

Original Research Article

## **Research on the Evaluation and Improvement Strategy of the Teaching Quality of Information and Innovation Education Based on Big Data Analysis**

*Yuan Yue, Fan Zhang, Yu Su*

*College of Information Engineering, Zhengzhou University of Technology, Zhengzhou 450000, China*

---

**Abstract:** This article uses big data methods to evaluate the quality of innovative education in information technology and proposes optimization strategies. Through mining and analyzing a large amount of data, we have obtained more accurate and objective teaching quality evaluation results and proposed corresponding improvement strategies. Firstly, through big data analysis, we have gained a deeper understanding of students' learning needs, interests, habits, and performance, providing an important basis for optimizing teaching content and methods. Secondly, using big data technology to build a teaching quality evaluation system can help us better understand and assess students' learning situation and needs, achieving a combination of quantitative and qualitative evaluation, dynamic and static evaluation, and improving the accuracy and objectivity of teaching quality evaluation. Finally, by analyzing data related to teaching quality, we have timely identified existing problems and risks, and taken corresponding measures to effectively ensure the continuous improvement and enhancement of teaching quality.

**Keywords:** Big data analysis; Education for information and innovation; Teaching quality evaluation; Improvement strategies; Optimization of teaching content and methods; Establishment of scientific evaluation system; Discovery and resolution of problems and risks

---

### **1. Introduction**

With the rapid development of information technology and the continuous expansion of its application fields, information technology education has become an important component of modern education. As an emerging field of information technology education, information technology innovation education aims to cultivate high-quality talents with innovative spirit and creative ability to meet the increasing demand for information technology talents in society. Nevertheless, how to scientifically and objectively evaluate the teaching quality of information technology innovation education and propose effective improvement strategies for existing problems is an important challenge facing current information technology innovation education.

The emergence of big data analysis technology provides new ideas and methods to solve this challenge. Big data analysis can extract valuable information and knowledge from a large amount of data, reveal the inherent laws and relationships of things, and provide scientific basis for decision-making. In the field of education and teaching of information technology, through big data analysis, we can have a deeper understanding of students' learning needs, interests, habits, and performance, providing important basis for optimizing teaching content and methods. At the same time, we can also establish a scientific teaching quality evaluation system, realize the combination of quantitative and qualitative evaluation, dynamic and static evaluation, and improve the accuracy and objectivity of teaching quality evaluation.

This research aims to utilize big data analysis in order to evaluate and improve the quality of education and teaching in the field of information technology innovation education. Firstly, we will collect and analyze a large

amount of data in the field of information and innovation technology education, including student achievements, teacher teaching conditions, curriculum settings, etc. Through mining and analyzing these data, we will understand the learning needs and characteristics of students, providing a basis for optimizing teaching content and methods. Secondly, we will use big data technology to construct a teaching quality evaluation system, comprehensively considering factors such as student achievements, teacher evaluations, and curriculum settings, to achieve a comprehensive evaluation of teaching quality. Finally, we will discover existing problems and risks in a timely manner based on the analysis results, and take corresponding measures to effectively ensure the continuous improvement and enhancement of teaching quality.

Through this study, we hope to offer novel ideas and methods for evaluating and enhancing the quality of education and teaching in the field of information technology and innovation, thus promoting the healthy development of information and innovation education. Simultaneously, this study can also serve as a reference and lesson for evaluating and improving the quality of education and teaching in other fields<sup>[1]</sup>.

## **2. Application of big data in the evaluation of teaching quality of information and innovation education**

With the rapid development of information technology and the continuous expansion of its application fields, information technology education has become an important component of modern education. As an emerging field of information technology education, information technology innovation education aims to cultivate high-quality talents with innovative spirit and creative ability to meet the demand for information technology talents in society. However, how to scientifically and objectively evaluate the educational quality of information technology innovation education and propose effective improvement strategies for existing problems is an important challenge facing current information technology innovation education.

The emergence of big data analysis technology provides new ideas and methods to solve this challenge. Big data analysis can extract valuable extracting information and knowledge from large datasets, reveal the inherent laws and relationships of things, and provide scientific basis for decision-making. In the field of education and teaching of information technology, through big data analysis, we can have a deeper understanding of students' learning needs, interests, habits, and performance, providing important basis for optimizing teaching content and methods. At the same time, we can also establish a scientific system for evaluating teaching quality. realize the combination of quantitative and qualitative evaluation, dynamic and static evaluation, and improve the accuracy and objectivity of teaching quality evaluation.

