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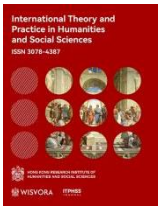

Reducing Burden to Achieve Efficiency in Homework ——Exploring the Optimization of Mathematics Homework in Chinese Rural Elementary Schools

Jiayi Ding[1], Wenxiong Ye[2,*], Bo Shu[3]

[1] *Liangtingao Elementary School, Huaihua, China*
[2] *School of Medical Business, Guangdong Pharmaceutical University, Guangzhou, China*
[3] *School of Management, Jinan University, Guangzhou, China*

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Corresponding Author:
Wenxiong Ye

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Abstract

Purpose: This study investigates the unique challenges faced by rural elementary school students in completing mathematics homework, focusing on weak academic foundations, inadequate resources, and limited tutoring support. It identifies key issues such as a lack of learning ability, insufficient study time, lax home supervision, and the absence of stratified and innovative homework designs.

Approach/Methodology/Design: The study employs a problem-analysis methodo- logy, identifying real challenges faced by rural students through an in-depth examination of their learning conditions and homework practices. Based on these insights, it proposes targeted recommendations.

Findings: A three-pronged strategy is proposed to address these challenges. First, reallocate written homework time to school hours, integrating independent homework into classroom teaching through intentional instructional design. Second, promote home-school collaboration by encouraging parental involvement and fostering a co-educational approach. Finally, innovate homework design by introducing hierarchical and diverse tasks that respect students ' developmental stages and provide feedback-oriented evaluation.

Practical Implications: Implementing these strategies can establish a virtuous cycle within the homework ecosystem, improving the effective completion rates of mathematics assignments among rural students. Additionally, these approaches can support the development of core mathematical literacy and life skills.

Originality/value: This study addresses the distinct challenges in rural education by proposing actionable strategies to optimize homework quality and efficiency. The insights and recommendations offered can serve as a model for improving homework practices in other underserved educational contexts, fostering long-term academic and personal growth.

1. Introduction

Homework is an essential component of school education and teaching management, serving as an effective extension of classroom learning(Tam & Chan, 2016). In China, educational authorities have consistently emphasized the importance of managing school homework and

overseeing students' academic progress. In July 2021, the General Office of the Central Committee of the Communist Party of China (CPC) and the General Office of the State Council issued the *Opinions on Further Reducing the Burden of Compulsory Education Students' Academic Work and the Burden of Out-of-School Training.* The "Double Reduction" policy, which aims to reduce excessive academic and extracurricular burdens on students, has a core objective of improving the quality of homework by limiting its quantity, thereby ensuring that students' homework loads are more reasonable and manageable. Specifically, the policy calls for scientifically calibrated homework arrangements that take into account both the total amount and the difficulty level, requiring that primary and junior secondary students complete the majority of their written homework within school hours. Schools are urged to eliminate excessive, repetitive, and low-value tasks and to avoid transferring the burden of homework to parents. Homework design must align with students' developmental stages, emphasizing differentiation and individualization, with a focus on utilizing homework as a tool for diagnosis and knowledge reinforcement, while reducing mechanical and punitive tasks. This policy encourages students to dedicate more time to personal interests and physical and mental well-being, relieving parents of the need for extensive involvement in their children's homework(Reimers & Chung, 2019). In doing so, the policy seeks to return educational responsibility to schools and moderate the academic pressure on students, promoting greater independence in learning and fostering a healthy, balanced approach to education.

However, in rural areas, education faces unique and severe challenges.From 2014 to 2021, national policies continue to help ease the problem of left-behind children, and the number of left-behind children studying in ordinary elementary school gradually decreases, as shown in Figure 1. According to statistics, in 2023, the number of left-behind children in China's rural areas has reached 15,505,600,000, and the problem of left-behind children is still an important issue to be solved.

Their parents work outside for a long period of time, and thus are unable to provide continuous guidance or strict discipline (Pan & Ye, 2017). As a result, these children often lack organized family education, leading to gaps in their basic learning habits and behaviors. This situation increases the difficulties teachers face in managing students' academic work and discipline both during and after school hours. Many rural students have low academic ability and struggle to complete homework independently, lacking the motivation and self-direction necessary for high-quality, self-driven learning. This, in turn, leads to low-quality homework submissions, reinforcing a cycle of inefficient and passive learning.

