Hindawi
Security and Communication Networks
Volume 2023, Article ID 9821364, 1 page
https://doi.org/10.1155/2023/9821364

Retraction

Retracted: Research on the Design of a Training Room Management System for Automotive Professionals in a 5G Wireless Network Environment

Security and Communication Networks

Received 8 August 2023; Accepted 8 August 2023; Published 9 August 2023

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] C. Luo, X. Yuan, T. He, and X. Yao, "Research on the Design of a Training Room Management System for Automotive Professionals in a 5G Wireless Network Environment," *Security and Communication Networks*, vol. 2022, Article ID 4560697, 7 pages, 2022.

Hindawi
Security and Communication Networks
Volume 2022, Article ID 4560697, 7 pages
https://doi.org/10.1155/2022/4560697

Research Article

Research on the Design of a Training Room Management System for Automotive Professionals in a 5G Wireless Network Environment

Cheng Luo,[1] Xiang Yuan ,[2] Tao He,[1] and Xing Yao[1]

[1]*Department of Electromechanical and Information Engineering, Changde Vocational Technical College, Changde 415000, Hunan, China*
[2]*Departments of Automotive and Mechanical Engineering, Changsha University of Science and Technology, Changsha 410000, Hunan, China*

Correspondence should be addressed to Xiang Yuan; yuanx@csust.edu.cn

Received 22 March 2022; Revised 22 April 2022; Accepted 27 April 2022; Published 21 June 2022

Academic Editor: Muhammad Arif

Education informatization is getting more popular, smart learning spaces are gaining popularity, and students' demands for personalized, convenient, and diverse learning content are becoming more apparent. This study focuses on exploring the design of automotive professional training room management system with 5G technology. On the basis of sorting out the main features of education informatization, it analyzes the technical challenges faced by the design of automotive professional training room management system, starts from three aspects of teaching, teaching and research, and education management, argues and proposes the corresponding 5G automotive professional training room management application scenarios, and forms a general view of 5G education informatization. It will continue to enhance the connotation of educational scenarios, stimulate educational scenario change, and become the primary driving force of innovation in automotive professional education informatization.

1. Introduction

Graduates of automotive majors are usually out of school and into the workplace. Only by paying attention to practical teaching and improving students' hands-on ability can the automotive profession bridge the school and society [1–5]. The use and management of the practical training room is therefore receiving more and more attention. The training room has two main functions: one is to arrange practical training courses according to the needs of the curriculum, equipped with professional teachers to guide students to carry out practical training activities, and improve students' hands-on ability and innovation; the second is to do a good job in the management of the training room, comprehensive management of the assets of the training room, and to ensure the normal conduct of practical training teaching [6–8].

Schools must expand their training rooms and improve their management model to accommodate the development of vocational education. Nowadays, enterprises require graduates to be able to quickly change their roles and adapt to new jobs, reducing the cost of job training for enterprises [9, 10]. The training rooms enhance the practical operation level and job business ability of students so that they can step out of the campus to take up the job and become the employees needed by the enterprises [11].

In recent years, schools have attached considerable importance to the hardware construction of practical training rooms, investing a large amount of money to increase the practical training venues and purchase practical training equipment and vigorous development of hardware facilities mapped out the weak supporting software management model [12]. The training room management system is still stuck in the traditional manual mode, relying on the

verbal or paper form management method, which is significantly behind the real needs and the training room management and is chaotic and poorly coordinated, with training equipment frequently lost or damaged. Only by taking reasonable management measures can we ensure the orderly development of practical teaching in the automotive industry, promote the development of the training room, improve the efficiency of the teaching co-ordination, and coordinate the work of all departments [13]. In western countries, where various fields are developing rapidly with the help of computer technology, the efficiency of information management has a multiplier effect [14].

The training rooms in the automotive industry are an important place for students to train, and the original management model was unable to cope with the increasing number of students and the demand for innovative training projects [15]. The increase in the number of students and the variety of practical training projects has increased the complexity of the management of the training rooms. Due to the low use of computer technology, two types of problems often arise in the management of practical training rooms: the incapacity to arrange practical training courses in a rational way to meet the practical training needs of students and the confusing management of equipment and the incapability to accurately count the use of equipment and daily management [16]. Only through the development and implementation of a complete training room management system and the unified management of training room courses and assets can the management of training rooms be improved and the normal operation of training rooms is ensured, providing a good place for practical teaching and training students' hands-on and innovative abilities for the ever-evolving vocational education.

