

Ethical Considerations in Computer Education under Digital Governance

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Abstract: This study explores ethical issues in computer education within the context of digital governance, particularly focusing on maintaining ethical standards and social responsibility in a rapidly evolving digital environment. The rapid advancement of information technology highlights the critical role of computer education in developing digital talent. However, the complexity and diversity of digital governance introduce numerous ethical challenges, such as data privacy, algorithmic bias, and information security. Through literature review and theoretical discussion, this paper reveals the profound impact of digital governance on computer education ethics. It begins by detailing the concepts and connotations of digital governance, then analyzes the primary ethical issues faced by computer education in this context, their causes, and implications. Finally, the paper proposes strategies and recommendations, including enhancing ethical education, improving legislation, and fostering interdisciplinary collaboration, to provide theoretical and practical guidance for ethical development in computer education. The results indicate that addressing ethical issues in computer education under digital governance requires a multifaceted approach involving technical, social, legal, and cultural dimensions. Only through collaborative efforts can these challenges be effectively managed, promoting the healthy development of computer education.

Keywords: Digital Governance; Computer Education; Ethical Issues; Social Responsibility; Interdisciplinary Collaboration

1. Introduction

1.1 Research Background and Significance

With the rapid advancement of information

technology, computer education has become an indispensable part of modern education. Technologies such as big data, artificial intelligence, and cloud computing have propelled digital governance in public administration, business enterprises, and social services. This shift not only changes lifestyles but also profoundly impacts various forms of education. As a crucial avenue for nurturing professionals in information and digital fields, computer education faces ethical challenges posed by new technologies, including data privacy and algorithmic bias. Mishandling these issues can negatively affect social fairness and justice. Therefore, researching the ethical issues in computer education under digital governance holds significant academic value and practical relevance.

1.2 Research Objectives and Methods

This study aims to explore the ethical issues in computer education within the context of digital governance and propose strategies to address these challenges, thereby providing theoretical support for achieving more equitable, transparent, and responsible computer education. The research primarily employs literature analysis, systematically reviewing and analyzing a substantial amount of domestic and international literature to identify the main ethical dilemmas in computer education under the digital governance framework and suggest corresponding solutions.

1.3 Review of Domestic and International Research

Current research on digital governance and computer education is extensive both domestically and internationally, but in-depth exploration of ethical issues remains limited. Domestic studies often focus on how new technologies alter educational models and enhance educational outcomes, with less consideration given to ethical aspects.

However, some scholars have begun to focus on this area. For instance, Wei Bin (2024) pointed out the significant impact of technological changes on legal and social ethics. Internationally, research tends to concentrate on specific issues such as data privacy and algorithmic fairness and attempts to propose solutions. Zhang Wei et al. (2020) analyzed the heterogeneity of knowledge resulting from government data openness from an interdisciplinary perspective but left the education field largely unexplored. Therefore, this study attempts to systematically explore and analyze this issue on a theoretical level.

2. Concepts and Connotations of Digital Governance

2.1 Definition of Digital Governance

Digital governance refers to the use of information technology tools to achieve public administration and social governance. By leveraging technologies such as big data, artificial intelligence, and the Internet of Things, it monitors and manages various aspects of social development, enhancing the scientific and precise nature of governance. Its core lies in data-driven decision-making processes that improve resource allocation efficiency and governance capability. The concept arises from the profound transformation of traditional governance modes by digital technologies.

2.2 Main Characteristics of Digital Governance

Digital governance is characterized by transparency, efficiency, and interactivity. Transparency involves making information public and transparent through digital means, increasing public trust in governments and organizations. Efficiency refers to enhancing management and decision-making through automation and intelligent methods. Interactivity denotes the information exchange and collaboration between different societal layers, where digital platforms enable tighter interaction and collective participation in the governance process among governments, enterprises, and the public.

2.3 Implementation Framework of Digital Governance

The implementation framework of digital

governance typically includes data collection and management, digital public services, risk governance, and information security assurance. Data collection and management serve as the foundation, utilizing big data technologies to gather, store, and analyze various data for data-driven decision-making. Digital public services manifest digital governance through e-government and online public service platforms. Risk governance and information security assurance are crucial for the smooth operation of digital governance, requiring the establishment of stringent risk assessment mechanisms and information security protection systems.

