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Analysis of Classroom Teaching Behavior of Junior Middle School Mathematics Teachers in Tibetan Areas

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***Abstract*—Language behavior is the main teaching behavior in teaching, and it is also an important indicator for evaluating a class. This paper aims to optimize classroom teaching through analysis and evaluation of teachers' language behavior. Based on Flanders interactive behavior analysis system, the original coding table has been improved according to the classroom teaching situation. Furthermore, it analyzes and discusses the verbal interaction between teachers and students in Tibetan classroom teaching from four aspects: classroom structure, teaching style, classroom questioning and teaching evaluation. Based on these problems found in the research, the following suggestions can be taken to improve teaching: to establish the teaching value belief of learner center; to propose innovative questions based on students' mathematical thinking; to establish a scientific and reasonable teaching evaluation system.**

Keywords—Teaching behavior; FIAS; Teaching style; Class questions; Teaching evaluation

I. INTRODUCTION

Teaching behavior is a series of problem-solving behaviors adopted by teachers to achieve certain teaching goals, and it is the externalized form of teachers' overall quality, which has rich connotation and value [1]. Language behavior is the main form of teaching behavior, accounting for about 80% of classroom teaching behavior. Due to the rigor, precision, inspiration and abstract nature of mathematics, the teaching language behavior of mathematics teachers must be the perfect combination of mathematics language and teaching language. Therefore, when studying the teaching behavior of junior middle school mathematics teachers in Tibetan areas, the language behavior is mainly used as a sample for analysis and discussion. The research uses the improved Flanders interactive behavior coding system, combined with the actual classroom teaching in Tibetan areas, quantitative and statistical processing of language behavior information in class. From the four dimensions of classroom structure, teaching style, classroom questions, teaching evaluation, analysis and evaluation of Tibetan mathematics teachers' teaching behavior. To avoid "teaching over learning", the research through a comprehensive analysis of the learning status of students in classroom teaching and tries to find out the problems existing in classroom teaching. So as to put forward some suggestions for the improvement of teaching behavior, teaching ability and teaching quality of Tibetan junior middle school mathematics teachers [2].

II. ANALYSIS OF LANGUAGE BEHAVIOR IN MATHEMATICS CLASSROOM

A Tibetan junior high school in gannan Tibetan area was selected, and four Tibetan mathematics teachers with 3-10 years' teaching experience were selected in each of the three grades. Through the interviews with the 12 Tibetan mathematics teachers, the differences and commonalities of teaching behaviors of mathematics teachers of different grades are analyzed, so as to find out the existing teaching problems. In addition, in order to ensure the objectivity and accuracy of classroom information , 720 students in the attending classes were surveyed to reveal the nature of classroom behaviors and the status of students' mathematical learning(672 valid questionnaires were collected, with an effective recovery rate of 93%). The reliability of the questionnaire is shown in table 1:Good reliability (=0.866>0.8).At last, the influence of teachers' teaching behaviors on students is clarified through the visual display of data and dynamic classroom description.

TABLE I RELIABILITY ANALYSIS

Cronbach's Alpha	N of Items
.866	24

With the help of FIAS auxiliary coding software, the linguistic behavior of teachers and students in 12 math classes recorded are coded according to the improved code table of classroom teaching behaviors (as shown in table 2).Each lesson lasts for about 40 minutes and is encoded every 3 seconds, generating n codes in total, such as "4,6,5,7,2,6,9... ", that is, n-1 sequence pairs, such as (4,6) (6,5) (5,7) (7,2) (2,6) (6,9)... .[3]Then input the sequence pair into the matrix table, the rule is: the first number of the sequence pair represents the row, the last number represents the column, such as (4,6) is the cross lattice of the fourth row and the sixth column. Finally, according to the calculation of relevant formulas, [4]the information about the four dimensions of classroom structure, teachers' teaching style and tendency, classroom questioning method, classroom evaluation and teaching evaluation is obtained, as shown in table 3.

