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Principles and Case Studies of Large-Unit Assignment Design in Senior High School Mathematics: A Big-Idea Perspective

Jixiang Zeng[1, a], Hongchang Li[2, b, *]

[1]Zunyi No. 4 High School, Zunyi, Guizhou, China
[2]The High School of Guiyang Affiliated to Beijing Normal University, Guiyang, Guizhou, China
[a]651052262@qq.com, [b]15527796443@163.com
**Corresponding author*

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Abstract: Assignments have long been treated as an afterthought of classroom instruction, with their educational functions reduced merely to knowledge reinforcement and skill drilling. Meanwhile, big-idea-based teaching is plagued by a substantial interpretive gap between theoretical discourse and teachers' real-world classroom practice. Drawing on long-term classroom observations, this study puts forward two key arguments. First, the essence of assignments lies in "meaning-making weave" rather than mechanical knowledge consolidation: students interweave their personal experiences with disciplinary big ideas to construct their own individualized conceptual tapestry of meaning. Second, big ideas function as "conceptual anchors" within students' cognition, and problem-solving constitutes an exploratory process unfolding along cognitive manifolds. Building upon these propositions, this paper develops the "meaning-making weave: three-domain integration theory" and the Conceptual Anchor-Thinking Manifold Theory (CATM). It further establishes the Big-Idea Anchor-Manifold Unit Assignment Design Framework (BIAM-DT), which consists of five procedural phases: anchor extraction, objective formulation, upfront evaluation, manifold-oriented design, and reflective refinement. It demonstrates how this framework can be applied in real-world teaching contexts through complete cases falling into three categories: pre-unit assignments, lesson-based unit assignments, and core-thinking-method tasks. Findings indicate that large-unit assignments anchored in big ideas and organized around cognitive manifolds can effectively push students beyond reproductive thinking toward integrative weaving-style thinking, enabling a pedagogical shift from knowledge transmission to cognitive-oriented student development.

1. Introduction

Within the landscape of educational research, assignments have long occupied a peripheral position. Traditional instructional theories treat assignments as appendages to classroom teaching, reducing their functions to knowledge consolidation and skill practice. Though curriculum theories incorporate assignments into curriculum implementation procedures, they focus largely on alignment with instructional objectives and seldom probe the inherent, unique value of assignments themselves. This gives rise to a thought-provoking paradox: teachers assign, grade and comment on student assignments on a daily basis, yet rarely reflect on what assignments truly are, why they exist, and how they can genuinely foster student growth.

Meanwhile, "big ideas", a core concept driving curriculum reform, face comparable practical obstacles. When translated from official curriculum standards into real-world classroom practice, big ideas are frequently misinterpreted by front-line teachers. Some equate them with key knowledge points; others reduce them to problem-solving heuristics; still others treat them merely as rhetorical slogans for instruction. In a survey of 126 mathematics teachers across three senior high schools in one Chinese city, more than 70 % of respondents admitted they "lacked a clear grasp of the concrete connotations of big ideas", and over 80 % reported that they "did not know how to design assignments under the guidance of big-idea thinking". The obscured nature of assignments and the poor practical implementation of big ideas may appear as two separate concerns, yet both stem from one fundamental gap: there exists no theoretical framework that enables deep integration between big-idea thinking and assignment design[1].

Motivated by this core research question, the present study seeks to build a coherent system spanning theory and practice, as well as cognition and value. It first traces the intellectual evolution of big-idea constructs and proposes a five-component definition for the concept. On this basis, the paper puts forward the "meaning-making weave: three-domain integration theory" to unpack the essential nature of assignments. It further develops the Conceptual Anchor-Thinking Manifold Theory (CATM) to illuminate underlying cognitive mechanisms. These theoretical components are synthesised into the Big-Idea Anchor-Manifold Unit Assignment Design Framework (BIAM-DT), whose feasibility is validated through thirteen complete instructional cases.

2. The Theoretical Genealogy and Typological Construction of Big Ideas

2.1 The Evolution of Big-Idea Thinking

The intellectual roots of big-idea thinking stretch back to the rise of structuralist educational thought in the mid-twentieth century. In 1959, American psychologist Jerome Bruner argued in The Process of Education that "the foundation of any subject taught should be the understanding of its fundamental structure"[2]. According to Bruner, mastery of such fundamental structures enables learners to move beyond concrete contexts and achieve broad knowledge transfer. This insight laid the initial cornerstone for big-idea theory.

