Strategies for Classroom Language Behaviors: A Case Study of Primary School Mathematics Classes with Bilingual Education

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Abstract. The most important thing for an instructional classroom is to make it efficient and easy for students to learn. The teacher's use of language plays a pivotal role in the classroom. In a bilingual classroom, the use of teacher language is not only about whether the students learn, but also about whether the students understand the teacher's second language correctly and whether they learn the correct knowledge. Therefore, the use of teacher language in the bilingual classroom is even more important. This paper analyzed the teacher's use of teaching language, which are written language, spoken language, and body language, in a case study of a bilingual mathematics classroom. Next, this paper analyzed the grammatical problems of the second language, the pedagogical knowledge problems, and the possible emergencies in the classroom. To address these possible emergencies in the classroom, this paper suggested strategies for using the teacher's language and how to design the classroom beforehand, in order to help the classroom complete smoothly, improve the efficiency of the bilingual classroom, and help students gain more knowledge.

Keywords: Teaching Language; Bilingual Education; Primary School Mathematics.

1. Introduction

People's thoughts and opinions need to be expressed through language. Language has the functions of cognition, transmission, reflection, and creation, which create and support the human soul [1]. The language of teachers is a professional language of professional communication and is used mainly in teaching activities. Classroom teaching is a process of mutual communication and exchange between teachers and students, and the language of teaching is the most effective and direct tool for teachers to convey their ideas and insights and to facilitate communication activities between teachers and students, between students and students and between students and teaching materials [2]. In this paper, teachers' language is divided into three categories, namely written language, oral language, and body language. Written language refers to the language that reproduces the intellectual language from the textbook in the form of words on the board and then presented to the students' eyes. Oral language refers to the language that conveys information and communicates thoughts and feelings through speech. An effective classroom requires the teacher to pronounce the words accurately and clearly and also requires the teacher to form beautiful and beautiful language in the teaching process to increase the interest of the class so that students can complete the course easily and happily [3]. The third type of language is body language, which refers to the teacher's every move during the teaching activity. The use of body language is based on verbal language to enrich the ideological and emotional and curricular content. The teacher's class is the centerpiece of the entire teaching activity, and verbal expression is the most important tool in the teaching activity and an effective carrier of the teacher's educational guidance to students. The correct use of teachers' language is directly related to the efficiency of teaching activities [3].

Written language, spoken language, and body language have different manifestations in different classrooms. For example, the bilingual classroom is a typical application scenario. The Encyclopedia of Bilingual and Bilingual Education explains that bilingualism is a situation in which schools use two languages to teach the content of mathematics, science, humanities, and other subjects in schools. [4] Teaching in bilingual classrooms means that teaching involves more complex content and requires an in-depth understanding of teaching objectives and instructional design. It is also more challenging...
Regarding the use of teacher language in the bilingual classroom. Bilingual classrooms are cited because previous research on teacher language has focused on monolingual classrooms, and there has been little research on teacher language in bilingual classrooms, especially bilingual mathematics classrooms.

Mathematics is a logically clear and rigorous, standardized subject. The greatest peculiarity of the subject of mathematics is that it contains both abstract and figurative aspects, and elementary school mathematics is no exception [5]. However, students at this stage of learning are between the ages of seven and twelve, and they are still at a stage of immature physical and mental development and limited cognitive ability. Therefore, it is very difficult to learn mathematics, a subject that is both abstract and figurative, and very logical [5]. Therefore, how teachers improve students' mastery of mathematical knowledge through teaching is extremely demanding for the use of teacher language. The traditional language of mathematics classrooms, with its one-sided emphasis on standardization, science, and accuracy, has challenged the vitality of mathematics classroom teaching and has become almost synonymous with "tedious" [6]. If we want to change the situation of boring language in traditional mathematics classrooms, we need to start from the root, that is, to improve the use of teacher language in the classroom. Teachers, through language, need to systematically impart mathematical knowledge that has a rigorous logic to students. This process also requires ensuring smooth emotional communication between teachers and students and needs to enhance students' thinking skills and ensure their enthusiasm for the subject. Therefore, it requires teacher language that is correct, objective, enlightening, and artistically interesting [3]. Therefore, it seems that all three types of teacher language are indispensable in the classroom, and all three contribute to and support each other.

