Evaluation Research of Online Live Classroom Teaching Behavior Based on Process Data

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Abstract. Online live classroom has become an indispensable and important form of online teaching because of its flexibility and convenience. In order to reflect the real situation of online live classroom, this paper combines the typical classroom teaching behavior classification systems and the characteristics of online live classroom, constructs an online live classroom teaching behavior evaluation index system based on process data from three dimensions. By observing the classroom playback videos, we find that: the current online live classroom needs to be improved in terms of student subjectivity, online interaction quality and classroom design. Accordingly, the study proposes corresponding strategies to improve the effectiveness of online live classroom.

Keywords: online live classroom; online teaching behavior; process data

1 Introduction

Online live classroom is a form of teaching and learning that uses video conferencing systems for synchronous education [1]. Relying on Internet technology, online live classroom generates a large amount of process data. Online teaching behavior is an important process data in the online live classroom, which refers to the actions and behaviors of teachers and students in the online environment for teaching purposes. It has been shown that analysis and evaluation of online classroom behaviors can help improve the quality of online teaching [2]. However, existing classroom teaching behavior classification systems are mainly for traditional classroom, typically Flanders Interaction Analysis System (FIAS), Information Technology-based Interaction Analysis Coding System (ITIAS) [3], Improved Flanders Interaction Analysis System (IFIAS) [4], and Qualitative Analysis Framework for Classroom Teaching Interaction Behavior in Digital Environment [5], etc., lacking a classification and evaluation of online live classroom teaching behavior. Therefore, based on the typical classroom teaching behavior classification systems and the characteristics of online live classroom, this paper constructs an online live classroom teaching behavior evaluation index system based on process data, and applies and analyzes it in order to reflect the real situation of online live classroom and understand the online education process.

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2 Evaluation research of online live classroom teaching behavior based on process data

2.1 Construction of online live classroom teaching behavior evaluation index system based on process data

This paper combines the typical classroom teaching behavior classification systems and the characteristics of online live classroom to construct an online live classroom teaching behavior evaluation index system from the perspective of the observable online environment. The details are shown in Table 1.

Table 1. An online live classroom teaching behavior evaluation index system

Type	Code	Index	Explanation of the content of index
Teachers' verbal and technical behavior	1	Verbal Evaluation	Respond to and evaluate students' response, including repeating students' response, incorporating students' ideas, and praising and encouraging students.
	2	Solving doubts	Explaining the questions raised by students.
	3	Asking open-ended questions	Asking open-ended questions.
	4	Asking closed-ended questions	Asking closed-ended questions.
	5	Explanation	Explaining course content.
	6	Demonstrating content	Showing learning resources such as classroom materials, and text reading resources.
	7	Instruction	Using language to ask or instruct students to perform certain behaviors.
	8	Classroom interaction	Using the interactive features of the live platform to organize classroom interactions, such as randomly drawing students to ask questions, posting live room answer keys, etc.
	9	Asserting authority	Using authority to criticize students or correct their behaviors in class.
Students' verbal and technical behavior	10	Passive response	Answering questions posed by the teacher or other students to answer questions.
	11	Active response	Proactively responding questions in the discussion forum by text input, hand up voice, etc.
	12	Active questioning	Raising their own questions and doubts.
	13	Discussion	In the group space, discussing with peers and sharing group communication ideas.
	14	Presentation of results	Presenting learning results or experiments by raising their hands to answer with voice, etc.
	15	Opinion evaluation	Proactively describing and evaluating peers' responses or ideas in the discussion forum by text input, raised hand voice, etc.
Silence	16	Active silence	Thinking or typing independently to prepare for responses.
	17	Negative silence	Teaching vacuum caused by network disconnection or under sound quality.

2.2 Application of online live classroom teaching behavior evaluation index system based on process data

We use the playback videos from DingTalk as the research samples. After manual screening, 10 valid examples were obtained. The coding rules were as follows: (1) the corresponding codes were recorded every 15 seconds interval; (2) if multiple behaviors appeared at the same time, only one current dominant behavior was recorded; (3) behaviors that could not be identified or

were not in the coding Table 1 were not analyzed. The two coders carried out coding after understanding the coding framework rules.

Structure of online live classroom.

