

Study on the Role and Problems of Learning Feedback in Primary School Mathematics Classroom Teaching

Huimin Liu^{1,a,*}

¹*School of Economics and Management, Jiangxi University of Science and Technology, Ganzhou, Jiangxi, China*

a. miyan@asu.edu.pl

**corresponding author*

Abstract: In education, learning feedback has received widespread attention as an important means to improve students' learning outcomes. However, implementing feedback in primary school mathematics classrooms is still insufficient. Problems such as inadequate feedback and inappropriate feedback seriously affect students' learning outcomes and the development of mathematical thinking. This paper takes primary school mathematics classrooms as the research background and systematically analyzes the current feedback status and problems. The paper also explores the causes of insufficient and inappropriate feedback, especially the impact of tight class time and insufficient teacher feedback skills. The research shows that optimizing feedback strategy is the key to improving the quality of primary school mathematics teaching. Based on the analysis results, this paper makes the following recommendations: combining clear feedback goals with inquiry-based teaching, diversified feedback methods adapted to the level of inquiry, combining precise feedback content with assessment type, adjusting feedback timing and frequency, and improving teachers' feedback skills. The application of these strategies can effectively solve the feedback problem in primary school mathematics classrooms and provide a reference for teaching reform in primary school mathematics.

Keywords: Feedback, inquiry-based learning, elementary mathematics, formative assessment.

1. Introduction

In today's wave of global education reform, focusing on how to enhance students' learning outcomes is one of the important topics in educational research. As a key teaching strategy, feedback has been widely recognized as an effective way to improve learning outcomes, motivate students, and improve understanding. Especially in the primary school stage, students are in a critical development period of cognitive ability and learning habits. Appropriate feedback can help them adjust their learning methods in time and deepen their understanding of knowledge. However, there is still a significant gap between the practice and theory of feedback in primary school mathematics education. The role of feedback is evident in elementary school math classrooms. Feedback can not only guide students to find mistakes and improve learning methods but also stimulate students' interest in learning through timely affirmation. However, there are a series of problems of insufficient feedback and improper feedback in practical teaching. If feedback is too general or lacks personalization, students will not be able to effectively use the feedback to improve their learning. In addition, some teachers may

neglect timely and effective feedback due to curriculum pressure or teaching time constraints. In some classes, feedback sessions are absent altogether. These phenomena greatly reduce the effectiveness of feedback in primary school mathematics education and hinder students' learning progress.

Although the importance of feedback in education has gradually received attention, research on feedback in primary school mathematics classes is still relatively limited. At present, there is a lack of systematic analysis of classroom feedback in primary school mathematics. There is also a lack of specific solutions to the problem of inadequate and inappropriate feedback. Therefore, this study will explore solutions by analyzing the current situation and problems of feedback in primary school mathematics classrooms. To improve the quality of classroom teaching and promote the development of students' mathematical thinking. This study aims to provide feasible solutions to the problems of feedback in primary school mathematics education. These solutions can promote the effective use of feedback in primary school mathematics classes and the healthy development of primary school mathematics education.

2. Literature Review

2.1. Basic Theory of Feedback

In the field of education, feedback is the evaluation, suggestion, or guidance provided by teachers or peers on students' learning behaviors and outcomes [1]. The core purpose of feedback is to help students recognize their strengths and weaknesses in learning, adjust their learning methods, and improve their learning outcomes.

The main types of feedback are oral feedback, written feedback, self-feedback, and peer feedback. Among them, verbal feedback refers to the verbal suggestions or comments given by teachers or peers in real time in class. Written feedback refers to specific suggestions or corrections given in writing during an assignment or test. Self-feedback refers to students' autonomous adjustment of their learning behaviors based on feedback from self-evaluation or reflection. Peer feedback refers to mutual evaluation and guidance among classmates, which enhances collaboration and multi-angle reflection [2].

