



# An Impact of Cloud Technology on Education, HealthCare, Cybersecurity and Agriculture: A comprehensive Literature Review

Amandeep Kaur<sup>1\*</sup>, Raj Kumar<sup>2</sup>, and Priyanka Dadhich<sup>3</sup>

<sup>1,2,3</sup>Manav Rachna International Institute of Research and Studies, Faridabad, Haryana, India

<sup>1\*</sup>amanasus09@gmail.com

<sup>2</sup>raj.k1033@gmail.com

<sup>3</sup>dadhichpriyanka18@gmail.com

**Abstract.** The study gives a thorough literature review of cloud computing and its impact on four main areas: Healthcare, Cybersecurity, Agriculture, and Education. On the basis of more than 50 peer-reviewed publications published during 2019-2025, This paper explores the trend in technological integrations, challenges, benefits and adoption. The findings, based on comparative studies, indicates that cloud computing adoption across sectors needs improvement related to cost management, accessibility, scalability and operational performance. It helps with flexible learning models, virtual classrooms and administrative accuracy for education. Cloud computing also gives its support in Telemedicine, diagnosis and patient monitoring by combining AI with IOT. Moreover, using Blockchain technologies can enhance cloud security by providing tamper-resistant data records, while Artificial intelligence techniques enable anomaly detection to identify potential cyber threats in cloud environments. Cloud computing also supports precision agriculture by enabling real-time data collection, predictive analytics for crop yields and intelligent irrigation management through IoT-based monitoring systems.

**Keywords:** Cloud Computing Telemedicine, Blockchain, Anomaly Detection

## 1 Introduction

Cloud computing is a distributed computing model that provides on-demand access to shared computing resources such as servers, storage, databases and applications over the internet. Use of different services over the Internet, such as saving data, using servers, connecting networks, working with databases and running software. Instead of owning and taking care of their own equipment, users can get these services whenever they need them from companies that provide cloud services. Cloud services provide on-demand resources availability, allowing users to dynamically scale computing power, storage and applications based on current requirements. Companies can quickly adjust how much computer power they use, only pay for what they need and get their data and programs from anywhere with internet access. Cloud computing becomes more popular

in number of industries because of its scalability and affordable infrastructure, including education, healthcare, cybersecurity and agriculture.

### 1.1 Education

Cloud-based facilitates online learning and fosters collaboration through shared tools. It increases educational accessibility and provides scalable storage for digital learning materials. But there are still many problems occur like maintaining a dependable internet connection, protecting data privacy.

### 1.2 Health Care

Electronic health record management, real-time monitoring, precise health issue detection and virtual doctor appointments are all made possible by cloud platforms. System connectivity and regulation compliance are still issues.

### 1.3 Security

Data encryption, threat detection and automated incident responses are examples of cloud-based security services. While there may be security risks associated with centralizing data in cloud environments. Modern cloud architecture usually reduces these risks by using redundancy, distributed data centers and automated backup systems.

### 1.4 Agriculture

Modern farming methods such as data-driven decision-making, irrigation control and crop monitoring, are made possible by cloud computing and Internet of Things. However, limited internet access and massive data volumes in rural areas are issue still occur.

## 2 Comparative Study

### 2.1 Appendix A: Cloud Computing in Education

**2024 and 2025 - Future Direction:** Smart evaluation demonstrated IoT enabled test management in 2024-2025, leading to improved academic performance and higher grades. Future trends in cloud-based education [6] identified a rise in bandwidth-driven adoption but warned of possible security and strategy problems. An edu cloud-based framework for personalised learning and predictive analytics was presented in a suggested model for a cloud-based education system by [7], highlighting the importance of strong cybersecurity. By now, cloud computing research has advanced from understanding basic adoption factors to analysing complex integrations with new technologies, applications and education strategy.

**2023 – Specialized Applications and Administrative Benefits:** Research on cloud computing expanded dramatically in 2023. The importance of the cloud in facilitating digital

transformation and effective remote learning emergencies was brought to light by the development of ICT in education. Performance showed that by enabling remote work, the usage of cloud technology increased administrative efficiency.

