

Multi-directional and In-depth: A Practical Research on Optimizing Homework Design Through School-Based Professional Development

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Abstract

In July 2021, the General Office of the CPC Central Committee and the General Office of the State Council issued the Opinions on Further Reducing the Homework Burden and After-school Training Burden of Students in Compulsory Education. Reducing students' excessive homework burden and improving homework design quality are among the main tasks of this policy. To implement the "Double Reduction" policy, Haining Yangshan Primary School determined to focus on optimizing homework design as the starting point for homework reform. Based on homework design for core competencies, we proposed principles and strategies for optimizing homework design, effectively improving teachers' homework design quality and cultivating students' core competencies. This study explores a school-based teacher training model that includes multi-directional and in-depth dimensions, refined tiered homework, integrated large-unit homework, and collaborative research and sharing mechanisms. Through three years of practice, significant results have been achieved in reducing students' homework burden while improving learning quality.

Keywords: Double Reduction Policy; School-Based Teacher Training; Homework Design; Core Competencies; Primary Education

1. Introduction

In July 2021, the General Office of the CPC Central Committee and the General Office of the State Council issued the "Opinions on Further Reducing the Burden of Homework and Extracurricular Training for Students in Compulsory Education" (hereinafter referred to as the "Double Reduction" policy) (Ministry of Education of the People's Republic of China, 2021).

This landmark policy document explicitly identifies reducing students' excessive homework and improving its design; this policy marks a significant shift in China's basic education reform.

As a vital link between classroom instruction and after-school reinforcement, the quality of homework assignments directly impacts the achievement of instructional objectives and the effectiveness of student learning, serving as a core mechanism and practical cornerstone for implementing the "Double Reduction" policy. Cao (2023) highlights the need to examine the "Double Reduction" issue from multiple dimensions—both through specific governance approaches and broader perspectives of sustainable human and social development. This dual approach clarifies the means-ends relationship. Education, though rooted in the private sphere of children and their families, is defined by its public nature, which is fundamental to public education. The optimization of homework design embodies the integration of education's public nature with the needs of individual development.

Since the implementation of the "Double Reduction" policy, reducing the volume and enhancing the quality of primary and secondary school homework has become a hot topic in educational theory and practice research. In the quest to improve the quality of homework, the academic community has conducted extensive research on the theoretical foundations and practical strategies of homework design. Qian and Shi (2024) point out that well-designed homework is a crucial link in ensuring classroom teaching quality. Cognitive diagnostic theory can not only effectively address the issue of improving quality and efficiency but also help resolve the practical contradiction between personalization and scalability. In their 2024 study, Wang et al. (2024) further emphasize, from a systems perspective, that primary and secondary schools must effectively reduce students' excessive homework burden. They argue that homework design is the fundamental approach to alleviating this burden, and that it is necessary to conduct an in-depth exploration of the standards that homework design should adhere to from a systems theory perspective.

However, empirical investigations also reveal that despite diversified homework optimization reforms in basic education, certain issues inevitably persist across primary and secondary schools nationwide. Wu and Li (2024) note that current homework reduction policies in primary and secondary schools have not been fully implemented in practice. To varying degrees, regions face issues such as homework content failing to effectively align with educational development and student needs, as well as lax homework management processes. Research by Luo et al. (2025) further indicates that schools serve as the primary battleground for implementing the "Double Reduction" policy, with teachers bearing responsibility for its advancement. Teachers' policy execution capacity directly impacts the effectiveness of implementation.

Against this backdrop, optimizing homework design is not only a practical requirement for implementing the "Double Reduction" policy, but also an inevitable choice for overcoming the current challenges in homework reform and returning to the essence of education. As a grassroots educational institution, Yangshan Primary School in Haining City actively responded to national policy directives by initiating homework reform centered on optimizing assignment design. The school established principles and strategies for enhancing homework design, effectively improving the quality of teachers' assignments, and cultivating students' core competencies. This

study aims to share the school's practical experience in optimizing homework design through school-based professional development, providing a reference for other schools implementing the "Double Reduction" policy.

2. Literature Review

2.1. Policy Orientation for Homework Design Under the "Double Reduction" Policy

The core essence of the "Double Reduction" policy is not merely to reduce the quantity of homework, but to achieve a virtuous cycle of reducing students' academic burden and enhancing learning efficiency by improving the quality of homework (Wu and Wang, 2025). The policy explicitly requires that homework design be integrated into the curriculum and teaching research system, embodying characteristics of differentiation, flexibility, and personalization, while eliminating mechanical repetition and punitive assignments (Ministry of Education of the People's Republic of China, 2021). Subsequent supporting policies have further refined these requirements: the 2022 "Five-Pronged Management" initiative emphasized that homework design must align with students' age characteristics and learning patterns, while the 2024 "Work Plan for the 'Education Consortium' on Home-School-Community Collaborative Education" proposed optimizing the supply of homework resources through home-school-community collaboration (Li and Li, 2025).

From the perspective of policy implementation logic, the core orientation of homework design reform is reflected in three dimensions: the value orientation has shifted from knowledge consolidation to competency development, requiring homework to fulfill the function of fostering virtue and integrating core competency development goals (He and Wang, 2025); the implementation approach has shifted from piecemeal design to systematic construction, emphasizing the consistency of homework with curriculum, instruction, and assessment (Wu and Wang, 2025); the shift in primary responsibility from teachers designing assignments independently to collaborative development among multiple stakeholders, highlighting the school's central role and the supportive function of teaching and research (Luo et al., 2025).

