

Research on Primary School Mathematics Homework Design under the Background of "Double Reduction"

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Abstract: Homework is a supplement and extension of students' mathematical knowledge in the classroom and is an indispensable part of mathematics teaching activities. "Double Reduction" points out that it is necessary to comprehensively reduce the total amount and duration of homework, reduce the burden of students' excessive homework, and clarify the total amount of homework. Therefore, homework should not be monotonous written exercises, but should be designed with life-like content, simplification of quantity, gamification of form, level of difficulty, and diversified evaluation to achieve the purpose of helping students consolidate their knowledge and reduce their learning burden. Homework, as a supplement to classroom teaching, should be made good uses and designed reasonably, which has a positive effect on the improvement to students' mathematical literacy.

Keywords: "Double Reduction", primary school, mathematics, homework design, research

1. Introduction

On July 24, 2021, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the "Opinions on Further Reducing the Burden of Students' Homework and Off-campus Training in Compulsory Education" (referred to "Double Reduction"). "Double Reduction" points out that it is necessary to comprehensively reduce the total amount and duration of homework and reduce the burden of students' excessive homework. Among them, it is required to classify and clarify the total amount of homework, and also puts forward requirements on the quantity, quality and evaluation of students' assignments. "Basic Education Curriculum Reform Outline (Trial) 2001" (referred to "New Curriculum Reform") proposes to change the current situation of overemphasizing rote memorization and mechanical training in curriculum implementation, advocate to pay attention to student experiences and interests, advocate students to participate actively, be willing to explore, and be diligent in practicing, develop students' ability to collect and process information, cultivate students' ability to acquire new knowledge, develop students' ability to analyze and solve problems, and build students' capacity to communicate and cooperate ^[1]. This means that students should be encouraged to participate actively, explore cooperatively, and experience emotionally, and establish a homework view of diverse learning methods. If students want to develop better, they must ultimately be incorporated into homework design.

Homework is extremely important in mathematics teaching activities and cannot be ignored. Teachers use homework to understand the learning effect of students' mathematics knowledge points in the classroom, get instant feedback on the teaching effect of the classroom, and discover what problems students have in their homework on the basis of students completing homework, so as to help students improve their problem-solving skills. However, the research found that the current mathematics homework still has some problems such as being out of touch with the life situation, lack of interest, unreasonable evaluation and insufficient difficulty to meet the needs of students. Therefore, considering the introduction of the "Double Reduction" policy, based on the existing situation of primary school mathematics homework, combined with the actual situation, it is urgent to explore the optimization path of primary school mathematics homework design.

2. Lifelization of the homework content

Mathematics is not only an abstract and logical subject, but also a life-oriented subject. Education is life, so mathematics education should pay more attention to the close connection with life than other

subjects. Therefore as an important part of mathematics teaching, math homework is not only for reviewing, previewing, and consolidating knowledge, but also for students to use the knowledge they have learned to expand, extend and get close to life. And when students try to solve some practical problems in life, they can cultivate great hands-on ability and enhance application awareness.

For mathematics knowledge, teachers should guide students to establish a connection between what they have seen, heard and thought in their own life experiences and their learning, and combine theory with practice, so that it is easier to arouse students' enthusiasm for mathematics, so that they can think more and are more willing to communicate and discuss with their peers, so that they can spontaneously use the mathematical knowledge they have learned to solve life problems and improve their learning ability in life. It can be seen from this that we should strengthen the connection between mathematics homework and life, and promote the life of homework. In this regard, the realization of lifelization of the homework content can start from the following two aspects:

First of all, design hands-on practice assignments, so that students can be involved in it and experience mathematics in life. As Suchomlinsky said: the wisdom of a child is at the tip of his finger^[2]. In the process of completing hands-on practice assignments, students use existing knowledge, experience and learning methods to improve their hands-on ability to a certain extent. In this process, students' hands-on operation ability is improved, and it can also promote students to further understand their mathematical knowledge. For example, in the unit "hours, minutes, seconds" in the third grade, teachers can assign math homework to students, let them estimate the number of pulse beats per minute, the number of steps they walk, feel the length of "1 minute", and know "1 minute" what they can do. This design of assignments can stimulate students' interest in learning, make students connect with their own or other people's lives to observe carefully, and then get a variety of experiences and the development of innovation and application skills, and can also guide them to actively exchange ideas, and express their findings.

Secondly, teachers can create a variety of life situations when designing homework, fully display knowledge points, and guide students to learn to solve problems from a mathematical perspective in specific life situations. For example, when learning the multiplication problem, the situation can be designed as: "Mr. Wang, the head teacher of the first class of the fourth grade, leads 20 students in the class to visit the museum. There are two ways to buy tickets for the museum: the first way, 24 yuan per adult and 12 yuan per student; the second way, grouping purchase 16 yuan per person (more than 20 people including 20 people), Which ticket purchase method is more cost-effective?". Such assignments are more likely to bring students into life situations, arouse students' interest in the problem, and encourage them to actively think about and use mathematical knowledge to solve problems.