One major issue in rural education is that teachers often lack a scientific and contextually relevant approach to homework design, overlooking the students' life circumstances and practical needs. As a result, rural students frequently feel disconnected from the material, which can lead to a loss of interest or even a negative attitude toward learning, seriously impacting both their academic success and personal development(Coman et al., 2020). This issue is particularly pronounced in mathematics homework, where homework are often repetitive and disconnected from real-world applications. Teachers sometimes focus on rote problems that fail to integrate real-life situations, leaving students struggling to understand and apply mathematical concepts in practical contexts(Jurdak, 2016). Such a lack of relevance and practicality in homework design not only hampers students' development of mathematical thinking but also limits their ability to apply math skills to solve real-world problems.

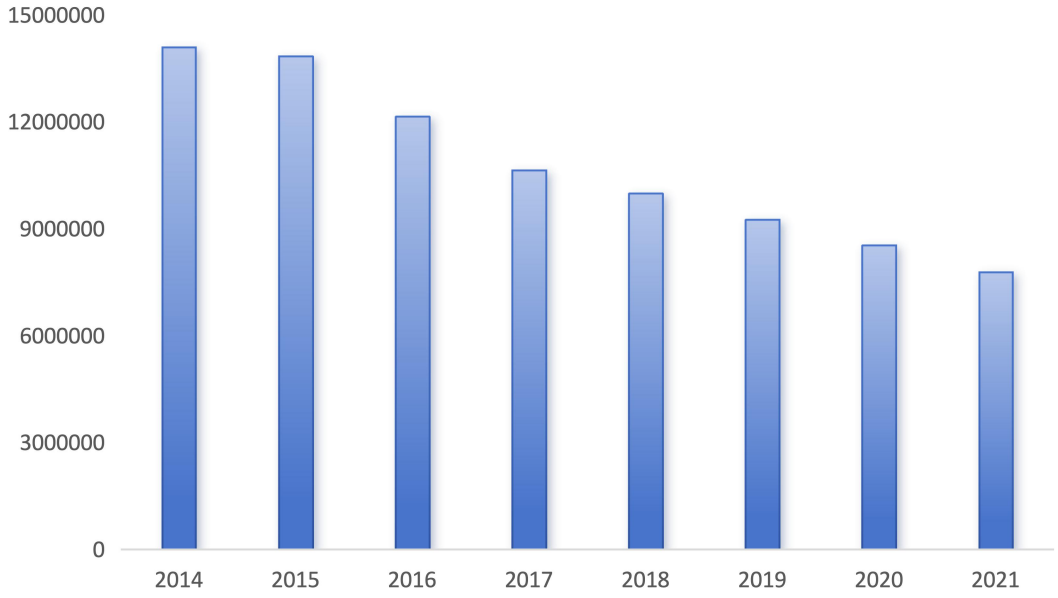

Figure 1. Number of children left behind in elementary school, 2014-2021 (persons)

This study focuses on mathematics homework in rural elementary schools, aiming to explore the challenges students face due to limited learning time, insufficient supervision at home, and teachers' tendency to overlook stratified and innovative homework designs. By analyzing these factors in depth, this research intends to propose optimization strategies that are tailored to the realities of rural education, with the goal of improving the effectiveness of mathematics homework. Ultimately, these recommendations seek to simultaneously enhance students' mathematical abilities and foster a genuine interest in learning, supporting their academic growth and long-term development. Through this study, it is hoped that valuable insights and practical recommendations can be provided to help address the unique educational needs of rural students and contribute to the ongoing advancement of rural elementary education.

2. Dilemma and Analysis of Rural Elementary School Mathematician's Work

Nowadays, the State strongly supports policies to revitalize the countryside, such as the "Three Supports and One Support" and the "Teach to the Countryside" programmes, which have strengthened the development of the rural teaching force, and have systematically arranged for teachers from county and city schools to go to the countryside to teach, so that the conditions of education in the countryside have been improved. With the return of the population, the number of students in rural schools has gradually increased, and the quality of teachers has improved, but the teaching task has also increased. Teachers not only have to complete their daily teaching, but also have to take care of homework correction and individual tutoring, and because of the increase in the number of students, it is difficult to take into account the progress of the learning of each student, and the pressure has increased significantly(Roschelle et al., 2016). From a practical point of view, rural elementary school are still facing difficulties in improving the overall quality of teaching and learning, and in particular, elementary school students still have many problems in completing their homework in mathematics.