The arrangements of the study are as follows. Section 2 describes the related work. Section 3 discusses the various architecture design system. Section 4 analyzes the simulation tests. Section 5 concludes the article.

2. Related Work

Here, we discuss the training room management system. They applied technology for Laboratory Management. Cloud computing and virtual reality is being integrated into the laboratory management system.

2.1. Training Room Management System. The Laboratory Information System (LIMS) was first proposed by a foreign company and was used by a number of foreign scholars to standardize the management of laboratories. The first generation of laboratory information system was researched in the late 1970s, and with the development of the computer base, the laboratory information system has been improving its functions and performance. A multicomponent LIMS using pattern recognition was developed in [17] [18]. A fully automated LIMS used in the biological field and a system using workflow technology can obtain more accurate results by analyzing data obtained from experiments [19]. The integration of collaborative information systems into LIMS makes it more user-friendly.

The laboratory management system in colleges and universities will eventually achieve information management [20]. Due to the differences in national conditions and education methods, the existing training room management systems abroad may not always meet the actual needs in China, and we must independently develop a training room management system that suits the characteristics of Chinese automotive majors in order to effectively manage the school's training rooms and achieve modern management [21]. At present, our institutions lack effective laboratory management standards, and practical training teaching has not yet been standardised and efficient. Only by improving the level of management of practical training teaching and providing vocational education can we meet the employment needs of enterprises [22].

2.2. Applied Technology for Laboratory Management. Big data refer to large datasets, diverse data types, fast data distribution and processing speeds, low data density, and high-value data clusters. Big Data is the tool that enables the intelligent management of a wide variety of data in the form of thinking [23]. The application areas of Big Data are reflected in four main areas: data collection, processing, storage, and visualization of results. A big data-based practical training room management system allows for automatic distribution of practical training equipment and resources, enhancing management efficiency and reducing manual errors [24]. Using big data to mine students' practical training information, including data on equipment operations, experimental processes, practical training consumables, testing processes, and evaluation of results, Map Reduce and Hadoop tools are used to summarize students' learning literacy and habits through their learning behavior, build personalized learning profiles, and customize personalized experiments to meet students' characteristics [25].

Social apps software is a product of the rapid development of the mobile Internet, and students have become accustomed to using various apps for social activities. By developing appropriate apps applications to manage the equipment in the practical training rooms and application enquiries for practical training arrangements and to help teachers publish open practical training content, students can learn before they enter the classroom.

The introduction of cloud computing and virtual reality technologies into the laboratory management system allows for distributed information storage and describes the exchange of data between different arithmetic rules.

Overall, the rapid development of information technology has provided many references and supporting technologies that can be considered for the development and application of cutting-edge network technologies in laboratory management systems to improve service and management efficiency.