2.2. Theoretical Foundations of Assignment Design

The optimization of assignment design must be grounded in diverse educational theories. Cognitive diagnostic theory provides a core technical pathway for precision assignment design, enabling accurate assessment of students' mastery of knowledge and thereby resolving the tension between personalization and scalability (Qian and Shi, 2024). Systems theory, from a holistic perspective, proposes that homework design should establish a cyclical model of "analysis-conceptualization-design-feedback," emphasizing the synergistic interaction among school management, teacher competence, homework content, and evaluation feedback (Wang et al., 2024). Furthermore, the principle of teaching according to individual aptitude requires that homework difficulty be aligned with students' ability levels, providing a direct basis for tiered homework design (Xi, 2024).

2.3. Limitations of Existing Research and Research Gaps

Although existing research has made some progress, there remains a disconnect between theory and practice. Most studies focus on a single theory or a narrow approach, lacking a comprehensive exploration of the full implementation process in grassroots schools. Due to high technical barriers, precision design techniques such as cognitive diagnosis rely on specialized tools and data support, making them difficult to implement in ordinary primary and secondary schools. Additionally, evaluation systems remain inadequate; existing research often emphasizes innovation in homework design formats while neglecting quantitative assessments of implementation outcomes and long-term tracking.

Current research has not fully addressed three key questions: How can a low-threshold, high-effectiveness professional development system for homework design be established that is suitable for grassroots schools? How can a balance be struck between the differentiation and personalization of homework and its large-scale implementation? How can a closed-loop mechanism for optimizing homework design be established? These research gaps provide the core entry points for this study.

2.4. Innovative Value of This Study

The innovation of this study is primarily reflected in three aspects: First, innovation in the practical approach, which involves constructing a “multi-directional and in-depth” school-based professional development model that deeply integrates homework design with teacher professional development, thereby forming a replicable operational framework for grassroots schools; Second, innovation in technical translation: transforming complex theories such as cognitive diagnosis into tiered design methods that are easy for teachers to implement, thereby lowering the barrier to entry for precise homework design; Third, innovation in the evaluation system: establishing a dual assessment mechanism combining “process+outcome” and “quantitative+qualitative” approaches to provide empirical evidence of the effectiveness of homework design.

3. Research Design and Methods

3.1. Research Subject

This study focuses on Yangshan Primary School in Haining City. The school is a public compulsory education primary school with a current staff of 149 members. Its curriculum covers all compulsory education subjects, including Chinese, mathematics, English, science, art, and physical education. The school currently has 56 classes and 2488 students.

3.2. Research Process

This study was conducted in three phases. During the initiation phase (September 2021-December 2021), a school-based professional development plan was formulated based on policy study and current status research, establishing a “multi-directional-in-depth” professional development framework. Implementation Phase (January 2022-December 2024): We fully

implemented refined, tiered homework assignments and integrated large-unit homework designs. Concurrently, we conducted collaborative professional development activities under the “Master Teacher Mentorship+Young Teacher Growth Camp” model, established a three-tier review mechanism for homework design, and conducted periodic effectiveness evaluations and strategy adjustments each semester. Optimization Phase (January 2025-May 2025): Refine the principles and strategies for homework design, establish a school-based homework resource repository, and conduct a summary of outcomes along with an effectiveness evaluation.

3.3. Research Methods

This study employs a comprehensive approach utilizing multiple research methods. Through literature review, we analyzed the “Double Reduction” policy documents, theoretical literature on homework design, and domestic and international case studies to construct the theoretical framework and practical references for the research. Data was collected through questionnaires (a student homework burden and learning interest survey once per semester, and a parent satisfaction survey once per year) and interviews (teacher interviews twice per year). A total of 4860 questionnaires were distributed, with 4628 valid responses received; interviews were conducted with 156 teachers, 320 students, and 280 parents. Using the case study method, representative subjects such as Chinese, mathematics, and science were selected to track and document the entire process of homework design optimization, resulting in 12 typical cases for in-depth analysis; data analysis software was utilized to conduct pre- and post-comparative analyses of quantitative indicators such as student homework time, academic performance, and classroom participation, and to complete statistical data processing.

4. Principles of Homework Design

Against the backdrop of the “Double Reduction” policy, reducing workload while enhancing effectiveness serves as the overarching principle for modern educators in optimizing subject-based homework design. Based on practical circumstances, the school has established four core principles for refining homework assignments. These principles are interconnected and mutually reinforcing, collectively forming the theoretical framework for optimizing homework design within the school.

4.1. Target Principle: Emphasizing Core Competencies

Against the backdrop of the “Double Reduction” policy, enhancing teachers’ ability to design goal-oriented assignments is crucial. Optimizing homework design based on the new curriculum standards and targeting core competencies is key to implementing policy requirements. Xi (2024) proposes that the tiered design of elementary mathematics homework under the “Double Reduction” policy should focus on cultivating students’ core competencies rather than merely engaging in repetitive, mechanical drills of knowledge points.

Schools should adopt structured design approaches aligned with large-unit homework models, emphasizing holistic frameworks and enhanced interconnectivity to elevate students’ cognitive levels. The principle of purposefulness requires teachers to first identify specific core

competencies to be developed when designing assignments. Tasks should then be crafted around these objectives to authentically assess students' developmental progress, transforming homework into an effective tool for promoting well-rounded growth. For instance, in mathematics instruction, if the core competency goal for a lesson is to develop logical reasoning skills, homework should emphasize proof-based reasoning rather than repetitive computational drills. Through this approach, homework ceases to be an appendage of classroom teaching and instead becomes a vital pathway for cultivating students' core competencies.