2.1 Lack of study skills and time, and challenges in completing assignments

The findings of the survey show that students' relatively weak ability to understand and analyze problems is due to their young age, limited social experience and lack of life experience, as well

as insufficient extracurricular reading. The academic performance of left-behind children is also poorer, with 20.4% of them assessing their academic performance as being on the low side, and 82.1% experiencing a decline in academic performance. They have more bad academic behaviors, with a higher proportion of unfinished homework, lateness to school, and truancy than non-reserved children. This phenomenon is particularly obvious in mathematics, especially when faced with slightly complex mathematical problems, many students appear to be unable to do so. The data from the study, as shown in Figure 2, showed that students typically took 10 to 20 minutes to complete their math homework, but for students with weak foundations, it often took longer to complete their homework. In addition, many rural students have to undertake family farm work after school and have relatively limited time to study outside of school, making the time they take to complete their homework far longer than their teachers expect, which further aggravates their learning pressure(Charlton & Taylor, 2020).

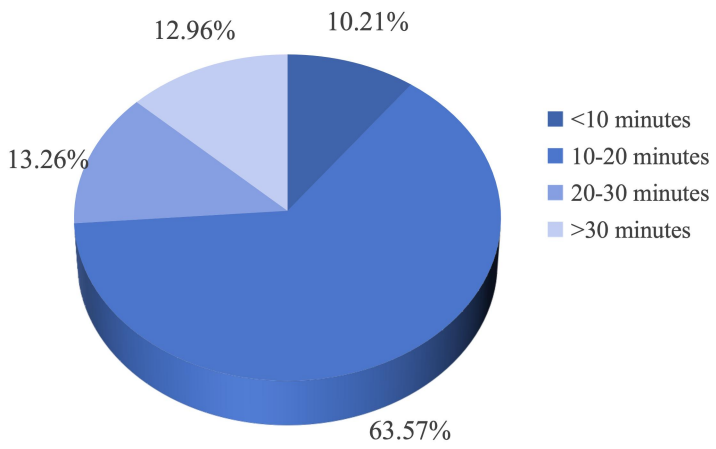

Figure 2. Percentage of time spent completing assignments

Due to the lack of sufficient study time and effective tutorial support, some students, in order to avoid being criticized for not completing their homework, began to choose to plagiarize their homework or cope with them hastily in order to barely complete their tasks. This perfunctory attitude leads to a lack of in-depth thinking and true mastery of knowledge in their homework, forming a task-completion learning habit. This phenomenon not only gradually weakened their interest in math learning, but also made students fearful and even bored when facing math homework, further affecting their motivation and commitment to learning. In the long run, mathematics homework is no longer an effective tool to help students consolidate and understand their knowledge, but becomes a mechanized repetitive task, which is difficult to stimulate students' interest in learning, and even more ineffective in promoting the understanding and consolidation of knowledge(Darmayanti et al., 2023). This ineffective and passive learning state ultimately has a negative impact on students' mathematical thinking and learning ability, and is not conducive to their long-term academic development and the cultivation of core literacy.

2.2 Weak family supervision and lack of parental counseling for children

In rural areas, the relatively weak family supervision creates a significant and widespread issue: the lack of adequate tutoring for students on their extracurricular homework. Most left-behind children's parents are away working for extended periods, often for the entire year, leaving them unable to provide consistent guidance and support for their children's studies. As a result, the responsibility for family education frequently falls on grandparents, who, while dedicated

caregivers, often have limited literacy skills. This lack of academic preparation among guardians makes it challenging for them to offer the effective help and guidance their grandchildren need, especially in subjects that require higher-level comprehension, such as mathematics. Consequently, when students encounter difficult problems in their homework, they are rarely able to receive timely support or clarification. Lacking guidance, they are often left to struggle through problems on their own or may abandon the attempt entirely, leading to a weak grasp of foundational knowledge and a gradual decline in their interest and confidence in learning.

In this environment of minimal supervision and support, many students lack the motivation and initiative to approach their homework proactively, which results in poor-quality homework. Lacking encouragement and structured support, some students adopt coping mechanisms to get by: they may copy from their peers or complete tasks hastily, often bypassing the opportunity to understand the concepts in depth or apply the knowledge meaningfully. This approach not only directly undermines their learning outcomes but also erodes their capacity for independent thought and problem-solving, creating a barrier to meaningful academic progress.