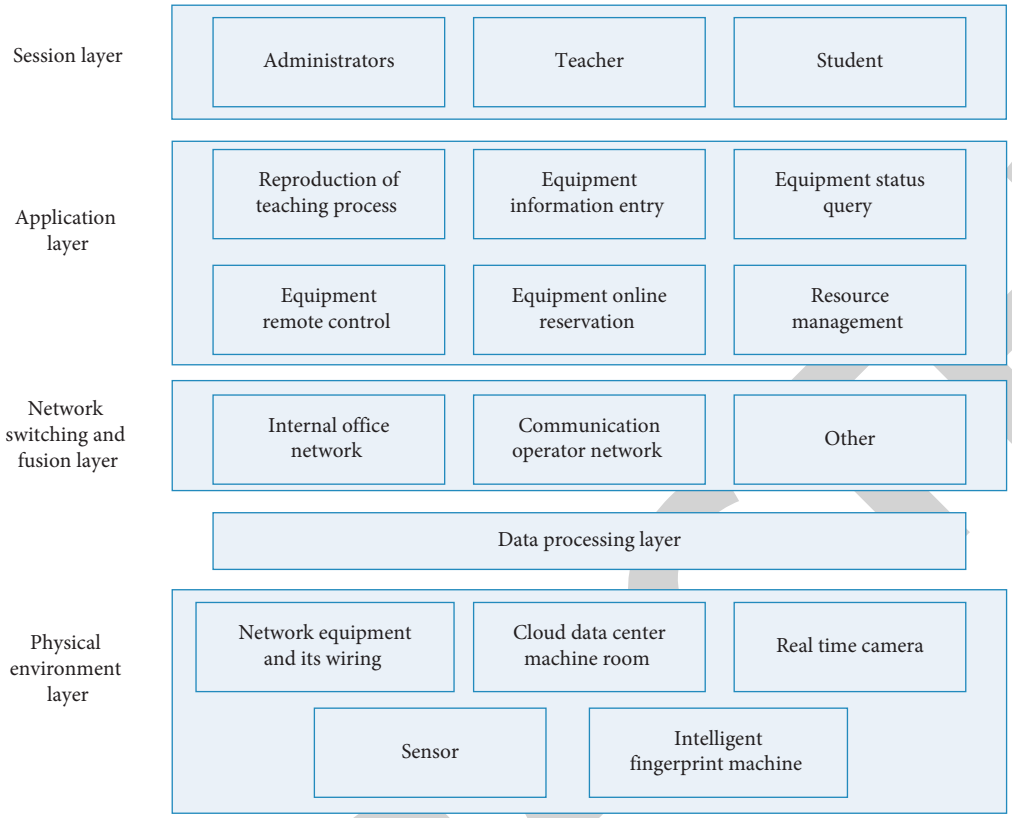

Figure 1: System hierarchy diagram.

3. System Architecture Design

In this section, the logical structure of the equipment management system is described. The system combines computer, communication, Internet of Things, database, and other technologies in an organic way.

3.1. Logical Structure of the Equipment Management System. According to the location distribution of each training room in the automotive training centre, combined with the current common network access methods and with the help of the "Internet + education" service concept and software technology, the design of the logical architecture of each function of the management system is completed. The system is designed as a session layer, an application layer, a network exchange and convergence layer, a data processing layer for integrated management of training equipment, and a physical environment layer, etc. The specific system level design is shown in Figure 1.

The interface logic architecture is shown in Figure 2.

Based on the Visual Studio 2010 system, the system is an organic integration of computer, communication, Internet of Things, database, and other technologies, employing a hybrid B/S and C/S mode for the system administrator to handle the underlying data outside the user. Using B/S architecture, equipment management system users do not need to install software in the client, through the browser can achieve the relevant access control, while for the system is designed as a C/S architecture in order to improve the efficiency of data management work, such as data collection and transmission of equipment label data. The system is an equipment management system with a SQL server 2008 database as the core. The main functions designed are intelligent access control module, equipment management module, consumables' management module, equipment IOT module, equipment remote control module, real-time reproduction of teaching process module, equipment reservation module and teaching management module, etc., taking the specific situation and actual needs of the automotive professional engineering training centre as the guide.

The database, which offers storage and information sources for the system data, corresponds to the data layer. The user layer of the system displays a different interface and is separate from the business layer so that changes to either the user layer or the business layer do not affect each other. This facilitates the maintenance and functional changes and expansion of the system. To maintain data security, uniformity, and uniqueness, the business layer data are processed on the server, while the user layer data are confined to display and confirmation, and the SQL database provides data integrity control with strong security and confidentiality. This is shown in Figure 3.

A view of a 5G network-based remote interactive teaching scenario is shown in Figure 4. 5G networks, compared to wired networks, can be adapted to various changes in the teaching venue and can be used to provide a

