Research on Full-Cycle Intelligent Evaluation of Information and Communication Courses Driven by Digital-Intelligent Empowerment

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Abstract: With the rapid development of information technology and the acceleration of educational digital transformation, the application of digital-intelligent technologies in education has become increasingly widespread. This paper focuses on information and communication courses, exploring how to leverage digital- intelligent empowerment to achieve intelligent evaluation across all stages of the curriculum. Through analysis of the current status and challenges of traditional course evaluation models, this study reconstructs a teaching evaluation system using digital-intelligent means and designs a full-stage course implementation process. Innovative evaluation models and methods are proposed, and practical teaching reforms validate the effectiveness and feasibility of this approach. The results demonstrate that the digital-intelligent evaluation system can effectively support personalized teaching, optimize instructional processes, and provide decision-making insights for educational administrators.

Keywords: Digital-Intelligent Empowerment; Information and Communication Courses; Full-Stage Intelligent Evaluation; Teaching Reform; Assessment System

1. Introduction

Against the backdrop of today's digital and intelligent era, the rapid advancement of information technology has introduced new demands and challenges for education. Information and communication courses, as critical programs for cultivating students' information technology capabilities and innovative practical skills, urgently require reforms in their teaching evaluation models. Traditional evaluation methods, such as reliance on final exam scores, are inherently limited. They fail to comprehensively reflect students' performance and growth throughout the learning process, neglect individual differences, and overlook practical skill assessments. Consequently, these methods adversely affect students' learning motivation and teaching quality. Therefore, establishing a diversified, process-oriented, and intelligent evaluation framework is essential for advancing reforms in information and communication education [1-3].

2. Current Status and Challenges of Traditional Course Evaluation Models

2.1 Current Status Analysis

Traditional evaluation models predominantly depend on final exam scores, which, while objective and operational, have significant limitations. They cannot holistically capture students' performance and progress over time, neglect individual differences, and fail to provide timely feedback mechanisms [4-6].

2.2 Key Challenges

Single evaluation method: Traditional evaluation methods primarily rely on final exam scores, which fail to comprehensively reflect students' learning progress and potential for development.
Lack of feedback: Students are unable to receive timely feedback on their learning process, making it difficult for them to adjust their learning strategies promptly. This negatively impacts their learning outcomes.
Neglect of practical skills: Traditional evaluation methods inadequately assess practical abilities, leading students to focus solely on theoretical knowledge while neglecting practical operations.

3. Constructing a Digital-Intelligent Evaluation Framework

The teaching evaluation in higher education institutions is a process of systematically judging

the value of teaching activities based on specific criteria. Digital technology provides methodological support for innovative practical teaching and can continuously drive the disruptive reconstruction and multidimensional construction of practical teaching course models. Under the perspective of technological innovation, teaching evaluation integrates intelligent technologies and methods into the evaluation process. It promotes the optimization of course teaching and the improvement of teaching capabilities through evaluation, thereby achieving the application, breakthrough, and innovation of intelligent technological innovation in the evaluation of teaching content, teaching models, and teaching effectiveness.

3.1 Theoretical Foundation

Guided by the theory of smart education and in combination with the characteristics and teaching objectives of information and communication courses, a teaching system integrating teaching, learning, training, and evaluation based on digital and intelligent technologies is constructed, as shown in Figure 1.This system fully utilizes various means such as digital and intelligent knowledge computing engine technology, digital and intelligent push technology, digital and intelligent learning analytics technology, data mining, processing, and analysis capabilities, virtual reality and intelligent modeling technology, and intelligent diagnostic information technology to form a scientific, comprehensive, specific, and highly operable teaching evaluation model [7].

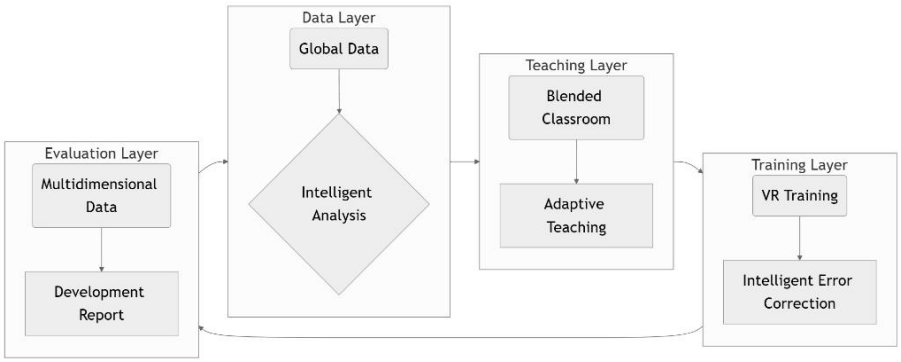

Figure 1. "Teaching-Learning-Training-Evaluation" Integrated Workflow

3.2 Application of Digital-Intelligent Tools

Data collection and analysis: Data collection, statistics, and analysis are realized throughout the entire process through digital and intelligent platforms and tools such as MOOCs, online virtual training courses, Rain Classroom, and Cloud Classroom. The data collected includes learners' study duration, online test scores, homework completion status, and experimental operation results, providing a rich basis for evaluation [8-9].