The long-term absence of tutoring and supervision has deeper consequences, as it can foster a sense of dread and avoidance toward learning tasks, and students may begin to view homework as a burdensome chore rather than a constructive activity. Without accountability and encouragement to persevere, they are unlikely to develop a sense of responsibility or ownership over their academic work. Over time, this reluctance becomes habitual, preventing students from cultivating a positive attitude toward learning and forming healthy study routines.

The impact extends beyond their academic performance. This lack of structure and support in completing homework stunts their development in essential life skills, such as self-discipline, responsibility, and independent learning(Duckworth et al., 2019). These students often struggle with maintaining motivation and confidence in the long-term educational process, leaving them at a disadvantage not only in their immediate studies but also in their ability to pursue future educational and personal growth. In essence, this situation creates a cycle that both limits their academic potential and curtails their personal development, posing significant challenges to their long-term success and resilience in learning.

2.3 A single form of homework is lacking in stratification, and stimulating interest becomes a pipe dream

Among the types of homework assigned by teachers, written homework accounted for a striking 84.15%, while cooperative homework made up only 8.54%, experiential inquiry homework constituted a mere 4.63%, and production-based tasks were as low as 2.68%, as shown in figure 3. These figures reveal an evident lack of attention to stratification and innovation in homework design, with an over-reliance on written exercises. This approach results in an overly homogenous form of homework that not only restricts students' engagement but also limits their growth across different competencies. Many teachers appear to underestimate the potential role of mathematics homework in fostering students' comprehensive skills, tending to view it mechanistically as repetitive practice for consolidating isolated knowledge points rather than as a tool to enhance broader literacy skills.

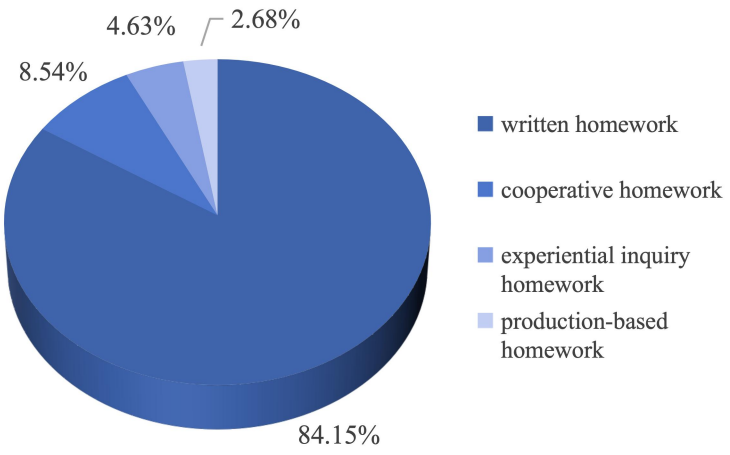

Figure 3. Percentage of types of homework assigned by teachers

Such uniform, monotonous homework disregards students' diverse learning needs, often leading to boredom and disinterest. For students who have a solid foundation in mathematics, the repetitiveness of written homework provides little challenge or stimulation, hindering opportunities for them to deepen their critical thinking skills and creativity(Jablonka, 2020). Conversely, for students who struggle academically, the one-size-fits-all difficulty level can seem insurmountable. These students often lack the necessary guidance tailored to their learning pace, causing them to experience heightened frustration, diminished self-confidence, and increased anxiety around learning.

The absence of layered, diversified homework not only hampers effective knowledge consolidation but also obstructs the development of essential skills that are part of students' core literacy. When homework are not thoughtfully varied, they miss the chance to engage students through different modes of learning—such as collaborative projects, inquiry-based tasks, and creative productions—that foster skills beyond rote memorization. An innovative and stratified approach to homework could encourage curiosity, resilience, and a genuine interest in mathematics by aligning with students' varied levels and learning styles. Ultimately, without a more balanced homework design, many students are deprived of opportunities to fully develop their potential in critical thinking, problem-solving, and creative application, which are essential for lifelong learning.

3. Strategies for Solving the Rural Homework Problems

3.1 Introduction

Mathematics homework, as a critical component of mathematics education, plays a pivotal role not only in shaping students' interest in the subject but also in fostering the development of mathematical thinking and problem-solving skills. Homework can bridge classroom learning and real-life applications, helping students see mathematics as an essential tool for understanding the world around them. To achieve this, teachers should skillfully incorporate elements from students' daily lives into homework design, creating homework that encourage students to observe, question, and explore the mathematical concepts that underlie everyday experiences(Langub & Lokey-Vega, 2017).