Feedback usually includes four levels: task-level feedback, process-level feedback, self-regulation-level feedback, and personal-level feedback [1]. Among them, task-level feedback is feedback for specific tasks or problems. Task-level feedback is mainly to check whether the student's answer is correct or to observe the student's task completion. This kind of feedback focuses on the performance of students on tasks, and can effectively measure the level of students to complete the set task. Process-level feedback aims to focus on the methods and processes of students completing tasks, helping students understand the way, steps, and logic of completing tasks. This feedback can help students optimize their problem-solving ideas or learning methods and improve the quality and efficiency of task completion. Self-regulation feedback aims to help students improve their self-regulation ability. For example, reflect on, monitor, and adjust your learning process. This type of feedback can guide students to proactively identify their own mistakes, propose improvement measures, and enhance their ability to solve problems independently. Personal feedback involves an evaluation of the individual student. Such as praise and encouragement, which are designed to motivate students. This feedback helps boost students' self-confidence. These four levels of feedback have different focuses and need to be used in combination to help students improve their learning outcomes overall.

2.2. Research on the Application of Feedback in Primary Education

Feedback plays an important role in primary school. Primary school students' cognitive level and abstract thinking are still in the initial development stage. And it is easy for them to have

misunderstandings or completely misunderstand [3]. Elementary school math includes basic operations, geometry, and logical reasoning, concepts that may be difficult to understand at the beginning. Feedback can help students understand these mathematical concepts, find and correct errors in time, deepen their understanding of knowledge, and avoid cumulative errors. Secondly, to learn mathematics is not only to learn specific knowledge but also to train the way of thinking. Through feedback, teachers can guide students to think about the process and methods of solving math problems and help them draw parallels. Feedback can gradually cultivate students' logical thinking, analysis, and reasoning abilities, laying a solid foundation for subsequent mathematics learning. Moreover, Solving problems is often needed in mathematics learning, and feedback is an important tool to help students improve their problem-solving ideas. Through feedback, the teacher points out the problems in the process of solving the problems and guides the students to reflect and improve. In the long run, it can improve students' comprehensive ability to solve mathematical problems. In addition, mathematics is relatively abstract and challenging for some primary school students. Students tend to lose confidence and become afraid of difficulties when they encounter difficult problems. Through encouraging feedback, teachers can help students overcome their fear of math. Good feedback can make them feel like they're making continuous progress and boost their self-confidence. Primary school is a critical period for learning habits. Through feedback, teachers can guide students to form the habit of answering questions regularly [4]. Developing good math learning habits can help primary school students make long-term progress in math learning. Furthermore, primary school students have different learning styles and cognitive levels. Personalized feedback can help teachers provide targeted instruction to primary school students and respect the uniqueness of each student [5].

2.3. The Current Status of Research on Feedback Issues in Primary School Mathematics Classes

In recent years, there have been few literature studies on classroom feedback in primary school mathematics. As for feedback, most literature studies feedback in higher education classrooms. There are relatively few studies on classroom feedback in primary schools, and little attention has been paid to them. There are many feedback studies about math classrooms. Different age groups have different levels of feedback. Most of the literature on math classroom feedback focuses on college classrooms. Therefore, there is still a research gap in the area of mathematics feedback in primary school classrooms.

3. Current Situation and Problem Analysis of Classroom Feedback in Primary School Mathematics

In primary school mathematics teaching, feedback is an important teaching link, which should provide timely and accurate guidance for students' learning. However, the current situation of primary school mathematics classrooms has a direct impact on students' mathematics learning effect.

3.1. Problem Analysis

3.1.1. Insufficient Feedback

In primary school mathematics classes, teachers often face the challenges of tight class time and intensive teaching content. This results in insufficient feedback frequency of students' questions. In many primary school math classes, teachers only pay attention to explaining knowledge points and completing established teaching tasks but lack careful observation and feedback on student's classroom learning. For example, when a student makes a mistake in the process of solving a problem,

teachers may only give "right" or "wrong" feedback without further explanation due to limited class time. This phenomenon of insufficient feedback leads to students not being able to fully understand the knowledge in class and correct the mistakes in the process of solving problems in time.

