Research Article

Exploring Innovative Development Strategies for Safety Education in the Context of Big Data and the Internet of Things

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With the continuous development of Internet technology, human beings have entered the era of big data, which has had a significant impact on people’s lives and work, both positively and negatively. With the continuous application of big data in all walks of life, safety education innovation in China’s colleges and universities has also undergone changes. Through the use of big data, the quality of safety education innovation in China’s colleges and universities has been significantly improved, and to a certain extent, the development of safety education innovation in China’s colleges and universities has been promoted. However, influenced by a variety of factors, there are still numerous problems in the safety education innovation of some colleges and universities in China in the era of big data. Based on this, the article focuses on the impact of big data and the Internet of Things on the innovation of safety education in China’s colleges and universities. By analyzing the characteristics and essence of big data, the article proposes corresponding optimization countermeasures to achieve fundamental changes in education methods, transform the traditional teaching classroom, and improve teaching efficiency. The future of education informatization will develop faster and with a higher degree of informatization. School administrators, teachers, and students should keep pace with the development of technology, improve their own literacy, and contribute to the reform and innovation of education informatization.

1. Introduction

With the deepening of education reform, the number of students enrolled in China’s universities is rising year by year, and they are facing numerous difficulties in education and management [1]. The use of big data has improved this phenomenon to a certain extent and enhanced the management level of universities. In the era of big data, the dissemination of information has become faster and the types of information have become more diverse [2]. Colleges and universities will be affected by the negative factors of big data in the background of this era, so they should summarize the problems existing in the current work of safety education innovation, use the thinking of development to look at the problems, and formulate timely solution strategies, so as to promote the sustainable and healthy development of safety education innovation in colleges and universities [3].

With the continuous penetration of big data thinking, China’s colleges and universities have started to use big data to educate and manage students, which has greatly improved the efficiency and quality of safety education innovation in colleges and universities [4]. Colleges and universities are like half a society; their internal structure and environment are relatively complex, so there are numerous problems in education and management, mainly in the following aspects. Firstly, some colleges and universities lack the correct idea of using big data, not only is the relevant awareness weak but also weakens the role of big data in safety education innovation in colleges and universities; secondly, some colleges and universities lack a perfect system of big data safety education innovation, so the education of students and the management of teachers and students are not standardized and cannot be effectively implemented, and very often, the system of big data safety education innovation is relatively
backward, which has a certain resistance to big data safety
Thirdly, in terms of big data education and management, some universities lack top-level design, professional big data analysis and management teams, and professional teachers, so they cannot use big data to analyze various phenomena and thus cannot formulate effective teaching strategies; fourthly, there is a lack of financial guarantee, and in order to realize the informatization of universities, it is inevitable to invest a certain amount of materials. Fifthly, there is a lack of financial guarantee; in order to realize the informatization of colleges and universities, it is inevitable to invest certain materials, and its operation and maintenance costs are relatively high [5].

At the present stage, there are many problems with the awareness and cognition of big data safety education innovation in colleges and universities [6]. It is necessary to analyze from multiple angles and levels, constantly expand the channels of big data safety education innovation, optimize the management mode, analyze the trend of future development of big data safety education innovation in China’s colleges and universities with development vision and forward-looking thinking, accurately make predictions on the development of big data safety education innovation, and ensure the advanced nature of big data safety education innovation [7].

Colleges and universities should change their previous concept of safety education innovation and use the thinking of big data to look at current teaching and management. They should enhance good awareness of big data; establish the concept of big data safety education innovation development; do a good job of linking the 3 aspects of data, thinking, and technology; and establish an open and shared platform for data. Universities should establish the concept of sharing and actively use the current Internet platform to transform teaching methods, so as to create a good classroom atmosphere and increase the interaction between teachers and students [8]. Universities should also continue to strengthen links and interactions with other universities and use big data to build a platform for sharing resources and experiences, so as to constantly guide current education and management [9].

Universities should use developmental thinking to see the impact and influence of big data on safety education innovation. In order to make the innovation of safety education in colleges and universities develop in a more standardized and scientific direction, colleges and universities should strengthen their own top-level design [10].

First of all, based on the background of big data, colleges and universities should make scientific strategic planning [11]. Colleges and universities should first clarify the objectives of school education and build an interoperable communication platform for students and teachers; from course selection to teaching to course evaluation, every link should be efficient [12].