During the 1990s, American curriculum experts Wiggins and McTighe formally established big ideas as a core construct for curriculum design in their book Understanding by Design[3]. They defined big ideas as "the heart of a discipline, key anchors that connect disjointed facts and foster durable understanding". Their three-stage backward-design model—identify desired results, determine acceptable evidence, and plan learning experiences—remains a canonical template for unit instructional design to this day.

Within Chinese scholarship, Liu Hui and other researchers introduced big ideas into unit-teaching studies, describing big ideas as "concepts, notions or propositions that reflect expert-level thinking and bear real-life practical value"[4]. Zhang Jianyue systematically elaborated the central role of "general notions" in mathematics teaching, framing them as an integration of subject content, procedural skills and educational values[5].

A review of existing literature reveals a distinct evolutionary thread. From Bruner's "disciplinary structure", through Wiggins and McTighe's "big ideas", to Zhang Jianyue's "general notions", big-idea theory has grown progressively more sophisticated. Nevertheless, most existing scholarship concentrates on the curriculum-oriented implications of big ideas. Far less attention has been paid to a more fundamental question: how exactly do big ideas reside within an individual's cognition? This gap constitutes the point of departure for the present investigation.

2.2 A Five-Component Definition of Big Ideas

Through critical examination of prior theoretical frameworks, this study offers a working definition for big ideas in senior-high-school mathematics: big ideas in senior-high-school mathematics are core notions that organise and unify mathematical knowledge, uncover the essence of mathematics, and carry durable transferable value. Five essential components underpin this definition.

First, overarching capacity. Big ideas weave discrete knowledge points into a cohesive organic whole. Take the notion of function as an illustration: functional thinking integrates definitions, properties, graphical representations and real-world applications of functions. It allows students to grasp function as a major mathematical model from a holistic perspective.

Second, durability. Big ideas retain their value across educational stages and do not become obsolete as learners advance. The combination of number and shape, for instance, persists as a vital mode of reasoning for mathematical inquiry and problem-solving from junior high school, through senior high school, and into university-level mathematics.

Third, transferability——big ideas can be applied to new contexts to solve new problems. The transformation-and-reduction approach can help students, when facing unfamiliar problems, transform them into already-solved problems. Transfer is not the conveying of knowledge but the unfolding of a thinking manifold—growing new understanding from existing anchors.

Fourth, abstraction——Big ideas are products of high-level abstraction and do not depend on specific content. The "basis idea" manifests in plane vectors as two non-collinear vectors capable of representing any vector in the plane, and in space vectors as three non-coplanar vectors capable of representing any vector in space.

Fifth, hierarchy——Big ideas exist at different levels, which, according to their scope of integration, can be divided into three tiers: macro-level big ideas (e.g., "the basic path for studying a mathematical object"), meso-level big ideas (e.g., "the basis idea"), and micro-level big ideas (e.g., "recursive thinking").

2.3 The Five-Type System of Big Ideas in Senior High School Mathematics

Based on a systematic analysis of the People's Education Press (PEP) A-edition senior high school mathematics textbooks, this study classifies big ideas in senior high school mathematics into five types.

Type One: Mathematical Object Research Path—The core anchor is "the basic path for studying a mathematical object is context → concept → properties → structure → application," a path that runs through the study of all mathematical objects including functions, vectors, sequences, and derivatives.

Type Two: Core Thinking Methods—The core anchor is "the essence of mathematical thinking is transformation and connection; through analogy, induction, and the integration of number and shape, the unknown is transformed into the known." Thinking-method big ideas constitute the operating system of mathematics, running through all mathematical activities.

Type Three: Algebraic Structural Notions—The core anchor is "the core of algebra is operation; the core of operation is operational laws; the fundamental principle of number system expansion is the preservation of existing operational laws."

Type Four: Geometry-Algebra Integration—The core anchor is "vectors and coordinate systems serve as bridges between geometry and algebra; geometric intuition perceives properties, while algebraic operations precisely characterize them."

Type Five: Probabilistic and Statistical Thinking—The core anchor is "random phenomena can likewise be precisely characterized mathematically: sample spaces describe possible outcomes, random variables quantify them numerically, distribution laws describe patterns, and samples are used to infer populations."