### **2.1. Diversification of data sources**

The application of big data in assessing the quality of education and teaching in the field of information technology and innovation requires diversification in data sources. Real-time data analysis is one such approach. By collecting and analyzing data on the teaching process and students' learning outcomes, it is possible to gain valuable insights into the effectiveness of educational methods and techniques. This allows for more objective and accurate evaluation of teaching quality, leading to continuous improvement in education and teaching practices, it can provide real-time feedback on teaching quality, timely identify and solve problems in teaching. At the same time, it can also discover the correlation and influence between teaching quality and various factors through in-depth mining, providing more targeted basis for improving teaching quality.

Big data technology can analyze students' learning behavior data in real time, including online learning time,

learning efficiency, correct answer rate, etc., as well as teachers' teaching content, methods, effects, etc. Through real-time analysis of these data, we can more accurately understand students' learning status and needs, as well as teachers' teaching effectiveness and quality, so as to make targeted teaching improvements<sup>[2]</sup>.

## **2.2. Real-time data interpretation**

Specifically, real-time data analysis can be achieved through the following steps: first, collecting data from students during the learning process, such as classroom performance, homework completion, online test scores, etc.; second, organizing and analyzing these data to extract useful information; finally, promptly feeding back the analysis results to Enables teachers to adjust teaching strategies and enables students to improve themselves.

Big data technology can conduct in-depth data mining and extract valuable information from a large amount of data. For example, by analyzing exam score data over the years, it is possible to identify the factors that correlate with teaching quality and other potential factors that affect student performance, such as students' interest in learning and family background. These correlation factors are important in guiding the development of more effective teaching strategies<sup>[3]</sup>.

## **2.3. Deeply exploring the factors related to teaching quality**

Specifically, real-time data analysis can be achieved through the following steps: first, collecting data from students during the learning process, such as classroom performance, homework completion, online test scores, etc.; second, organizing and analyzing these data to extract useful information; finally, promptly feeding back the analysis results to teachers and students so that teachers can adjust teaching strategies and students can improve themselves.

The diverse data sources of big data also offer more dimensional perspectives for the evaluation of the quality of education and teaching in the field of information technology and innovation. In addition to data from students and teachers, big data can also integrate more relevant data, such as school facilities and equipment data, curriculum setting data, etc., to provide a comprehensive and multi-dimensional evaluation result<sup>[4]</sup>.

In summary, the application of big data in the evaluation of teaching quality in the field of information and innovatiDeep mining of factors related to teaching quality can be achieved through the following methods: first, collecting data related to teaching quality, such as teacher background, teaching strategies, curriculum settings, etc.; second, using big data technology to mine and analyze these data to discover the relevant factors; finally, comprehensively analyzing the results to identify the factors that have the greatest impact on teaching quality, providing a basis for improving teaching quality.

Through the application of big data in the evaluation of the quality of education and teaching in the field of information and innovation, it is possible to achieve a more scientific and objective evaluation of teaching quality, providing more targeted evidence for improving teaching quality. At the same time, it can also promote Deepen the integration of information technology and education, and promote the healthy development of information and innovative education.

Through big data technology, education can achieve diversification of data sources and real-time analysis of data, deeply explore factors related to teaching quality, and provide richer and more accurate information support for teaching quality evaluation.

### **3. A big data-based evaluation model for the teaching quality of information and creation education**

#### **3.1. Establish a comprehensive evaluation framework**

In the evaluation of the quality of education and teaching in the field of information technology and innovation, establishing a comprehensive evaluation index system is the key. The index system should include data from multiple aspects such as students, teachers, courses, and school facilities, covering the entire process of education and teaching. Among them, data from students should include learning behavior, academic performance, learning motivation, etc.; data from teachers should include teaching ability, teaching methods, teaching effectiveness, etc.; data from courses should include curriculum setting, curriculum content, curriculum evaluation, etc.; data from school facilities should include hardware facilities, software facilities, network environment, etc. Through comprehensive analysis of these data, we can have a comprehensive understanding of the actual situation of education and teaching in the field of information and innovation, providing a basis for improving teaching quality<sup>[5]</sup>.

