

## **A Big Data Based Education Information System for University Student Management**

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**Abstract.** The decentralized processing and updating of information in colleges and universities has led to a lot of repetitive work, resulting in confusing student information and poor data consistency, which seriously affects accuracy and completeness and brings a lot of inconvenience to the management of big data in colleges and universities. The emergence of big data in the Internet of Things has revolutionized the way education and teaching are managed in higher education institutions. This paper aims to examine the nature of information technology in education and to explore its role in higher education management. Through a comprehensive study of the current situation, problems, and innovative trends in education management informatization, the close relationship between ICT and management has been established. A higher education management information system that emphasizes open interaction, mutual support, mobility, flexibility, and virtualization has been analyzed. This study highlights the critical importance of information technology for student management in higher education and emphasizes the growing demand for its development. Ultimately, this paper serves as a valuable reference for promoting the development of higher education student management information and improving the level of higher education student management.

**Keywords:** Educational management, Big Data, innovation path

## 1. Introduction

In today's world, modern information technology provides an abundance of easily accessible information. However, many people are unprepared to research and analyze this information. Some administrators, for the sake of convenience, rely on downloading rules and regulations directly from the internet without fact-checking. This is a common practice when implementing education management policies. While limited knowledge of information technology may provide us with factual information on the "when," "where," and "what," it does not equip us with the critical thinking skills necessary to solve complex problems. If the information provided by technology does not reflect reality, it becomes a pointless and indirect application. Therefore, it is crucial to give special attention to connecting information and practice in educational management, especially in light of the prevalent use of information technology (Kim & Jung, 2022).

Building information support for education management in higher education institutions is to create a perfect education management information system. This system allows step-by-step planning and execution, which ensures close collaboration between stakeholders, and it can reflect the school's educational information strategy. This management information system can play an important role in teaching, research, staff training, social services and external communication of the school. Nowadays, the computerised management of higher education requires more information, more transparency, more interactivity and better virtual functions. This is the new situation of computerised higher education management, while traditional education management faces problems such as mismanagement, administrative difficulties and low efficiency. This paper examines how modern educational governance can be combined with ICT to make higher education governance work effectively and quickly. It focuses on educational management methods and information strategies and addresses educational management practices to improve the efficiency and reliability of educational management. With educational management information in universities as the object of study, it selects educational management information for graduates as the area of study, introduces a new model of educational management information, analyses the theories and practices associated with it and introduces general rules of educational management information in universities with a specific status quo.

## 2. Related Works

### 2.1. How to understand big data

From a macro perspective, the huge data scale of big data and the available value behind it are its main characteristics (He & Li, 2023). Observing big data from a detailed perspective, it also has fast, true, and complex micro-notations (Kong, 2017). The basics of big data characteristics are shown in Figure 1. Some thought changes at the current stage in my country have contributed to big data as follows: the comprehensive analysis of data has an impact on the nature of things; the huge and unstructured data makes people no longer delve into its accuracy; the causality of things is complex and cannot be effectively controlled. Guide, leading to a focus on the relationship between each other (Liu, 2018).

