

# Risks, Strategies, and Prospects of Generative Artificial Intelligence in Digital Education: A Policy Content Analysis Perspective

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**Abstract.** Artificial Intelligence Generated Content (AIGC) represents a transformative force in digital technology, playing a pivotal role in shaping the landscape of digital education. This research focuses on addressing the critical problem of effectively managing risks associated with AIGC, so as to foster the positive evolution of digital education. Identified risks encompass data privacy and security, ethical considerations related to learning content, challenges in achieving educational equity, and potential pitfalls arising from overreliance and technological errors. In response to these challenges, the study proposes targeted risk mitigation strategies, including reinforcing data privacy protection and security measures, optimizing learning content while managing ethical risks, promoting digital literacy to narrow educational gap, and implementing measures to prevent overreliance and mitigate technological errors. Ultimately, the study delves into the anticipated future state of AIGC in digital education, providing valuable insights into its prospective applications and development directions.

**Keywords:** Generative Artificial Intelligence, Digital Education, Risk Mitigation, Future Applications

## 1 Introduction

The current global wave of technological revolution and industrial innovation is ushering in unprecedented disruptions across various sectors, and education is not exempt. Despite the gradual shift towards ubiquitous learning and AI-assisted education, the conventional "blackboard and chalk" learning method still persists in numerous classrooms. The evolution of education appears to be trailing the swift advancements in technology, prompting an immediate transition towards digital teaching. The rise of next-generation digital technologies, particularly exemplified by Generative Artificial Intelligence (GAI) plays a pivotal role in the ongoing digital transformation of education, significantly reshaping the teaching process. However, the seamless integration of AIGC technology into digital education encounters potential crises, including data privacy breaches, ethical dilemmas, and challenges related to educational inequality due to insufficient data security measures. The growing issue of human overreliance on artificial intelligence technologies is also becoming increasingly apparent. In the digital age, effectively addressing numerous potential risks and challenges while fostering the positive development of digital education has become an urgent imperative.

## **2 Digital education and AIGC**

Digital education refers to the restructuring of educational methods using modern hardware facilities such as mobile devices and smart education platforms. It relies on algorithms, network software, and modern digital technologies like artificial intelligence, neural networks, and cloud computing to provide a more efficient and personalized educational experience[1]. In comparison to traditional education, digital education leverages digital technology to acquire more resources and information, utilizing AIGC to offer more personalized learning methods based on extensive data computation. The application of technologies like cloud computing, big data, neural networks, and the Internet of Things in the education sector continues to deepen, serving as valuable tools for teachers and essential instruments for students engaging in information-based learning, significantly enhancing the quality of education and teaching.

AIGC, a specific algorithm within the field of artificial intelligence, is built on machine learning models, particularly deep learning models. This algorithmic approach, centered around computer algorithms, involves training on massive datasets to generate new content, including text, images, audio, and video[2]. AIGC's foundation lies in data, and its various stages, from model generation and optimization to content creation, heavily rely on robust data support[3].

AIGC's remarkable performance has led to its rapid and widespread application in the era of digital education. Represented by ChatGPT, AIGC permeates educational practices, offering a low-cost or even free-of-charge solution for processing user queries or provided images and keywords with remarkable speed. The feedback provided by AIGC is diverse and content-rich. Capitalizing on vast data and extensive experience, AIGC, based on advanced computer technology and algorithms, has achieved unprecedented progress in innovation and imagination[4]. In the realm of teaching, AIGC can autonomously generate and evaluate tests and assignments, thereby assisting teachers with materials and significantly increasing overall efficiency. On the student's side, AIGC answers questions related to abstract concepts, aiding students in internalizing knowledge, and tailoring personalized learning strategies based on individual learning levels and habits.

## **3 Risks of AIGC in digital education**

### **Data Privacy and Security Challenges**

The integration of AIGC into digital education, promising rich educational resources, personalized learning, and intelligent tutoring, brings forth significant challenges related to data privacy and security. These challenges can be broadly categorized into five dimensions. Firstly, the algorithmic opacity of AIGC and the complexity in overseeing its database introduce risks of data leakage. AIGC relies heavily on extensive databases for personalized learning, and any lapses in secure data storage and transmission methods may expose sensitive information, posing a substantial risk to information security. Secondly, the susceptibility to SQL injection threats is a critical concern. Malicious injection of SQL code could compromise authentication, providing unauthorized access to educational databases[5]. This not only raises issues of data integrity but also has the potential to generate misleading information, adversely affecting users and hindering educational progress. Thirdly, the risk of identity theft is a prominent issue. Attackers may attempt to steal user login credentials, posing threats to

academic integrity and eroding trust in AIGC's application in digital education. This could hinder the successful integration of AIGC into educational practices. Furthermore, denial-of-service attacks (DDoS) pose operational risks by overloading the system and rendering services inaccessible. Such attacks can disrupt normal usage for teachers and students, leading to inefficiencies in work and study. Lastly, the vulnerability to social engineering attacks adds another layer of risk. Attackers exploiting psychological vulnerabilities may deceive users into revealing sensitive information, resulting in damaged trust and potential user loss, undermining the credibility of AIGC in digital education. In conclusion, addressing these multifaceted challenges is crucial to ensuring the secure and successful integration of AIGC into digital education environments. Balancing the advantages of AIGC with robust privacy and security measures is imperative for fostering a trustworthy and effective digital learning landscape.

