



# Analysis of the Application Prospects of Computer Big Data in Higher Education Curriculum Software Development

**Xiaoping Chen**

Communication University of China, Nanjing, Nanjing 211199, Jiangsu, China

DOI: 10.32629/jher.v5i5.2976

**Abstract:** This paper explores the application prospects of computer and big data in the development of higher education curriculum software. It analyzes the current state of computer and big data in higher education, including technological applications and the state of curriculum software. The discussion focuses on the demands and challenges in developing higher education curriculum software, emphasizing the need for personalized learning and the limitations of current technologies. The paper further proposes integration paths of computer and big data, such as data collection and processing, data analysis to support educational decision-making, and personalized learning design. Finally, it analyzes the future prospects, pointing out that computer and big data will promote educational equity, enhance teaching quality, and foster lifelong learning development.

**Keywords:** computer; higher education; technological applications; curriculum software

## 1. Introduction

With the rapid development of information technology, the application of computer and big data is becoming increasingly widespread, especially in the field of education. The development of higher education curriculum software, as an important part of educational informatization, faces unprecedented opportunities and challenges. The widespread adoption of computer technology has enriched educational methods, diversifying learning approaches. The introduction of big data offers new perspectives and a basis for educational decision-making. By deeply analyzing students' learning behaviors, outcomes, and feedback data, universities can better understand students' needs and development directions, optimizing course structures and teaching methods[1].

In this context, exploring the integration paths of computer and big data in higher education curriculum software development is crucial. On one hand, the development of curriculum software needs to be closely aligned with computer technology, utilizing its powerful data processing capabilities to improve the adaptability and flexibility of educational content. On the other hand, the application of big data can help educators extract valuable insights from massive data, supporting personalized education and precise management. Additionally, the growing emphasis on data in education has spurred the development of more data-driven educational applications and platforms[2].

## 2. The Current State of Computer and Big Data in Higher Education

### 2.1 The Application of Computer Technology in Higher Education

The rapid development of computer technology has significantly driven transformations in higher education, profoundly impacting teaching methods, learning models, and management systems. Computer technology provides various auxiliary tools for teaching, such as online courses, learning management systems (LMS), and virtual classrooms, enabling teachers to design courses more flexibly and implement personalized teaching[3]. For instance, teachers can release course materials, assign homework, and conduct online discussions via online platforms, greatly enhancing the interactivity and convenience of teaching. Computer technology also supports the widespread use of multimedia teaching, where educators can use videos, animations, and simulations to enhance students' learning experiences and understanding, promoting effective knowledge transmission. Moreover, computer technology is increasingly applied in educational management. Various management systems enable schools to manage student information, course scheduling, and grading more efficiently, improving management efficiency and decision-making. However, despite the remarkable achievements of computer technology in higher education, challenges remain, such as uneven resource distribution, insufficient technical application skills among teachers, and the fast pace of technological updates, which can negatively impact education quality and efficiency.

## **2.2 The Application of Big Data in Education**

The application of big data in education is becoming increasingly widespread, with its powerful data processing and analytical capabilities providing new support for educational decision-making. By analyzing massive data, educators can gain deeper insights into students' learning habits, mastery levels, and individual differences, enabling more effective personalized education. For instance, many higher education institutions have begun using big data to track and analyze students' learning behaviors, creating more precise learning plans for them[5]. This data-driven teaching approach not only improves students' learning efficiency but also provides teachers with guidance for their teaching strategies. Additionally, big data technology has shown advantages in course setup and evaluation. By analyzing feedback and student performance data, schools can adjust course content and teaching methods to meet the changing educational needs. Despite the enormous potential of big data in education, its application faces challenges such as data privacy protection, insufficient data processing capabilities, and a lack of understanding of big data among educators, which may limit its further application[6].

## **2.3 Current Status of Higher Education Curriculum Software**

The development and application of higher education curriculum software are currently in a rapid growth phase. Many universities are introducing advanced curriculum management systems and learning platforms to improve the quality and effectiveness of education. These curriculum software tools not only support teachers in course design, content management, and student evaluation but also provide students with personalized learning, online discussions, and resource-sharing capabilities[7]. For example, learning management systems (LMS) have become an essential part of higher education activities, allowing teachers to easily upload course materials, assign homework, conduct online exams, and engage in real-time interactions, significantly enhancing teaching efficiency. However, there are still several issues that need to be addressed. Some software tools have limited functionality and fail to meet diverse teaching needs, leading to a poor user experience for both teachers and students. Furthermore, due to the lack of effective data analysis tools, teachers often face challenges in assessing students' learning outcomes and teaching effectiveness. Additionally, software maintenance and updates have become limiting factors, as many universities lack sufficient investment in technical support and training, making it difficult for teachers to fully utilize the software's capabilities. To address these issues, universities should increase their investment in curriculum software, enhance functionality and user experience, and provide more training and support to teachers, promoting the comprehensive development of higher education curriculum software.