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TABLE II CLASSIFICATION AND CODING TABLE OF CLASSROOM TEACHING BEHAVIORS

classification		code	content	Simple explanation
Language behavior of teachers	Indirect effects	1	Express emotion	Accept and adopt students' emotion and clarify students' attitude
		2	Praise or encouragement	Raise or encourage the student's behavior
		3	Adopt the student's view	Affirm or repeat the student's opinion
		4	Ask individual students	Ask individual students questions, call by name
		5	Ask all the students	Ask all the students questions and the whole class answers
	Direct impact	6	Instruct	Provide facts and opinions relevant to the course
		7	Order	Ask students to do certain behaviors through language
		8	Criticism	Criticize students for correcting or improving their classroom behavior
Language behavior of students		9	Reply	Answer the questions within a limited range
		10	Volunteer questions /answers	Express opinions and ideas freely
		11	Discuss with peers	Discuss and exchange ideas with peers
Silent confusion language		12	The chaos of the useless	A temporary period of silence or confusion in teaching
		13	helpful silence	Take notes, practice, meditate, blackboard writing

TABLE III VARIABLE STATISTICS OF TEACHERS IN THREE GRADES

	Grade seven	Eighth grade	Ninth grade	norm
Teacher language ratio(TT)	54.17	56.32	52.43	68
Student language ratio(PT)	19.71	18.03	23.25	20
The ratio of quiet to chaos(SC)	26.13	25.66	24.33	12
Direct impact ratio	34.05	36.30	36.34	\
Indirect impact ratio	20.12	19.27	16.09	\
Teachers indirect and direct impact ratio(I/D)	59.09	53.09	44.28	\
Teacher response ratio(TRR)	54.17	36.72	26.70	42
Teacher's question rate(TQR)	37.01	37.96	30.67	26
Student question rate(PIR)	1.67	1.43	1.23	34

A. Classroom structure and teaching style

The data in table 3 is the grade average quantity formed by averaging the variable statistics of 12 math classes in three grades. Through mutual comparison, it is found that the language ratio of teachers in three grades is higher than that of students, and the cumulative teaching time of teachers in each class is about 25 minutes, accounting for more than half of the class time. It can be seen from this that the students' dominant position in the classroom is not obvious, and the teacher's language is too much. Therefore, it belongs to the teacher-dominated classroom, which focuses on knowledge transfer. And the classroom structure tends to be stable.

The influence of teachers' classroom language can be divided into indirect influence and direct influence. Indirect effects include the transmission of emotion, encouragement and praise, the adoption of ideas, questions, to show the teacher's positive reinforcement of students; the direct influence is divided into explanation, instruction and criticism, which indicate teachers' negative reinforcement to students. The different frequency of using these two expressions in class reflects the different styles of teachers' classroom teaching. Through literature analysis, it is shown that teachers' positive reinforcement behavior is the main motivation to improve teaching effect.[5]Table 4 shows that teachers of different grades have significant differences in positive reinforcement behavior ($P=0.00<0.001$), in which the value of the third grade is the lowest and the value of the first grade is the highest, indicating that teachers of the first grade pay more attention to emotional communication in teaching than teachers of the second and third grade, and the teaching style is more diversified, which is conducive to the cultivation of students'

non-intellectual factors. From the perspective of teachers' language behaviors, the indirect influence of teachers on students is lower than that of direct influence. [6]Although there are more or less positive reinforcement behaviors in classroom teaching, overall, classroom teaching tends to directly control students.

TABLE IV THE DIFFERENCE OF POSITIVE REINFORCEMENT BEHAVIOR OF MATHEMATICS TEACHERS IN DIFFERENT GRADES

	N	Mean	Test of Homogeneity of Variances			Std. Deviation	95% Confidence Interval for Mean	
			df	F	Sig.		Lower Bound	Upper Bound
Grade seven	212	30.6415				2.85574	30.2549	31.0281
Eighth grade	220	25.0292	2	131.567	.000	5.00159	24.3932	25.6652
Ninth grade	240	24.1636				5.19840	23.4729	24.8544

B. Classroom questioning behavior of teachers

Classroom questioning is an important way of ideological exchange between teachers and students in the teaching process, and a bridge and medium between teachers, textbooks and students [7]. Effective classroom questions can give students timely feedback, promote their thinking development and enhance their learning initiative [8]. Table 3 shows that all the teachers' question-asking ratio is higher than the norm, which indicates that the math teachers of the three grades like to use the question-asking method to organize teaching and have certain classroom coordination and organization ability. Questioning behavior can be divided into closed questioning (training questioning) and open questioning (innovative questioning).It can be seen from the variance test that there is no significant difference in the three grades of question types, as shown in table 5.Combined with the classroom record, most teachers are using closed questions, especially such as "is it so?" ", "right? ", "is the proof good enough?" and so on. This kind of repetitive questions are mostly, and students can only limit themselves to the mechanical answers of yes or no, which makes it difficult for students to develop their creativity and is not conducive to the development of students' initiative and innovative thinking.