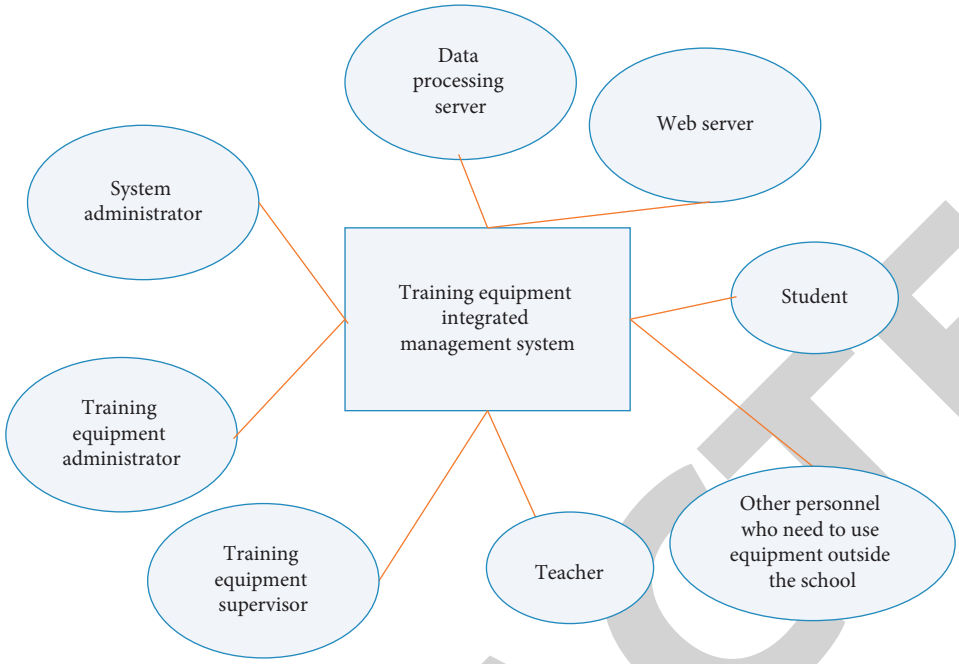

Figure 2: System interface logic architecture.

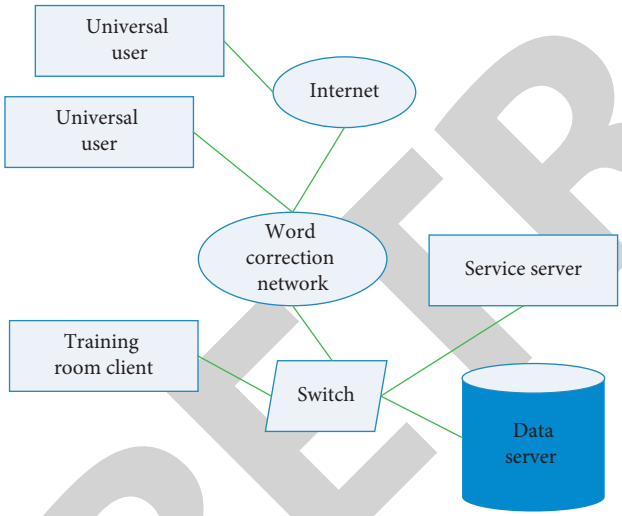

Figure 3: Data network connection.

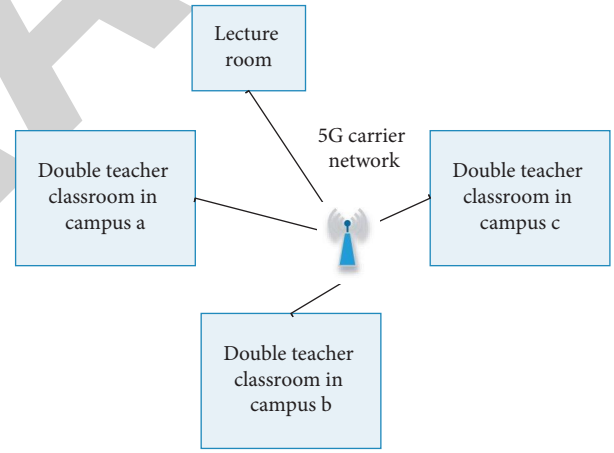

Figure 4: Remote interactive teaching scenario based on 5G network.

more flexible teaching environment. 5G networks can adapt to various changes in the teaching venue, with good flexibility and convenience.

A view of the VR/AR teaching scene based on 5G technologies is shown in Figure 5. The VR/AR cloud platform is built to carry out VR/AR cloud-based applications, including virtual experimental classes, and learn the digital content in a system that can be operationalized.

It is highly interactive and participatory. Students intuitively experience the learning content in VR/AR learning practice, closely participate in the teaching process, and fully mobilize their learning enthusiasm. Active interactive learning: in the process of learning, students can pause or repeat any step at any time, without too much consideration of the interference caused by intermittent or repeated learning. Game-based teaching, based on the visual and interactive characteristics of VR/AR, can design very attractive game-based teaching content, so as to enhance students' interest in learning. Reduce the danger of hands-on operation and experiment in chemistry, physics, electromechanical engineering, and other fields by using VR/AR technology to conduct virtual experiments.