Secondly, colleges and universities should constantly enhance the organizational and leadership skills of their leaders. The leaders of colleges and universities should constantly improve their own literacy, look at the development of colleges and universities with a critical eye, and make timely solutions to the problems that arise in them [13]. In the era of big data, big data thinking is much more important than big data itself, so college leaders should use big data thinking to look at the education and management of colleges and universities, and constantly strengthen their knowledge and skills to promote college reform and innovation [14].

2. Related Work

There are many studies on the application of IoT in innovative education; for example, [15] integrated a microelectronic processor, wireless transceiver on a wireless sensor network UbiCell series node with various functions such as information acquisition, signal processing, data transmission, and real-time monitoring. [16] builds a low-power wireless sensor network node based on the Telos-b platform with a well-established on-board built-in antenna and a long transmission distance. [17] implemented various network topologies such as star, cluster, and mesh networks based on a ZigBee wireless communication protocol stack. In [18], the study elaborates on the application of fusion product IoT in various fields, especially in the education industry, pointing out that the application of IoT in the field of education will definitely bring about a new reform in education.

3. Innovative Structural Design for Safety Education

3.1. Objectives and Content. The students show a good mindset during the creative activities. This includes awareness, interest, boldness, determination, attitude, and thinking in a creative spirit, specifically, the ability to analyze things from a new perspective and to transform them without being bookish.

The ability to innovate mainly refers to the subjective conditions and psychological characteristics of the learner’s personality, as demonstrated by the learner’s initiative and active and successful completion of innovative activities. Creative ability carries a great deal of weight in innovation education [19].

The innovative personality refers to the learner’s cognitive, analytical, and problem-solving styles, specifically ideals, beliefs, pragmatic style, emotions, strong interests, sense of responsibility, mission, and commitment.

3.2. Strategies and Methods. The strength of a teacher’s faculty is a fundamental guarantee of its development. The teacher’s view of creativity itself, the social relationship between teacher and student, the optimal information provided by the teacher, and, more importantly, the extent to which the teacher is educated were used. If teachers are able to think critically and creatively and have the basic knowledge of philosophy and engineering sciences to use unique creative methods and skills in the classroom, this can more effectively enhance the development of students’ creativity, as shown in Figure 1.

Based on the innovative educational practices described above, the following five competencies and literacies should
Innovation ability

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receive high priority: first, mathematical and scientific literacy; second, humanistic literacy; third, international understanding; fourth, information and communication skills using educational technology; and fifth, creativity. To achieve the teaching objectives and to change the teaching strategies and methods, we propose an innovative and open model of scientific inquiry based on IoT teaching, as illustrated in Figure 2:

One of the IoT-based science inquiry models is the teaching management module, which includes out-of-class interconnection, classroom interaction, student text editor, lesson plan editor, campus resource management and retrieval, and the most important module is the material and information resources. We introduce these modules separately: the material and information resources module is the heart of the teaching management module; it provides learners, pedagogues and administrators with a wealth of teaching management information resources, mastering, and understanding these dynamic and timely relevant information in order to serve students well and teach every science and innovation lesson. The lesson plan editor is a module for all educators; its main function is to realize the teachers’ communication. As the name suggests, the student text editor is an online learning platform specifically for students, which focuses on what students do not understand before and after class or what better ways to solve certain problems, as well as expressing their emotions about learning and life. It is also a platform for students to express their emotions about their studies and life. It is not only a platform for students to communicate but also to express their constructive thoughts about their teachers and the campus, providing a space for students to tell the truth. The extracurricular interconnection module is a way to have your study partner and a master teacher wherever you go [20]. The classroom interaction module uses IoT technology and collaborative application technology together to ensure that all aspects of each student’s learning characteristics indicators in the classroom are summarized in the teacher’s receiver and that the teacher will make reasonable and standardized responses to different students according to their abilities and management. The campus resource management and retrieval module mainly refers to campus security, campus activities, campus resources, campus library, and other campus auxiliary facilities management.

4. Cloud Computing and IoT-Based Research Methods

4.1. Network Data Transmission and Computing. In the research of network big data based on cloud computing and Internet of Things, in order to improve the efficiency of data operation, the network data is transmitted using hierarchical network coding. In the process of data transmission, the network data transmission delay estimation formula is obtained based on the set of network data host points, and the data transmission parameters are obtained based on the change of the order of the finite domain of the network data in the estimation formula to complete the process of multinet data transmission. The specific procedure is as follows.

