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Application and Reflection of Information-based Teaching Tools in Classroom Interaction

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Abstract: With the deepening of educational informatization, the classroom interaction model has transformed from the original one-way indoctrination teaching to the current multi-dimensional, dynamic, interactive teaching. This paper mainly studies the specific application and in-depth reflection of information-based teaching tools in classroom interaction, attempting to explore the reconstruction mechanism of teacher-student interaction and student-student interaction after technological empowerment. The article first discusses how tools break through the constraints of time and space to activate the classroom ecology, then analyzes how data-driven, precise feedback improves teaching strategies, and finally explores the risk of "technological alienation" and the path of humanistic return in the process of technology application. Through theoretical deduction and logical construction, this paper attempts to provide theoretical support and practical direction for a new type of intelligent, efficient and warm classroom.

Keywords: Information-based teaching tools; Classroom interaction; Application; Reflection introduction

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1. Introduction

The field of modern education is undergoing structural changes at an unprecedented speed. Information technology is no longer just a means to assist teaching, but has become a major factor changing the teaching ecology. Against this grand background, the classroom is the main position of education and teaching, and its internal operation logic is also changing. Traditional classroom interaction is limited by physical space, time rhythm and teachers' personal experience judgment, which is static and linear. However, when various information-based teaching tools enter the classroom, the original interaction model is broken, replaced by a new interactive method with strong immediacy, multi-directionality and personalization. It not only changes the carrier of knowledge transmission, but also fundamentally changes the way of emotional connection and cognitive cooperation between teachers and students.

2. Reconstruction of the temporal-spatial structure and participation form of classroom interaction by information-based teaching tools

2.1. Immediate response mechanism breaking physical boundaries and time lag

Traditional classroom interaction is often strictly limited by time and space. There is a natural delay between teachers'

questions and students' answers, and limited by seat arrangement, interaction is only limited to students in the front or those who actively raise their hands. After the intervention of information-based teaching tools, the first manifestation is the elimination of time and space barriers. Relying on cloud-collaborative real-time voting, bullet screen communication, online whiteboards, and other means, every student can join the interactive network at the same time, no matter which corner of the classroom they are in. Such synchronization completely breaks the "center-periphery" structure of traditional classrooms and extends the tentacles of interaction to every part of the classroom [1].

The most important point is that an immediate response loop is formed. In the traditional teaching mode, teachers have to wait for students to think, raise their hands and stand up to answer questions, which takes a long time and easily disrupts students' thinking continuity [2]. Digital tools enable students to submit their views on terminal devices at any time, and the system can immediately summarize data and present it in the form of charts. The millisecond-level feedback mechanism not only preserves students' most original thinking sparks, but also forces teachers to change the teaching rhythm from the original preset linear process to a dynamically generated process based on real-time data. Interaction is not waited for, but generated through high-frequency immediate interaction. Immediacy greatly reduces the psychological barriers to student participation. Introverted or inarticulate students can also express their opinions anonymously or semi-anonymously, achieving full coverage of participating subjects.

2.2. Paradigm shift from one-way transmission to multi-dimensional network interaction

In traditional classrooms without technical assistance, most interaction models are one-way radiation structures of" teachers ask and students answer", that is, teachers are the only senders and receivers of information, and horizontal communication between students is ignored or even regarded as interference. The popularization of information-based teaching tools has fundamentally changed this power structure, making classroom interaction transform from the original linear structure to the current network structure. The emergence of collaborative learning platforms, group discussion software and mind mapping tools has formed a close and diverse connection between students and students, students and resources, and students and the environment.

In this new paradigm, teachers gradually become the guides and coordinators of interaction, and students become the main body of knowledge construction. When online collaborative documents are used for project-based learning, each group can communicate progress and revise each other in real time, thus achieving cross-group thinking collision. Network interaction not only increases the density of interaction but also makes interaction more complex. It is not simply answering right or wrong, but analyzing viewpoints, integrating solutions and colliding ideas. The recording and backtracking functions of the tools make every interaction traceable, providing a large amount of material for subsequent in-depth learning. Virtual simulation and augmented reality technologies extend interaction from plain text to three-dimensional situations, enabling students to operate and experiment in simulated environments to achieve interaction and experience a great sense of immersion in such situations. The network interaction of points, lines, surfaces and shallow, medium and deep levels turns the classroom into an active community of knowledge production.

3. Accurate evaluation and strategy adjustment of classroom interaction quality driven by data

3.1. Whole-process data collection and quantitative representation of interactive behaviors

High-quality classroom interaction cannot only rely on teachers' subjective feelings, but should have an objective and comprehensive understanding of interactive behaviors. A core advantage of information-based teaching tools is their strong data collection capability [3]. Students' login frequency of the system, stay time when watching videos, accuracy rate of answering questions, frequency of occurrence of keywords in discussion area speeches, changes in concentration degree detected by expression recognition systems, etc., all belong to interactive behavior data.