3. The Meaning-Weaving Ontology: Three-Domain Integration Theory

3.1 The Essence of Homework: Meaning-Weaving

Traditional views of homework suffer from three limitations: the usurpation of instrumental rationality—positioning homework as a tool for consolidating knowledge, its value entirely determined by external objectives; the narrowing of the view of knowledge—assuming knowledge is an entity that can be conveyed, ignoring its constructive and contextual nature; and the reification of the view of the student—treating students as containers for knowledge, effacing their agency and creativity.

Based on reflection on these limitations, this study advances a core insight: The essence of homework is not knowledge consolidation, but meaning-weaving. This insight contains three layers of meaning.

First layer: Homework is a process of weaving, not a result of conveying. In completing homework, students are not conveyors of knowledge but weavers of meaning—they interweave their own experiences (the weft) with disciplinary big ideas (the warp) on the loom of authentic problems, creating their own tapestry of meaning. Two students may produce the same answer yet undergo entirely different weaving processes; a student who produces an incorrect answer may nevertheless gain profound insight through the weaving process.

Second layer: Homework is the construction of a network, not the accumulation of points. Each homework assignment is a traversal of the network—widening the big ideas (the main roads) and strengthening the connections between side paths and main roads. As homework progresses, students' knowledge networks grow from sparse to dense, from flat to multidimensional.

Third layer: Homework is the generation of meaning, not the manipulation of symbols. When students experience the value of mathematics in solving real problems, when they form their own views of mathematics through reflection, homework transcends the knowledge level and enters the realm of meaning.

3.2 The Three Realms Integration Theory

The Meaning-Weaving Body answers what homework is, but not yet how to design it to promote meaning-weaving. To address this, this study proposes the Three Realms Integration theory—high-quality large-unit homework design must simultaneously attend to the integration of three realms.

The first domain is the conceptual domain, which targets the structural organisation of knowledge. Centred on unit-level big ideas, this domain knits isolated knowledge points into a logically cohesive knowledge network. Its construction follows a three-step mechanism: identifying shared constructs, differentiating and integrating components, and elevating cognitive dimensions[6].

The second domain is the problem-driven domain, corresponding to situated learning. It translates abstract big ideas into tangible, accessible core questions that run through the entire teaching unit. This domain unfolds in three sequential phases: introducing key questions, driving in-depth inquiry, and activating flexible application.

The third domain is the existential-personal domain, oriented toward individual-centred student development. It respects each student's unique prior experiences, emotional dispositions and value orientations, and guides learners to develop personal conceptual understandings in the course of knowledge acquisition.

These Three-Domain do not operate in isolation; instead, they interpenetrate one another to form an integrated organic whole. The conceptual domain supplies the structural skeleton, the problem-driven domain delivers substantive substance, and the existential-personal domain endows the whole design with its educational spirit. No high-quality assignment design can afford to neglect any one of the three domains, as all are indispensable.

4. Conceptual Anchor-Thinking Manifold Theory (CATM)

4.1 How Big Ideas Operate within Human Cognition

Having established the three-domain integration theory, a more fundamental research question emerges. How exactly do big ideas reside in students' minds? How are they triggered when learners confront a specific task? How do they coordinate with other concepts during complex problem-solving? And how can they evolve into renewed notions through reflective thinking?

This study puts forward the Conceptual Anchor-Thinking Manifold Theory, abbreviated as CATM. Its core insights are condensed into three propositions.

Proposition 1: Big ideas exist within student cognition in the form of conceptual anchors. Rather than static knowledge entries stored in memory, they function as cognitive triggers that can be activated by contextual cues. Nor are they isolated conceptual units; instead, they serve as network nodes interlinked with other anchors.

Proposition 2: Student problem-solving amounts to an exploratory journey across cognitive-thinking manifolds. A thinking manifold is not a rigid linear sequence of problem-solving procedures. Instead, it denotes a multi-dimensional psychological space encompassing trial-and-error reasoning, analogical reasoning, mental backtracking, and insightful cognitive leaps.

Proposition 3: Anchors and manifolds interact to form anchor-manifold dynamics. Anchors provide starting points and direction for manifold exploration; the unfolding of the manifold provides material and opportunities for anchor creation. The two recur in cycles, jointly driving the development of thinking.

4.2 Conceptual Anchors: The Activated Form of Big Ideas

Conceptual anchors are the activated form of disciplinary big ideas in students' thinking—problem-solving control centers that can be activated when students face problems. They possess three essential characteristics.

First, transferability—Anchors can transcend contexts. For example, the anchor "functions are mathematical models for describing patterns of change" can guide students to analyze various change phenomena including exponential growth, logarithmic decay, and periodic motion.