Homework can consolidate the foundation and help deepen students' understanding of mathematical knowledge. The lifelization of the homework content is to let students feel that life is related to mathematics everywhere and master mathematical knowledge to solve practical problems in life, so that they can learn to apply what they have learned, develop mathematical thinking, cultivate creativity and application awareness, and contribute to their subsequent learning.

3. Simplification of homework quantity

The simplification of homework is based on students' interest in completing homework. On this basis, teachers can arrange appropriate homework to promote the formation of students' good study habits. However, homework load reduction has always been a hot topic in the society for a long time. The quantity of homework has a great relationship with whether students can learn mathematics with a good attitude. Heavy homework is not conducive to the development of students' thinking, and will cause great pressure on students. It is difficult to mobilize the enthusiasm of students to study mathematics. Our country's education department also emphasizes that the time to complete homework should not exceed one hour. In the face of the current situation of "winning by quantity", the design of homework should not be sloppy.

In this regard, teachers should actively response to "Double Reduction" policy, arrange the number of homework reasonably and scientifically, and adjust the quantity of homework according to the actual situation of the students, so as to truly achieve "less and better" and reduce the burden on students' shoulders. Then the homework should reflect the characteristics of refinement and effectiveness, and reflect the effectiveness of homework:

First, streamline homework and improve quality. A reduction in the amount of homework does not

mean a decline in the quality of homework. As a homework designer, teachers should not damage the quality of homework while considering reducing the amount of homework. When it comes to teaching optimization and reducing the burden on students, the Soviet educator Babansky exhorted people to do their best to maximize the effect of an exercise ^[3]. Therefore, in order to reduce repetitive and ineffective homework, teachers need to select homework carefully, keep the "essence" and remove the "dross", and retain the key content in the homework.

Second, design flexible homework. Teachers assign a certain amount of math homework every day which students can choose and complete the corresponding amount of homework according to their own abilities. Give students the space of their own choice to complete their homework more efficiently and achieve the effect of practice.

Finally, strengthen the exchange of assignments among various subjects, and design comprehensive assignments for multiple subjects. In order to prevent the total number of homework from exceeding the regulations of the national education department, teachers of various disciplines need to communicate with each other and reasonably arrange the amount of homework in each subject. In addition, teachers of various subjects can integrate the key knowledge they have learned with other subjects to design comprehensive homework. This not only improves the utilization of exercises, but also increases the knowledge of students. Many students reflect that they agree with streamlining their homework, which not only reduces their academic burden, but also allows them to complete their homework in a relaxed and happy mood. What is more, the above measures can maintain students' interest in mathematics, and also allow them to free up enough time and energy to think about mathematical problems, build a mathematical knowledge system, and improve their abilities.

4. Gamification of homework forms

As the saying goes: Interest is the best teacher. As far as primary school students are concerned, they are young, their body and mind are not yet mature, they have active and lively personalities, and they are impatient in doing things. Mathematics teachers should design interesting homework based on students' hobbies and psychological characteristics, so as to attract students to approach and participate actively. Traditional homework is mostly presented in the form of written homework. Considering the age characteristics and physical and mental development of students, homework design can be considered from the following aspects:

First, gamification of assignments are used in the lower grades. Considering the age characteristics of the students, the first and second grade students are younger and still in the transition period of learning. Gamification of homework can reduce students' resistance to mathematics learning and stimulate students' interest in learning mathematics. For example, let the "zero-based" first-grade students experience the fun of mathematics in hands-on operation through the game of "building blocks", cultivate students' concept of geometric space, and experience the connection between life and mathematics; after learning graphics in the second grade, a hands-on mini-game of "cutting and cutting, sticking and sticking" is designed to increase interest through mini-games and competitions, help students deepen their understanding of graphics, and cultivate their ability to analyze and solve problems.

Secondly, combine homework and practical activities in middle and senior grades in primary school. The students at this stage have a certain foundation in learning and strong learning ability. The combination of homework and practical inquiry activities allows students to actively explore mathematical knowledge in mathematical activities, promote the improvement of mathematical logical thinking ability, and deepen students' understanding of mathematical knowledge with mastery. Test students' learning situation in practice, and promote the improvement of students' mathematical literacy in practice.

5. Design of the different difficult homework

Feng Jianjun once mentioned that education facing human life is to recognize and respect the uniqueness of life and create conditions for the realization of the uniqueness of life ^[4]. Everyone is special, and their cognitive level, thinking logic, and acceptance ability are all different to varying degrees.