In general, few previous studies have conducted comprehensive analyses of bilingual classrooms and mathematics classrooms together. Therefore, this paper discusses the problems and improvement measures of teacher language in bilingual mathematics teaching classroom case as a reference object. In addition, we will discuss how to use the teacher's language in a bilingual classroom in order to maximize the effectiveness of the classroom. How can students acquire knowledge in the most efficient way? What is the most effective way to interact with students in a second language?

2. Methodology

2.1 Classroom observation

Through video and audio of elementary school mathematics classrooms, classroom observations were made, especially in-depth observations of the process of teacher-student verbal interaction in the classroom, to determine the current status of teachers' behavior in the classroom.

2.2 Data analysis

Approach to making inferences: Using what is observable in the data to make claims about how participants are accomplishing teaching and learning. Open to discussing participants' effect if there is evidence in the data (Jordan & Henderson, 1995). By analyzing CA transcript and understanding the specific process of classroom teaching, it is helpful to grasp the basic features of teacher language, and teacher-student interaction in the classroom.

3. Discussion

In this paper, we discuss the cases of bilingual mathematics classrooms. Since the research case involves two major issues, teacher language, and bilingual education. These two issues are independent of each other and cannot be discussed at the same time, so the discussion is divided into two parts, which are teacher language and bilingual education.
3.1 Teacher Language in the Bilingual Mathematics Classroom Problem Discussion

In this part, we discuss the issues related to teacher language, and the discussion is divided into three parts.

3.1.1 Simple and Clear Written Language Help Students Understand the Knowledge Directly

In classroom teaching, the written language involved is mainly the board, i.e., the presentation of classroom content on the blackboard. With the development of technology, the board book is used together with multimedia teaching aids, thus the written language in the classroom is not only the board book but also the electronic whiteboard and other devices. All these tools are designed to help teachers better use written language in the classroom so that they can accomplish their teaching objectives and maximize teaching efficiency. The role of the written language in the classroom, represented by the board and the electronic whiteboard, is to visually present the knowledge point exercises and highlight the important and difficult points to achieve the teaching objectives [10].

\begin{align*}
1 \text{ minute} &= 60 \text{ seconds} \\
1 \text{ hour} &= 60 \text{ minutes} \\
1 \text{ day} &= 24 \text{ hours} \\
1 \text{ month} &= \frac{30}{31} \text{ days} \\
\text{February} &= 28 \text{ days} \\
1 \text{ year} &= 365 \text{ days} \\
\end{align*}

Fig. 1 Whiteboard

Fig. 2 Blackboard

In this case, the teacher simply wrote down an example on the board and used arrows to point to the corresponding concepts. May corresponds to month, 6th corresponds to the day, and 2016 corresponds to a year. Although simple, it helps students to understand visually what the year, month, and day are. In addition, the teacher needs to conduct classroom questioning sessions, classroom interaction sessions are displayed on the whiteboard, or each student is given the paper needed for classroom activities in advance. The language on the blackboard is something that takes time to complete in class, but the electronic whiteboard can be prepared in advance, which not only allows students to understand the relevant points directly, but also saves classroom board time, improves the efficiency of the teacher's instruction, and increases classroom efficiency.
3.1.2 A Combination of Polite Phrases and Gestures to Move the Classroom Forward Effectively

Verbal communication is an important part of human life, and politeness is a principle that people consciously or unconsciously observe in the process of verbal communication. The social function of politeness is to maintain harmony between people, to eliminate resistance and to facilitate cooperation [12][13]. Activities in bilingual mathematics classrooms are primarily instructional in nature, but still communicative in nature. The classroom itself is a communicative place because all activities in the classroom are made possible through interpersonal communication [12][14]. Teachers and students first have to establish a social relationship, and thus teachers need to consider how to successfully interact with students in the classroom and how to keep the classroom atmosphere harmonious and cordial, which makes the politeness factor an important issue that teachers must consider [12].