**Table 1.** A compiled study of development in Education field using cloud computing from 2019 to 2024 is given below:

Ref.	Year	Authors	Key Findings	Conclusion	Method
[1]	2024	Chia Zhi.	Improves access, cost-efficiency, pedagogy	Cloud can revolutionize learning; more research needed	Systematic literature review
[2]	2024	Nader Mohammad.	User satisfaction boosts education agility	Satisfaction is key to agile university systems	Quantitative survey
[3]	2024	Cui T.	Microlearning growth trends, collaboration patterns	Highlights future microlearning topics, gaps, and collaboration limits	Bibliometric and science mapping
[4]	2024	Hiren Mistry, Chirag Mavani.	AI improves performance; cloud enhances scalability	Cloud+AI drives digital competitiveness	Case studies, Google Trends analysis
[5]	2024	Amine Dehbi.	IoT automates exam grading and boosts academic performance	Smart exams enhance accuracy, security, and efficiency	Mann-Whitney U test, IoT implementation

**2022 – Expanding Scope and Mapping Global Research:** During this time, domain mapping became more data-driven and knowledge was consolidated. In 2022, attention turned to practical advantages such cost-effectiveness, scalability and remote learning as well as security threats and downtime problems.

**2021 – Theoretical Integration and Emerging Technologies:** The importance of student perceptions was highlighted by computer-based learning platforms that looked at how cloud-based resources may enhance well-established learning theories. More generic concepts like e-learning theories, components and the Internet of Things (IoT) began to be included into cloud computing research in 2021.

**2020 – Mapping and Early Applications:** Two important studies broadened the scope in 2020. After conducting a comprehensive evaluation of the literature between 2012 and 2017, a systematic mapping study on cloud for educational innovation [46] found that only 17% of the studies included empirical research. Virtual labs and collaborative platforms were popular topics while security and digital divide received attention. In order to demonstrate how cloud technology could facilitate tailored learning, research on the

development of Tailored Physical Education Teaching System Employing a Cloud Computing Platform [45] was conducted.

**2019 – Foundational Adoption Factors:** Understanding the reason behind cloud adoption in higher education institutions was the focus of the current study include collection, Factors influencing Cloud Computing adoption in Higher Education Institutions [52]. Eighteen factors were identified through qualitative interviews with IT professionals at a public university in Malaysia. These factors were divided into three categories: Technologies (security, cost effectiveness, user friendliness), organisational (infrastructure, management support) and environmental (service provider, dependability, data confidentiality). While recognising a lack of comprehensive and multi-institutional studies, the initial research also emphasised the significance of strategic planning, setting rules and selecting deployment methods.

**2.2 Appendix B: Cloud Computing in Health Care**

The focus of research on cloud computing in healthcare has shifted from identifying adoption factors to creating sophisticated, integrated systems between 2020 and 2024.

**Table 2.** A compiled study of development in Health care field using cloud computing from 2019 to 2024 is given below:

Ref.	Year	Authors	Key Findings	Conclusion	Method
[10]	2024	Temiwande Esho, Oluwafunto Ayeni.	Enhances tailored treatments; ethical & privacy challenges	Cloud enables precision healthcare; calls for ethical regulation	Systematic literature review
[11]	2024	M Sunil Kumar, D Ganesh	Improves monitoring and patient access	Cloud-IoT boosts rural access; AI integration is future path	Case studies & IoT analysis
[20]	2023	S Praveen	DACAR improves data security & processing	Cloud-fog integration supports real-time, secure healthcare apps	Fog computing, RFID, clustering
[21]	2023	Alain Henne belle .	Random Forest predicts diabetes accurately; IoT integrated	AI-cloud integration effective for health prediction	ML (RF, LR), SMOTE, CV
[22]	2023	Atef Zaguia	Ensures secure biometric data monitoring	Personalized therapy system via IoT-cloud is robust and secure	Authentication protocols, IoT

In 2020,[47] researched the causes of cloud adoption in healthcare and identified compatibility, technological readiness, cost savings and vendor support as key factors. Public hospitals showed a high uptake of Software-as-a-service models. By 2021, the emphasis had shifted to concentrate on security concerns: [41] completed a systematic review on Data security, integrity, availability, recommending encryption and authentication, while Farnaz Farid's team [42] developed a biometric identity management framework utilizing ECG and PPG fusion, achieving 100% authentication accuracy. In 2022, studies expanded into healthcare monitoring and quick response. Abd El-Aziz [33] and colleagues proposed an IoT-assisted monitoring system with optimized data grouping and deep learning classification, Seyedeh Shahrokhi [34] in 2022 analyzed the surge in cloud use during COVID-19, emphasizing benefits and security risks.