By engaging students with practical, relatable scenarios, homework can become a powerful medium through which students discover the relevance of mathematics outside the classroom. Whether measuring ingredients in a recipe, analyzing patterns in nature, or calculating distances, students are given opportunities to apply mathematical principles in meaningful ways. This approach helps students move beyond rote calculation, fostering a deeper understanding of concepts and encouraging them to view the world through a mathematical lens.

In this way, mathematics homework becomes a catalyst for educational reform, shifting away from traditional, repetitive tasks to more dynamic, inquiry-based learning experiences. By embedding real-world connections, teachers can inspire students to develop a genuine interest in mathematics and to recognize its value as a tool for logical thinking and informed decision-making. Such innovative approaches to homework not only deepen students' conceptual understanding but also lay the groundwork for lifelong learning and curiosity, ultimately empowering students to approach the world with a critical and analytical mindset.

3.2 Reduced homework burden by completing written homework at school

3.2.1 Allow time for independent work in the instructional design optimizing classroom time for homework support

To address the challenges posed by limited after-class study time and the absence of effective homework guidance, teachers should focus on maximizing the efficiency of classroom time. This can be achieved by incorporating structured, teacher-supervised homework sessions into the daily schedule. Allowing students to complete their homework during class time ensures immediate access to academic support, enabling students to clarify doubts and receive on-the-spot feedback. This approach is particularly critical for rural students who lack access to home tutoring or face competing responsibilities outside of school hours, such as farm work or household duties.

In this model, teachers can transform homework sessions into opportunities for active learning. A focus on targeted exercises aligned with core concepts ensures that students strengthen foundational skills under guidance, reducing the likelihood of errors or misunderstandings. Immediate teacher intervention also minimizes the development of task-completion habits and helps build students' confidence by reinforcing their understanding of mathematical concepts. This structured and supportive classroom environment not only alleviates pressure on students but also promotes a more meaningful engagement with the material, fostering a proactive approach to learning.

3.2.2 Reducing passive learning habits, fostering lifelong learning skills

To combat the tendency of students to plagiarize or hastily complete homework, teachers must focus on cultivating meaningful engagement with assignments. Assignments should be designed to encourage in-depth thinking, reflective learning, and iterative improvement. Additionally, creating a classroom culture that values effort and resilience over mere task completion can motivate students to take their homework seriously. Positive reinforcement—such as acknowledging well-thought-out responses and improvement over time—can instill a sense of pride and commitment to quality work. By shifting the emphasis from completing tasks to understanding concepts, students are more likely to view homework as an integral part of their academic development rather than a burdensome chore.

Ultimately, this aims to nurture self-directed learning and critical thinking skills in students. By integrating tailored homework sessions into classroom instruction, emphasizing differentiated tasks, and providing opportunities for independent practice, rural students can develop the confidence and skills necessary for lifelong learning. Teachers must continuously adapt their

approaches to align with students' evolving needs, ensuring that homework serves as a meaningful bridge between classroom instruction and independent academic growth.

3.2.3 Integrating independent work into classroom instruction

Incorporating time for independent practice during classroom instruction ensures that students can internalize new concepts under teacher supervision. This practice helps students develop critical thinking and problem-solving skills by encouraging them to rely on their reasoning rather than external assistance. During these sessions, teachers should adopt a hands-off approach, allowing students to work uninterrupted for 10–15 minutes while remaining available for targeted guidance when needed. This balance fosters autonomy and accountability, empowering students to take ownership of their learning.

When dynamic, unforeseen challenges arise during these sessions, teachers should use them as teaching moments to promote deeper understanding and encourage student inquiry. Conversely, distractions or less relevant issues should be managed tactfully to maintain focus. This structured approach ensures that classroom time is used effectively to strengthen students' confidence in tackling mathematical problems independently.

3.3 Parents cooperate with the school's arrangement to assist in completing homework assignments

In optimizing the design of mathematics homework in rural elementary school, parents should actively participate in home-school co-education, help their children understand mathematical concepts through daily life examples, and create a family atmosphere conducive to learning for their children. Since rural families are more limited in educational resources and tutoring ability, parents can start from practical scenes in life, for example, using measurements and calculations in farming or family affairs, to help their children combine mathematical knowledge with practical life, so that they can understand mathematical concepts in a familiar environment(Zippert & Rittle-Johnson, 2020). At the same time, parents should take the initiative to communicate with teachers to understand the school's teaching objectives and classroom progress, so that they can more effectively guide their children to rationalize their time and complete their homework independently at home, thereby cultivating good learning habits.