In the actual network big data transmission process, the network data usually has a hierarchical structure; assuming that at network data node \( p \), the received network data is decoded and then multicast to the subnet, while at other network data nodes, the data transmission is carried out using the coded form, and let all network data hosts decode the data information after receiving it, the maximum multicast rate of the hierarchical network data coding method is assumed, assuming that the maximum multicast rate is \( u \), then the set of all hosts in the network can be expressed as

\[
T = \{u_1, u_2, u_3 \ldots u_i\}.
\]

If, \( u_1, u_2, u_3 \ldots u_i \) represents the network data host of the main network, \( \{u_{k+1}, u_{k+2}, \ldots u_{k+1}\} \) represents the network data host of the subnet, and network data node \( p \) represents the connection point between the subnet and the main network; if it is connected using hierarchical network data encoding, it is equivalent to connecting it twice with single source multicast, and during the connection process, if the data source point A multicasts network data into \( \{u_1, u_2, u_3 \ldots u_i, p\} \); then, its maximum network data multicast rate is \( z \). If the network data node \( p \) is multicast into \( \{u_{k+1}, u_{k+2}, \ldots u_{k+1}\} \), then its network data multicast rate is \( z \). The maximum network data multicast rate that can be obtained using hierarchical network data encoding to multicast data from the network data source to all network data hosts is \( z \), and the relation

![Figure 1: IoT innovation education structure system.](image-url)
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when z1 < z2, additional data information is interpolated at network data node p, and network data transmission is completed by using network broadband capacity.

In network big data research, the calculation of network data is very important. In order to make the network data calculation faster, the byte-by-byte CRC algorithm is used to calculate the network data. The network data code can be expressed as

\[ O(X) = O_n \times 4^n + O_{n-1} \times 4^{n-1} + \cdots + O_1 \times 4 + O_0, \]

where \( O(X) \) represents the network data encoding, \( O \) represents an octet of data, and \( n \) represents the number of octets. Using the above calculation as a basis, the data bytes are first multiplied by 216 and then divided by the data to calculate the polynomial \( F(X) \), giving the relation

\[
\frac{O(X) \times 2^{16}}{F(X)} = \frac{O_n \times 2^{16}}{F(X)} \times 2^n + \frac{O_n \times 2^{16}}{F(X)} \times 2 + \frac{O_n \times 2^{16}}{F(X)}
\]

where \( f \) represents the threshold that controls the minimum value of relation (8), \( w \) represents the coefficient of network data transmission, and \( g \) represents the network data calculation parameter. In summary, the control of the relation by the threshold value enables fast calculation of network data.

4.2. Network Data Storage and Query. The network data is stored using grouped storage, which can save network storage space. The storage process uses the relationship between network data measurement points and the number of group storage groups to obtain the total amount of
network file data after grouping, and the storage of network data is completed based on the total amount of network file data after grouping.

Assume that there are \( j \) network data measurement points, each network data measurement point sampling period is not necessarily the same; if each data measurement point is submitted for storage in large quantities, its attribute data has \( r \); then, these data are grouped and stored into different network files. According to the distance of the data, the more concentrated network data measurement points are divided into a group, assuming that the \( j \) data measurement points are divided into \( e \) groups, then there is a relationship between the data measurement points and the number of groups as follows:

\[
j = \sum_{i} r_{e}.
\]

Using the grouped network file \( y_{e} \) to hold the network attribute data submitted by the group \( e \) data points, the total amount of data in file \( y_{e} \) is

\[
D_{e} = (6 + M) j_{e},
\]

where \( D_{e} \) represents the total amount of network file data after grouping and \( M \) represents the network data storage parameters; experiments prove that the data storage efficiency is the highest when \( M \) takes the value range of 0.4-0.5.

Iterating over equation (10), the final sum of the data volume of the network file data after \( e \) groupings is

\[
D = \sum_{i=1}^{e} D_{i} = (6 + M) \sum_{i=1}^{e} j_{i},
\]

where \( D \) represents the total amount of network file data after \( e \) grouping, based on the total amount of network file data after grouping, to complete the network data storage based on grouping storage method.