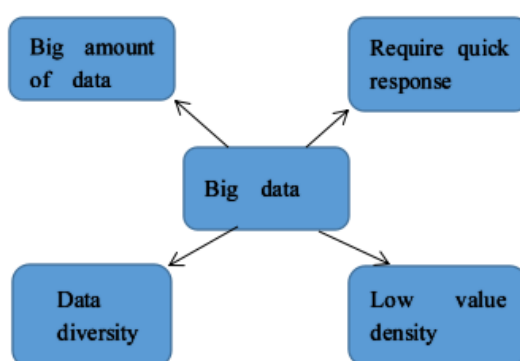


Figure 1. Basic characteristics of big data

## **2.2. In-depth understanding of big data**

In the college student system, each student has a completely different information situation. In the past two years, college students prefer to use social platforms such as Weibo to take real-life selfies of themselves and those around them, original funny video clips, etc. The release of content with distinctive personal characteristics has created a diversified social group. The interactive comments between college students have made the information and data produced by them continue to grow, and this speed is refreshing people's values with an amazing growth momentum (Wu, 2018). In the advanced teaching management model in the era of big data, some changes that keep pace with the times are also good features, such as the registration of college students' school status, campus cards that are closely related to school life and consumption, students' class attendance, student course selection and test scores Grading, etc., are used to effectively communicate with college students in the form of new media applications. These big data analyses, which are close to the daily life of university students, show that the digital information sphere is playing a good role in the management of university students (Sun & Liu, 2019). There has also been some progress in research into privacy data related to student management systems, with examples of research seeing the application of blockchain (Sowmiya & Poovammal, 2021).

## **2.3. Imperfect Big Data**

The complexity and instability of big data makes it seem chaotic and difficult to control. The management system of each university has no clear establishment model. Unchanging management models and tools do not meet the needs of most university administrators. Unchanging management models and tools do not meet the needs of most university administrators. The inconsistency of student data information greatly reduces accuracy, making the benefits of big data much less effective and making management applications for university students hit a wall at every turn. Traditional data analysis methods have led to the inability to make better use of big data resources. Many universities basically use traditional paper questionnaires to investigate data and use them as reference samples (Xi et al., 2016). However, this kind of long-lasting sampling statistics has great Restrictions and the resulting negative effects are also very troublesome. Obviously, you can use a faster and more effective big data environment to conduct statistics with more accurate information and stubbornly insist on using traditional methods.

## **3. The status and problems of university student management big data**

### **3.1. University big data management is chaotic, and a unified and complete big data management system has not been formed**

Faced with the rapid development of schools and the deepening of reforms at the school and college levels, the amount of information has increased significantly and the data has been updated and changed rapidly (Yang, 2019). The big data management functional departments of universities have not yet been established, and the management model has not changed. The traditional data management method and management methods are far from being able to meet the needs of big data management in colleges and universities. At the same time, more decentralized information processing and updates have led to a large amount of repetitive work, which has led to student information disorder and poor data consistency, which seriously affects the accuracy and Integrity brings a lot of inconvenience to the big data management of universities and seriously affects the effectiveness of big data use.

### **3.2. There are a large number of information islands and the data quality is poor**

In the process of informatization construction, because various departments have developed or purchased specific domain-oriented functions and business management systems based on different technologies and application models, the versatility of data exchange is poor, and it is difficult to realize the integration and sharing of existing system data and information. The utilization rate is low. At the same time, there is a lack of data quality control in the link of data entry and data exchange between

various systems, and problems such as untimely data maintenance, inaccuracy, incompleteness, and randomness often occur, resulting in poor data quality (Xu, 2016).

### **3.3. Pay attention to information system technology instead of information**

Today's information technology reform focuses on "T" (technology) rather than "I" (information). That is to say, most domestic colleges and universities attach importance to the construction of business processing systems (OLTP systems, online transaction processing systems), and the idea of.

Ignoring the construction of online analysis systems (OLAP) also affects the quality of data, resulting in the lack of attention to data construction for data analysis. Now, it's time to turn the spotlight on "I" and start focusing on the information itself (Srikajan et al., 2018).

### **3.4. The influence of traditional thinking on university data analysis**

In many universities, most of the analysis and inferences are conducted through questionnaires and sample data, but statistical sampling is actually only generated to solve some specific problems that existed at a specific period when technology is limited. Sampling analysis in the era of big data is like riding a horse in the era of automobiles. In some specific cases, it is still possible to use sample analysis, but this is no longer a primary way of analyzing data. The above reasons are the main reasons for the poor effect of domestic universities in the use and analysis of big data. Other aspects such as the concept and awareness of the use of big data, information literacy, and data governance management system also affect the analysis and use of university data (Xu, 2019).