This kind of family support not only makes up for the lack of classroom teaching resources, but also solves, to a certain extent, the problem of rural students who have no one to tutor them after school, which helps to improve parent-child relationship and enhance children's confidence in learning, so that they will be more proactive and self-confident when facing math learning. Through home-school co-education, children can gradually develop the ability to learn independently and a positive attitude towards learning, so that they can better cope with academic challenges.

3.3.1 Renewal of the concept of education and cooperation of parents in completing family education

Parents should embrace a progressive approach to education, moving beyond traditional perspectives and adapting to contemporary educational concepts. By staying informed about new educational methods and fostering a supportive learning environment at home, parents can play a crucial role in their children's growth and academic success(Duckworth et al., 2019). For rural families, where resources may be limited, parents can leverage their everyday life experiences to assist their children in developing a practical understanding of mathematical concepts, aligning with the educational goals set by schools and teachers.

Incorporating mathematics into daily activities not only helps reinforce classroom learning but also makes math relevant and engaging. Parents can create more hands-on learning opportunities, allowing their children to see the usefulness of math in real-world contexts. For instance, when children are preparing for the Grade 5 topic on "Understanding Volume and Volume Units," parents can use common household items such as kettles, spice bottles, and buckets to introduce practical applications of measurement. By guiding their children to observe the capacity markings on these items, parents can help them grasp the meaning of units like "liter" and "milliliter" through direct interaction with tangible objects.

To deepen this understanding, parents can encourage their children to engage in simple experiments, such as estimating and measuring how many times it takes to fill a cup with 500 milliliters of water. They could ask questions like, "If one serving of juice is 250 ml, how many servings can we pour from a liter bottle?" or "Why do some containers measure in grams while others measure in milliliters?" Such questions not only illustrate the practical applications of math but also stimulate curiosity and analytical thinking, encouraging children to explore and understand mathematical concepts beyond rote learning.

By embedding math into everyday life, parents foster an environment where children naturally encounter and explore mathematical ideas. This approach enhances children's interest in math, strengthens their conceptual understanding, and helps them develop good learning habits(Zippert & Rittle-Johnson, 2020). Parents' active involvement in this way bridges the gap between theoretical knowledge and practical application, ensuring that math is not only a subject in school but a useful and integral part of daily life. This method supports children in building confidence in their mathematical skills and lays a foundation for more advanced learning in the future, making math both accessible and enjoyable.

3.3.2 Parent-child interaction and diversified homework for growth

In rural areas, the educational challenges faced by left-behind children whose parents are often absent due to long-term work commitments underscore the critical need for parent-child interaction and diversified homework strategies. Against this backdrop, promoting parent-child interaction through diversified homework can offer a way to bridge the gap created by absent parents. Diversified homework involves designing tasks that are engaging, collaborative, and rooted in real-life contexts, allowing families to participate in learning activities even with limited resources. For example, assignments could include practical tasks like cooking, measuring, or budgeting, where grandparents or available family members can participate using everyday household items. These tasks can transform routine chores into educational opportunities, teaching children important mathematical concepts like fractions, units of measurement, and basic arithmetic. Such homework not only strengthens the academic foundation of left-behind children but also builds confidence as they see the relevance of their learning in real-world scenarios.

Additionally, incorporating creative assignments — such as storytelling, drawing, or project-based learning — can provide children with opportunities to express themselves and engage with their caregivers in meaningful ways. Grandparents, despite their limited formal education, can contribute by sharing cultural stories, traditional practices, or experiences that enrich the child's learning. For instance, a math project could involve calculating areas for farming plots, helping children connect geometry concepts to agricultural activities. These activities foster a sense of belonging and shared purpose, reducing the emotional and educational gaps left by absent parents.

Furthermore, schools can play an essential role by providing guidelines to make homework

more inclusive and accessible to all families. For example, teachers could design assignments that require minimal literacy or financial resources, ensuring that guardians can participate effectively regardless of their educational background. Schools could also offer optional workshops or materials to train guardians, helping them feel more confident in supporting their children's education. Community-based homework clubs or peer tutoring programs could further supplement the efforts of families, providing additional guidance and social interaction for left-behind children.