4.2. Comprehensive Principle: Emphasizing Comprehensive Application

When designing assignments, teachers should focus not only on knowledge content but also on fostering students' comprehensive competencies. By drawing from their own perspectives, educators can explore assignment design that stimulates motivation for learning and achievement. This approach enhances the interactivity between subject knowledge while incorporating students' relevant life experiences and social knowledge. Integrating subject-specific knowledge with interdisciplinary concepts optimizes classroom instruction. Jiang (2024) emphasizes that under the "Double Reduction" policy, the essence of enriching science education should return to the classroom, with assignment design reflecting practicality and comprehensiveness.

The principle of comprehensiveness recognizes that real-world problems rarely align neatly with single-subject boundaries. By designing homework that requires students to apply multidisciplinary knowledge and skills, teachers equip students with the ability to tackle complex challenges in future academic and professional life. Schools encourage teachers to design interdisciplinary project-based assignments, enabling students to synthesize their learning through research, data analysis, product creation, and presentation of findings. Interdisciplinarity does not mean erasing disciplinary boundaries; rather, it involves identifying organic connections between disciplines while preserving the core knowledge systems of each. In their teaching practice, educators should strike a balance regarding "disciplinary boundaries," centering on the core competency goals of the primary subject and using knowledge and skills from other disciplines as support and extensions. This approach helps avoid both the formalism of integration for integration's sake and the tendency to cover everything superficially without delving deeply into any single topic.

4.3. Appropriateness Principle: Focusing on Layered Effects

Teachers can assign homework tailored to individual students. Given that each student's knowledge mastery, homework completion, and overall abilities vary, assignments must accommodate different learners to achieve differentiated instruction. Wang (2025) proposes that effective, appropriate, and high-quality flexible homework design serves as a practical vehicle for precision teaching, emphasizing the creation of tiered, optional, and open-ended assignments based on students' individual differences and learning needs.

The principle of appropriateness requires teachers to develop multiple versions of assignments that vary in complexity and challenge level. For each lesson, teachers should design foundational-level assignments ensuring all students grasp core concepts, intermediate-level assignments challenging students to apply knowledge in new contexts, and advanced-level assignments

providing enrichment opportunities for high-achieving students. Students can autonomously choose which level to attempt, fostering their self-directed learning and self-regulation skills.

Implementing tiered assignments requires teachers to possess a deep understanding of their students. Schools mandate that teachers comprehensively assess each student's learning status and ability level through daily observations, homework analysis, test scores, and other methods to inform tiered assignment design. Simultaneously, schools emphasize that tiering is not static but should be dynamically adjusted based on students' learning progress, ensuring every student develops at their appropriate level. In his 2024 review of *Diverse Designs for Innovative Primary Chinese Language Assignments*, Li noted that assignment design must balance knowledge reinforcement with interest stimulation, fostering students' autonomous learning abilities and innovative spirit. This perspective aligns with the school's principle of appropriateness, both emphasizing that assignment design should address individual differences and developmental needs.

4.4. Evaluative Principle: Focusing on Comprehensive Development

The purpose of homework evaluation is to assess students' mastery of knowledge and the effectiveness of their assignments. Through communication, work displays, and other methods, a dynamic evaluation is conducted by multiple stakeholders-including self-assessment, peer assessment, teacher assessment, and parent assessment-across dimensions such as knowledge, skills, competencies, and attitudes. This approach motivates students to complete assignments more effectively and comprehensively enhances homework efficacy.

The school has developed a comprehensive evaluation framework that transcends traditional pass/fail grading. As the primary evaluators, teachers focus on the accuracy of students' knowledge acquisition, the proficiency of their skill application, and the development of their subject-specific literacy. Through self-assessment, students reflect on their level of effort, the extent of their progress, and any knowledge gaps in their learning process, thereby cultivating a multifaceted understanding of themselves. Peers evaluate each other's contributions and teamwork skills during collaborative activities. Parents assess their children's attitude toward learning and the development of homework habits, and gain insight into their children's overall development through communication between home and school. This multidimensional evaluation system helps teachers identify students who may require additional support or enrichment, avoids the limitations of a single evaluation perspective, and provides a reference for improving instructional strategies.

4.5. Theoretical Basis for the Formulation of Principles

4.5.1. Understanding by Design

The Compulsory Education Curriculum Guidelines (2022Edition) explicitly require that education and teaching focus on cultivating core competencies. As an extension of instruction, assignments must align with this core objective. Understanding by Design (Grant Wiggins and Jay McTighe) complements core competency theory; its "backward design" logic requires teachers to first clarify the learning objectives for core competencies and students' expected understanding, and then design assignment tasks in reverse. The Principle of Goal-Oriented is

grounded in this theoretical framework, transforming abstract competency requirements into assessable and actionable specific assignment tasks. It ensures that assignment design consistently revolves around the questions: “What competencies should be cultivated? How should these competencies be assessed? How should tasks be designed to achieve these competencies?” This approach prevents assignment design from becoming disconnected from the goals of competency development.

4.5.2. TPACK: The Technology Pedagogical Content Knowledge Model

Systems theory emphasizes the dialectical relationship between the whole and its parts. As a subsystem of the educational system, assignment design must interact synergistically with elements such as curriculum, instruction, and assessment (Wang et al., 2024). The TPACK (Technology Pedagogical Content Knowledge) model (Punya Mishra and Matthew Koehler) emphasizes that assignment design must integrate three core elements: content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK). It also requires consideration of interdisciplinary knowledge connections, the alignment of teaching methods with assignment formats, and the integration of modern educational technology with assignment implementation. The principle of comprehensiveness embodies the holistic requirements of this theoretical framework, breaking through the limitations of assignment design confined to a single discipline, a single format, or a single pathway, and enabling assignments to serve as a vehicle connecting disciplinary knowledge, teaching practice, and students’ lives.