### 2.3 Appendix C: Cloud Computing in Security

**2024 – Governance and Future Direction:** In 2024, the focus of study had switched to comprehensive security frameworks, governance and standards. [12] Identified important security issues, the significance of human factors and the advantages of efficiency-oriented models such as serverless computing. Yusuf Adebayo and his colleagues [13] focused on IT standardization, multilayered security and the implementation of Security-as-a-service (SecaaS).

**Table 3.** A compiled study of development in Education field using cloud computing from 2019 to 2024 is given below:

Ref.	Year	Authors	Key Findings	Conclusion	Method
[8]	2024	Obi, Chimezie.	Urges human-centered, innovative, secure cloud adoption	Cloud evolution must prioritize strategic innovation and trust	Theoretical review
[53]	2024	Anandappa Mr., Kavita Mudnal et.al.	Security risks are proportional to benefits; strong models are needed.	Strong frameworks and research needed to counter evolving threats	Review of cloud strategies
[12]	2024	Yusuf Adebayo.	SecaaS is rising; layered security essential	Standardization is key for secure, interoperable cloud systems	Case studies, technical standards
[23]	2023	Muhammad Dawood	ML helps threat detection; multitenant challenges	Innovative countermeasures needed for resilient cloud platforms	IDP, vulnerability scans, ML
[52]	2019	Ashok Gupta	Blockchain builds transparency and trust	Smart contracts and blockchain can secure sensitive cloud infrastructure	Blockchain architecture review

**2023 – Realistic Security Measures and Threat Countermeasures:** Research in 2023 was more focused with real-world uses and defences. Two step fingerprint authentication, intrusion detection systems, Attribute-Based Encryption (ABE) and machine learning for threat detection are some of the solutions they recommended. [25] examined Amazon web services (AWS) has maintained a leading share in the cloud service market and is widely adopted by companies such as Netflix and Airbnb for scalable cloud infrastructure.

**2022 – Anomaly Detection and Machine Learning:** In 2022, Zeyuan Fu et.al [38] presented a Network Anomaly Detection (NAD) model that uses Fuzzy-C-Means clustering using KDD Cup 99 and HoneyNet datasets. This model achieved an accuracy of 93.33% with a low percentage of false positives by utilising RSA encryption and cybersecurity assessment frameworks for efficient detection in cloud environments.

**2021 – IoT and Cloud Integration:** In 2021, Carsten Maple, Matthew Bradbury, Munam Shah and their group [43] examined IoT cloud architectures in a thorough analysis that was published in *Electronic*, Volume 11. They looked into a risk of cloud security such as resource depletion, lack of transparency and denial of service assaults. In order to uncover technological gaps and restrictions in use of AI and deep learning security efforts, the investigation examined more than a hundred academic publications.

**2020 – Emphasis on Unique Security Issues in Domains:** In 2020, research has concentrated on particular industries and technology weaknesses [49] investigated the use of cloud computing in financial institutions, emphasizing features like encryption, authentication and the use of private or hybrid clouds to enable safe transactions in banking industries.

**2019 – The Foundations: Security Models & Emerging Technologies:** Research on cloud security in 2019 was primarily concerned with basic ideas. They discussed current implementation and secure e-wallets as well as the potential of blockchain to promote trust, transparency and security.

## 2.4 Appendix D: Cloud Computing in Agriculture

By 2024, there was a significant shift in emphasis towards the integration of AI and IoT. A cloud-based smart farming system with sensors for soil humidity and livestock health, as well as an Android farm tracker app, was developed by Ivanochko, Greguš, and Melnyk (*Procedia Computer Science*) [14]. To reduce water waste, expenses, and soil erosion, Rathod, Shivaputra [37] developed Smart Farm Agri Tech, an IoT and cloud platform that incorporates Raspberry Pi, Arduino, and machine learning for monitoring crops, detecting diseases, and managing farms automatically. Wei, Han, and Yu (*Journal of Cloud Computing*) [26] proposed an AI- and cloud-based environmental safety monitoring system in 2023, which used indirect data transmission and an improved DV-Hop algorithm to attain a 97–99% data reception rate while lowering energy consumption and positional errors.