4. Simulation Tests

The 5G remote listening and evaluation scenario (see Figure 6) is designed with a 5G normalized recording terminal, 5G powerful computing powers, and AI analysis capability at its core. The 5G-enabled traditional recording terminal is

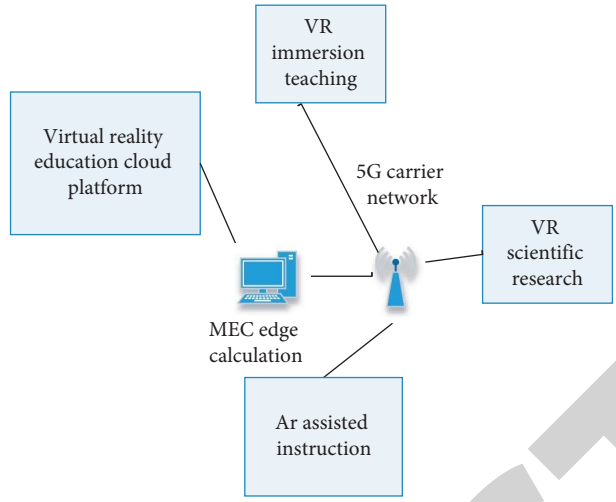

Figure 5: VR/AR teaching scenarios based on 5G networks.

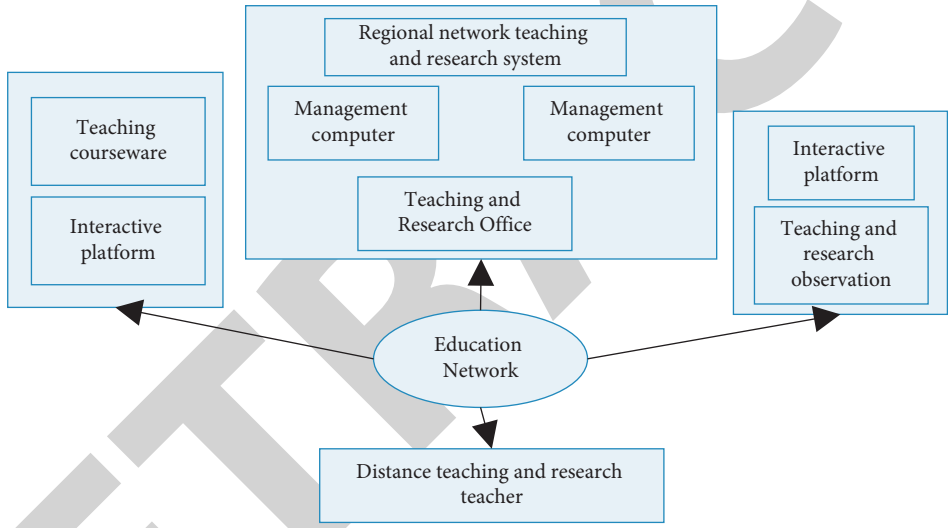

Figure 6: 5G remote listening and assessment teaching scenario.

used for remote classroom interaction, listening, and commenting on the 5G mobile network, creating a near real-time, two-way interactive and intelligent listening and commenting environment. Compared to remote listening and evaluation in a wired or Wi-Fi network environment, the ultra-high bandwidth and ultra-low latency of the 5G network ensure that remote teachers can experience smooth, high-definition teaching audio/video and ensure the objectivity and accuracy of the evaluation. The integration of AI capabilities for real-time classroom analysis and evaluation allows for intelligent analysis of teachers' and students' teaching behaviors, generating big data on classroom teaching conditions, synthesizing live classroom data and the content of remote evaluation by experts, and generating feedback on listening and evaluation through AI algorithms to visually reflect what teachers need to improve in the teaching process [26, 27].

