

## **A Study on the Characteristics of Teacher-Student Interaction in Mathematics Classroom of Chinese Senior High Schools in the Information Technology Environment**

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To implement an idea proposed in the Third Plenary Session of the 18th, which is to build an effective mechanism to expand the coverage of high-quality educational resources by means of informatization, the Ministry of Education launched a nationwide campaign “One Teacher, One Excellent Class, and One Class, One Excellent Teacher” in 2014. The main content of this campaign is that teachers show their lessons on the National and Local Public Service Platform for Educational Resources. Then, education management departments at all levels organize experts to evaluate and select the lessons showed by these teachers, and mark them into three levels: the national “high-quality lesson” (level A), the provincial “high-quality lesson” (level B), and the municipal “high-quality lesson” (level C). The Ministry of Education requires the local audio-visual education and teacher training departments to organize teachers to watch online lessons and the process of evaluating them. In this way, online teaching and research can be carried out to form a teaching application environment in which “everyone uses resources and each lesson has cases”, so as to gradually solve the problem of the balance of high-quality education resources in China. As of April 2021, the National Public Service Platform for Educational Resources ([www.eduyun.cn](http://www.eduyun.cn)) has released a total of 2,007,191 high-quality lessons, including 928,647 for primary school math, 381,846 for junior middle school math and 8,270 for senior high school math.

At present, China’s senior high school mathematics curriculum reform emphasizes that teachers should build a good teacher-student cooperative relationship, integrate students into the classroom teacher-student interaction, and stimulate students’ interest in learning, so as to realize students’ independent learning and improve the classroom teaching effect. As the model lesson of teachers’ teaching, some people think that high-quality lesson should be the model of good teacher-student interaction. But are these high-quality lessons are really positive in terms of teacher-student interaction? There is still a lack of empirical research to prove this question.

For this reason, nine high school math lessons of three levels belonging to PEP textbooks were selected as the research objects from the National and Local Public Service Platform for Educational Resources. The topics of these lessons are “The Meaning of Probability” (concept type lesson), “Right triangle altitude theorem” (proposition type lesson), “The Intersection Point Coordinates and Distance Formula of Straight Lines” (mathematical method type lesson). The analysis framework is based on the Flanders Interaction Analysis System (FIAS) proposed by the American scholar Ned Flanders, and the Information Technology-Based Interactive Analysis Coding System (ITIAS) proposed by Chinese scholars Gu Xiaoqing and Wang Wei, combined with mathematical

characteristics, the improved Mathematic Classroom Interaction Analysis System (MCIAS) is obtained.

MCIAS divides the teacher-student interaction behaviors in high school math classes into 18 categories. The researchers observed each high-quality lesson video every three seconds, and assigned 18 categories to each, resulting in nine coding matrices containing 700 to 1000 codes.

It is found that the selected high-quality lessons have excellent performance in teacher-student interaction on the whole, but they have their own characteristics in specific analysis dimensions, as follows: (1) Teachers' speech structure is good and speech act is moderate, and there is not too much control over the classroom. Teachers gives students more time for speech interaction. (2) A large amount of time is left for non-verbal interaction in high-quality classrooms, and the types of teacher-student interactions in the classrooms are diverse. (3) The teacher-student conversation time and students' speaking time are long, and the teacher-student speech interaction is frequent and lasting for a long time. 4) Teachers are good at interacting by asking questions and stimulating students' enthusiasm for learning by asking open questions, so students can express their opinions freely and have a better speech interaction with teachers and peers. (5) Teachers are good at responding to students' words through the indirect influence of praise, encouragement and adoption, and are also good at interacting with students in the classroom through questioning closely. (6) Teachers can organize the classroom in an orderly manner. (7) Teachers mostly use direct control methods such as lectures and instructions to mobilize students, but students are less proactive. (8) Teachers are good at adopting teaching means of positive reinforcement, giving positive feedback to students' opinions or emotions, and accepting, encouraging and praising students' opinions and emotions. 9) In terms of interaction, female teachers prefer to teach in the classroom through lectures, while male teachers are more inclined to interact by requiring students to conduct written exercises, classroom board performances, or participate in activities and experiments and so on. (10) Among the selected high-quality lessons, compared with provincial and municipal high-quality lesson teachers, national high-quality lesson teachers are more adept at using the blank in the classroom to give students more time to think and express.

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