**Table 4.** A compiled study of development in Agriculture field using cloud computing from 2019 to 2024 is given below:

Ref.	Year	Authors	Key Findings	Conclusion	Method
[13]	2024	Iryna Ivanochko	Cloud + IoT automate crop & livestock tracking via sensors	Enhance efficiency and precision in smart farming	Prototype testing
[14]	2024	Yiyu Lin, Huixiang Li	AI-cloud integration improves crop health monitoring	Cloud-AI solutions help early pest/disease detection	Transfer learning
[25]	2023	Yunxiao Wei, Chao Han.	Cloud improves real-time crop environment monitoring	DV-Hop model and cloud yield high data accuracy	DV-Hop Algorithm
[26]	2023	Samuel Pizarro, Narcisa Pricope.	Cloud with UAV images predicts soil composition (clay, pH, etc.)	Cloud-UAV integration enhances soil prediction for smart farming	Machine learning
[27]	2023	Zixuan Teng, Jiawei Chen.	Cloud + AI detects rice panicles, supports phenotyping	Enable scalable, AI-based rice classification and breeding	YOLOv5 AI model
[34]	2022	Khongdet Phasinam.	IoT sensors and cloud predict irrigation needs for soil types	Improves water efficiency and crop-specific irrigation patterns	SVM, RF, Naive Bayes
[35]	2022	Lingxiao Liu.	Cloud improves decision-making and risk-sharing between farmers and merchants	Cloud platforms support profitable, resilient Agri e-commerce	Game theory model
[36]	2022	Meenakshi Rathod, A Shivaputra.	Real-time data (soil, weather) improves farm decisions	Automation lowers	IoT + ML framework

Traditional agricultural surveys are often costly and provide limited real-time insights whereas cloud-based data collection allows continuous monitoring of crop conditions and environmental variables,[27] successfully produced high-accuracy forecasts by

digitally mapping soil properties using UAV multispectral imagery with machine learning models like Random Forest and CART. Chen, Wang, Teng, and colleagues [28] presented Panicle-Cloud, an AI-driven platform that employs YOLOv5 to calculate rice panicles from drone images and tested it against manual scoring. The method was restricted to mainland Chinese rice types but could classify yields on a big scale.

In 2022, a lot of progress was made. In the Hindawi Journal of Food Quality, Phasinam, Kassanuk, Shinde, Thakar, Sharma, Mohiddin, and Rahmani [35] created an Internet of Things based smart irrigation framework that optimizes water consumption by utilizing soil and climatic data with SVM, random forest and Native Bayes algorithms. Liu (Hindawi Mathematical Problems in Engineering) [36] used game theory to access risk-sharing in cloud-based agricultural e-commerce between farmers and e-merchants.

In 2021, Kalyani, Collier, Dezfouli, and Liu et.al [44] carried out a systematic survey on cloud, fog and edge computing combinations in smart agriculture from an initial selection of 2788 relevant studies. The bulk of research, according to their minimal integration of fog and edge computing.

