pacific Journal of Convergent Research Interchange*, 10(6):533–546, 2024.

[46] Yoon Kyung Lee, Yong-Ha Park, and Sowon Hahn. A portrait of emotion: Empowering self-expression through ai-generated art, 2023.

[47] Lixiang Yan, Lele Sha, Linxuan Zhao, Yuheng Li, Roberto Martinez-Maldonado, Guanliang Chen, Xinyu Li, Yueqiao Jin, and Dragan Gašević. Practical and ethical challenges of large language models in education: A systematic scoping review, 2023.

[48] Safiye İpek Kuru Gönen. Implementing poetry in the language class: A poetry-teaching framework for prospective english language teachers. *Advances in language and literary studies*, 9(5):28–42, 2018.

[49] Parvathy Panicker. Exploring cultural challenges to implementing educational technology in the higher education sector in india, 2020.

[50] Sudeshna Roy, Meghana Madhyastha, Sheril Lawrence, and Vaibhav Rajan. Inferring concept prerequisite relations from online educational resources, 2019.

[51] April Galyardt and Ilya Goldin. Predicting performance during tutoring with models of recent performance, 2015.

[52] Nicolas Balacheff. ck, a model to reason on learners' conceptions, 2013.

[53] ZhaoBin Li, Luna Yee, Nathaniel Sauerberg, Irene Sakson, Joseph Jay Williams, and Anna N. Rafferty. Getting too personal(ized): The importance of feature choice in online adaptive algorithms, 2023.

[54] Jean Vassoyan, Jill-Jênn Vie, and Pirmin Lemberger. Towards scalable adaptive learning with graph neural networks and reinforcement learning, 2023.

[55] Noa Garcia and George Vogiatzis. How to read paintings: Semantic art understanding with multi-modal retrieval, 2018.

[56] Wayne Holmes, Jen Persson, Irene-Angelica Chounta, Barbara Wasson, and Vania Dimitrova. *Artificial intelligence and education: A critical view through the lens of human rights, democracy and the rule of law*. Council of Europe, 2022.

[57] Ariela Mitrani and Guofei Gu. *Ethics of a new frontier: Understanding the link between knowledge and opinions of AI art*. PhD thesis, 2024.

[58] Andy Nguyen, Ha Ngan Ngo, Yvonne Hong, Belle Dang, and Bich-Phuong Thi Nguyen. Ethical principles for artificial intelligence in education. *Education and Information Technologies*, 28(4):4221–4241, 2023.

[59] Jonas Oppenlaender. A taxonomy of prompt modifiers for text-to-image generation, 2023.

[60] Francesc Pedro, Miguel Subosa, Axel Rivas, and Paula Valverde. Artificial intelligence in education: Challenges and opportunities for sustainable development. 2019.

[61] Peter Kun, Matthias Freiberger, Anders Sundnes Løvlie, and Sebastian Risi. Ai-generated art perceptions with genframe–an image-generating picture frame. *arXiv preprint arXiv:2405.01901*, 2024.

[62] Melissa Bond and Svenja Bedenlier. Facilitating student engagement through educational technology: towards a conceptual framework. *Journal of Interactive Media in Education*, 2019(1), 2019.

[63] Ted Chiang. Why ai isn't going to make art. *The New Yorker*, 2024.

[64] Gabriel Lima, Assem Zhunis, Lev Manovich, and Meeyoung Cha. On the social-relational moral standing of ai: An empirical study using ai-generated art. *Frontiers in Robotics and AI*, 8:719944, 2021.

[65] Zhengxia Zou, Tianyang Shi, Shuang Qiu, Yi Yuan, and Zhenwei Shi. Stylized neural painting. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 15689–15698, 2021.

[66] René F. Kizilcec and Hansol Lee. Algorithmic fairness in education, 2021.

[67] Ravidu Suien Rammuni Silva, Ahmad Lotfi, Isibor Kennedy Ihianle, Golnaz Shahtahmassebi, and Jordan J. Bird. Artbrain: An explainable end-to-end toolkit for classification and attribution of ai-generated art and style, 2024.

[68] Muragul Muratbekova and Pakizar Shamoi. Color-emotion associations in art: Fuzzy approach, 2023.

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