### **3.5. The reasons for the above problems exist**

The first is the socio-economic and cultural factors. Under the background of global economic integration, domestic institutions of higher education need to meet the following requirements if they want to build a new model in line with international standards: firstly, to cultivate talents not only to meet the needs of the domestic market, but also to put their eyes on the international market; secondly, to do a good job of research to understand the needs of society for talents, and to use this as the cornerstone to carry out student education and management work; thirdly, the new model should be in line with the international development direction. Thirdly, the new model should be aligned with international developments. In this situation, all fields have undergone radical changes, and student management in domestic higher education institutions is also facing unprecedented challenges, mainly in three aspects: firstly, economic development has become the focus of attention of the whole society, and the construction of new models has not received due attention; secondly, during the special period of China's economic transformation, various corruption issues and unequal competition have emerged frequently, which are contrary to the positive education of schools. Thirdly, with the frequent economic and cultural exchanges between China and other countries, the injection of many foreign ideas will inevitably affect students' values and make management difficult. As economic development rockets upwards, as society develops day by day, people's quality of life improves and their ideology, emotional attitudes and value orientations change. College students are known as the pride of the generation, they love the motherland, positive and enthusiastic, full of vigour and vitality, but with the development of society, the inner factors of college students' growth and the external environment are also undergoing greater changes: firstly, the hostile forces in the West have pointed their fingers at the young generation in China, promoting the three views of the Western people through various channels such as newspapers, books and film works; secondly, in the important period of economic transformation a variety of negative ideas have emerged, such as hedonism and weak collective consciousness, which inevitably affect the correct values of university students. Among today's university students, emotional attitudes and value orientations are diversified; the phenomenon of neglecting faith, collective and dedication is increasingly prominent. This phenomenon has brought great challenges to the ideological education and management of students in domestic higher education institutions.

Then there is the school system factor. In the case of private schools, for example, while

universities are expanding in size, they are not ensuring the quality of their student population. When people's educational philosophy is enhanced, in order to achieve education for all, most of the private schools expand their enrollment. The expansion of colleges and universities not only has an impact on the learning and living conditions of students in the original schools, but also makes the work of building new models suffer a serious challenge. The expansion of the scale of higher education has led to an increase in the number of students, and in terms of the quality of the student population, it is impossible to compete with the previous elite education, and the quality of new students has dropped sharply. The traditional model of student management is becoming more and more difficult to adapt to the needs of education for all. Since the reform and opening up, China's education has adopted a two-pronged approach of general education and private education. At present, there are more than a thousand private colleges and universities, and the number of enrollment has expanded again and again, basically reaching the upper limit of the number of enrollment. In the expansion work, the third and fourth batch of students have entered ordinary colleges and universities, which makes private colleges and universities encounter the embarrassment of student quality, most of them are after the fourth batch, with low quality of students, limited funds for running schools and lack of experience. Compared with ordinary colleges and universities, private colleges and universities start late in China, and the longest school is only a dozen years old, so they cannot get financial guarantee, and the only funds available can only meet the basic teaching activities, and the construction of cultural and sports facilities is not even possible, which seriously restricts the development of the school. On the road to development, some private universities rely on advertising effects and pursue bubble achievements, which often lead to difficulties. For example, in the leadership management hired, it is important to hold the principle of practical and effective work, and to keep the people who can really help the development of the school to take up the heavy responsibility of student management and education. It is important to focus on learning from experience in practice and to carefully seek out the reasons that affect the work of building new models. Dare to face up to problems as they arise, be truthful and stop concealing information without reporting them. Talent drain and poor management. China's private universities mainly implement the staff employment system, but due to the lack of funds and the failure to establish a scientific and reasonable salary system, it is difficult to attract the attention of outstanding talents, and many young and middle-aged outstanding talents have jumped ship. In other words, the school is unable to retain and attract talents with its own strong power, scientific management methods and effective incentive system. At this stage, most of the student managers are young teachers who have just joined the school or are retired, with a large age span. Older teachers are experienced in management, but less innovative in their thinking. Most of the young teachers are fresh graduates with active ideas, but they do not have enough practical experience to manage students in a focused way. In terms of teacher qualifications, teachers with titles are older, or even retired. In terms of academic qualifications, undergraduate and specialist degrees are the main ones, and there is a serious lack of talents with master's degrees and above. Therefore, the quality of student management personnel in private colleges and universities has become a stumbling block on the road of development of private colleges and universities. Coupled with the loss of excellent talents, student management still remains at the level of many years ago and it is difficult to form a distinct management style.