The potential for AI in education is to be used in a variety of ways. Figure 7 depicts a typical AI evaluation scenario for the teaching process, in which many AI cameras are positioned in the classroom to record video and picture data: face

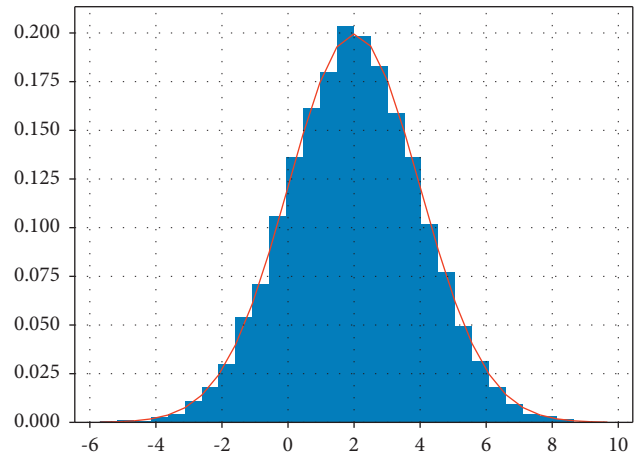

Figure 7: Distribution of teaching effectiveness.

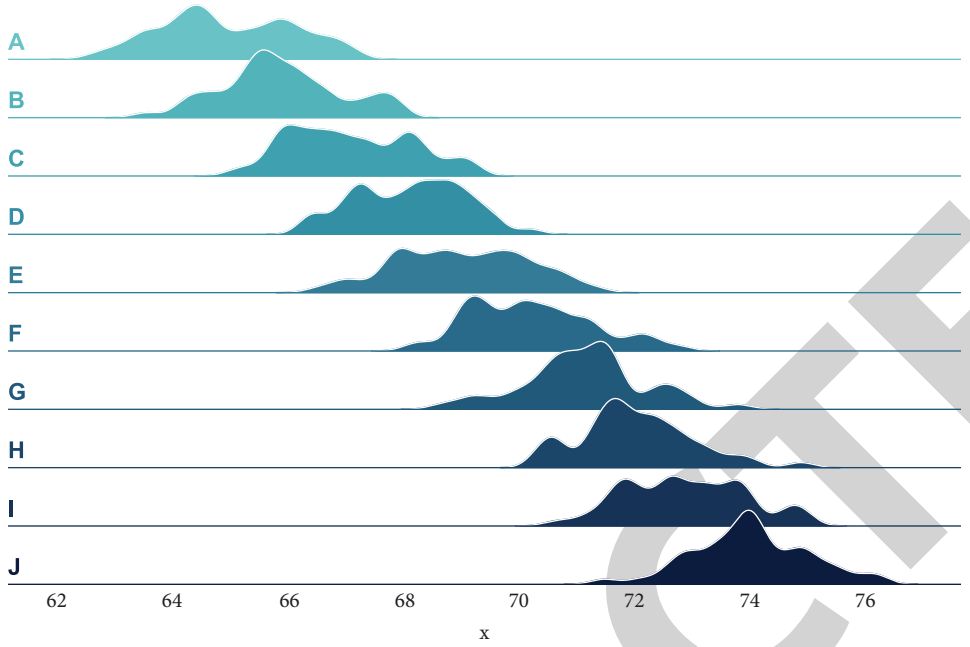

Figure 8: Effectiveness of test management.

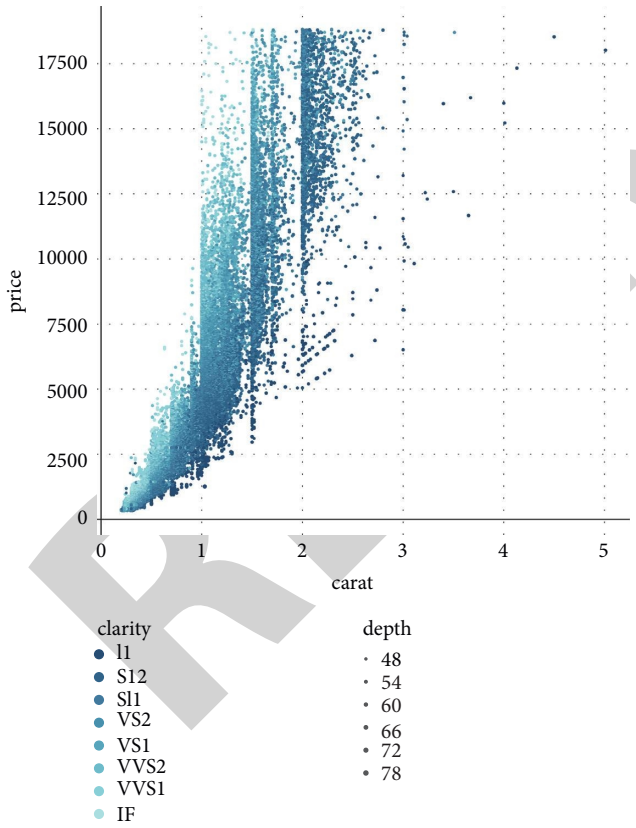

Figure 9: Effectiveness of the information trained.