The querying and indexing of network data utilizes a hierarchical inverse order superposition location method, assuming that the primary query matrix \( Q_{1} \) of the data query node is multiplied with the secondary data query matrix \( Q_{2} \) to obtain the new data query matrix, and extracting the common factor of the maximum data query matrix and summing this matrix as

\[
Q'_{i-2} = \frac{Q'_{i-1}Q_{i-2}}{\varepsilon_{i-2}} + Q'_{i-1}Q_{i-2},
\]

where \( \varepsilon_{i-2} \) represents the greatest common factor of the resulting data query matrix \( Q'_{i-1}Q_{i-2} \) and so on up to the data root node:

\[
Q'_{1} = \frac{Q_{1} Q'_{2}}{\varepsilon_{1}} + Q_{1} Q'_{2},
\]

where \( \varepsilon_{1} \) represents the greatest common divisor of the data query matrix obtained from \( Q_{1} Q'_{2} \). Extracting the largest common factor \( \varepsilon \) of the data query matrix \( Q'_{2} \),

\[
\varepsilon = \varepsilon_{1} + 1.
\]

At this point to get the \( \varepsilon \) value, assume that the value represents the data query node in the entire network data query system query parameters, experiments have proved that this parameter to take the value of the interval of 5-6, and the network data query accuracy is the largest. Then, iterative calculation of \( \varepsilon \), and compare the \( \varepsilon \) value of each data query node to obtain the smallest data query node; the node in the entire network data query system is the optimal path point for data query, at this time, ignore other data query nodes, in the data query system, for the node to query, so as to complete the query of network data.

5. Case Studies

The use of information technology in teaching provides a fully digital teaching environment for education and learning. Classrooms are traditional classrooms where classroom teaching is knowledge transfer-oriented, mainly teacher-centered, book-centered, and classroom-centered, where teachers do not pay enough attention to students’ learning abilities and learning methods, where teaching is more procedural and schematic, and where teachers and students lack sufficient two-way interactive communication. The effect of educational innovation in the context of big data and the Internet of Things, as shown in Figure 3, uses a variety of teaching media in the teaching process, but still uses lecture-based teaching, and information is still transmitted in one direction. Teachers and students can communicate in both directions through real-time interactive information terminal devices, breaking through the limitations of traditional lecture-based teaching and allowing for interactive teaching, seminar-based teaching, and group cooperative inquiry teaching. The basic form of traditional classroom teaching has been completely changed, allowing for immersive and immersive teaching, accurate tracking of process evaluation, and precise and timely learning interventions. At this stage, the learning environment for students is a fully digital one, allowing for more digital technology support for students.
The use of big data has also had a significant impact on education teaching and learning. By collecting and analyzing big data in education, it is possible to gain a deeper understanding of students’ learning processes and learning states, making it easier for safety education innovators to provide personalized teaching content and learning plans for students. The development of cloud computing technology has provided students with a wealth of educational resources, enabling learners to learn new knowledge in the classroom as well as on the internet according to their development needs, contributing to the development of their personal expertise as well as their overall development. The development and application of these new technologies in education have had a definite impact on traditional education methods and have innovated the educational model [21].

As shown in Figure 4 for the different educational clusters, although information technology in education has developed to a certain stage, there are still a considerable number of school leaders and teachers who do not have a good understanding of information technology in teaching and learning and only focus their school efforts on the purchase and installation of multimedia equipment and only pursue the use of information technology in teaching to achieve a variety of teaching forms, without realizing the
fundamental problem of using information technology as a support to change teaching and learning.

The era of information technology in education has also put forward corresponding requirements on the information literacy of university students. Students should know how to give full play to their advantages and strengths in front of various information technologies to help their learning, learn to filter and screen the information on the Internet, and consciously resist the bad information. As shown in Figure 5 of the students’ creative abilities, it can be seen that in fact the information literacy of the university students is far from meeting the requirements, they have various problems in information processing, equipment use, etc. and do not have the corresponding ability to apply information technology. They need to fundamentally change their perception of classroom concepts as well as their learning habits and learn to use information technology to select excellent educational resources for learning.

6. Conclusions

With the support of big data, computer technology has been introduced to university teaching, many courses have also been taught in the cloud, and communication platforms have been established between teachers. This has provided more scientific advice on university governance, facilitating both the communication of tasks from the top to the bottom and the supervision of the top by the bottom; it has facilitated the collection of student suggestions and improved the efficiency and quality of university governance. Innovation in safety education in higher education has far-reaching implications, but this impact is not one-sided. Universities should actively utilize its beneficial aspects to constantly serve the current innovation of safety education in higher education, while its negative effects should be avoided in time. Universities should understand the nature and characteristics of big data and analyze the shortcomings of current safety education innovation, so as to develop effective strategies for big data safety education innovation, and thus promote the sustainable and healthy development of universities.

Data Availability

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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