Finally, there is the factor of team building. Nowadays, most private colleges and universities take counselors and class teachers to share the work of building a new model. Thus, to train up a team of counselors with good ability, high quality, strong politics and good business in a short time is the key to improve the level of student education and good management, and is also the right road to make private colleges and universities move towards scientific and formalization. From the perspective of management work, the ability of management personnel directly affects whether the management work can be carried out smoothly, whether there is a high-quality student management team is the key factor whether the new model can be well constructed, and in the construction of this team, the counsellor accounts for the improvement of quality and ability, which becomes the most crucial part. The class is

the most basic unit of education and is the main site of student learning, while the tutor is the direct organiser of all activities and is the direct person responsible for guiding and directing students in the school's ideology and learning. Therefore, it is very important to build a strong team of tutors. The construction of a team of tutors is the primary task of student work management. Student management in private colleges and universities is a comprehensive discipline, which puts forward high requirements to the management personnel, who should not only organise and manage with full of enthusiasm, but also pay attention to working skills, and not be satisfied with the status quo, not to mention being stuck in the form, but be brave to innovate and break through. The only way to take the most scientific approach to better guidance for students is to learn, summarise and explore. Tutor teachers should set an example by infecting and motivating students mentally, emotionally, morally and in character, influencing them implicitly and inspiring their thinking. Faculties should create more opportunities for students to study, exchange and visit, and actively encourage students to study for a master's degree or to further their studies abroad. Students should be made to understand and appreciate the importance of learning through a variety of means. From the counsellor-teacher perspective, it is important to enrich oneself with the most advanced management knowledge, to accurately grasp the psychological characteristics of students and to understand their ideological trends in order to choose the best entry point and to explore new models to build a better path for the work. First, counselors should care for and love students and understand them in all aspects. The quality of students in private colleges and universities varies, but as a college counselor, the primary goal is to discover and play the strengths of students so as to appreciate them and educate them objectively, and not to be prejudiced against them because of their source. The counsellor should go to the students' study and life more often to understand more deeply the characteristics of each student, and maintain good communication with the class teacher and class cadres to always grasp the students' thought dynamics and be able to deal with problems in a targeted manner. For students who do not have a proper attitude towards learning and whose goals are not clear, it should actively help them to establish a correct outlook on life and values and help them to set the right goals in life, so that they can maintain their motivation to learn. In the construction of the new model, the tutor teacher should also take into account the students' self-esteem, and should combine positive guidance with moderate discipline to escort the formation of good living and learning habits for students. Secondly, counsellors should be both lenient and strict, and should be precise about the degree of "strictness" and "love". In the new model of construction work, more is required to counselor stern first, but in the management process, always grasp the degree of strict and love, only then can do a good job of student management. If you only rely on strict discipline to counsel students, it will not only widen the distance between the counsellor and the students, but may also lead to students losing their self-confidence and fighting spirit, which will defeat the original purpose of the counsellor to manage students. If the students are overly coddled in the management process, the students will feel that the teacher is "easy to bully" and ignore the discipline, which will not achieve the effect of management. Therefore, in the management of students, counsellors should focus on the boundary between strict and love, in the strict management of students at the same time, but also do not ignore the respect and love for students. Thirdly, counsellors take classes as a unit to manage and teach students. The class is the "cell" of the school, the basic unit of the school, and the good or bad of the class affects the development of the school to a certain extent. Students in private colleges and universities are seriously divided into two classes, with different educational and family backgrounds, and the phenomenon of each student working on his or her own after admission is serious. Therefore, counsellors should start to manage and teach students in the aspect of class cohesion. They should establish rules and regulations for class management and actively guide students in their thinking, helping them to set clear learning goals. After understanding the characteristics of the students, class cadres are elected according to their characteristics and taking into account their opinions. On this basis, counsellors must abandon the old style of working in a big way, help class cadres to establish prestige in the class and, within the scope of the class, not to engage in underwriting and try to let students solve

problems within their ability independently.