TABLE V DIFFERENT TYPES OF CLASSROOM QUESTIONS FROM DIFFERENT TEACHERS

		N	Mean	Std. Deviation	Std. Error	F	Sig.
Training question	Grade seven	735	183.75	58.266	29.133	.436	.659
	Eighth grade	750	187.50	13.178	6.589		
	Ninth grade	664	166.00	7.746	3.873		
Innovative questioning	Grade seven	109	27.25	4.113	2.056	.710	.517
	Eighth grade	101	25.25	1.500	.750		
	Ninth grade	98	24.5	3.873	1.913		

The students' question-asking ratio in table 3 can reflect the students' initiative to speak, which shows the students' lack of initiative and enthusiasm in class. In addition, table 5 shows that the number of innovative questions is much lower than the number of training questions, which reflects that teachers rarely ask individual students to answer by calling the roll, and all of them are completed in the form of collective answers. It is easy for students to "follow the trend" and "pretend to know what they don't know", and it is difficult for students to reflect their creative and divergent thinking. In the seemingly active classroom, students' active participation is not high, and more time is in the state of passive traction, leading to the lack of classroom generation. Therefore, strengthening students' learning initiative is the key to effective teaching.

C. Teachers' feedback on students' classroom performance

Teachers' evaluation and feedback based on students' classroom performance is a summary and support of students' current learning, as well as the guidance and encouragement for the next step of learning. This kind of evaluation feedback is mainly reflected in the response of teachers after students answer questions (including active answers and responses), which can be divided into direct teaching, expressing emotions, praising or encouraging, adopting students' views, questioning, criticizing and issuing instructions. Direct teaching can be called no feedback, which is denoted by A; Expressing emotion, praising, encouraging and adopting students' opinions can be called positive feedback, which can be expressed in B. Issuing instructions and criticism can be called negative feedback, and denoted by C. In order to make it easier to count

the feedback behaviors of teachers after students answer questions, we can use the form of set to represent the coding sequence pairs corresponding to each feedback behavior:

$$A:\{(x,y)|x\in[9,10],y=6,x,y\in z\},B:\{(x,y)|x\in[9,10],y\in[1,5],x,y\in z\}$$

$$C:\{(x,y)|x\in[9,10],y\in[7,8],x,y\in z\}$$

(x represents the corresponding codes of students' answering behaviors, and y represents the corresponding codes of teachers' feedback behaviors).Although the feedback behavior of teachers is not as much as that of no feedback, each teacher will more or less accept, praise or encourage the answers of students, and show little negative feedback. In addition, combining with the response ratio of teachers in table 3, the difference in teacher feedback among different grades can be compared horizontally, showing that the feedback ratio of grade 7 is larger than that of grade 8 than that of grade 9, among which the feedback ratio of grade 8 and grade 9 teachers is lower than the norm. Since students are teenagers, their learning behaviors are mostly generated by stimulus-response(S-R) under external reinforcement. Teachers' feedback and evaluation in class can not only help students master knowledge and improve their abilities, but also improve their sense of self-efficacy and enhance their learning interest. Through classroom observation, although many teachers showed positive feedback behaviors in these 12 classes, they should pay more attention to classroom feedback behaviors as a whole.