orientation detection to determine whether students are facing the front of the lectern; analysis of the up, down, left, right, and left angles of the face, and the proportion of time spent in front of the face; detection and analysis of students' facial features and microexpressions; monitoring of students' nonlearning behaviors; automatic analysis of students' individual and overall class concentration through a concentration analysis model. The analysis of individual students and the class as a whole is carried out through a concentration analysis model.

Using intelligent sensing and Internet of Things technology, the campus environment and people's information are collected through various collection devices such as cameras and sensors, and the massive amount of data collected is intelligently analyzed, and the analysis results are applied to the teaching (see Figure 8).

The educational environment will grow smarter and more responsive to the demands of individual students. Through the ubiquitous communication network and sensing devices, we can intelligently sense the scenarios and characteristics of individual learners and actively create learning environments, plan learning paths, and push appropriate learning resources for them, switching from "people looking for information" to "information looking for people". As shown in Figure 9, all kinds of data and information in education will flow seamlessly.

Education services will be intelligently collaborative, all types of education services will be connected and collaborated in a near full-time/all-domain, multimodal manner, highlighting convenience, speed, efficiency, and intelligence. Smart collaboration capabilities in education management, teaching, training, and services will facilitate business process re-engineering and innovative service forms.

5. Conclusions

The many new applications of education informatization have placed higher demands on the infrastructure functions of ICT. Existing network access technologies, such as fixed broadband, Wi-Fi, and 3 G/4G mobile networks, trail behind

in terms of networking comfort, network latency, and security, security management, and terminal costs, making it difficult to meet future innovative application scenarios for education and teaching such as HD live streaming, VR/AR teaching, holographic classroom, and HD surveillance. This study recognizes the necessity for practical training for automotive majors based on 5G education applications, as well as the demand for higher-quality teaching resources such as ultra-high definition video, VR panoramic video, and two-way interaction.

Data Availability

The datasets used during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] H. Ullah, N. Gopalakrishnan Nair, A. Moore, C. Nugent, P. Muschamp, and M. Cuevas, "5G communication: an overview of vehicle-to-everything, drones, and healthcare use-cases," *IEEE Access*, vol. 7, pp. 37251–37268, 2019.

[2] S. Zhang and Q. Cheng, "Data analysis and management system design of contaminated site based on intelligent data acquisition vehicle and 5G communication," *International Journal of Communication Systems*, vol. 34, no. 6, p. e4555, 2021.

[3] G. Muhammad, M. F. Alhamid, M. Alsulaiman, and B. Gupta, "Edge computing with cloud for voice disorder assessment and treatment," *IEEE Communications Magazine*, vol. 56, no. 4, pp. 60–65, 2018.

[4] F. Sartipi, "Influence of 5G and IoT in construction and demolition waste recycling–conceptual smart city design," *Journal of Construction Materials*, vol. 1, no. 4, pp. 1–9, 2020.

[5] A. M. French, M. Risius, and J. P. Shim, "The interaction of virtual reality, blockchain, and 5G new radio: disrupting business and society," *Communications of the Association for Information Systems*, vol. 46, no. 1, pp. 603–618, 2020.

[6] M. Y. L. Chew, E. A. L. Teo, K. W. Shah, V. Kumar, and G. F. Hussein, "Evaluating the roadmap of 5G technology implementation for smart building and facilities management in Singapore," *Sustainability*, vol. 12, no. 24, p. 10259, 2020.

[7] J. Pei, K. Zhong, M. A. Jan, and J. Li, "Personalized federated learning framework for network traffic anomaly detection," *Computer Networks*, vol. 209, 2022.

[8] X. Vasilakos, N. Nikaein, H. Lorenz, B. Koksal, and N. Ferdosian, "Integrated methodology to cognitive network slice management in virtualized 5G networks," 2020, https://arxiv.org/abs/2005.04830.