In the classroom, the teacher habitually uses polite language such as Thank You, Please, etc. At the same time, the teacher uses these words with a tone of voice that not only makes the students feel respected but also makes the teacher's teaching lively for the students. When a student's answer is incorrect, the teacher will also use a questioning tone to say "really" to let the student find out the error himself, instead of denying the student's answer directly and discouraging the student's motivation! In addition, when the teacher asks students to answer a question, she uses the "please" gesture, with four fingers together, instead of "pointing" at the student who needs to speak with her index finger. In addition, when students answer the questions, the teacher smiled throughout the whole process, paying attention to the students who spoke, so that students felt respected, and when the students who spoke behind the students near the aisle, the teacher also walked toward that student and stood by his side, to close the distance between the students on the ground, but also to close the distance between the students' hearts. Whether a classroom can be completed efficiently cannot be done by the teacher alone or by the students alone, but requires a concerted effort. These behaviors, although not related to classroom knowledge, all unconsciously help the teacher to draw closer to the students and keep them engaged in the classroom, thus moving the classroom forward effectively.

3.1.3 Equal Discourse Rights for Teachers and Students to Ensure the Existence of "Real Language" in the Classroom

In his Philosophy of Existence, Jaspers states that "whatever is beneficial and useful to existence is true; whatever is harmful, hindering, or inhibiting to it is false" [7]. The term "authentic language" was coined concerning its literal and meaningful formulation. Authentic language refers to the language of effective interaction in classroom teaching and learning that contributes to the intellectual generation and spiritual growth of learners. It helps to generate effective teaching and learning [8]. Whether "authentic language" is generated or not is mainly reflected in the attitudes of teachers and students towards knowledge presented in the classroom [8]. There are two main reasons for the lack
of "authentic language". The first one is the unequal power of teacher-student discourse, where the teacher has absolute discursive authority, and the second one is the lack of organic presupposition of classroom teaching, where the teacher fails to prepare presupposition discourse to complete the class successfully [9].

In the classroom case mentioned in this article, the teacher has tried to equalize the discourse with the students. Regarding each point of knowledge in the classroom, the teacher does not seize all the discourse but interacts with the students by asking questions and guiding them step by step to understand and feel the relevant knowledge. For example, at the beginning of the lesson, regarding the understanding of the abstract concept of time, the teacher designed for students to complete 12 arithmetic problems in one minute. This is a review of old knowledge that leads to new knowledge, which is a review of previous knowledge and also gives students a realistic experience of how long a minute is. Then, the teacher will point out the topic of how long a minute is and what time is, to make the abstract concept concrete. In addition, every time the teacher threw out a question, many students raised their hands to answer the question, and the classroom atmosphere was active and well organized. This shows that students are willing to accept the teacher's lecture and participate in the class, which confirms the effectiveness of classroom teaching in this case. The fact that classroom questions were part of the design process means that the teacher in the case had a reasonable amount of forethought in the design process.

3.2 A Discussion of the Problems of Second Language Use in Bilingual Mathematics Classrooms

In this part, we discuss the problems related to a second language, and the part is divided into three parts.

3.2.1 Inaccurate Use of the Teacher's Second Language will Cause Students to Have Misconceptions about the Grammar of the Language

There is a subtle relationship between the native language and the second language. In the classroom, the correct use of the teacher's classroom language can help students learn the points correctly, and is more conducive to the development of students' ability to use the second language, their awareness of the communicative value of the target language, and the development of their communicative competence[11].