4.5.3. SOI-SIOP

The concept of differentiated instruction emphasizes that education must adapt to individual student differences (Xi, 2024). SOI-SIOP (Structure of Intellect-Student-Oriented Instructional Planning) provides a scientific and practical framework for differentiated instruction. This model comprehensively assesses students across three dimension-learning styles (visual, auditory, kinesthetic), cognitive abilities (memory, reasoning, problem-solving), and foundational knowledge-to precisely identify their learning needs and ability levels. The principle of appropriateness, grounded in this theoretical framework, elevates tiered assignment design from simple difficulty-based stratification to a multidimensional approach that integrates “difficulty+learning style+ability requirements.” This ensures that every student can achieve growth within their own capabilities and in alignment with their learning style.

4.5.4. KANO User Needs Analysis Model

The KANO User Needs Analysis Model provides professional support for precise and diversified assignment feedback. In the context of this study, it categorizes students’ needs regarding assignments into three levels: basic needs (feedback on knowledge mastery), expected needs (feedback on skill development), and excitement needs (personalized evaluation and growth incentives). This approach requires that feedback not only meet students’ basic learning needs but also exceed expectations by providing guidance on skill development, while simultaneously stimulating learning interest through personalized incentives. Based on this theory, the evaluative principle establishes a multi-stakeholder feedback system, transforming assignment evaluation from a mere judgment of right or wrong into a vital tool for motivating student

learning and helping teachers optimize their instructional design, thereby maximizing the value of assignments.

5. School-based Teacher Training Approach to Homework Design

To ensure the effective implementation of the “Double Reduction” policy, schools-as the primary venues for teaching-should continuously refine their school-based professional development systems. They should prioritize improving homework quality as a breakthrough point for enhancing teachers’ professional competence, making homework design a focal point of school teaching research. Regular school-based training should be conducted, and homework design capability should be incorporated as one of the criteria for evaluating teachers’ educational and teaching competencies. Research by Luo et al. (2025) indicates that teachers’ implementation of the “Double Reduction” policy is influenced by factors such as subjective norms, perceived behavioral control, and behavioral attitudes. Therefore, establishing a supportive institutional environment is crucial for teachers’ professional development.

5.1. Exploring New Training Ideas

Under the “Double Reduction” policy, homework design holds significant practical importance. By optimizing homework assignments, teachers enhance teaching practices, stimulate students’ interest in learning, and build their confidence. This lays a foundation for students to complete assignments more effectively and improve their core subject competencies in the future. In summary, enhancing all teachers’ ability to optimize homework design is particularly crucial.

Based on this, the school implements a school-based professional development program centered on homework design through two dimensions: First, grounded in classroom practice and problem-focused, it conducts multi-directional professional development activities. Through individual study, mentorship by distinguished teachers, grade-level integration, and departmental workshops, it strives to create efficient classrooms and enhance research capabilities (as shown in Figure 1).

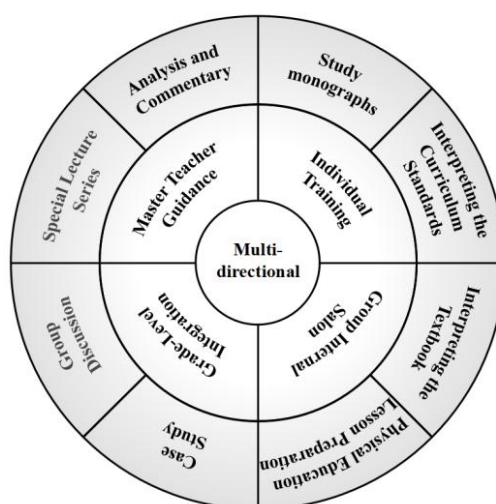


Figure 1. Schematic Diagram of the Connotations of the “Multi-directional” Dimension

Second, centered around the theme, we conducted in-depth training activities through layered refinement. By integrating theoretical guidance, practical design, reflective optimization, and compilation into a handbook, we significantly reduced students' homework burden and stimulated their interest in learning (as shown in Figure 2).

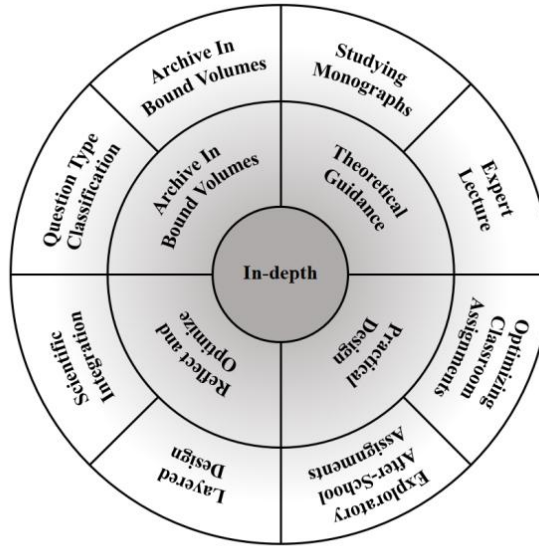


Figure 2. Schematic Diagram of the “In-depth” Dimension’s Implications

5.2. Enhancing New Training Patterns

Based on the above considerations, the school has established a school-based professional development program focused on optimizing homework design. This initiative aims to enhance the quality of teachers' homework assignments and cultivate students' core competencies (as shown in Figure 3).