"Curriculum Standards" ^[5] pointed out: "Everyone can get a good mathematics education, and

different people have different development in mathematics." So as to achieve this goal, it is necessary to put forward higher requirements for homework. Teachers need to face up to students' individual characteristics, teach students in accordance with their aptitude, take cultivating students' interest in learning as a premise, identify students' proximal development zone, and design homework with different difficulty and difficulty for them to improve their learning ability and level. In order to respect the individual differences of students, teachers can scientifically and reasonably design assignments in the form of hierarchical assignments:

First, comprehensively consider the learning characteristics of students, and reasonably stratify students. The students in the class are divided into three levels according to their learning foundation and ability level. Among them, students with good foundation and strong ability are group A, students with relatively average foundation and ability are group B, and students with slightly poor foundation and weak ability are group C.

Secondly, to meet the learning needs of students, the assignments are divided into three levels, and the difficulty of the exercises is designed into three levels: the first level is basic exercises; the second level is variant questions or simple comprehensive questions; the third level is comprehensive application questions. The first-level exercises are required for the whole class to consolidate basic knowledge; the second is for group B students to prepare to consolidate their knowledge and deepen their understanding of mathematical knowledge; while the third level is used as a group A to expand practice, so that students can fully integrate the mathematical knowledge they have learned, deal with mathematical problems flexibly, and better exercise their thinking ability.

In this way, it can encourage students to complete their homework with higher quality and efficiency, meet the learning needs of students at different levels, and gain interest in mathematics and confidence in learning mathematics in the homework.

6. Diversification of the homework evaluation

Homework evaluation is the main method for teachers to obtain feedback. Diversified evaluation helps to improve the effectiveness of homework evaluation, so as to obtain the effect of promoting and diagnosing students with homework. As an important part of teaching, teachers should also follow the requirements of the curriculum standards and pay attention to homework evaluation.

First, the evaluation subject needs to be diversified. The course objective clearly mentions that evaluation should reflect multiple subjects, which means that teachers, parents, classmates and students themselves can examine students' learning as evaluators. In developing evaluation criteria, teachers can invite students to participate. Students are the main body of learning, and teaching is the unifying process of teachers' teaching and students' learning. Therefore, as an important link in teaching, homework evaluation needs to respect the subjectivity of students. In this process, students can put forward their own ideas, and teachers should pay attention to their feelings and their opinions. For example, open-ended assignments are designed to allow students to use their imaginations, and teachers invite students to participate in the development of evaluation criteria and express their opinions. In this process, teachers can guide students to understand some problem-solving strategies and enhance the cultivation of thinking logic. Of course, students and parents also have the right to evaluate assignments. Different evaluation methods have their own advantages. Teachers should change the evaluation methods reasonably, and flexibly organize teacher evaluation, student evaluation and parent evaluation. Teacher evaluation should be more diversified. In addition to simply correcting all homework, it can flexibly add part of spot checks, face-to-face corrections, etc; mutual evaluation of students will give students more autonomy, and allow them to contact more different thinking ways in the process which make students understand the diversity of problem-solving methods; parent assessment is also an opportunity for teachers, students and parents to communicate with each other, which allows parents to better understand students' learning progress, enables students to obtain a certain degree of feedback, and increases the frequency of communication between teachers and parents, in order to facilitate the synergy between home and school and students can develop in all aspects.

Second, the evaluation methods should also be diversified. The purpose of evaluation is to better guide students to reflect, teachers can get timely and effective feedback. Therefore, it is necessary to use multiple evaluation methods, focusing on the combination of qualitative evaluation and quantitative evaluation, and attaching importance to process and result evaluation, in order to stimulate and guide students to learn. To promote teaching through evaluation, to promote learning through evaluation, both

teachers and students can develop in the process of evaluation.

At the same time, the evaluation criteria should also be varied. The existing homework evaluation standards should get rid of the "score theory" and use various comments to help students understand their own learning situation. Compared with grades, students are more willing to get teachers' suggestions for their own learning through homework [6]. This can stimulate students' enthusiasm for open-ended assignments, and also enable students to get various answers from other classmates when evaluating, so as to make up for their lack of thinking and obtain more perfect results.

7. Conclusion

Teachers should implement the "Double Reduction" policy, arrange homework reasonably, pay attention to "reducing quantity and improving quality", and adopt effective design of homework to reduce the burden on students. In the primary education stage, the homework should take into account the characteristics of the students in the learning process as much as possible, and should conform to the students' cognitive rules and psychological characteristics as much as possible. Students' knowledge consolidation should not rely on monotonous written exercises. Teachers should be guided by the new concepts of curriculum education and obey these homework design requirements: lifelization of the homework content, simplification of homework quantity, gamification of homework forms, design of the different difficult homework, diversification of the homework evaluation. It is conducive to maintain students' interest in mathematics learning. At the same time, teachers can guide students to actively participate, think actively, learn independently, improve mathematics literacy, and reduce students' academic burden, in order to promote the all-round development of students in the process of completing homework.

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