# **3. Needs and Challenges in Higher Education Curriculum Software Development**

## **3.1 Analysis of the Need for Personalized Education**

With the continuous development of higher education, the demand for personalized education is becoming more prominent, requiring curriculum software development to adapt to these changes. Personalized education aims to provide tailored learning experiences based on students' diverse backgrounds, interests, and learning styles, which not only improves learning motivation but also enhances learning outcomes. Currently, students' learning needs are highly diversified, and they expect more options in learning content, methods, and progress. For example, some students may prefer visual learning through videos and images, while others may prefer acquiring knowledge through reading text materials. Therefore, curriculum software needs to include flexible learning modules that allow students to adjust according to their learning habits. Moreover, personalized education also demands real-time feedback, with students expecting timely responses during the learning process to make self-adjustments. To meet this demand, curriculum software development should integrate data analysis technology to track students' learning behaviors and performance in real-time, providing accurate learning suggestions and resource recommendations to achieve truly personalized education.

## **3.2 Main Challenges in Current Curriculum Software Development**

Despite the significant technological progress in developing higher education curriculum software, several challenges remain in its practical application. Software development often lacks systematic needs analysis, resulting in products that fail to fully meet teachers' and students' needs. Consequently, the software's functionality may deviate from educational goals, affecting the user experience. The rapid iteration of technology also pressures software maintenance and updates, and many universities, due to funding and technical resource limitations, struggle to upgrade and optimize existing software. Additionally, the differing levels of technical competence among teachers and students create barriers to effective use, as some teachers may lack the understanding and confidence in using new technologies, negatively impacting teaching effectiveness. Lastly, data security and privacy concerns are becoming increasingly important in curriculum software application, as universities must ensure effective protection of students' personal and learning data. Addressing these challenges requires

universities to prioritize needs assessment, strengthen technical support and training, and establish robust data protection mechanisms in the curriculum software development process.

### **3.3 The Impact of Big Data on Curriculum Software Development**

The introduction of big data technology brings revolutionary changes to higher education curriculum software development, enabling software to better meet the needs of personalized learning. By deeply analyzing students' learning behaviors, performance, and feedback data, educators can gain a comprehensive understanding of students' needs, allowing for more targeted software functionalities. For example, big data analysis can identify the most popular learning resources and the most effective teaching methods, providing data-driven insights for curriculum design. This data-driven decision-making process can significantly improve teaching quality and efficiency. Big data also facilitates the development of intelligent recommendation systems, which can recommend suitable courses and learning resources based on students' learning history and interests, building personalized learning paths. Furthermore, big data technology shows great potential in evaluating teaching effectiveness, as educators can assess the actual outcomes of course implementation through data analysis and adjust teaching strategies accordingly.

## **4. Integration Paths for Computers and Big Data**

### **4.1 Data Collection and Processing Technologies**

In the development of higher education curriculum software, data collection and processing technologies are fundamental to integrating computers and big data. With advancements in information technology, the amount of data generated in education, including student learning behaviors, exam results, and course feedback, is growing exponentially. Effective data collection technologies can gather data from various channels, such as online learning platforms, learning management systems (LMS), and mobile applications. These channels can capture students' learning activities in real-time, forming a comprehensive dataset. In terms of data processing, using appropriate tools and technologies to clean and organize data is critical to ensuring the accuracy and reliability of subsequent analysis. Data processing technologies, such as ETL (Extract, Transform, Load) processes, can convert data from different sources into a uniform format for subsequent analysis.

### **4.2 Big Data Analysis and Educational Decision Support**

Big data analysis technology provides powerful tools for educational decision-making, promoting more scientific and refined education management. In higher education, by analyzing students' learning data, educators can identify key problems in teaching and potential areas for improvement. For example, data mining techniques can reveal students' learning trends and patterns in specific courses, identifying which content is poorly mastered and allowing for timely adjustments in teaching strategies. Predictive analysis can also be used to assess students' academic risks, enabling early intervention for those facing learning difficulties, thus improving overall academic performance. Additionally, big data analysis can integrate various student-related data, such as student performance, attendance, and feedback, providing university management with comprehensive information for data-driven decisions. Furthermore, big data analysis can support resource optimization in higher education, helping universities allocate resources more rationally based on actual demand, and improving the efficiency and quality of teaching.