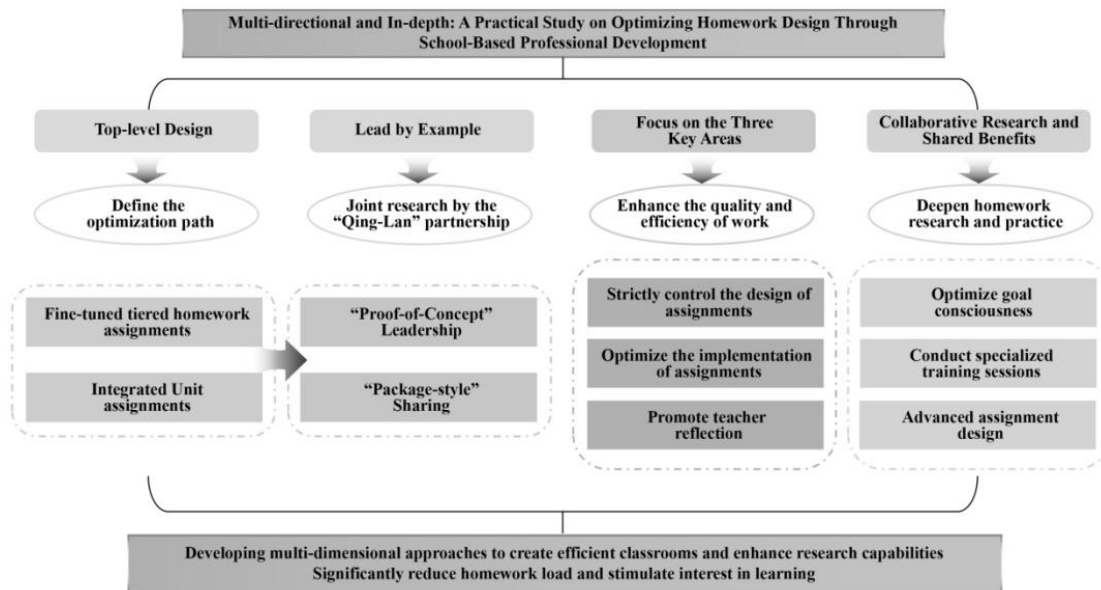


Figure 3. Multi-directional and In-depth: Operational Diagram of Practical Research on Optimizing Homework Design Through School-Based Professional Development

5.2.1. Top-level Design: Clarifying Optimization Paths

Implementing the spirit of reducing academic burdens, specialized training sessions on homework design have been conducted at all levels and for various types of assignments. This initiative strengthens theoretical learning in homework design, laying a solid foundation for scientific and standardized assignment creation. Centering on school-based professional development projects, the school has proposed the following pathways for optimizing homework design.

The first point is refined, tiered operations. Refined Tiered Assignments. Tiered assignment design involves creating targeted homework based on students’ individual characteristics, existing knowledge levels, and learning ability differences. However, its implementation in actual teaching has been less than satisfactory, failing to leverage learning objectives as a guiding principle for assignment design. To address this, the school proposes refined tiered assignments emphasizing “three refinements.” First is the precise stratification. This entails two dimensions: stratification must be grounded in learning objectives and student diversity, while assignment difficulty and quantity must be meticulously tiered-for instance, distinguishing between foundational and extension assignments, or written tasks and hands-on practice. Second is refined selection, concerning the content choices for assignments. This requires alignment with learning objectives, emphasizing representativeness and goal attainment, while also ensuring both foundational knowledge and individual development are enhanced. Finally, refined compilation stresses that assignment design should focus on consistency between learning objectives, knowledge content, and real-life contexts. Attention must be paid to the practicality, contextual relevance, and real-world applicability of assignments to stimulate student interest and cultivate key competencies and subject-specific literacy (as shown in Figure 4).

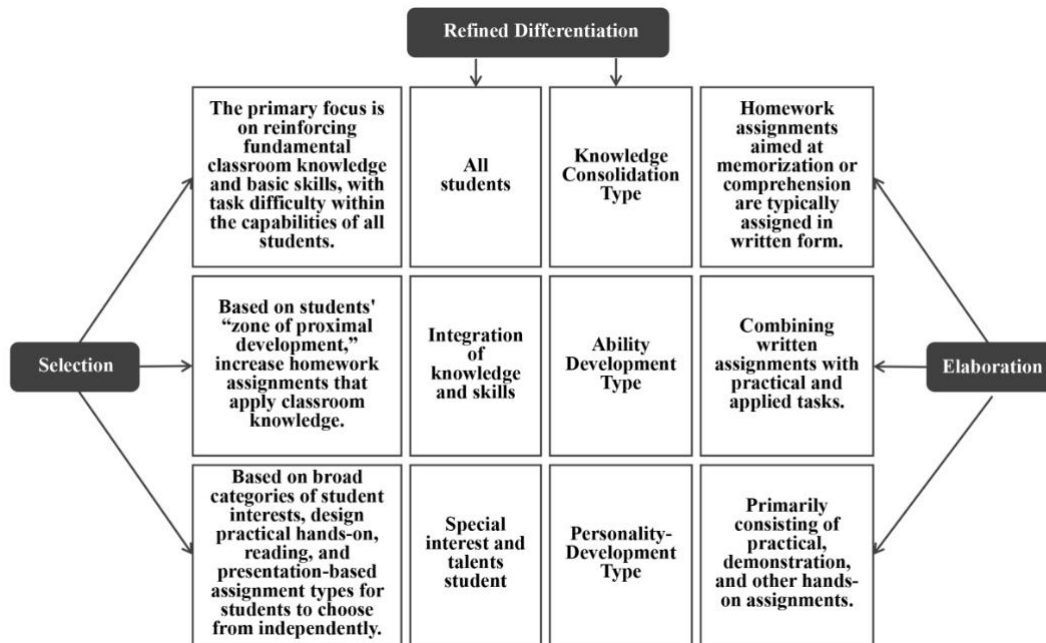


Figure 4. Schematic Diagram of the “Three-Step” Operation

It should be noted that the “fine-grained differentiation” discussed in this paper encompasses two dimensions: first, the differentiation of assignment content, which involves categorizing assignments into different levels-such as foundational, advanced, and extension-based on difficulty and task type; second, the grouping of students, which involves comprehensively assessing students’ mastery of knowledge, learning abilities, and interests to divide them into different learning groups. The grading of homework content and the grouping of students are two interrelated yet fundamentally distinct concepts: the former pertains to the design of the homework tasks themselves, while the latter refers to the organizational structure of the learning group.