3. Computer Education under Digital Governance

3.1 Development of Computer Education

The development of computer education dates back to the mid-20th century, initially aimed at teaching computer operation skills and basic programming knowledge. With advancements in computer technology and expanding application scenarios, computer education has integrated into school curricula and extended to job training and lifelong education. In the digital era, the content and form of computer education continuously evolve, covering topics from basic programming to advanced AI technologies, emphasizing the integration of theory and practice to prepare students for the rapidly changing IT environment.

3.2 Impact of Digital Governance on Computer Education

Digital governance affects computer education mainly in terms of content and delivery methods. Educational content now requires students to master not only traditional computer knowledge but also new technologies like big data analysis, AI algorithms, and information security. In terms of delivery methods, digital teaching tools such as online learning platforms and virtual laboratories enhance interactivity and convenience. However, these advancements introduce ethical challenges, such as safeguarding student data in data-driven learning, ensuring fairness in algorithmic recommendations, and addressing information security in online environments.

3.3 Educational Practices in a Digital Environment

In a digital environment, computer education practices are diverse. Online education platforms significantly enrich educational resources, allowing students to access cutting-edge computer courses and materials online. Additionally, virtual reality (VR) and augmented reality (AR) technologies make learning more interactive and engaging. For example, students can conduct programming experiments and simulations in virtual labs, receiving immediate feedback and guidance. While these practices improve learning outcomes, they also raise ethical issues such as equitable access to educational resources and student privacy protection. Educational institutions must consider these ethical issues comprehensively and establish reasonable policies to ensure fair, just, and secure educational practices.

Summarizing these research findings, this study proposes strengthening ethical education, improving laws and regulations, and promoting interdisciplinary collaboration to provide theoretical guidance and practical support for ethical development in computer education. These systematic explorations and countermeasures respond to current technological needs and offer important references for future research and practice.

4. Major Ethical Issues in Computer Education

4.1 Data Privacy and Protection

Data privacy is a prominent issue under digital governance. With the digitalization of computer education, vast amounts of student data, including learning habits, academic records, and online behavior, are collected and stored. While this data helps educators understand students' learning needs and progress, it also exposes privacy risks. Misuse of this data could lead to serious consequences such as privacy breaches and identity theft. The literature indicates that data privacy protection measures in digital education systems are inadequate and require stricter legal and technical safeguards (Pu Haitao, 2022).

4.2 Algorithmic Bias and Fairness

The application of big data and AI

technologies in computer education significantly advances personalized learning. However, algorithms are not neutral; they can introduce biases during design and application, leading to unfair distribution of educational resources. Algorithmic bias stems from two main areas: the biases of algorithm designers, potentially leading to systemic neglect or discrimination of certain student groups, and biases in the historical data used for algorithm training, perpetuating existing biases in the output (Zhang Wei, 2020). These issues challenge the fundamental ethical principles of justice and fairness in education.

4.3 Information Security and Ethical Risks

The security of educational information systems directly impacts the interests of students and educational institutions. As educational activities increasingly rely on digital platforms, ensuring the security of information systems becomes crucial. Information security issues include hacker attacks, data breaches, and malware infections. Attacks or data tampering in educational systems can disrupt educational activities, jeopardize student privacy, and damage institutional reputations. Wang Guoyi (2019) pointed out that current information security governance mechanisms in educational systems are insufficient, necessitating enhanced protective technologies and security management strategies to fundamentally prevent information security risks.

5. Ethical Strategies under Digital Governance

5.1 Strengthening Ethical Education

Strengthening ethical education is key to addressing ethical issues in computer education under digital governance. Integrating ethical content into all aspects of computer education cultivates students' ethical awareness and sense of responsibility. This can be achieved by offering specialized ethics courses or incorporating ethical modules into computer courses, enabling students to understand and address issues like data privacy and algorithmic bias. Schools and educational institutions can also use case studies and ethical debates to enhance students' awareness and understanding of ethical issues, nurturing more well-rounded digital professionals.