## 4. Experiment and Result

Contemporary social civilization is built on the basis of data civilization. The university student management big data platform should be a multi-level and multi-dimensional organic system, and it should be a "full sample" data collection platform, which must integrate all relevant departments of the university. Data records are integrated into a unified big data exchange and sharing platform in accordance with the characteristics of standards, norms, safety, and efficiency to realize seamless exchange of data between various departments. The initiative and enthusiasm of relevant departments should be mobilized, their responsibilities should be clarified and a unified, complete, multi-level, intelligent, secure and reliable big data management platform should be built.

### 4.1. Establish a decision model

The goal of the entire university student management big data construction is to make rational use of student management big data. While meeting the needs of the student management department, it must also provide data services for teachers and students, and provide school-level leaders with data statistical analysis and decision support. That is, it should have multi-level intelligent service functions, to ensure that every level of personnel must benefit, in order to promote effective decision-making, the establishment of a pyramid model, as shown in Figure 2.

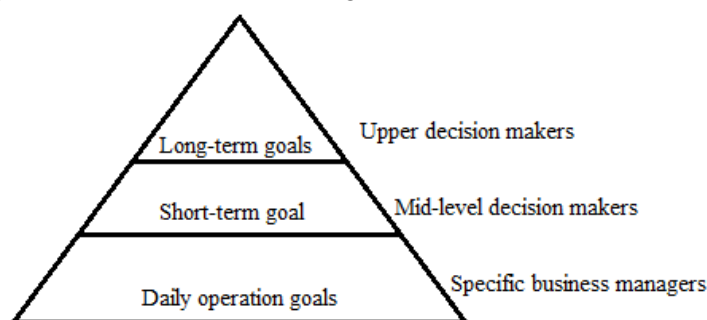


Figure 2. Specific goals at different levels in the organization

### 4.2. Establish big data standards

In order to ensure the integration, sharing and effective accumulation of data, refer to the specifications in the "Student Management Data Subset" issued by the Ministry of Education in the "Higher Education Management Information Standards) "Student Management Data Subset", and combine the actual situation of the school to establish the basic information coding standards and data subsets for college students Standardize and unify student codes to ensure that students' codes are unique; unify department codes to ensure that department codes are unique; unify data codes of all business systems to ensure the accuracy of business data; at the same time formulate codes and data management updates and maintenance specifications. Due to the lack of standards and specifications for the data management of campus network authentication and billing and campus cards in colleges and universities. According to the actual use of the school and combined with our school's many years of practical experience, there has separately formulated and expanded student electronic behavior data standards, such as campus cards, network certification, and equipment use. There are plans to submit and participate in such standards in the future.

### 4.3. Establish big data management and use specifications

Our school attaches importance to and emphasizes the participation of all staff in the big data analysis and utilization process of college student management. Everyone is a producer and consumer of data. For this reason, the school has established a data information use and maintenance team such as Each second-level college in charge of leading class teachers, counselors, and related business department

staff has also established an informant management system, assigning all kinds of data responsibilities to the department, and special personnel are responsible for strict control, unified data entry management, and data maintenance management. Standardize the collection, processing, storage, transmission and use of information in various departments to ensure that the data is unique, accurate and timely.