Second, operability—Anchors can be transformed into specific thinking actions. For example, the anchor "transform spatial problems into planar problems" can activate a series of operable strategies such as "constructing projections," "finding cross-sections," and "drawing development figures."

Third, connectability—Anchors can form networks with other anchors. In solving comprehensive solid geometry problems, multiple strategic anchors—establishing coordinate systems, writing point coordinates, finding normal vectors, calculating angles—work in coordination to constitute a complete problem-solving procedure.

Based on the degree of abstraction and scope of application, conceptual anchors are divided into three levels: core anchors (running through the entire discipline), thematic anchors (organizing unit knowledge blocks), and strategic anchors (guiding specific problem-solving operations). The three support each other, and none can be omitted—without core anchors, strategic anchors are blind routines; without strategic anchors, core anchors are empty slogans.

4.3 The Thinking Manifold and Anchor-Manifold Dynamics

A thinking manifold refers to the dynamic, multi-dimensional psychological space formed by all possible paths, mental states and connections that students traverse while tackling complex problems. It bears three defining attributes. First, non-linearity: thinking unfolds via branching, backtracking and mental leaps. Second, dynamism: the manifold continuously expands, contracts and reconstructs itself throughout the exploratory process. Third, individuality: manifolds constructed by different students exhibit distinct topological structures.

Anchor-manifold dynamics consists of three pivotal subprocesses. Process one: anchoring. When students encounter an unfamiliar problem, pre-existing conceptual anchors get activated, supplying starting points and directional cues for subsequent mental exploration. Process two: manifold unfolding. Guided by active anchors, thinking spreads across the problem-solving space and generates diverse exploratory patterns, including path branching, retrospective looping, and mental leaps. Process three: new-anchor generation. After successfully resolving a challenging task, students reflect upon their full thinking-manifold experience. They distil more efficient, widely-applicable reasoning trajectories and “compress” these trajectories into new, higher-order conceptual anchors.

These three subprocesses do not unfold as a one-off linear sequence. Instead, they operate iteratively in an upward-spiral fashion. Each instance of new-anchor generation endows students with more powerful cognitive tools for future reasoning.

5. The BIAM-DT Framework: Bridging Theory and Practice

5.1 Theoretical Foundations and Core Procedures of the Framework

Chapters 1 through 4 have established a complete theoretical system spanning big ideas, the meaning-making weave, and the CATM theory. Even so, the value of any theory can only be validated and realised through practical application. Against this backdrop, the present study develops the Big-Idea Anchor-Manifold Unit Assignment Design Framework, abbreviated as BIAM-DT. This framework represents a systematic synthesis of foregoing theoretical outputs: the big-idea system supplies subject-matter resources; the three-domain integration theory sets its value-oriented bearings; and the CATM theory furnishes its underlying cognitive mechanisms[7].

BIAM-DT breaks unit-assignment design down into five interlinked procedural steps.

Step one: anchor extraction. Practicable core anchors, thematic anchors and strategic anchors are distilled from unit-level big ideas to build a unit anchor map.

Step two: objective formulation. The three tiers of anchors are translated into concrete, measurable unit-level and lesson-specific objectives. A basic question sequence is constructed around thematic anchors.

Step three: upfront evaluation. Drawing on the three subprocesses within CATM, a three-dimensional assessment rubric is developed. Performance-based tasks are devised, with explicit success criteria laid out.

Step four: manifold-oriented design. Three tiers of differentiated assignments (foundational consolidation, competence advancement, integrative inquiry) are constructed around strategic anchors. Each task is embedded with tiered navigational prompts.

Step five: reflective refinement. Lesson-focused reflection sheets are deployed to prompt students to revisit their thinking manifolds and summarise strategic anchors. Teachers deliver individualised feedback informed by three-dimensional assessment outcomes.

5.2 Design Principles and Three-Tiered Differentiated Assignments

Implementation of the BIAM-DT framework adheres to five guiding principles.

Anchor-centred governance: every assignment task targets the activation and deepening of relevant anchors.

Backward-alignment consistency: tight coherence is maintained across objectives, assessment instruments and learning activities.

Manifold openness: assignments permit multiple valid lines of reasoning.

Tiered progression: foundational consolidation, competence advancement and integrative inquiry build incrementally upon one another.

Reflective elevation: reflective components constitute an indispensable part of assignment arrangements.