Intelligent Diagnosis and Feedback: Leveraging intelligent diagnostic information technology, the learning process of learners is monitored and diagnosed in real time. This enables timely identification of issues encountered by learners during their studies and provides personalized feedback and suggestions to help them adjust their learning strategies promptly and enhance their learning outcomes.

Virtual Reality and Intelligent Modeling: Virtual reality technology is utilized to offer learners an immersive learning environment, enhancing the fun and interactivity of learning. Meanwhile, intelligent modeling technology is employed to build learning profiles for learners, comprehensively displaying their learning processes and achievements, thereby supporting personalized teaching.

3.3 Full-Stage Evaluation Model

Pre-class: By pushing relevant learning materials and test questions, learners' interest and motivation in learning are stimulated. Meanwhile, feedback on learners' previewing situation is provided to instructors, helping them understand the learners' preparation and get ready for classroom teaching.

In-class: In theoretical teaching, instructors can use tools such as “Rain Classroom” and “Cloud Classroom” for classroom interaction to keep track of learners' progress in real time. In practical teaching, instructors can release experimental tasks and requirements, and learners can submit their experimental results and reports in real time. Instructors can then provide timely feedback and evaluation.

Post-class: Homework and experimental tasks are pushed through online platforms, allowing learners to complete and submit their homework and experimental reports in a timely manner. Instructors can check the learners' homework and experimental performance and provide timely evaluation and feedback. Additionally, learners are encouraged to engage in discussions and exchanges to promote collaborative learning and knowledge sharing among them [10].

Full-stage intelligent evaluation model is shown in Figure 2.

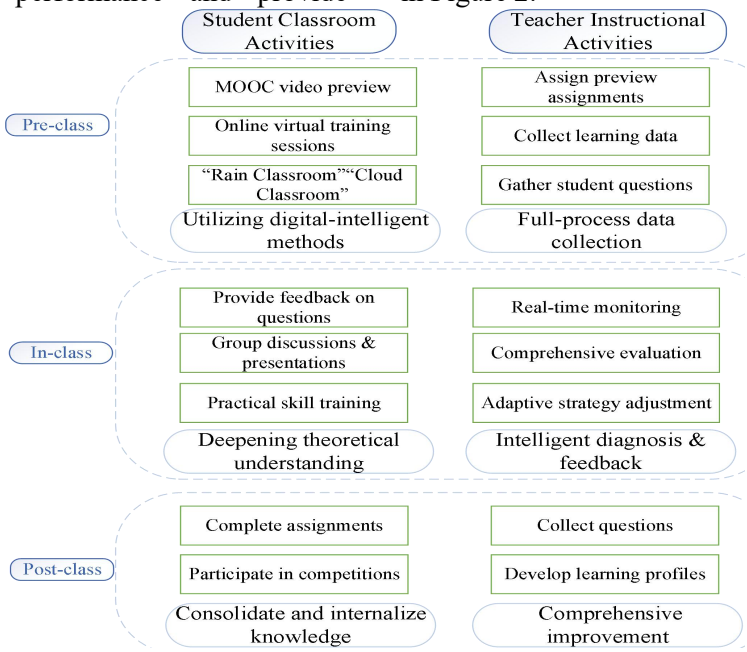

Figure 2. Full-Stage Intelligent Evaluation Model

4. Technological Innovation Perspective on the Transformation of Intelligent Teaching Evaluation

Intelligent evaluation is not only a reflection of the iterative development of tools, but also promotes the reconstruction of educational evaluation. In the face of innovation and breakthroughs in intelligent technology and teaching evaluation, it is necessary to use technological innovation methods to promote the application of digital technology in teaching evaluation, optimize models and algorithms, and improve intelligent information platforms. This will drive the transformation of evaluation from a "management tool" to a "development engine," providing core support for the high-quality development of higher education.

4.1 Transformation of Teaching Evaluation Tools Driven by Data Technology

Traditional teaching evaluation activities in higher education institutions are based on experience and perceptions of teaching practice performance, lacking multi-dimensional and multi-level data support. Data-driven teaching evaluation primarily relies on artificial intelligence (AI) technology to extract data from multiple dimensions that cover the entire process of student development. This shift enables a transition from static evaluation to dynamic evaluation and real-time monitoring, thereby facilitating a process-oriented evaluation approach. The transformation of data-driven teaching tools integrates multimodal and unobtrusive data, leveraging technologies such as virtual reality (VR), blockchain, and machine learning to provide more accurate and real-time evaluations of teaching activities.

4.2 Transformation of Teaching Evaluation Methods Driven by Model and Algorithm Optimization

Innovations in AI technology are mainly reflected in the use of foundational techniques such as machine learning, deep learning algorithms, data mining, and natural language processing. These technologies demonstrate exceptional capabilities in data collection, processing, and analysis, providing strong technical support for the transformation of teaching evaluation. After collecting vast amounts of data in teaching evaluation, AI uses machine learning models to optimize algorithm design and train large-scale data sets. It predicts teaching effectiveness and student academic

trends, thereby making decisions and judgments. This truly enables a shift in teaching evaluation methods from "data-driven decision-making" to "data-based decision-making" and ultimately to "data perception."