Ultimately, parent-child interaction through diversified homework serves multiple purposes: it improves the academic performance of left-behind children, strengthens family bonds, and fosters essential skills like critical thinking, responsibility, and collaboration. In an environment where traditional family structures are often disrupted, such an approach helps create a supportive learning ecosystem that nurtures the holistic growth of rural students. By embedding learning into daily life and encouraging shared activities, diversified homework not only enriches the educational experience of left-behind children but also equips them with the resilience and motivation needed to overcome their unique challenges.

3.4 Innovative hierarchical design of homework to stimulate students' interests and potentials

The type of homework reflects the ecology of education and also profoundly affects students' motivation to learn. Surveys show that students prefer flexible and diverse types of homework such as cooperative and experiential inquiry, while written homework is relatively less attractive. In view of the actual situation of mathematics education in rural elementary school, tiered homework can better meet the learning needs of different students and help stimulate their interest in learning(Zhu, 2012). It is necessary for teachers to study and design rich forms of layered homework. The following are some suggestions for the design of math homework suitable for rural elementary school to provide reference for the innovation of math homework in rural elementary school.

3.4.1 Diversify the types of homework to ignite enthusiasm for learning

For instance, when studying the area of a parallelogram in the fifth grade Humanistic Edition math curriculum, teachers can create a real-life scenario to help students truly grasp the concept. Rather than simply calculating areas on paper, teachers might design an engaging task set in the context of the students' own community, such as "planning a venue for community gatherings in the village." This activity could begin with a thought-provoking question: "Why are some venues designed as rectangles while others are shaped as parallelograms?"

By simulating the process of designing a community hall, students would need to apply their mathematical knowledge in practical ways. They could start by measuring and calculating the areas of various potential layouts, then move on to planning the arrangement of the space and budgeting for materials. Throughout this activity, students would be encouraged to think critically about the advantages and limitations of different shapes for the venue, such as the space efficiency, structural integrity, and aesthetic appeal of rectangles versus parallelograms.

As they progress through this task, students engage in hands-on problem-solving that brings mathematical concepts to life. They not only deepen their understanding of area and shape properties but also see firsthand how math plays a crucial role in decision-making and problem-solving in real-world contexts(Carreira & Baioa, 2018). This type of activity fosters students' core mathematical literacy and cultivates a range of skills, including spatial reasoning,

critical analysis, and financial planning. Through such practical applications, students experience the relevance of mathematics beyond the classroom, enhancing their appreciation for the subject and their confidence in applying it to real-world challenges. This holistic approach to teaching the area of a parallelogram transforms an abstract mathematical concept into a meaningful learning experience, building both competence and enthusiasm for mathematics.

3.4.2 Flexibility in designing assignments according to students' ability levels

When designing homework, it's crucial to consider students' varying abilities and create flexible tasks that allow each student to benefit from the learning process. A tiered assignment approach can be highly effective in catering to different skill levels. The first tier of homework consists of basic questions that are mandatory for all students, focusing on foundational skills, such as essential calculations and core knowledge review. These questions are designed to reinforce the basics, ensuring that students with weaker foundations can build a solid understanding through straightforward and manageable tasks.

The second tier includes applied questions that offer real-world problem scenarios or variations on the core material, blending theoretical knowledge with practical application. These questions allow students to connect what they've learned in the classroom with everyday situations, enhancing their ability to apply concepts to new contexts. By relating homework to real-life situations, students engage more deeply with the material, developing a more practical understanding of mathematical principles(Lo & Hew, 2017). The third tier features optional challenge questions designed for those who are ready to engage in higher-level thinking and complex problem-solving. This level encourages students with a strong grasp of the basics to push beyond their comfort zone and engage in creative exploration, fostering critical thinking and innovation.

This layered structure, with around 10-15 minutes set aside for completion, provides students the opportunity to work at their own pace and ability level, allowing those who need more practice with the basics to build confidence, while enabling more advanced students to explore challenging problems. Each student gains value from their work without feeling overwhelmed, as they can engage with homework that are appropriately matched to their individual needs. To further enrich this approach, interdisciplinary and reflective questions can be integrated into homework. Prompts like "analyze today's mistakes" or "explain why certain mistakes were made and how to correct them" encourage students to reflect on their learning process, promoting independent thinking, self-assessment, and expression skills. These questions deepen students' understanding of their learning journey and teach them to approach errors with a growth mindset, ultimately fostering resilience and adaptability in their approach to problem-solving. Through this flexible, layered design, homework become a tool for personalized growth and improvement, encouraging each student to find meaning in their work, make interdisciplinary connections, and develop a more self-directed, confident approach to learning.