In the classroom of the case, the teacher made grammatical errors during the lecture. For example, saying the singular calendar as the plural calendar causes grammatical errors. Although the students can understand the meaning of the whole sentence and correctly understand what the teacher wants to say, the wrong grammar will cause the students to have a wrong perception of the language grammar. The teacher has authority over the students, and the students may think that what the teacher says is right, and the students may take this incorrect grammatical error as correct and use it in other places, which may cause more serious errors.

3.2.2 Teachers Need to Effectively Understand and Correctly Guide Students' Incorrect Use of the Second Language

In the case study classroom, one student wanted to actively answer the teacher, and it was clear from the student's state that the student knew the answer, but was stuck in answering the question because he or she had to use a second language to answer the question. In both instances, the teacher was focused and eagerly awaiting the student's answer, but in the end, the student did not organize the language correctly. Only then did the teacher use keywords to guide the student to the correct answer. A teacher guiding a student to answer a question requires the teacher to have an accurate prediction of whether the student has an answer and what answer the student wants to answer so that he or she can guide the student correctly. This requires not only the teacher's ability to adapt to the situation but also the teacher's ability to design the class with accurate predictions and solutions to the problems that will occur. Because the classroom is taught in a second language, this requires a higher and more complex level of anticipation.
4. Solutions and Suggestions for Bilingual Mathematics Classroom

In the last part, we discuss the potential problems in a bilingual mathematics classroom. The teacher in this case solves these problems well, but not every issue can be solved in a good way. Besides, there are some issues that did not happen in this case. As a teacher, what should do is have a good instructional design. Presupposition is often used in instructional design. In this section, we discuss the role and use of presupposition mechanisms in instructional design.

4.1 Understanding of Presupposition Mechanism

Presupposition is a complex but pervasive linguistic phenomenon, a concept first introduced in 1892 by the German philosopher and mathematician Frege in On Meaning and Referentiality [15]. In this paper, the presupposition mechanisms mentioned in the text are divided into two main categories, namely, linguistic presupposition mechanisms and presuppositions of teaching sessions. Regarding language presupposition mechanisms, it plays an important role in linguistic communication. The study of language presupposition has two perspectives, broad and narrow. In a broad sense, presupposition refers to the fact that speaking and writing assume information that is already known to the other person, and in a narrow semantic perspective, presupposition is inferred from such speech fragments as sentences, where presupposition is already embedded in the meaning of the sentence and where presupposition is the basis and prerequisite for the sentence to be formed [18]. With regard to presupposition in the instructional design process, this paper defines it as the teacher's anticipation of the instructional aspects of the classroom, the use of instructional language in the classroom, the problems that will arise in the classroom, and the development of appropriate solutions in advance during the instructional design process.

4.2 Application of Presupposition Mechanism in Teaching

In the section, we discuss three solutions for the use of presupposition mechanisms, which are the use of presupposition mechanisms in classroom content design, the use of teacher language design, and how else to presupposition when teaching in a second language.

4.2.1 Application of Presupposition Mechanism in Classroom Question and Answer Session

Classroom teaching is accomplished through the interaction of teachers and students together. In the process of linguistic communication, there is the phenomenon of linguistic predetermination. In the case classroom, when students are unable to answer a question, the teacher presumes the answer that the student wants to tell through linguistic presupposition, which is a manifestation of the mechanism of linguistic presupposition in a narrow semantic perspective. Students' inability to answer a question, or answer the wrong question, is the most common phenomenon in the classroom. This requires that the teacher be able to give the correct solution as soon as possible when faced with a similar problem. Therefore, teachers need to take into account the problems that may arise in the classroom during the design process. This is a reflection of the value of instructional design. By grasping the important points and objectives of teaching, teachers anticipate students' reactions during the teaching process and design the question-and-answer session to gradually guide students' thinking. The design of the lesson requires the teacher to have a clear and accurate understanding of the learning situation, the students, and the important and difficult points of the material.