TABLE VI TEACHER'S EVALUATION AND FEEDBACK BEHAVIOR

Grade	Grade seven				Eighth grade				Ninth grade			
Class	1	2	3	4	1	2	3	4	1	2	3	4
The number of A	50	76	48	67	71	58	59	63	55	62	64	68
The number of B	22	62	37	48	33	48	42	43	37	40	41	40
The number of C	5	7	6	9	8	10	7	11	5	4	6	9

III. SUGGESTIONS ON IMPROVING CLASSROOM TEACHING BEHAVIOR OF TIBETAN MATHEMATICS TEACHERS

A. *Establish the teaching value belief of learner center*

Although the classroom structure arrangement and teaching style of the 12 Tibetan junior middle school mathematics teachers have different performance for different grades, most of them are mainly dominated teaching and negative reinforcement, ignoring the main character of students. Reasonable coordination of the relationship between teachers and students plays a vital role in improving teaching quality. Only by adhering to the principle of student-centered education, regarding students as developing persons, paying attention to the unity of students' development potential and diversity, and carrying out individualized teaching according to students' different characteristics, can we prevent "guidance" from changing into "control" in the teaching process. Since most students in Tibetan schools come from rural or pastoral areas, students' hard-working and united character is recognized by teachers as one of the major advantages, which is also the prerequisite for cooperative learning. Combining this feature, organizing mathematics teaching can not only get rid of the situation of "full" classroom teaching, but also enhance its interest. Therefore, according to the cognitive characteristics of students in teaching, combined with Tibetan culture and life examples to illustrate relevant issues, not only can achieve the combination of theory and practice, but also facilitate teaching.

B. *Propose questions based on students' mathematical thinking*

Based on the phenomenon of less creation, less generation and more mechanical training in class, improving the quality and efficiency of classroom questioning becomes the key to teaching. The math class needs more creative questions to mobilize students' thinking participation, and to promote students' mechanical answers with low cognition to creative answers with high cognition. And a question-and-answer mode of "teachers organize questions -- teachers give stimulation -- students react spontaneously -- teachers give feedback -- students take the initiative to answer again" is formed in multiple question-and-answer sessions, so as to enhance students' thinking training. In addition, the quality of classroom questioning does not depend on its frequency, but on whether it can cause students to think actively and whether it can realize the function of inspiration. In a word, only by asking innovative questions and making students the subject and teachers the guide can we achieve the real success of teaching.

C. *Establish a scientific and reasonable teaching evaluation system*

Teachers in Tibetan areas are influenced by students' learning foundation and the trend of educational situation, so most teachers attach more importance to teaching progress and tend to neglect the promotion effect of evaluation and feedback on students' development. As shown in figure 1, the linear regression equation with one variable obtained by data fitting shows that teachers' positive evaluation is positively correlated with students' interest in learning mathematics. This shows that students need teachers to give a positive stimulus to produce the corresponding learning response, and teachers expect to be

the source of students' learning passion, affecting the display of students' learning behavior. Therefore, no matter what teaching mode and teaching style, teachers must consider the possible impact of evaluation on students' enthusiasm for learning. In this regard, based on the concept of developmental evaluation, a classroom evaluation model is established to promote the development of students, and each evaluation is regarded as the cornerstone to promote the long-term development of students, and students are encouraged to become evaluators, so as to realize the simultaneous progress of teacher growth and student development.

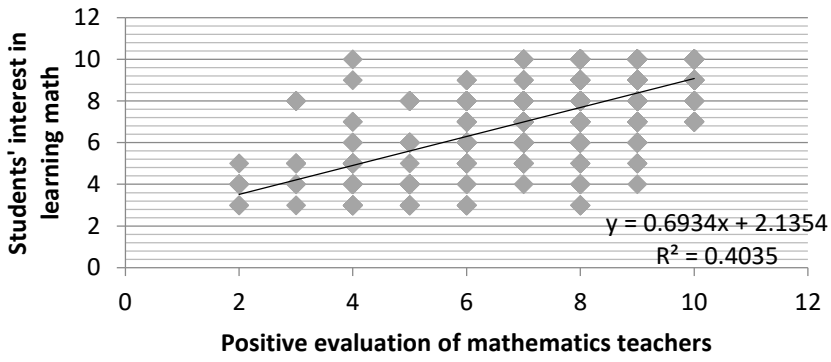

Fig. 1 The linear relationship between teachers' positive evaluation and students' interest in mathematics learning

IV. Conclusion

We should comprehensively consider the influence of teachers' classroom teaching behaviors on students from various aspects, evaluate teaching scientifically and objectively, strengthen the communication and interaction with students, and form a democratic, equal and harmonious classroom teaching culture, which will serve as a foundation to improve the quality of classroom teaching in Tibetan areas.

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