5.2 Improving Laws and Regulations

Formulating and improving relevant laws and regulations is essential for effectively addressing ethical issues in computer education under digital governance. This includes detailing student data privacy protection rules, clarifying algorithm transparency requirements, and establishing information security standards. Governments and educational authorities must collaborate to establish specialized regulatory bodies and oversight mechanisms, ensuring the implementation and enforcement of these laws, thereby protecting students' legal rights.

5.3 Promoting Interdisciplinary Collaboration

Ethical issues in computer education under digital governance involve multiple disciplines, including technology, law, and sociology. Single-discipline research and countermeasures cannot fully address these complex issues. Therefore, promoting interdisciplinary collaboration is crucial. By forming interdisciplinary research teams to conduct joint studies, leveraging the strengths of various fields, we can provide multi-dimensional explanations and solutions for ethical challenges in computer education. Interdisciplinary collaboration also fosters complementary expertise among professionals from different fields, enhancing the ability to collectively explore strategies and improve problem-solving efficiency and effectiveness.

6. Conclusion

This study delves into the ethical issues in computer education within the context of digital governance, highlighting key challenges such as data privacy, algorithmic bias, and information security. These issues not only affect students' interests but also have profound implications for educational fairness and social justice. By analyzing existing literature and theories, the study proposes several recommendations and strategies, including strengthening ethical education, improving laws and regulations, and promoting interdisciplinary collaboration.

Future research can further explore practical solutions to specific ethical issues, such as implementing ethical education in actual teaching, formulating more reasonable and

actionable laws and regulations, and fostering interdisciplinary collaboration. Additionally, empirical research should be conducted to validate the proposed theoretical frameworks and strategies through case studies and data analysis. As digital technology continues to evolve, new ethical issues will emerge, requiring ongoing attention and research to ensure the healthy and responsible development of computer education.

The discussions and analyses presented in this paper aim to provide valuable theoretical references for addressing ethical issues in computer education and promoting its normative and sustainable development under digital governance.

References

- [1] Bin Wei. The Transformation of Legal Technology: From Computerization to Digitization and Intelligence [J]. *Jurist*, 2024(3).
- [2] Huaming Chen, Linxing Yu, Yijia Sun. Study on the Symbolization of Virtual Images in the Metaverse Era [J]. *Literature and Art Contention*, 2023(9):203-208.
- [3] Wei Zhang, Xiaofeng Zhu, Hao Wang. Analysis of Knowledge Heterogeneity in Government Data Openness from an Interdisciplinary Perspective [J]. *Information and Documentation Services*, 2020, 41(3):12. DOI: CNKI:SUN:QBZL.0.2020-03-012.
- [4] Feizheng Tu, Liang Zhou, Guanghui Song, et al. Exploration of Smart Campus Construction Plan Based on Normalized Data Services [J]. *Computer Applications Abstracts*, 2023, 39(11):110-112.
- [5] Haitao Pu. Data Governance and Quality Analysis in the Context of Big Data in Healthcare [J]. *Computer Applications Abstracts*, 2022, 38(23):92-94.
- [6] Juan Xia, Jiao Liu, Zhenyu Qin, et al. Research on the New Ecology of Digital Government Governance Based on the Construction and Application of "Data Sources" [J]. *Leadership Science*, 2022(10):124-128. DOI:10.3969/j.issn.1003-2606.2022.10.035.
- [7] Guoyi Wang. Discussion on the Main Issues of Data Quality Governance in Smart Campuses [J]. *Straits Science & Technology and Industry*, 2019. DOI:

- CNKI:SUN:HXKT.0.2019-06-059.
- [8] Huishu Zhang. Ethical Research and Governance Design of Non-Family Smart Elderly Care [J]. Packaging Engineering, 2020, 41(2):6. DOI: CNKI:SUN:BZGC.0.2020-02-031.
- [9] Mingyue Wang. Opportunities and Challenges Faced by Digital Libraries in the Era of Big Data [J]. Regional Governance, 2018(36):1. DOI:10.3969/j.issn.2096-4595.2018.31.158.