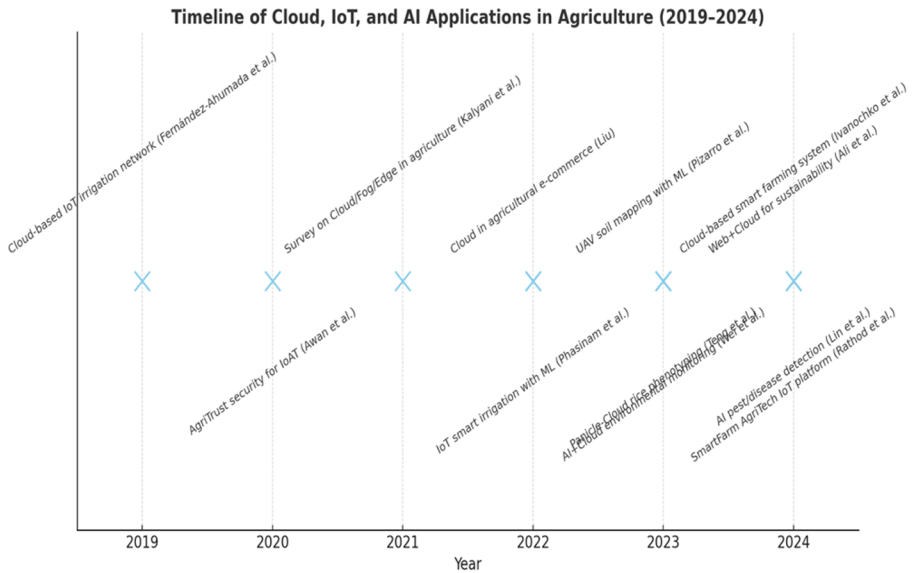
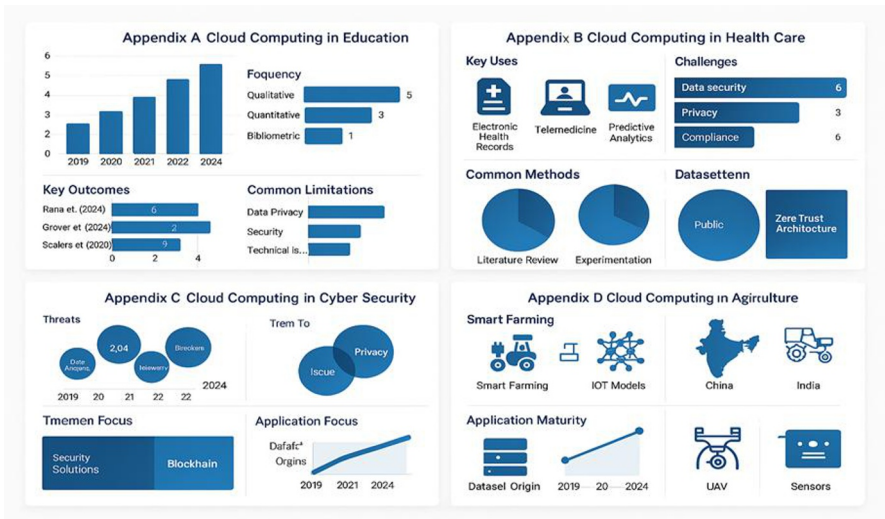


Fig. 1 An update Refer to Page no.2 (Comparative study)

### 3 “Cloud Computing Impact Across Sectors”

**Table 5.** The scenario of cloud computing in different domains.

Criteria	Education	Healthcare	Cyber Security	Agriculture
<b>Adoption Level</b>	High	Moderate	High	Growing
<b>Primary Benefit</b>	Scalability, LMS	EHR, remote access	Threat monitoring	Smart farming
<b>Challenges</b>	Privacy, bandwidth	Regulation, ethics	Insider threats	Connectivity
<b>Data Sensitivity</b>	Moderate	Very High	Very High	Moderate
<b>Technological Integration</b>	LMS, AI, IoT	AI, IoT, EHR	Blockchain, AI	IoT, GIS, AI