Insufficient feedback will limit the divergence of students' thinking and lead to teachers' neglect of students' psychological development, thus affecting students' progress. First of all, the lack of enough feedback will cause students to form the wrong way of thinking in the process of solving problems. If students' understanding is not corrected for a long time, it may lead to misunderstandings. In addition, insufficient feedback makes it difficult for students to understand their learning status promptly. They will gradually lose interest and confidence in learning mathematics. For students who are slower in thinking, the negative impact of insufficient feedback is more serious. They will feel "ignored" in class, become confused, and gradually distance themselves from the teacher's teaching progress. Ultimately, it affects students' learning of mathematics.

3.1.2. Improper Feedback

In many classrooms, teachers' feedback is not very targeted. Especially in primary school math class, it is difficult for teachers to have a detailed understanding of each student's problem-solving ideas. The feedback given by teachers may be general or even wrong. For example, current teachers have a "fixed answer teaching problem". That is to say, the teaching is based on the predetermined answers in the textbook without delving into the process. It is very rigid and lacks flexibility. This kind of inaccurate feedback content easily leads to students' rigid thinking and difficult progress. It may even cause students to misunderstand their learning status, causing the problem to persist. Secondly, the feedback form in the current primary school mathematics classroom is mostly oral feedback, which lacks diversity. Most teachers use direct verbal feedback and lack diversified feedback forms such as written, graphical, and procedural analysis. This results in some students having difficulty understanding the content of the feedback or losing interest in the feedback.

It can be seen that inaccurate feedback content and a single feedback form will hurt students' learning experience. Firstly, after receiving inaccurate feedback, students may have a partial or even wrong understanding of the concept. This is not conducive to mathematical accuracy. Next, A single form of feedback fails to stimulate students' interest in mathematics learning. It makes students lack the motivation to participate actively in class. Over time, it may lead to students' learning attitudes becoming negative.

3.2. Cause Analysis

Limited classroom time is one of the main reasons for inadequate and inappropriate feedback. Especially in elementary school mathematics classes, after teachers complete their teaching tasks, the remaining time is insufficient to provide adequate feedback to students. Besides, The limited time for homework marking and after-school tutoring makes it difficult for teachers to fully pay attention to the needs of each student. Feedback is also prone to be superficial. Primary school mathematics courses have a lot of teaching content and a tight schedule. Teachers often devote their time to the completion of teaching tasks, and it is difficult to spend enough energy and time on feedback. This course pressure affects the density and quality of teachers' feedback in class, leading to feedback loss. Moreover, the trend of diversified teaching goals also requires teachers to take into account various teaching goals, resulting in insufficient and inappropriate feedback.

Lack of teachers' feedback skills is also one of the important reasons for insufficient or inappropriate feedback. Feedback is an important part of teaching. However, some teachers lack a full understanding of teaching. Some primary school teachers lack scientific and effective feedback methods. Sometimes teachers rely only on subjective judgment or imperfect experience to give

feedback. For example, when giving feedback, teachers failed to provide targeted responses to students' questions but instead relied too much on the ready-made answers in the textbook. This kind of teacher likes to answer all questions with rigid answers, ignoring the guidance of feedback. Furthermore, some teachers rarely pay attention to the timing and specific methods of feedback, which makes it difficult for feedback to meet students' actual needs.

4. Discussion on Optimization Strategies and Feasibility of Feedback in Primary School Mathematics Classes

4.1. Combining Clear Feedback Goals with Inquiry-based Teaching

Clear feedback goals are the foundation of effective feedback. In the process of feedback, teachers should not only focus on whether students answer correctly, but also pay attention to students' understanding of the internal logic of mathematical concepts and problem-solving methods. In this process, inquiry-based teaching can play an important role. Inquiry-based teaching encourages students to participate in mathematics learning through question-posing, hypothesis verification, reflection, and summary, which is highly consistent with the goal of feedback [6]. Therefore, teachers can set clear feedback goals in class, so that students can get corresponding guidance and support in each inquiry link. For example, teachers can provide targeted feedback to students after independent thinking or group discussion. Teachers help them think about the pros and cons of different problem-solving methods, thereby developing their mathematical thinking and problem-solving skills. Besides, by combining feedback objectives with inquiry-based teaching, teachers can use class time more efficiently and avoid superficial feedback. At the same time, it can also guide students to independently construct a knowledge framework in the process of understanding. This optimization strategy has a good application prospect in current primary school mathematics teaching. Teachers only need to slightly adjust the style and timing of feedback to achieve feedback goals in inquiry-based teaching.