#### **3.2. Combination of quantitative and qualitative evaluation**

With the assistance of big data, we are able to carry out quantitative evaluations of the education and teaching of information technology innovation. For instance, we can calculate the average scores of students' academic achievements and the excellent rate of teachers' teaching effectiveness. These evaluations provide valuable insights into the effectiveness of educational methods and techniques, enabling continuous improvement in education and teaching practices. At the same time, we can also conduct qualitative analysis, such as conducting case analysis on students' learning behavior and reflecting on teachers' teaching process, to gain a deeper understanding of the inherent laws and characteristics of information technology innovation education and teaching. Combining quantitative evaluation with qualitative evaluation can reflect the quality status of information technology innovation education and teaching more comprehensively and accurately<sup>[6]</sup>.

#### **3.3. Combination of dynamic evaluation and static evaluation**

The big data-based evaluation model for the teaching quality of information and innovation education should include both dynamic and static evaluations. Static evaluation refers to conducting static analysis of various elements in the teaching process, such as quantifying the qualifications, professional titles, and scientific research achievements of teachers. Dynamic evaluation refers to conducting dynamic analysis of various elements in the teaching process, such as monitoring students' learning behavior in real-time and tracking evaluation of teachers' teaching effectiveness. Combining dynamic evaluation with static evaluation can provide a more comprehensive understanding of the actual situation of information and innovation education, and provide strong support for improving teaching quality<sup>[7]</sup>.

### **4. Utilize big data to optimize the quality of education and teaching in the field of information technology innovation**

#### **4.1. Optimizing teaching content**

Firstly, teachers can use data analysis to deeply understand the content that students are interested in and the content that is difficult for students, and adjust the teaching content according to the students' needs to ensure that teaching meets the students' needs. Secondly, teachers can introduce more practical cases and practical

operations to make the teaching content more practical and applicable. In addition, teachers can also provide students with a variety of content, including video, image, animation and other content, to enhance the attractiveness of the teaching content and improve students' learning enthusiasm. Finally, teachers can regularly evaluate and analyze the teaching content based on the feedback of students and constantly improve the teaching quality<sup>[8]</sup>.

#### **4.2. Innovative teaching methods**

By using big data, we can optimize the quality of education and teaching in the field of information technology innovation and achieve innovation in teaching methods. Through in-depth mining and analysis of students' learning behavior, interests, and hobbies, teachers can have a deeper understanding of students' learning situation and learning needs, so as to develop teaching plans and methods that are more in line with the actual situation of students. At the same time, by utilizing big data and intelligent recommendation technology, personalized and accurate learning resources and learning paths can be provided for students, enabling them to learn more effectively. Therefore, utilizing big data to enhance the quality of education and teaching in the field of information technology innovation not only improves students' learning outcomes and experiences but also fosters a more personalized and engaging learning environment, but also promote the innovation and development of education and teaching. Through continuous innovation in teaching methods and models, we can cultivate more high-quality talents with innovative spirit and practical ability, and make greater contributions to social development<sup>[9]</sup>.

#### **4.3. Enrich teaching resources**

Through big data technology, teachers can access more and better teaching resources, including various online courses, learning materials, teaching software, etc. These resources can provide students with more comprehensive and diversified learning options, while also helping teachers improve teaching quality and effectiveness. In addition, technologies such as intelligent recommendation based on big data can also provide students with more personalized learning resources and paths, helping students better leverage their potential.

Therefore, leveraging big data to enrich teaching resources in the field of information technology innovation can not only enhance students' learning effectiveness and experience but also catalyze innovation and advancement in education and teaching.

#### **4.4. Improve teacher quality**

Firstly, through data analysis, Teachers can obtain comprehensive feedback on their teaching methods, content, and effectiveness. allowing them to accurately understand their own strengths and weaknesses. Secondly, big data provides teachers with a wealth of resources and information, enabling them to stay up-to-date with the latest research results and teaching methods in the field of information and innovation, and continuously improve their professional knowledge and skills. Finally, big data analysis can help teachers better understand students' learning needs and interests, customize teaching plans according to students' characteristics, and improve the quality of education and teaching. By improving the quality of teachers, the quality of education and teaching in the field of information and innovation can be effectively improved. This requires teachers to have a high level of data analysis ability and information technology skills, so that they can effectively use big data and intelligent recommendation technology to optimize teaching methods and improve teaching effectiveness, so it is important for teachers to continuously improve their own data analysis ability and information<sup>[10]</sup>.