The second is integrated, large-unit assignments. Integrated large-unit assignments. These assignments should not only encompass content from each lesson but also span two or more units in their design, potentially crossing disciplines, units, and grade levels. Their integration manifests primarily in three aspects. First is content integration. Assignments target the cultivation of core subject competencies, synthesizing knowledge points across units to identify connections and structure them systematically. Second is design integration, where assignments are conceived from a holistic perspective to reflect the structural and relational connections between unit knowledge points, helping students form sound cognitive frameworks. Finally, form integration involves diversifying assignment formats. Assignments can be designed based on specific learning objectives within the content, or they can integrate students’ existing unit knowledge to combine multiple assignment formats. Xu (2024) emphasizes that to meet the requirements of the new curriculum standards and enhance teachers’ homework design capabilities, conducting school-based professional development focused on homework design within a large-unit framework is essential (as shown in Figure 5).

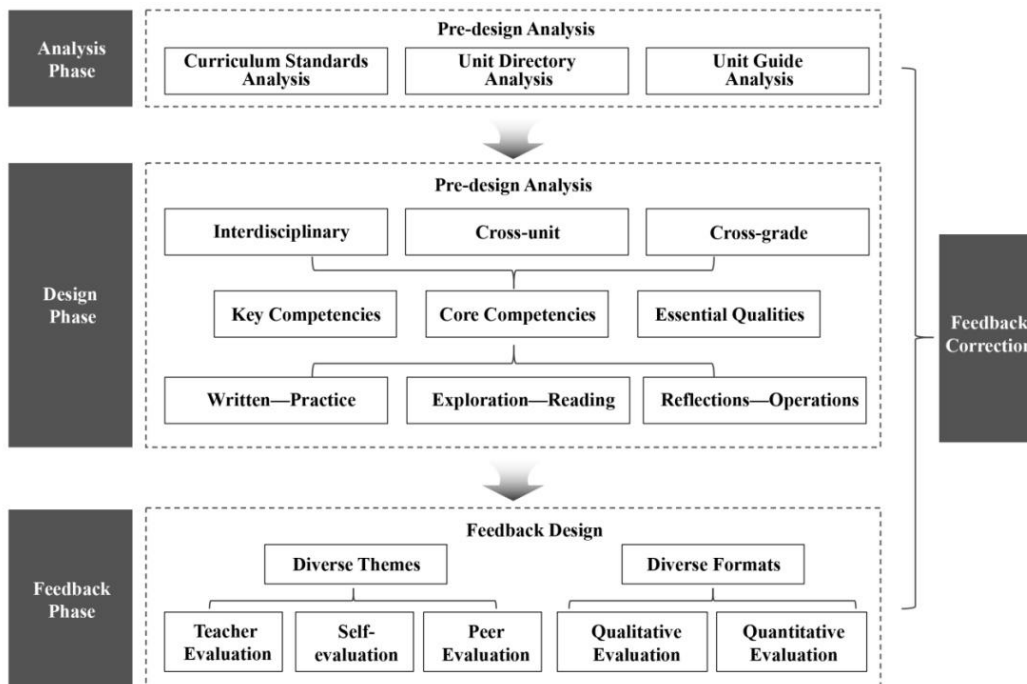


Figure 5. Large-Unit Project Design Blueprint

5.2.2. Demonstration and Leadership: Blue-Green Partnership for Collaborative Research

Led by the school's distinguished teachers and supported by outstanding young faculty members, the Blue-Green Partnership (also known as the Young Teachers' Growth Camp) was established. Its purpose is to guide educators in conducting specialized research on homework design, fostering a school-based homework system that progressively evolves from design and implementation to feedback-spanning daily assignments, periodic exercises, and reflective improvements-ultimately forming an interactive framework of mutual reinforcement and correction.

“Design-Driven” Leadership. The camp prioritizes homework optimization as a core professional development initiative. Addressing issues in current assignment design-such as goal alignment, content relevance, and structural coherence-it adopts a unit-based approach. This involves analyzing unit curriculum materials, designing unit assignments, gathering implementation feedback, and refining assignments through a research-driven cycle. Grade-level workshops focus on developing comprehensive unit-based homework designs. During the implementation phase, participants engage in iterative discussions and refinements of assignment designs. This process identifies challenges while accumulating best practices, with insights disseminated across subject teams to enhance assignment effectiveness.

“Bundled” Sharing. Grounded in curriculum standards and grade-level requirements, the Growth Camp facilitates school-based, phased assignment optimization tailored to student needs and textbook specifications. Members designed segmented assessment assignments for grades 1-6 based on the phased teaching content of each grade's instructional tasks and the key competency training focuses for that stage. Following implementation, teachers conducted quality analysis and reflection on their class situations. Based on the implementation feedback, they: 1.Revised and adjusted relevant designs to prepare thoroughly for subsequent implementation; 2.Provided targeted improvement suggestions for each class's next-phase teaching implementation to enhance effectiveness.