The intended roles and functions of the three-tiered differentiated assignments are specified below.

First, foundational-consolidation assignments. These activate strategic anchors within simple contexts and help students establish basic reasoning trajectories. Corresponding CATM mechanism: anchor activation.

Second, competence-advancement assignments. Set within complex contexts, they require students to mobilise multiple anchors simultaneously and experiment with diverse solution pathways. Corresponding CATM mechanism: manifold unfolding.

Third, integrative-inquiry assignments. Through open-ended investigative tasks, students are pushed to reflect and generalise amid in-depth exploration, which enables the generation of new conceptual anchors. Corresponding CATM mechanism: new-anchor generation.

Navigational prompts constitute a key innovation embedded within BIAM-DT. They embody the design philosophy of “laying out a manifold rather than prescribing fixed tracks”. Basic navigation offers explicit procedural hints to kick-start cognition for struggling learners. Intermediate navigation signals alternative methodological options and encourages students to test multiple reasoning routes. Extended navigation delivers orientational guidance to challenge high-achieving students toward deeper inquiry.

6. Case-Study: Empirical Validation of the BIAM-DT Framework

6.1 Pre-Unit Assignment: Operations with Logarithms

Pre-unit assignments are deployed prior to the commencement of a new instructional unit, aiming to activate students’ pre-existing cognitive anchors. This section presents a pre-unit assignment for the unit “operations with logarithms”. The new learning content covers logarithmic definition, operational rules for logarithms, and the change-of-base formula.

During anchor extraction, the core anchor is formulated as: Logarithms are inverse operations of exponentiation; logarithmic rules derive directly from exponential rules. Thematic anchors include “operational rules of exponents” and “the concept of inverse operations”. Strategic anchors consist of recalling exponential rules, recognising operational structures, formulating conjectures for logarithmic rules by analogy, and testing conjectures with concrete numerical examples.

At the manifold-oriented design stage, foundational-consolidation tasks activate exponential-operation anchors via fill-in-the-blank and computational items. A sample item reads: “$2^3 \cdot 2^4$ =____. This illustrates that when multiplying powers with identical bases, the base remains unchanged while the exponents are __”. Competence-advancement tasks prompt students to generate conjectures through analogy. One example: “Drawing on exponential rules, what value would you conjecture for $\log_2(8\times16)$? First calculate $8\times16=128$, evaluate $\log_2 128$, and compare the result with $\log_2 8+\log_2 16$. What inference can you draw?” Integrative-inquiry tasks require students to verify conjectured rules with specific values and generalise observations toward broader cases.

This design embodies the structural pursuit of the conceptual domain, building logical connections between exponential and logarithmic operations. It reflects the inquiry-driven thread of the problem-driven domain, with inverse-operation reasoning running throughout all tasks. It also realises the personalisation of the existential-personal domain, encouraging students to make discoveries and carry out verification independently.

6.2 Lesson-Based Unit-Assignment Design: Curves and Equations

The unit “curves and equations” integrates Chapter 2 (Lines and Circles) and Chapter 3 (Conic Sections) from Volume 1 of the People’s Education Press-A elective textbook. Its core anchor holds that a curve represents the locus of points, and an equation serves as the algebraic translation of geometric conditions. This unit systematically unfolds the fundamental reasoning of analytic geometry[8].

Within the anchor-extraction phase, the core anchor is articulated as follows: A curve is the locus of points, and an equation translates geometric conditions into algebraic form. Learners convert geometric constraints into algebraic equations, investigate geometric properties via those equations, and thereby resolve geometric problems algebraically. Thematic anchors are partitioned into six components: lines, circles, ellipses, hyperbolas, parabolas, and synthetic curve-and-equation tasks (locus-related problems). Each component is paired with a set of corresponding strategic anchors.

During objective formulation, unit-level objectives span four dimensions: knowing (writing standard forms for various curves), understanding (interpreting the curve-equation relationship and grasping the meaning of purity and completeness for loci), doing (deriving curve equations from given conditions and applying properties to solve problems), and disposition-building (adopting an analytic-geometry perspective toward geometric tasks and forming the habit of combining algebraic and geometric reasoning). Seven core sustaining questions are constructed to form the basic question sequence for the whole unit.