3.4.3 Multi-dimensional feedback on assignments to increase students' confidence and interest in learning

Homework feedback serves as a vital extension of classroom teaching, offering students an opportunity to receive supportive and varied evaluations that can encourage growth and improvement. However, current surveys indicate that 89% of homework evaluations are still conducted solely by teachers and often in a limited, single-dimensional format. Only a small number of teachers adopt more dynamic forms of assessment, such as rubrics, symbols, or visual

feedback like drawings, to communicate progress and areas for improvement.

To create a more comprehensive and engaging feedback process, teachers can experiment with a multidimensional evaluation system that combines independent self-assessment, peer evaluation, and teacher assessment. This approach enables students to receive feedback from multiple perspectives, enriching their understanding of their performance. Evaluations can focus on three key criteria: "accuracy of the answer," "standardization of the response," and "innovation in the solution." By examining each assignment based on these criteria, teachers can assign ratings across three levels—A, B, and C—for each dimension, culminating in an overall assessment that offers a holistic view of the student's efforts and progress(Guskey & Link, 2019).

Such a diversified evaluation model provides students with a clearer sense of their own strengths and areas for development. By engaging in peer evaluations and self-reflections, students learn to assess their work critically, fostering a habit of self-reflection and promoting personal growth. This multidimensional feedback not only helps students identify their learning level but also encourages them to take responsibility for their own progress, enhancing motivation and initiative. Through this approach, feedback becomes a motivating force that inspires students to improve their study habits, strive for accuracy, and think creatively about problem-solving. Students begin to see feedback not as mere judgment but as constructive guidance that supports their learning journey, helping them build confidence and enthusiasm for their studies. By valuing each student's unique contributions and fostering a culture of reflection and self-improvement, teachers can create a learning environment that emphasizes growth, curiosity, and resilience.

4. Conclusions

The current state of mathematics homework in rural elementary schools reveals significant deficiencies, marked by a reliance on single-form homework, limited access to tutoring, and a lack of diverse feedback mechanisms. These limitations contribute to low student engagement, poor homework quality, and a general lack of enthusiasm for learning. This study delves deeply into the challenges associated with math homework completion in rural elementary schools, highlighting areas for improvement in content, format, and feedback to better align with the actual needs of students and to enhance homework effectiveness. To comprehensively address these issues, this paper examines the situation from multiple perspectives: the student level, the family level, and the teacher level. Based on these insights, it proposes targeted strategies. One key recommendation is to allocate time for written homework during school hours, thereby alleviating the burden on students and reducing the need for external support at home. Additionally, emphasizing parental responsibility within home-school co-education frameworks can create a cohesive learning environment that supports students'academic growth. Teachers, on the other hand, should innovate in the design of homework, introducing a variety of forms and levels to cater to students' diverse abilities and stimulate interest in mathematics.

Given the unique learning contexts and environments of rural students, the design of mathematics homework should incorporate a range of formats and levels that acknowledge differences in students' learning capabilities. Parents can play an active role by participating in homework guidance and creating a positive, supportive atmosphere at home that encourages independent learning and a sense of accountability. Teachers should prioritize life-oriented, exploratory tasks that bring mathematics into the realm of students' everyday experiences, making learning more relevant and engaging. Increasing the inclusion of practical, real-world applications in homework can help foster curiosity and a deeper understanding of mathematical concepts. A stable communication mechanism between schools and parents is essential to support

home-school co-education. By building a strong partnership, schools and families can work together to provide students with the guidance they need to complete high-quality homework, creating a more supportive learning environment. A diversified approach to homework design, coupled with a robust evaluation system, can continuously improve the effectiveness of mathematics homework and develop students' core literacy skills.

Ultimately, these strategies aim to create a more engaging and relaxed homework experience, increasing students, intrinsic motivation in mathematics and enhancing the quality of their work. By fostering an environment that prioritizes reducing burdens and enhancing learning efficiency, this study contributes valuable insights to the field of rural mathematics education. In doing so, it supports the long-term development of rural elementary math programs, helping to build a nurturing environment that promotes students' holistic growth. These improvement measures are intended to lay a foundation for children's healthy development, contributing to a more equitable and impactful educational experience that benefits both current and future generations.

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