5.2.3. Grasping Three Gates to Improve Homework Quality and Effectiveness

Given the current weakness in teachers' homework design and implementation, homework management is delegated to teaching research groups. The focus is on strengthening three key areas: rigorously controlling homework design, optimizing homework implementation, and promoting teacher reflection. This approach uses management to drive standardization, standardization to drive quality, and continuously enhances the quality and effectiveness of homework.

Ensuring Rigorous Homework Design. Each teaching research group prioritizes monthly specialized training sessions on homework design during collective lesson preparation activities. Standardized procedures are implemented: the lead preparer completes unit homework design one week in advance, and group members independently review and provide feedback. During the preparatory group meeting, the lead designer and members discuss the unit assignment; finally, the lead designer incorporates feedback, revises the assignment, and submits it to the preparatory group leader for review and release (as shown in Figure 6).



Figure 6. Assignment Specialized Training Model

Optimizing Homework Implementation. At the beginning of the semester, the Academic Affairs Office revised the homework routine checklist and organized teachers to study requirements regarding homework objectives, wording, structure, timing, grading, feedback, reflection, and tutoring. During implementation, beyond basic standards like homework frequency and teacher grading, particular emphasis was placed on analyzing homework design quality—specifically considering aspects such as goal alignment, scientific design, diverse types, appropriate difficulty, reasonable time allocation, logical structure, and differentiation. Building on this foundation, subject teams conduct regular peer reviews of homework practices. This allows teachers to identify strengths in others’ approaches, reflect on their own shortcomings, and make improvements.

Promoting Teacher Reflection. On one hand, subject teams require teachers to utilize subject-specific homework portfolios effectively. These portfolios document common student errors and individual student mistakes in real time, providing solid evidence for class-wide homework feedback sessions. Teachers are also required to engage in teaching reflections to refine and enhance future instruction. On the other hand, for frequently occurring problems in student assignments, the teaching group collaboratively analyzes the root causes of these errors. Together, they design supplementary exercises to reinforce learning, iteratively optimizing the design and implementation of tiered homework assignments.

5.2.4. Collaborative Research and Sharing: Deeply Cultivating Homework Training

Adhere to a diverse school-based professional development strategy, fostering collaborative research and knowledge sharing through activities. Grounded in competency-based education, problem-oriented approaches, and iterative refinement, we will deepen research on optimized homework design to tangibly enhance teachers’ homework planning capabilities.

Competency-based and goal-oriented. Conduct specialized training on effective homework design through both external learning (attending expert lectures and master teacher seminars) and internal training (inviting subject specialists and experts to train teachers). This transforms homework design from arbitrary to standardized, and from experience-based to scientific, providing theoretical support and innovative approaches for in-depth research. The school organizes teacher forums, homework design competitions, and case study writing contests to explore effective strategies and best practices. These insights are shared during teacher forums to find the intersection between reducing workload and enhancing effectiveness.

Problem-Oriented Approach: Conducting Thematic Training. Each teaching research group identifies current homework issues through routine inspections and classroom observations, establishes research themes, and conducts training activities. Leveraging the exemplary role of distinguished and outstanding teachers, we address key challenges in homework design. Through

discussion and practice, teachers gain a deeper understanding of design principles and methodologies, thereby enhancing their homework design capabilities.

Starting with iteration, we advance homework design. Each subject focuses on multiple aspects, including objectives, content, delivery methods, and assessment. Beyond designing targeted consolidation assignments, we also provide ability-development-oriented tasks for high-achieving students, catering to diverse learning needs. To diversify homework formats, we design more creative content and flexible types—such as extension, research-based, and hands-on assignments—emphasizing cognitive development, imaginative thinking, and practical skills. This transforms homework experiences into a holistic, expressive learning journey, pioneering new approaches and embodying innovative principles in assignment design.

6. Recommendations for Optimizing Homework Design through School-based Teacher Training

6.1. Implementing Refined Management

The school has introduced the “Haining Yangshan Primary School Student Homework Management System” and the “Haining Yangshan Primary School Implementation Rules for Strengthening Homework Management,” emphasizing aspects such as homework assignment, grading, and evaluation. A management mechanism has been established involving the principal’s office, the teaching affairs office, subject departments, and all teachers. Teachers in each subject carefully manage homework in accordance with the system, ensuring comprehensive, meticulous, and practical implementation. Teachers meticulously design assignments, carefully grade work, provide substantive feedback, prioritize process-based evaluation, and emphasize developmental assessment. This maximizes the functionality and impact of homework, effectively reducing students’ excessive academic burden and promoting their healthy development. Li and Li (2025) emphasize that optimizing the educational ecosystem is an inherent necessity for advancing the implementation of the “Double Reduction” policy. Evaluating the effectiveness of this policy should focus on the restoration and improvement of the educational ecosystem.

6.2. Grounding in Classroom Teaching

School-based professional development must be grounded in the classroom. Teachers should anchor their efforts in the primary arena of classroom instruction. Building upon a thorough study of curriculum standards and teaching materials, they should meticulously design lesson plans, carefully select exemplary problems and exercises, and continuously reinforce key concepts, promptly address ambiguities, and effectively resolve difficulties during classroom teaching. Before assigning homework, teachers should complete the tasks themselves. Homework should be categorized into required and optional assignments, carefully selected based on student learning needs to ensure foundational coverage and timeliness. Assignments should take diverse forms; beyond written work, oral assignments, research-based learning tasks, and practical projects are encouraged.