#### **4.4. Establish a big data exchange and sharing platform to realize data sharing**

The big data sharing platform integrates the data of all business information systems in the school, and realizes a significant feature of big data-recording all data, including educational administration system, academic system, scientific research system, library system, personnel system, asset system. The campus card management system and network authentication system and other record information related to student management have realized the interconnection and intercommunication of information among the systems, realized data sharing, and fundamentally eliminated information islands, making the business system internal and inter-system. The complicated and complex information is smoothly flowed, completing a complete process from data source to data integration to data analysis application, providing a solid data foundation for big data analysis and statistics.

### **5. Conclusion**

The research and discussion presented in this paper hold significant theoretical implications. Firstly, it offers a fresh perspective on educational methods, introducing new ideas and diversifying existing ones, thereby contributing to the development of educational methods. Secondly, this paper highlights the evolving nature of college education management in the face of informationization and proposes strategies to enhance educational management theory, educational technology, and management science. It is a comprehensive and innovative study that aims to integrate information technology and college teaching. Thirdly, this paper illustrates the general principles of the informatization of college education management, which can help increase awareness and prompt a change in mindset.

Moreover, the research and discussion on the informationization of college education management also have practical implications, which can be observed in several ways. Firstly, the current efficiency of education management in higher education institutions is low, resulting in inadequate allocation of teaching resources and underutilization of resources. This study proposes a new teaching information model, providing a fresh perspective to interpret the traditional teaching model, and encourages college education managers to pay more attention to the new challenges and issues arising in the informationization of education management. Secondly, building a college education management information system is a significant challenge in establishing a comprehensive information system for colleges and universities. This study is a valuable contribution towards promoting the standardization, scientific rationalization, and effectiveness of educational management informationization, and enhancing the quality of undergraduate teaching.

### **References**

- Cui Z.F. (2014). Research on Innovation of College Student Management Based on Internet of Things Technology. *Management Engineer*, 24-26+30.
- He S.P., Li Y. (2023). Design and Application of College Student Management System Based on Big Data Technology. *Wireless Communications and Mobile Computing*, Vol. 2023.
- Kim, Y.J., Jung, K.H. (2022). Social data analysis on the perception of emergency simulation education of nursing college students using the q method. *Journal of Logistics, Informatics and Service Science*, Vol. 9, No. 1, pp. 291-306. <https://doi.org/10.33168/LISS.2022.0118>
- Kong X.X. (2017). Analysis of Innovation of College Student Management Model Based on Big Data Era. *Journal of Higher Education*.



- Liu Y.Y. (2018). *Journal of Chifeng University (Natural Science Edition)*, 112-114. (In Chinese).
- Pan T. (2016). College Student Management Research Group under the Background of Big Data Era. *China Adult Education*, (06): 25-27.
- Sowmiya B., Poovammal E. (2021). A Heuristic K-Anonymity Based Privacy Preserving for Student Management Hyperledger Fabric blockchain. *Wireless Personal Communications*, 127, pp.1359–1376.
- Srikajan S., Vithusha U., Kamsavathana S., Harthiyayini R., Susana J., Jerin A., Thiruthanigesan K. (2018). a theoretical approach of biometrics based student management. *ICTACT Journal on Soft Computing*, Vol. 9, No.1, pp.1794-1805.
- Sun Y.Q., Liu S.S. (2019). Research on innovation of big data and daily management of college students. *Yangtze River Series*, 139-139.
- Wu P. (2018). Research on Innovation of Teaching Management in Universities Based on Big Data. *Journal of Zhangjiakou Polytechnic*, 27-29.
- Xi C., Tan S.J., Bai Y. (2016). Research on the Big Data Construction of College Students Management in the Era of Big Data. *Economist*, (11): 9-10.
- Xu N. (2019). Innovation Path of College Student Management under the Background of Big Data. *Science and Education Guide*, 160-161.
- Xu W.X. (2016). Current Situation and Countermeasures of Information Construction of College Student Management in the Era of Big Data. *Journal of Mianyang Normal University*, (01): 19-20
- Yang X.X. (2019). Crown people; Analysis on the innovation development path of university teaching management in the era of big data. *Journal of Hubei Open Vocational College*, 23-25.