4.2. Diversified Feedback Methods Adapted to the Level of Inquiry

Different levels of inquiry activities require different feedback methods to meet the needs of students at different learning stages. In primary school mathematics teaching, the feedback mode can change according to the change in inquiry level. Including immediate verbal feedback, written comments, interactive question-and-answer sessions, peer feedback, and so on [2]. For instance, in the stage of basic inquiry, teachers can use immediate feedback to directly correct students' basic mistakes. In the more in-depth exploration stage, teachers can encourage students to express their understanding of the problem through group discussions and peer evaluation and obtain more in-depth feedback, thereby helping students to have a deep understanding of mathematical concepts. Moreover, matching the feedback method with the inquiry level helps to improve the pertinence of the feedback, so that students can get corresponding feedback in different inquiry links. At the same time, diverse feedback methods can also stimulate students' interest in learning. This optimization strategy has strong operability. Teachers can flexibly adjust feedback methods according to students' learning situations to achieve efficient classroom teaching.

4.3. Combine Precise Feedback Content with the Type of Assessment

Accurate feedback content is an important factor in ensuring that students improve their learning effectively. In elementary math classrooms, the accuracy of feedback can be improved by combining different types of assessments.

4.3.1. Formative Assessment Feedback

Formative assessment is a type of assessment conducted during the teaching process to provide teachers and students with feedback on learning progress so that teaching strategies and learning methods can be adjusted promptly [7]. The formative assessment can be completed by observing students' performance and giving them timely feedback in primary school mathematics classrooms [8]. For example, teachers can conduct formative assessments of students' understanding through classroom questions and quizzes. Based on the results of the assessment, teachers can provide feedback to help students adjust their learning methods. In addition, the implementation threshold of formative assessment feedback is low, can be carried out at any time in daily teaching, does not require complex design, and is very suitable for primary school mathematics classrooms. Through this feedback method, teachers can clearly understand students' learning status and adjust the teaching pace to make the class more efficient.

4.3.2. Summative Assessment Feedback

A summative assessment is an assessment at the end of the teaching cycle that aims to give a comprehensive summary of the student's performance and achievements throughout the learning process. This type of assessment is usually used to measure whether students have achieved the learning objectives of the course or subject and to determine the student's final grade or grade [9]. Summative assessment feedback is used after class or at the end of a unit to give students an idea of overall learning effectiveness and progress [9]. Assessment methods, such as unit tests and final summaries, can give more comprehensive feedback on students' knowledge and encourage students to continue to work hard in the follow-up study. Although summative assessment may require students to be observed for a longer period, such assessment feedback at the end of the unit or the end of the semester can more intuitively show the overall learning outcomes of students.

4.4. Adjusting the Timing and Frequency of Feedback

Appropriate timing and frequency of feedback are key to ensuring feedback effectiveness [10]. In elementary school mathematics classes, teachers can adjust the timing of feedback according to the difficulty of the learning tasks and students' mastery. For more difficult math concepts, teachers should let students think and discuss them before giving feedback, and for simple exercises, they can give feedback less frequently. Timely and appropriate feedback prevents information overload and ensures that students have a deep understanding of the knowledge. Adjusting the timing and frequency of feedback is a flexible strategy. This strategy requires teachers to pay close attention to student performance in the classroom to quickly decide when to give feedback. This strategy is particularly suitable for elementary school mathematics classes where there are many classroom discussions and group activities.