6.3. Implementing Burden Reduction and Efficiency Improvement

The school advocates reducing students' excessive and unnecessary academic burdens by implementing appropriate, targeted practice requirements. The Academic Affairs Office centrally manages homework assignments, ensuring overall compliance with curriculum standards, textbook requirements, and students' actual capabilities. This approach aims to reinforce knowledge understanding, hone skills and techniques, cultivate interests and abilities, and serve as a feedback mechanism for adjusting teaching methods. Homework types, content, and quantity must be standardized, with difficulty levels carefully controlled. Regular monitoring and spot checks of homework assignments across all grades are conducted through surveys, student interviews, and parent questionnaires. Grade-level teams carefully select assignments, maintain an overview of class-wide homework distribution, and coordinate effectively with subject teachers.

6.4 Enhancing Feedback on Assignments and Instructional Improvement

The school conducts monthly inspections of homework assignments by teachers, involving the Curriculum and Teaching Research Office, grade-level teams, and subject-specific teaching groups. Inspection results are documented in teachers' professional records. The school incorporates metrics such as homework duration, assignment formats, and evaluation methods into its teacher performance evaluations, thereby encouraging educators to enhance homework design quality and reduce students' academic burden.

Homework feedback not only serves as a basis for evaluating student learning outcomes but also constitutes a vital resource for teachers to conduct pedagogical research and refine teaching methods. The school has established a closed-loop mechanism of "identifying problems-analyzing causes-improving instruction-tracking and verifying results": when homework feedback indicates a high error rate on a specific concept, the teaching research group promptly organizes discussions to analyze the root causes of these errors, adjusts teaching strategies accordingly, and designs targeted remedial exercises; At the same time, the school encourages teachers to transform issues identified in homework feedback into small-scale research projects, such as "A Study on Improving Primary School Mathematics Concept Teaching Based on Homework Error Analysis," thereby continuously enhancing teaching capabilities through action research. This evidence-based model of instructional improvement fully embodies the core function of school-based professional development in fostering teacher growth, rather than merely treating homework feedback results as quantitative metrics for performance evaluations.

7. Discussion

Through over three years of practice, the school has achieved remarkable results in optimizing homework design through school-based professional development. Students' learning interest and academic performance have both improved, with students showing significantly increased classroom participation and enhanced learning initiative. Teachers' homework design capabilities have markedly advanced, fostering a cohort of professionally competent core educators who have consistently excelled in teaching competitions at various levels. Their homework design case studies have been promoted regionally (Table 1 and Table 2).

Table 1. Changes in Students’ Homework Load and Academic Performance (2022-2024)

Indicators	2022	2023	2024
Average daily homework time (minutes)	78.5	62.3	55.8
Satisfaction with completed assignments (%)	68.2	75.6	82.4
Percentage of students achieving excellence in academic quality monitoring(%)	24.5	28.3	31.7
Class participation rate (%)	56.3	64.7	71.5

Table 2. Development of Teachers’ Assignment Design Skills (2022-2024)

Indicators	2022	2024
Number of teachers awarded for assignment design	2	15
Teacher satisfaction with assignment design training (%)	-	91.5
Parent satisfaction with homework assignments (%)	72.4	89.6

However, challenges have emerged during implementation. First, teachers exhibit varying degrees of acceptance toward new pedagogical concepts, with some still relying on traditional homework design methods. This disparity in mindset leads to inconsistent homework quality, necessitating ongoing school-wide training and guidance. Second, developing large-unit assignments demands substantial additional time and effort, creating a practical dilemma for teachers in balancing daily instruction with homework research. Many teachers report that designing high-quality large-unit assignments often requires several times the effort of conventional assignments, placing greater demands on already busy teaching schedules.

8. Limitations and Future Directions

Since the study was conducted at only one elementary school, the representativeness of the sample is limited, and the applicability of the findings to different types of schools (such as middle schools and schools in urban-rural fringe areas) requires further verification; The three-year implementation period reflects only short-term changes in academic performance; the long-term effects on students’ learning interest, study habits, and innovative thinking require longer-

term observation and analysis; the study relies primarily on data collected independently by the school and lacks third-party assessment data, which may introduce some subjective bias; regarding the design of interdisciplinary assignments, challenges in achieving deep integration persist due to disciplinary barriers and limitations in teachers' professional backgrounds, and some interdisciplinary assignments exhibit a tendency toward formalism.

Future research could strengthen long-term tracking of assignment design effects to explore how optimized assignments impact students' sustainable development; Conduct comparative studies across multiple schools to validate the scalability of the school-based professional development model; further explore how to effectively utilize information technology to design targeted assignments, thereby enabling intelligent management of differentiated assignments. Regarding educational resources, establishing regional homework design resource-sharing platforms could facilitate the exchange of exemplary homework design cases among schools. Resource sharing would reduce redundant work for teachers, elevate the overall quality of homework design, and achieve equitable distribution of high-quality educational resources.

9. Conclusions

Optimizing homework design through school-based professional development ensures educational effectiveness by providing tiered, targeted exercises that cater to diverse student needs. This approach also unlocks teachers' potential and fosters their professional growth. Extending from classroom efficiency, optimized homework design must enhance quality while reducing quantity—requiring precise, thoughtful, and meticulous planning. Only through this interplay of “one plus one minus” can we truly align with the original intent of the “Double Reduction” reform.

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Conceptualization, methodology, formal analysis, resources, data curation: Qunfei Jiang; writing—original draft preparation, writing—review and editing, supervision, project administration, Conceptualization, investigation, data curation: Yingnuo Qi and Qunfei Jiang. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest:

The authors declare no conflict of interest.

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