**Fig. 2.** Annual wise overview in cloud computing

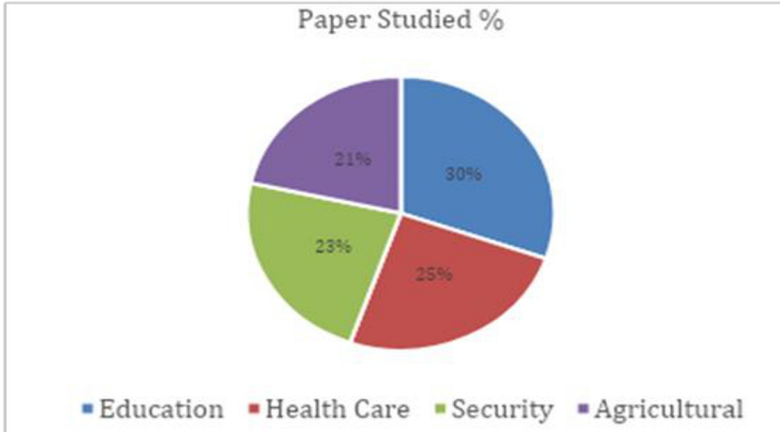


Fig. 3 Data analysis result

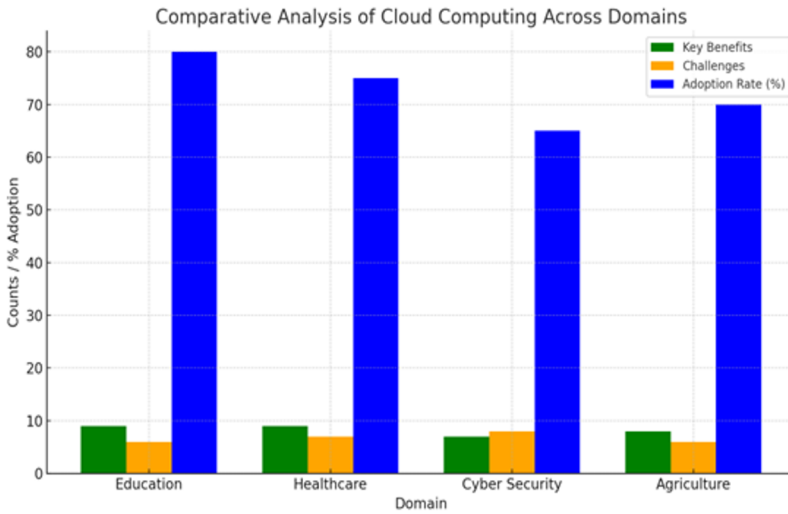


Fig. 4. Data Analysis

Cloud computing improves digital service delivery, system efficiency, scalable computing infrastructure and resource utilization. Cloud computing makes education more accessible and flexible by enabling online learning, virtual labs, and AI-powered educational apps. Enhanced security, expandable storage and economical infrastructure management are additional advantages for educational establishments.

## 4 Conclusion

Several Cloud computing industries are included in this review. It is to be observed that in all fields the big challenge is keeping private data safe, especially in healthcare and cyber security where the information is very sensitive. Cloud computing's main objective is to increase system speed, efficiency and overall creativity. Cloud technologies are increasingly used by organisation and individuals for data storage, application hosting and digital service delivery. Cloud computing is generally well liked which increases the efficiency and flexibility of online learning, utilizing secure IoT system and Identity based authentication in healthcare helps to protect patient data, Blockchain trust system and AI based threat detection shows potential and Crop tracking and yield prediction are improved by IoT and AI in the agriculture sector.

The review confirms that in all areas of cloud computing, it has real benefits in terms of being able to grow more efficiently and lowering costs. When used in education, it has led to flexible learning models like m-learning, u-learning, p-learning. Cloud-based applications in healthcare have made things better for patients by letting them be monitored in real time, have consultations from afar and use predictive treatment plans. Combined cybersecurity measures using AI, encryption and Blockchain technology have made it less likely for insider threats and data breaches to happen. Precision farming using cloud, IoT and AI has made it easier to track crop health, use less water and make better maps of the soil.

According to the literature review, cloud computing may be able to work with emerging technologies like blockchain, IoT, AI and GIS to enhance accessibility, scalability, cost effectiveness and creativity. However, there are still problems occurring particularly in rural areas, infrastructure limitations, privacy and data security. The safe and long-term integration of cloud technologies will depend on addressing these issues through efficient governance, standardized frameworks and industry-specific tactics. As cloud technology evolves, its collaboration with emergency technologies provides new applications that can boost growth and intensify its social and economic effects.

## 5 Future Scope

In the future, the creation of standardised protocols and frameworks will be necessary to address infrastructure inequalities between cloud platforms and service providers. Future research should focus on AI-driven personalised learning, immersive virtual learning environments and adaptive learning analytics to improve student engagement and learning results in education. Personalised care and predictive diagnostics can be enhanced in the healthcare industry by combining cloud platforms with cutting-edge AI, wearable technology and real-time monitoring systems. Drone and GIS technology can support environmental monitoring and yield forecasting in agriculture and farming can be implemented more quickly in remote and resource-constrained areas by offering reasonably priced IoT solutions.