### **4.3 Personalized Learning Design**

Personalized learning is a key objective in the development of higher education curriculum software, and big data technology plays a vital role in achieving this goal. With its powerful data analysis capabilities, big data can provide accurate learning paths for students, ensuring that they receive appropriate learning materials and guidance. Through analyzing students' learning progress and preferences, personalized learning platforms can automatically recommend relevant courses, books, and resources to optimize the learning experience. For example, based on the analysis of a student's learning habits and performance, an intelligent education platform can recommend the most suitable learning materials, providing a more efficient and effective learning process. Additionally, intelligent learning platforms allow students to flexibly choose learning content and progress based on their interests and needs, significantly enhancing their autonomy. This smart education, based on computer and big data technologies, not only improves learning efficiency but also promotes lifelong learning. In the future, with the further development of AI and big data technologies, educational systems will be able to more accurately identify students' needs, automatically adjust learning content and pace, and ultimately achieve a fully personalized education experience.

## 5. The Future Prospects of Computer and Big Data Integration in Higher Education

The integration of computer and big data technologies in the development of higher education curriculum software offers broad prospects. As technology continues to advance, universities are increasingly relying on data-driven educational models, which will profoundly influence how educational content is designed, delivered, and assessed. One of the most promising areas is the development of intelligent learning environments, which will enable dynamic adjustments of teaching materials based on real-time data analysis of students' learning progress. This continuous feedback loop will make education more adaptive, personalized, and effective.

Moreover, with the increasing focus on educational equity, computer and big data technologies are expected to play a significant role in closing the gap between different groups of students. By providing personalized learning solutions to those with diverse learning needs, educational technologies can help bridge disparities caused by socio-economic factors, geographic location, or learning disabilities. For example, rural and underprivileged students may benefit from more tailored educational content and remote learning opportunities, enhancing access to quality education.

Additionally, big data's role in higher education is expected to expand into more areas of university operations, such as campus management, student recruitment, and alumni relations. Universities will use big data analytics to refine their strategies, optimize operations, and improve student experiences. AI-driven analytics, combined with big data insights, will also help universities in making informed decisions regarding curriculum development, resource allocation, and even policy-making.

However, challenges remain. Universities will need to address concerns about data security and privacy, as well as the ethical implications of data-driven education. As reliance on data increases, the protection of students' personal information becomes crucial. Governments, institutions, and technology providers must collaborate to establish robust frameworks to ensure data integrity and protect students' rights.

## 6. Conclusion

In conclusion, the application of computer and big data technologies in the development of higher education curriculum software holds broad prospects. By effectively integrating the powerful data processing capabilities of computers with the analytical strengths of big data, universities can achieve personalized education, optimize course structures, and enhance teaching quality and educational equity. Although challenges related to technology, resources, and data privacy persist, ongoing advancements in technology and increased investment in higher education will ensure that computers and big data play an increasingly important role in educational reform and development. In the future, with the deeper integration of these technologies, the pace of educational informatization will accelerate, and the goals of lifelong learning and intelligent education will gradually be realized.

## References

---

- [1] Wang XX. Exploration of the Application of Computer and Big Data in Higher Education[J]. Educational Informatization Research, 2021, 8(5): 10-15.
- [2] Li XX. The Current State and Development Trends of Big Data in Education[J]. Information Technology, 2020, 7(12): 28-33.
- [3] Chen XX. Current Status and Countermeasure Study of Curriculum Software Design and Development in Higher Education[J]. Software Engineering, 2019, 5(3): 45-52.
- [4] Zhang XX. Analysis of Computer Technology in Educational Management[J]. Educational Management, 2018, 6(9): 23-29.
- [5] Yang XX. Research on Personalized Education Model Driven by Big Data[J]. Educational Technology, 2021, 9(4): 55-61.
- [6] Liu XX. Data Privacy and Challenges of Big Data Application in Higher Education[J]. Information Security and Privacy, 2020, 4(2): 14-20.
- [7] Zhao XX. Analysis of the Functions and Development Trends of University Learning Management Systems[J]. Journal of Educational Technology, 2022, 10(8): 36-42.

## Author Bio

Xiaoping Chen, native of Nantong, Jiangsu Province. Education: Master graduate student. Professional title: senior engineer. Research Direction: software development in communication field.