4.2.2 Application of Presupposition Mechanisms in Teachers' Language Design Sessions

The classroom is a joint effort between teachers and students, but the teacher should play a role in moving the classroom forward. Therefore, the use of written, spoken, and physical language in the classroom needs to be clearly predetermined in the instructional design process. Although the content of each lesson is different, it is important to master the simplicity and accuracy of written language in advance. With regard to the use of spoken language, each lesson will teach a different point, focusing on the accuracy, artistry, and more importantly, politeness of the language when teaching. Compared with spoken and written language, body language is more stable, so teachers can design
some subjects to mobilize the classroom atmosphere with polite instructional actions in the teaching design. Training in the simplicity and clarity of written language, grasping the accuracy, artistry, and politeness of spoken language, and designing polite gestures can and need to be accomplished by pre-designing classroom situations during instructional design.

4.2.3 The Use of a Second Language in Teaching and Learning

The European Centre for Modern Languages (ECML) considers language as the core of learning and communicative competence as a transversal competence. transversal competence can be understood as a combination of creative thinking, interpersonal skills, and global citizenship. It can be understood as a combination of innovative thinking, interpersonal skills, and global citizenship. Teachers should have transversal competence in order to integrate knowledge, skills, and expertise to provide high quality instruction to students [17]. For teachers who need to teach in a second language, having good transversal competence is even more important. This is because, in the second language classroom, the teacher has to consider not only the students' acquisition of subject knowledge but also the correctness of the students' grammatical use of the language in the second language. Thus, the teacher's use of the second language and the teacher's language in the classroom are more demanding. This requires teachers to anticipate their linguistic errors before the lesson and to design their teaching to address possible problems such as intonation, grammatical errors, and poor vocabulary.

5. Conclusion

This paper discusses two perspectives on teacher language and bilingual teaching through specific bilingual mathematics classroom case studies. In the discussion panel on teacher language, teacher language is divided into oral language, written language, and body language. The specific performance of the teacher in the classroom in the case study was analyzed from three different perspectives. In the discussion section of second language teaching, the language problems of the teacher in the case were discussed, as well as the unexpected situations in the classroom and the teacher's responses.

The fourth section proposes solutions to the problems that arose in the classroom, the specific performance of the teacher, and the specific performance of the students. Instructional design is a critical component in order to deal with the problems that can occur in the classroom, reducing avoidable classroom emergencies, engaging students in the classroom, and improving the efficiency of the lesson and thus the students' acquisition of knowledge. Before the class, the teacher prepares the class and the presupposition mechanism becomes a necessary part of the instructional design. Therefore, the solution proposed in Part IV is to use presupposition mechanisms in the instructional design process. This will improve the science and accuracy of instructional design, improve the quality of instructional design, and maximize the efficiency of the second language classroom.

There are still significant limitations to the study of teacher language use in second language mathematics classrooms in this paper. First, although bilingual teaching exists, it is still not a common situation, so there are constraints in case selection, and few cases can be selected and studied. Second, the cases used in this paper were specially recorded and not in the usual classroom, so in the case classroom, teachers consciously avoid some problems that may occur in the usual classroom during the lesson. In that case, the findings of the study are not very applicable to usual classroom teaching or other bilingual teaching classrooms. In addition to this, the subject of the case study classroom is mathematics, and each subject has different characteristics and therefore different use of teacher language, so the classroom case studies in this study cannot be perfectly matched with other bilingual classrooms in other subjects.

In this study, although the practical strategies of teacher language in bilingual teaching classrooms were involved, the logical relationship between bilingual teaching and teacher language was not discussed closely during the discussion. In addition, the amount of research literature on the strategies of using teacher language in bilingual teaching classrooms is small, so the literature base of this study is weak. In future research, I hope to learn more about bilingual teaching classrooms in different
disciplines so that I can compare and analyze the use of teacher language in different bilingual classrooms and propose more substantial solutions to improve the efficiency of classroom teaching, especially in bilingual classrooms.

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