4.3 Transformation of Teaching Scenarios Driven by Intelligent Information Platforms

Traditional teaching primarily relied on face-to-face instruction in physical classrooms, with the teaching environment confined to a single space. With the gradual application of smart classrooms, cloud classrooms, and micro-classrooms in teaching, the teaching methods in higher education institutions have shifted from "offline-focused" to "offline-focused with online support" and then to "blended online and offline teaching." This shift in teaching methods has also changed the teacher-student relationship within universities. Teachers are no longer solely knowledge providers but have become "integrators" of teaching resources. Data for intelligent teaching platforms in higher education mainly comes from smart classroom data, virtual platform data, academic affairs data, laboratory data, and network information platform data. The construction of intelligent platforms not only supports teaching evaluation but also promotes the improvement of teaching quality.

5. Action Pathways for Intelligent Evaluation Transformation

The transformation of teaching evaluation empowered by digital technology is centered on data-driven mechanisms. It reconstructs the multidimensional connections between teaching elements by systematically integrating data, knowledge graphs, and intelligent technologies. This process forms a new type of teaching paradigm where technology is deeply embedded and closely coupled with educational scenarios. Therefore, the goals of intelligent teaching evaluation transformation can be systematically achieved through approaches such as standardizing the use of digital technology, optimizing the iterative updating mechanism of personalized teaching, and strengthening the design of models and algorithms to improve evaluation results.

5.1 Standardizing the Use of Digital Technology to Achieve Precise Teaching Services

As a general-purpose and asymmetric information technology, digital technology promotes the free flow of resources across different fields, segments, and forms. It can protect user privacy and security during the in-depth information sharing and exchange among innovation entities. Specifically, in the construction and integration of data platforms, artificial intelligence (AI) technology can be used to achieve data connectivity and sharing. In data mining, methods such as "AI +," big data, and cloud computing can be employed to collect various types of data related to university teachers, ensuring the comprehensiveness and accuracy of the data. In data storage, a management cloud platform can be built to ensure data security and privacy. In data usage and visualization, a data public platform website can conveniently and efficiently display relevant data and reports on teacher teaching.

5.2 Real-time Learning Analysis and Optimization of Personalized Teaching Iteration Mechanism

Student profiling is a means of characterizing students' basic features, behavioral performance, and developmental needs through intelligent digital technology. Traditional student learning paths still follow a unified pace, primarily based on offline learning with online learning as a supplement. However, personalized learning paths require continuous iteration, updating, and optimization. Therefore, it is necessary to build digital student profiles to promote personalized student development. First, student learning characteristics should be mined. AI platform systems can track students' behavioral trajectories in real time, such as key indicators like learning duration, mastery of knowledge points, and thinking processes. By comprehensively depicting students' learning characteristics, strengths, challenges, and growth trajectories, strong support can be provided for personalized teaching and student development. Second, through big data clustering analysis and regression models, AI evaluation results can reveal the intrinsic connections between student learning behaviors and teaching effectiveness, effectively identifying issues in the teaching process. Third, AI technology can be used to identify students' strengths and weaknesses in learning, as well as the effectiveness and shortcomings of teachers' teaching methods. Association data mining technology can be

employed to precisely match teachers' teaching methods with students' learning outcomes, optimizing teaching approaches. Finally, continuous iteration and feedback are essential. Intelligent systems can provide valuable ongoing feedback for teachers through detailed analysis of student profiles.

5.3 Strengthening Model and Algorithm Design to Improve Teaching Intelligent Evaluation Results

When using AI to assist in teaching evaluation, it is important to establish transparency and interpretability mechanisms for algorithm models during algorithm design and model training. This allows for the timely detection and correction of evaluation biases. First, model-based algorithms are recommended. Through natural language processing and pattern recognition technologies, AI can automate the processing of multimodal data, including text, audio, and video, to generate personalized learning feedback. Second, AI prediction models can forecast students' performance in future learning activities based on existing learning data, including both process and outcome data. This effectively identifies problems and obstacles and provides strategies for improvement. Finally, systematic improvements to intelligent models and algorithms should be made in real time according to adjustments in teaching methods and content, as well as students' learning outcomes, to avoid biases.

6. Conclusion

The digital and intelligent-enabled holistic intelligent evaluation (Holistic Intelligent Evaluation) system provides new ideas and methods for the teaching evaluation of information and communication courses. By leveraging data-driven approaches, model optimization, and the construction of intelligent platforms, it is possible to achieve dynamic evaluation of the entire teaching process and personalized support, thereby enhancing teaching quality and students' learning experience. In the future, as technology continues to advance and its applications expand, the intelligent evaluation system is expected to play an even greater role in the field of education.

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