## References

- 1.Xuan, C.Z., Rana, M.E.: Revolutionizing higher education: A critical analysis of cloud computing's impact, suitability, and challenges. In: Proceedings of the ASU International Conference on Emerging Technologies for Sustainability and Intelligent Systems (ICETSIS 2024) (2024)
- 2.Mohammad, N.: Effect of user satisfaction between cloud learning applications and university education agility. *J. Stat. Appl. Pro.* 13(3), 871–879 (2024)
- 3.Pham, H.-H., Nguyen, N.-T., et al.: Science mapping the knowledge base on microlearning. (2021)
- 4.Mistry, H.K., Mavani, C., Goswami, A., Patel, R.: The impact of cloud computing and AI on industry dynamics and competition (2024)
- 5.Pham, H.-H., Nguyen, N.-T., et al.: Smart evaluation: A new approach improving the assessment management process through cloud and IoT technologies. *Int. J. Inf. Educ. Technol.* 14(1) (2024)
- 6.Vivekanand, R., Singh, V., Anwar, S.: Future trends in cloud-based education (2024)
- 7.Grover, V., Nandal, M.: An educational framework leveraging cloud computing: A proposed paradigm. In: Book Chapter, <https://doi.org/10.4018/979-8-3693-2314-4.ch009> (2024)
- 8.Obi, C., et al.: Review of evolving cloud computing paradigms. *Comput. Sci. IT Res. J.* (2024)
- 9.Praveen, S.P., Kodete, C.S., et al.: Revolutionizing healthcare: A comprehensive framework for personalized IoT and cloud computing-driven healthcare services with smart biometric identity management (2024)
- 10.Esho, T., Ayeni, O., Lasisi, O., Peter, O.: The role of cloud computing in personalized medicine: A systematic review. *CJAST* (2024). <https://doi.org/10.9734/CJAST2024v43i34355>
- 11.Kumar, M.S., Ganesh, D.: Improving telemedicine through IoT and cloud computing: Opportunities and challenges (2024)
- 12.Adebayo, Y., Adeusi, O., Ayodele, A., Onikoyi, T., Blessing, K., Adenekan, I.: IT standardization in cloud computing: Security challenges, benefits, and future directions. *World J. Adv. Res. Rev.* (2024)
- 13.Ivanochko, I., Greguš, M., Melnyk, O.: Smart farming system based on cloud computing technologies. *Procedia Comput. Sci.* (2024)
- 14.Lin, Y., Li, H., Li, A., Shi, Y., Zhuang, S.: Application of AI-driven cloud services in intelligent agriculture pest and disease prediction. In: Proceedings of the 2nd International Conference on Software Engineering and Machine Learning (2024) (2024)
- 15.Ali, S., Abdulqader, D., Ahmed, O., Rasheed, H., Hasan, S., Haji, L.: Consideration of web technology and cloud computing inspiration for AI and IoT role in sustainable decision-making for enterprise systems (2024)
- 16.Jadallah, Y., Khasawneh, A., Jarrah, H., Alsarayreh, R., Khasawneh, M.S.: The role of cloud computing in improving the performance of school principals. *Eurasian J. Educ. Res.* 107, 110–125 (2023)
- 17.Humeniuk, T., Romaniuk, P.: On the development of information and communication technologies. *Futurity Educ.* 3(1), 34–44 (2023)
- 18.Fernanda, A., Huda, M., et al.: Application of learning cloud computing technology (2023)
- 19.Agapito, G., Cannataro, M.: An overview on the challenges and limitations of using cloud computing in healthcare corporations. *Big Data Cogn. Comput.* 7, 68 (2023)
- 20.Praveen, S., Thati, B., Anuradha, C., Sindhura, S., Altaee, M., Jalil, M.A.: Data capture and auto identification reference (DACAR) project. *J. Intell. Syst. Internet Things* (2023)
- 21.Hennebelle, A., Materwala, H., Ismail, L.: Health edge: A machine learning-based smart healthcare framework. *Procedia Comput. Sci.* (2023)
- 22.Zaguaia, A.: Personal healthcare data records analysis and monitoring (2023)