[9] C. Zhang, P. Patras, and H. Haddadi, "Deep learning in mobile and wireless networking: a survey," *IEEE Communications surveys & tutorials*, vol. 21, no. 3, pp. 2224–2287, 2019.

[10] X. Huang, P. Craig, H. Lin, and Z. Yan, "SecIoT: a security framework for the internet of things," *Security and Communication Networks*, vol. 9, no. 16, pp. 3083–3094, 2016.

[11] G. P. Fettweis, "The tactile internet: applications and challenges," *IEEE Vehicular Technology Magazine*, vol. 9, no. 1, pp. 64–70, 2014.

[12] D. Raychaudhuri, I. Seskar, G. Zussman et al., "Challenge: cosmos: a city-scale programmable testbed for experimentation with advanced wireless," in *Proceedings of the 26th Annual International Conference on Mobile Computing and Networking*, pp. 1–13, London, UK, September 2020.

[13] K. Mershad and P. Wakim, "A learning management system enhanced with internet of things applications," *Journal of Education and Learning*, vol. 7, no. 3, pp. 23–40, 2018.

[14] M. Attaran and S. Attaran, "Digital transformation and economic contributions of 5G networks," *International Journal of Enterprise Information Systems*, vol. 16, no. 4, pp. 58–79, 2020.

[15] Y. Liu, M. Peng, G. Shou, Y. Chen, and S. Chen, "Toward edge intelligence: multiaccess edge computing for 5G and internet of things," *IEEE Internet of Things Journal*, vol. 7, no. 8, pp. 6722–6747, 2020.

[16] W. Zheng, D. Wu, and J. Chun, "Study of cellular traffic prediction based on multi-channel sparse LSTM," *Computer Science*, vol. 48, no. 6, pp. 296–300, 2021.

[17] P. An, Z. Wang, and C. Zhang, "Ensemble unsupervised autoencoders and Gaussian mixture model for cyberattack detection," *Information Processing & Management*, vol. 59, no. 2, Article ID 102844, 2022.

[18] G. F. Huseien and K. W. Shah, "A review on 5G technology for smart energy management and smart buildings in Singapore," *Energy and AI*, vol. 7, Article ID 100116, 2022.

[19] Y. Wang, "Industrial structure technology upgrade based on 5G network service and IoT intelligent manufacturing," *Microprocessors and Microsystems*, vol. 81, Article ID 103696, 2021.

[20] J. Woo, S. Shin, T. Asutosh, J. Li, and J. Kibert, "An overview of state-of-the-art technologies for data-driven construction," in *Proceedings of the International Conference on Computing in Civil and Building Engineering*, pp. 1323–1334, Springer, São Paulo, 2020, August.

[21] Y. Noh and Y. Ro, "A study on the service provision direction of the National Library for Children and Young Adults in the 5G era," *International Journal of Knowledge Content Development & Technology*, vol. 11, no. 2, pp. 77–105, 2021.

[22] C. Laoudias, A. Moreira, S. Kim, S. Lee, L. Wirola, and C. Fischione, "A survey of enabling technologies for network localization, tracking, and navigation," *IEEE Communications Surveys & Tutorials*, vol. 20, no. 4, pp. 3607–3644, 2018.

[23] Z. Li, "Simulation of English education translation platform based on web remote embedded platform and 5G network," *Microprocessors and Microsystems*, vol. 81, Article ID 103775, 2021.

[24] A. L. Imoize, O. Adedeji, N. Tandiya, and S. Shetty, "6G enabled smart infrastructure for sustainable society: opportunities, challenges, and research roadmap," *Sensors*, vol. 21, no. 5, p. 1709, 2021.

[25] Y. Zhao, J. Zhao, W. Zhai, S. Sun, D. Niyato, and Y. Lam, "A survey of 6G wireless communications: emerging technologies," in *Proceedings of the Future of Information and Communication Conference*, pp. 150–170, Springer, Vancouver, Canada, 2021, April.

[26] D. Chen, "An improvement in the teaching of college English writing and communication tools for fifth generation network: comparative study," *International Journal of Communication Systems*, vol. 34, no. 12, Article ID e4852, 2021.

[27] P. K. Singh, S. K. Nandi, and S. Nandi, "A tutorial survey on vehicular communication state of the art, and future research directions," *Vehicular Communications*, vol. 18, Article ID 100164, 2019.