In the upfront-evaluation phase, a three-dimensional assessment rubric evaluates student performance across anchor activation, manifold unfolding, and new-anchor generation. For manifold-oriented design, three tiers of differentiated assignments (foundational consolidation, competence advancement, integrative inquiry) are developed under each thematic anchor. For the “ellipse” theme, foundational items examine the definition and standard equation of ellipses; competence-advancement items address line-ellipse positional relationships and the point-difference method; integrative-inquiry tasks demand geometric proofs drawing on the optical properties of ellipses. Special attention is given to the systematic arrangement of locus-construction problems. Through progressive deployment of five approaches—the direct-condition method, definition-based method, correlated-point method, parametric method, and intersection-trace method—students walk through the full transformation from geometric constraints to algebraic equations, with explicit emphasis on verifying the purity and completeness of derived loci.

At the reflective-refinement stage, unit reflection sheets guide students to summarise core notions, construct knowledge networks, and identify generalisable reasoning patterns[9].

6.3 Assignment Design for Core Mathematical Thinking Methods

This large instructional unit consolidates eleven core modes of mathematical thinking: analogy and transfer, induction and generalisation, reduction and transformation, combination of algebra and geometry, classification and integration, equivalence and categorisation, invariance under transformation, symmetry, limit-based approximation, mathematical proof and deductive reasoning, and mathematical language and symbolisation. Its core anchor states: Mathematical thinking methods function as an operating system for problem-solving. By deploying cognitive tools such as analogy, induction, reduction, algebra-geometry integration, classification, equivalence reasoning, transformation, symmetry, limit reasoning, proof-based deduction and symbolisation, learners map unfamiliar scenarios onto familiar models and achieve effective cognitive simplification.

Each thematic subsection follows a three-tier progression: foundational consolidation → competence advancement → integrative inquiry. Take "analogy and transfer" as an illustration. Foundational items train students to detect structural similarity by drawing analogies from arithmetic sequences to linear functions, and from planar vectors to spatial vectors. Competence-advancement tasks ask learners to transfer the discrete "product-difference rule" by analogy to the continuous "product-derivative rule", and explain why the discrete "next-step" condition degenerates into the "current-point" condition under limit processes. Integrative-inquiry tasks invite critical reflection on analogical reasoning from two-dimensional planes to three-dimensional space. Using cuboid models, students identify logical gaps such as "non-parallelism does not guarantee intersection", and independently develop a self-checklist for analogy validation.

This instantiation reproduces the full three-process mechanism of CATM. Foundational assignments realise anchor activation; competence-advancement assignments realise manifold unfolding; integrative-inquiry assignments bring about new-anchor generation. Most notably, the student-generated "analogy-validation checklist" in inquiry tasks constitutes a typical case of new-anchor generation. Students "compress" concrete analogical experiences into transferable critical-thinking strategies[10].

7. Conclusion

Starting from the theoretical genealogy of big ideas, this study explores the essential nature of assignments, uncovers underlying cognitive mechanisms, and finally develops the five-step BIAM-DT design framework validated by three complete instructional cases. It thus delivers an integrated system that bridges theoretical reasoning and classroom practice.

The present research makes contributions along three distinct dimensions. At the conceptual level, it puts forward original constructs including "conceptual anchor", "thinking manifold" and "meaning-making weave". These constructs furnish new analytical tools for interpreting how big ideas reside within student cognition and for grasping the true nature of assignments. At the systematic-theory level, two mutually supportive theoretical frameworks are established: the three-domain integration theory addresses what assignments are, whereas the CATM theory explains how cognition operates during assignment-driven learning. At the practical-framework level, the five-step BIAM-DT procedural model translates abstract theoretical propositions into actionable design guidance for classroom teachers.

This study rests upon an educational philosophy encapsulated in four core propositions. Ontological proposition: assignments serve as sites for constructing personal meaning-making worlds. Epistemological proposition: knowledge arises from meaning-making weaving rather than mechanical knowledge reproduction.

Methodological proposition: Design is laying out manifolds, not planning tracks. Axiological proposition: The ultimate purpose of education is the enrichment of meaning, not the possession of knowledge.

When we regard every homework assignment as an opportunity for anchor activation, manifold unfolding, and new anchor creation, mathematics education can truly realize the transformation from teaching knowledge to cultivating thinking. As one teacher who participated in the experiment remarked: “Previously, when assigning homework, I considered ‘what to practice’; now, when designing homework, I think about ‘what anchors to activate,’ ‘what manifolds to unfold,’ and ‘what new notions to create.’ This shift has given my teaching more direction and my students’ homework more vitality.”

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