The big data-based evaluation model for the teaching quality of information and innovation education is an important means to improve teaching quality. By taking measures such as establishing a comprehensive evaluation index system, combining quantitative and qualitative evaluation, and combining dynamic evaluation with static evaluation, we can comprehensively understand the actual situation of information and innovation education and teaching, providing strong support for improving teaching quality. At the same time, we can also take measures such as optimizing teaching content, innovating teaching methods, enriching teaching resources, and improving teacher quality to further improve the quality of information and innovation education and teaching.

## **5. Conclusions**

First of all, we can more accurately understand students' learning needs, interests, habits, and performance, thereby optimizing teaching content and methods and improving teaching effectiveness. For example, by analyzing students' learning behavior data, we can timely identify their learning difficulties and problems and take targeted teaching measures to solve them.

Secondly, big data analysis can help us establish a scientific teaching quality evaluation system, achieve a combination of quantitative and qualitative evaluation, and a combination of dynamic and static evaluation, and improve the accuracy and objectivity of teaching quality evaluation. For example, by analyzing teachers' teaching behavior data, we can assess teachers' teaching level, teaching effectiveness, and student satisfaction, providing a scientific basis for improving teaching quality.

This study conducted in-depth exploration of the quality of innovative education and teaching in information technology through big data analysis. By analyzing data on students' learning behavior, interests, and hobbies, we conducted in-depth mining and analysis to understand students' learning needs and conditions. Simultaneously, the study also found that big data can accurately recommend learning resources and learning paths to help students learn effectively. Therefore, utilizing big data to optimize the quality of education and teaching in the field of information technology innovation not only enhances students' learning outcomes and experiences but also fosters a more personalized and engaging learning environment, but also promote the innovation and development of education and teaching. In the future, we will continue to explore and innovate teaching methods and models to cultivate more high-quality talents with innovative spirit and practical ability, and make greater contributions to the development of society.

## **Acknowledgements**

1. The Construction Project of Virtual Teaching and Research Section for Undergraduate Colleges and Universities in Henan Province (Education Department (2022) No.394)
2. The Construction Project of New Engineering and New Form Teaching Materials for Undergraduate Colleges and Universities in Henan Province (Education Department (2023) No.395)
3. The Construction Project of The Second Batch of Provincial Key Modern Industrial Colleges for Undergraduate Colleges and Universities in Henan Province (Education Department (2023) No.280)

## **Reference**

1. Smith, T., & Davis, E. (2023). The impact of big data analytics on assessment and improvement of information technology education. *International Journal of Computer-Assisted Learning*, 39(1), 17-33.
2. Wang, P., Zhang, L., & Xu, Y. (2023). Using big data to optimize information technology education: A

- mixed-methods study. *Computers & Education*, 144, 106926.
3. Chen, J., Zhang, M., & Wang, H. (2021). Big data analysis for improving information technology education: A literature review. *Computers & Education*, 106806.
  4. Li, M., & Zhang, L. (2020). Using big data to optimize information technology education: A case study. *Education & Information Technologies*, 25(1), 17-35.
  5. Wang, P., & Xu, Y. (2019). Big data in education research: A review. *Education Technology & Society*, 22(3), 15-26.
  6. Zhang, X., & Chen, Y. (2018). The application of big data in higher education quality assurance: A literature review. *Quality Assurance in Education*, 26(2), 149-162.
  7. Li, W., & Wang, Z. (2017). Big data and education: A review and future research agenda. *International Journal of Computer-Assisted Learning*, 33(6), 595-610.
  8. Xu, Z., & Yang, Y. (2016). The use of big data in education: Opportunities and challenges. *Education & Information Technologies*, 21(3), 1095-1110.
  9. Chen, Q., & Sun, X. (2015). Big data and education reform: Opportunities and challenges. *International Journal of Computer-Assisted Learning*, 31(5), 387-404.
  10. Wang, P., & Guo, Y. (2014). The application of big data in higher education management: An overview of recent research and future trends. *Computers in Human Behavior*, 30(5), 58-70.