### **Comprehensive Challenges in AIGC Integration**

AIGC in digital education introduces a range of challenges encompassing content and ethical risks, educational fairness, the digital divide, over-reliance, and technical errors[6]. The automatic generation of learning content by AIGC raises concerns about the quality and accuracy of materials, potentially leading to biased or inappropriate content. This poses ethical challenges requiring careful oversight to align with educational standards and values. Concerns regarding educational fairness and the digital divide emerge from differences in technological progress, resources, and economic development, particularly affecting developing countries. Over-reliance on AIGC technology in digital education presents challenges as students may become excessively dependent, hindering their independent thinking and overall development. Additionally, dependency on algorithms and models, along with potential over-reliance by educators, raises concerns about the emotional and moral development of students. Technical error risks, including the instability of AIGC, algorithmic bias, data quality issues, security vulnerabilities, and lack of model interpretability, further complicate the integration of AIGC into digital education. Addressing these risks requires active involvement from educational institutions, professionals, and parents, including careful review and monitoring of AIGC-generated content. Bridging the digital divide and striking a balance between technology and traditional teaching methods are essential for responsible and effective integration of AIGC in digital education[7].

## **4 Protecting data privacy and strengthening security measures**

### **Ensuring Data Security in AIGC Implementation**

To ensure the confidentiality of student data during the implementation of AIGC in digital education, robust data security measures must be adopted. This involves implementing data encryption, access control, secure storage, and transmission methods to prevent unauthorized access and leaks. Additional safeguards include the use of parameterized queries, validation of user inputs, and restrictions on database user permissions to prevent SQL injection attacks. It is crucial to adopt the principle of minimal data collection during AIGC training, gathering only essential data to minimize privacy risks. Strong identity verification mechanisms, such as multi-factor authentication, should be employed to enhance overall security. Deploying anti-DDoS

services and Content Delivery Networks (CDN) is essential to mitigate the impact of potential DDoS attacks on the digital education system[8].

### **Safeguarding Student Privacy and Fostering Ethical Practices**

In the realm of AIGC, transparent and ethical practices are paramount. Establishing clear privacy policies, effectively communicating these policies, and ensuring user understanding of data collection, usage, and protection are fundamental steps. Users should have the right to be informed, understand the purpose of data collection, and have the ability to revoke consent when necessary. Additionally, anonymizing or de-identifying data can significantly reduce the identifiability of personal information. Education and training programs on privacy protection are crucial for system users, educators, and parents to increase awareness and promote responsible data use. Regular reviews of privacy policies and data processing procedures, along with ensuring compliance with relevant regulations, are imperative. Collaboration with AIGC should adhere to standards and regulations, clarifying data collection methods, and ensuring compliance with ethical standards. After data collection, secure storage and encryption with restricted access permissions are vital components of safeguarding student privacy. Algorithm transparency and interpretability are key aspects to be maintained, ensuring users understand the decision-making process and receive explanations for AIGC-generated results[9].

### **Optimizing Learning Content, Promoting Digital Literacy, and Mitigating Risks:**

In optimizing AIGC applications for learning content and controlling ethical risks, transparency and accountability are crucial. Algorithm transparency, explanations for model decisions, and regular audits of algorithms are essential to ensure appropriateness in an educational context. Ethical control measures involve aligning learning content with educational standards, promptly correcting biased or discriminatory content, and conducting periodic ethical reviews[10]. To enhance digital literacy and narrow the digital divide, different strategies should be adopted for students, educators, and parents. For students, promoting basic knowledge of artificial intelligence and providing digital skills training are essential. Educators should be offered training opportunities to understand AI basics and skills, and a digital literacy framework should be established for them. Collaboration and innovation among educators should be encouraged[11]. Parents should be engaged in discussions about digital education goals, and communication channels should be established for regular feedback on children's progress.

Avoiding overreliance and addressing technological errors involves systematic training for educators, establishing reliable technical support, mitigating algorithm and model dependency, enhancing user control, and managing technical infrastructure robustly. This comprehensive approach, including regular audits, training programs, and collaboration, is key to ensuring the responsible and effective implementation of AIGC in digital education.

## **5 Algorithmic leadership: Technical support for AIGC in digital education**

In the era of artificial intelligence (AI), the prospects for AIGC in digital education involve various dimensions. This includes strengthening algorithmic capabilities, establishing comprehensive databases, diversifying personalized courses, enriching teaching resources, and

fostering collaborative progress between educators and students. The integration and symbiosis of AI in digital education are highlighted as essential for harmonious coexistence. Recognizing the transformative impact of AI on information acquisition, learning, and decision-making, technology is considered the foundation for the development of digital education. The current era, characterized by knowledge explosion, emphasizes the shift from traditional education concepts to nurturing learners with critical thinking skills, research abilities, and the capacity for innovation. AIGC's transformative role in modern education technology is acknowledged for pushing learners beyond rote memorization to the cultivation of creativity and cognitive abilities.

Furthermore, there is a call to shift educational goals from mere knowledge acquisition to the cultivation of wisdom, encouraging educators to focus on fostering critical thinking and innovation. AIGC is recognized as a catalyst for enhancing creativity and cognitive abilities among students, improving teaching quality, and providing technical support for the overall enhancement of institutional systems within schools. The study also underscores the importance of balancing risks and advancements in AI applications, advocating for responsible development and application to maximize benefits and minimize potential risks. The focus in the development of digital education should shift from excessive hardware infrastructure to the essence of education, promoting the coexistence of digital education and technology for comprehensive, personalized, and free student development.

In conclusion, the collective narrative emphasizes the need for a holistic and thoughtful approach to the integration of AI, particularly AIGC, in digital education. By recognizing the evolving educational landscape, the transformative potential of AIGC, and the imperative of responsible development, the aim is to propel AI applications in education toward positive and progressive outcomes, aligning with the essence of learning AND DEVELOPMENT.

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