4.5. Improve Teachers' feedback Skills and Support Inquiry-based Teaching

Improving teachers' feedback skills is a long-term strategy for optimizing classroom feedback. In inquiry-based teaching, teachers need to have a variety of feedback skills. For example, how to give open-ended feedback when students raise questions and how to provide corrective feedback during the problem-solving process. In addition, teachers should further improve their understanding of teaching, improve their understanding of teaching feedback from the theoretical level, fully implement student-oriented teaching and personalized teaching in practice, and pay attention to the proportion of feedback in class. At the same time, teachers can learn feedback skills through the workshop and can observe the teaching feedback style of experienced teachers, while reflecting on

and improving their feedback style. These feedback skills can help teachers promote student progress in inquiry-based teaching. Although improving teacher feedback skills requires a certain amount of training time, the results are significant. Through planned training, teachers can learn a variety of feedback methods, provide targeted feedback for different types of students, and effectively improve the class level.

5. Conclusion

Learning feedback in primary school mathematics classrooms plays an important role in promoting students' learning and improving teaching results. However, through the analysis of the current feedback status in primary school mathematics classes, it is found that the problems of insufficient feedback and inappropriate feedback are very prominent. This is mainly manifested in low feedback frequency, general feedback content, and single feedback form, which seriously affects students' understanding of knowledge and limits the divergence of students' mathematical thinking. The causes of these problems are closely related to the limited class time, the high pressure of curriculum progress, and the lack of teachers' feedback skills. To solve these problems, this paper has carried out a series of theoretical analyses and practical discussions and put forward some feasible solutions. It includes combining clear feedback objectives with inquiry teaching, adopting diversified feedback methods to match different inquiry levels, combining formative assessment, procedural feedback, and summative assessment to improve the accuracy of feedback, adjusting the timing and frequency of feedback, and improving teachers' feedback skills through systematic training. These strategies can not only promote the progress of students' mathematics learning but also provide references for teachers to optimize classroom teaching and promote the sustainable development of primary school mathematics education.

References

- [1] Söderström, S., & Palm, T. (2024). *Feedback in Mathematics Education Research: A Systematic Literature Review*. *Research in Mathematics Education*, 1-22.
- [2] Zhang, Z. V., & Hyland, K. (2022). *Fostering Student Engagement with Feedback: An Integrated Approach*. *Assessing Writing*, 51, 100586.
- [3] Mandouit, L., & Hattie, J. (2023). *Revisiting "The Power of Feedback" from the Perspective of the Learner*. *Learning and Instruction*, 84, 101718.
- [4] Green, J. (2023). *Primary Students' Experiences of Formative Feedback in Mathematics*. *Education Inquiry*, 14(3), 285-305.
- [5] Smit, R., Dober, H., Hess, K., Bachmann, P., & Birri, T. (2023). *Supporting Primary Students' Mathematical Reasoning Practice: The Effects of Formative Feedback and the Mediating Role of Self-Efficacy*. *Research in Mathematics Education*, 25(3), 277-300.
- [6] Gómez-Chacón, I. M., Bacelo, A., Marbán, J. M., & Palacios, A. (2023). *Inquiry-Based Mathematics Education and Attitudes Towards Mathematics: Tracking Profiles for Teaching*. *Mathematics Education Research Journal*, 1-29.
- [7] Winstone, N. E., & Boud, D. (2022). *The Need to Disentangle Assessment and Feedback in Higher Education*. *Studies in Higher Education*, 47(3), 656-667.
- [8] Aust, L., Schütze, B., Hochweber, J., & Souvignier, E. (2024). *Effects of Formative Assessment on Intrinsic Motivation in Primary School Mathematics Instruction*. *European Journal of Psychology of Education*, 39(3), 2177-2200.
- [9] Iannone, P., & Simpson, A. (2022). *How We Assess Mathematics Degrees: The Summative Assessment Diet a Decade on*. *Teaching Mathematics and its Applications: an International Journal of the IMA*, 41(1), 22-31.
- [10] Boud, D., & Dawson, P. (2023). *What Feedback Literate Teachers Do: An Empirically-Derived Competency Framework*. *Assessment & Evaluation in Higher Education*, 48(2), 158-171.