These data do not exist in isolation and can be converted into interaction maps. Through the analysis of the above quantitative indicators, the heat map of classroom interaction can be clearly drawn, and the links that cause climax and

the periods of distracted attention can be identified. The system can automatically generate the contribution degree of a certain student's speeches in all courses, and can also analyze the confusion index of the whole class on a certain knowledge point. Refined quantitative representation makes the originally vague interactive atmosphere measurable. It not only helps to understand the micro-mechanism of classroom operation, but also provides precious empirical materials for educational researchers. More importantly, the data-driven approach breaks through the" black box" situation in the past when evaluating interaction quality, puts every link of interaction under rational scrutiny, and lays a solid foundation for subsequent strategy improvement.

3.2. Dynamic optimization of teaching strategies based on feedback closed loop

The ultimate purpose of data collection is application, that is, using data analysis to feed back teaching practice and continuously adjust strategies. In the information-based environment, classroom interaction is no longer rigidly implemented, but an adaptive system that is constantly updated and self-adjusting. When the system detects that most students have deviations in understanding a certain concept, or the interaction participation rate suddenly drops at a certain time point, teachers will receive early warning signals.

At this time, teachers do not need to wait for the after-class summary, but can immediately change teaching methods in class. For common knowledge blind spots, teachers can immediately call preset micro-lesson resources for targeted explanations, or launch a new debate activity to stimulate students' thinking. For individual students with interaction difficulties, the system gives personalized tutoring suggestions, and teachers provide precise tutoring to individual students accordingly. Implementing and adjusting teaching strategies according to real-time data analysis makes teaching strategies more adaptable to students' situations, thus preventing ineffective interaction caused by a lack of pertinence. Long-term data accumulation can prompt teachers to recognize the preferences and deficiencies of their own teaching styles and promote the improvement of their own professional abilities. Through the closed loop of" collection, analysis, feedback, and adjustment," classroom interaction is driven by data instead of experience, making teaching more targeted and effective.

4. Risk of interaction alienation and humanistic return in the background of technological rationality expansion

4.1. Subjectivity weakening and emotional alienation caused by technological dependence

Although information-based teaching tools have greatly enriched the forms of interaction, if the underlying technological rationality logic is not examined, it is easy to lead to interaction alienation. When teachers and students rely too much on algorithm-recommended content and standardized interaction templates, human subjectivity will be damaged. Students will get used to clicking on the screen and ignore in-depth reading and independent thinking. Teachers are also attracted by exquisite courseware and smooth processes, ignoring the keen grasp of students' eye contact and emotional changes.

A deeper problem is emotional alienation. Classroom interaction is not only cognitive communication but also emotional resonance and spiritual touch. It is a process of mutual influence between teachers and students and an important part of the teaching process. However, cold screens and mechanical instructions will separate the simplest emotional flow between people. When all interactions are quantified into likes, points, or rankings, the teacher-student relationship will become a cold data exchange relationship. When students pursue high scores and rankings, they will gradually lose their interest and respect for knowledge itself, and interaction becomes a performance to complete tasks. The dehumanization tendency makes the classroom seemingly lively but without soul temperature. Once technology fails or the network is interrupted, teachers and students who are used to digital survival will fall into a helpless situation, exposing the degradation of basic interaction ability.

4.2. Return to the true essence of education: Building an interactive ecology of symbiosis between technology and the humanities

The challenge brought by the expansion of technological rationality is that technology is a tool serving people rather than being the master of the classroom. The core of establishing high-quality classroom interaction is to achieve the balanced coexistence of technological rationality and humanistic spirit. This means that when using information-based tools, we must adhere to the people-oriented principle and organically combine the convenience of technology with human creativity.

First of all, we should advocate the idea of "appropriate technology" and determine the boundary of technology intervention. When in-depth thinking, emotional communication, or value guidance is needed, technology should be withdrawn from the front as much as possible and return to real face-to-face dialogue. Secondly, teachers should be given greater autonomy, so that teachers can freely choose or develop tools suitable for themselves according to subject characteristics and students' learning conditions, rather than being bound by the standard processes of technology manufacturers. In addition, attention should be paid to cultivating students' digital literacy and ethical awareness, enabling students to use tools critically and have an independent personality and thoughts. The ultimate goal is to create an interactive environment where technology is hidden behind and people shine on the stage. In this ecology, technology is a powerful booster that releases the potential of interaction; humanistic spirit is the compass that ensures the direction and temperature of interaction. Only through the deep integration of technology and humanities can classroom interaction develop from "skill" to "Tao" and cultivate new people of the times with innovative thinking and sound personality.

5. Conclusion

The application of information-based teaching tools in classroom interaction is not simply superimposing technology, but a profound transformation of reshaping the temporal-spatial structure, intervening data logic and reconstructing humanistic values. Its essence is to break the physical barriers of traditional interaction with an immediate response mechanism, stimulate the thinking vitality of full participation with multi-dimensional network interaction, and realize dynamic and precise adjustment of teaching strategies with whole-process data collection. However, the rational expansion of technology also brings the risks of subjectivity weakening and emotional alienation. Therefore, the future construction of classroom interaction should take embracing technological dividends as the premise, adhere to the true essence of education, and build a new ecology of symbiosis and co-prosperity between technology and humanities on the basis of establishing the principle of appropriate technology, strengthening teachers' dominant position and cultivating digital ethics. Let classroom interaction move from formal liveliness to substantive depth, and realize people's all-round development and spiritual freedom in the data-driven intelligent environment.

Disclosure statement

The author declares no conflict of interest.

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