Table 2. Classroom structure

Classroom behavior	Percentage	Total
Teachers' verbal and technical behavior	1625/84.81	
Students' verbal and technical behavior	161/8.40	1916/100
Silence	130/6.79	

There is a serious imbalance between teaching and learning in the online live classroom. As shown in Table 2, the ratio of teachers' online teaching behaviors to students' online teaching behaviors is about 10:1. This may be because the study samples are all exercise lecture classes, where the classroom is mostly teacher-talked, and students mainly consolidate and review, and less actively ask new questions.

Analysis of online live classroom teaching behavior.

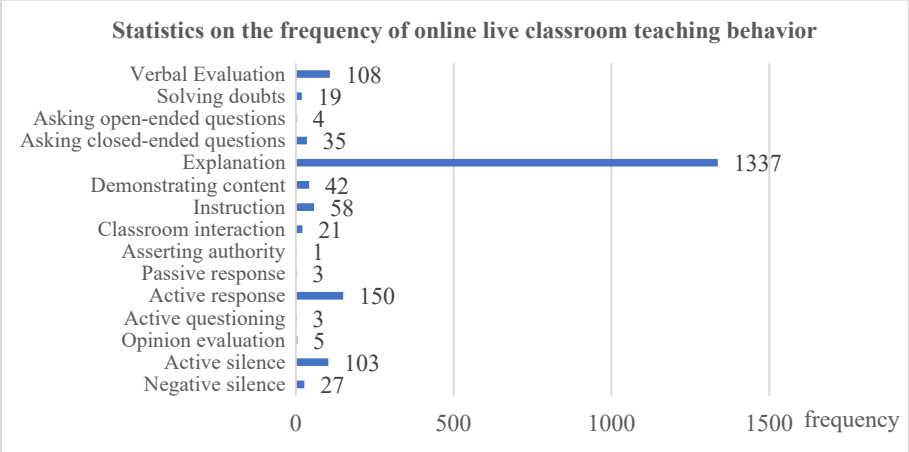

Fig. 1. Statistics on the frequency of online live classroom teaching behavior

As shown in Figure 1, among the teachers' behaviors, "explanation" accounted for the largest percentage (82.28%), indicating that online live classroom studied in this paper was teacher-driven, emphasizing the teacher's role of imparting course knowledge. The frequency of "classroom interaction" is low (1.29%), probably because teachers can see what students say in the discussion forum and usually do not spend much time on classroom interaction.

It can be seen that among the students' behaviors, "active response" was the most frequent (93.17%), indicating that students were actively keeping up with the pace of the class and interacting with the class by entering text in the discussion forum. It is noteworthy that "discussion" and "presentation of results" did not appear in the study samples. The analysis concluded that there were no groups in the problem-solving lessons, so there was no space for group and peer discussion. Also, the lessons were mainly explained by teachers, so student-initiated presentation of results was not present.

Regarding classroom silence, it was found that the frequency of positive silence (79.23%) was higher than the frequency of negative silence (20.77%), which indicates that online live classroom environment provides some time for reflection. Typically, positive silence occurred after teachers' explanation or instruction. During the negative silence time, the normal teaching progress and overall learning effectiveness were affected by the unstable network signal.

3 Discussion

3.1 Student subjectivity needs to be improved

Student subjectivity is not enhanced, and it is common for teachers to still have an absolute voice in the classroom [6]. Students need to take the initiative to seize learning opportunities. For example, taking the initiative to answer questions or asking timely questions without disrupting the current instructional pace, taking control of class time and effectively completing learning content.

3.2 Online interaction quality needs to be improved

The quality of interaction needs to be improved. The high-frequency interaction is only at the level of students responding to simple answers, and there is less student-student interaction. Teachers need to improve the quality of questions and focus on the process of students' response and problem solving. Students also need to improve the depth of class participation, including taking the initiative to share learning ideas.

3.3 Classroom design needs to be improved

Due to the stability issues of online live classroom environment [7], there is a need to achieve an organic integration of the classroom environment and overall structural design to improve student adaptability [8]. Teachers need to improve the classroom design. For example, using online tools to achieve timely feedback on students' learning effects [9]; confirming students' knowledge mastery in advance [10] and avoiding the illusion of collective silence brought about by unclear questioning targets.

4 Conclusion

By constructing an online live classroom teaching behavior evaluation index system, this paper provides a quantitative analysis and evaluation of online live classroom, which objectively reflects the teaching situation of online live classroom. When conducting online live classroom in the future, attention needs to be paid to allowing students to fully grasp the learning opportunities, teachers should ask higher quality questions, while integrating classroom design with the online environment, etc.

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