23. Dawood, M., Tu, S., et al.: Cyberattacks and security of cloud computing. *Symmetry* 15, 1981 (2023)
24. Naseer, I., et al.: Cloud computing solutions for businesses and SMEs: A review (2023)
25. Wei, Y., Han, C., Yu, Z.: An environment safety monitoring system for agricultural production. *J. Cloud Comput.* (2023)
26. Pizarro, S., Pricope, N., Figueroa, D., Carbajal, C., Quispe, M., Vera, J., Lidiana, A., Achall, L., Gonzalez, I., Salazar, W.: Digital mapping of agricultural soil properties from high-resolution UAV multispectral imagery. *Remote Sens.* (2023)
27. Teng, Z., Chen, J., Wang, J., et al.: Panicle-cloud: An open and AI-powered cloud computing platform (2022)
28. Kasumu, R., Oluwayimika, O.: Cloud computing in education and its importance to university students (2022)
29. Bocean, G., et al.: Mapping knowledge area analysis in e-learning systems based on cloud computing (2022)
30. Morais, D., Pinto, F.G., Pires, I.M., Garcia, N.M.: The influence of cloud computing on the healthcare industry: Applications, opportunities, and challenges. *Procedia Comput. Sci.* (2022)
31. Javaid, M., Haleem, A., et al.: Cognitive computing in engineering applications (2022)
32. Abd El-Aziz, A., Alanazi, R., et al.: An effective data science technique for IoT-assisted healthcare monitoring system with rapid adoption of cloud computing. *Comput. Intell. Neurosci.* (2022)
33. Shahrokhi, S.M.: Cloud computing for improving healthcare systems during COVID-19 pandemic. *Majlesi J. Telecommun. Devices* 11(2), 113–118 (2022)
34. Phasinam, K., Kassaruk, T., et al.: Application of IoT and cloud computing in automation of agriculture irrigation (2022)
35. Liu, L.: Research on the operation of agricultural products e-commerce platform based on cloud computing (2022)
36. Rathod, M., Shivaputra, A., Umadevi, H., Nagamani, K., Periyasamy, S.: Smart farming system based on cloud computing technologies (2024)
37. Fu, Z.: Computer cyberspace security mechanism supported by cloud computing (2022)
38. Matthew, U., Kazaure, J., Okafor, N.: E-learning theories, components, and cloud computing-based learning platforms. *Int. J. Web-Based Learn. Teach. Technol.* 16(3) (2021)
39. Matthew, U., Kazaure, J., Okafor, N.: Contemporary development in e-learning education, cloud computing technology, and the Internet of Things (2021)
40. Dashti, W.: Security challenges and solutions using healthcare cloud computing. *J. Med. Life* 14(4) (2021)
41. Farid, F., et al.: A smart biometric identity management framework. *Sensors* 21, 552 (2021)
42. Maple, C., Bradbury, M., et al.: Cyber security in IoT-based cloud computing. *Electronics* 11, 16 (2021)
43. Kalyani, Y., Collier, R., Dezfouli, B., Liu, Y.: A systematic survey on the role of cloud, fog, and edge computing combination in smart agriculture (2021)
44. Al-Malah, D.K.A.-R., et al.: Cloud computing and its impact on online education. *IOP Conf. Ser.: Mater. Sci. Eng.* 1094, 012024 (2021)
45. Scalera, M., Gentile, E., Plantamura, P., Dimauro, G.: A systematic mapping study in cloud for educational innovation (2020)
46. Ogwel, O., Odhiambo, O., Ratnam, D., Dominic, D.: Determinants of cloud computing adoption in healthcare (2020)
47. Bruma, L.: Data security methods in cloud computing. *Inform. Econ.* 24(1) (2020)
48. Balanagalakshmi, B., Bullard, S.K., et al.: Cloud computing technology: Security issues in banks—An overview. *Eur. J. Mol. Clin. Med.* (2020)

49. Chen, L., Xian, M., Liu, J., Wang, H.: Research on virtualization security in cloud computing. IOP Conf. Ser.: Mater. Sci. Eng. (2020)
50. Alenezi, M.: Safeguarding cloud computing infrastructure: A security analysis (2020)
51. Ganesh, et al.: Factors influencing cloud computing adoption in higher education institutions (2019)
52. Gupta, A., Shuaib, M., Siddiqui, S., Alam, S.: Cloud computing security using blockchain (2019)
53. Anonymous: Cloud computing and security issues in the cloud (2020)
54. Mananze, S., Pôças, I., Cunha, M.: Mapping and assessing the dynamics of shifting agricultural landscapes using Google Earth Engine cloud computing: A case study in Mozambique. Remote Sens. (2020)
55. Fernández-Ahumada, L.M., Ramírez-Faz, J., Torres-Romero, M., López-Luque, R.: Proposal for the design of monitoring and operating irrigation networks based on IoT, cloud computing, and free hardware technologies. Sensors (2019)

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

