# From Information Transmission to Meaning Construction: The Cognitive Stabilization Scaffolding Theory in Curriculum Design

**Jiacheng Wu*[1] and Qiao Li[2]**

[1]College of Computer Science and Technology,Zhejiang University,Hangzhou,China
[2]School of Future Design,Beijing Normal University,Zhuhai,China

**Abstract:** Traditional curriculum theory conceptualizes knowledge as transmissible, discrete packets of information, thereby ontologically neglecting the embodied and generative characteristics of cognition. Utilizing the three-layer cognitive structure of "Soma-Emotion-Meaning" established in Zhang Xusheng's *Knowing and Speaking* (2026) as the core analytical framework, and integrating the "Progressive Weakening-Compensation Principle" from Wang Dongyue's *The Theory of Universal Evolution* (2009), this paper presents a systematic philosophical critique of the information transmission paradigm and establishes the core concept of "concept as cognitive stabilization scaffolding." Within this ontological horizon, a concept is no longer a passive label, but a dynamic structural unit through which the cognitive subject actively compresses experiential differences, maintains judgmental consistency, and supports subsequent actions. Based on this ontological reconstruction, this paper argues that the core task of curriculum design should shift from the linear arrangement of information to the construction of an internal cognitive scaffolding system. This system activates learners' deep meaning construction through the three-dimensional synergy of the RID cognitive generation model (Discover-Imagine-Regulate). By placing this framework in theoretical dialogue with Bruner's discovery learning, Ausubel's meaningful learning, Biggs's deep learning, and contemporary social realism in curriculum epistemology (Deng, 2025), this study provides a solid philosophical foundation for curriculum design, calling upon educational practice to transcend simplified transmission models and genuinely respect the generative nature of cognition.

**Keywords:** Curriculum design; Cognitive stabilization scaffolding; Meaning construction; RID cognitive generation model; Embodied cognition

## 1 Introduction: The Epistemological Crisis in Curriculum Design

Curriculum theory has long been dominated by the metaphor of "knowledge as a transmissible commodity." Under this paradigm, knowledge is viewed as discrete, objective packets of information that need to be systematically packaged, sequenced, and unidirectionally transmitted from experts to novices [18]. While this epistemological stance played a massive historical role in the standardized education systems of the 20th century, it increasingly exposes its profound limitations in addressing contemporary, complex educational contexts. As Dahl and Mørch [6] point out in their recent empirical analysis of the tensions between learning objects and constructivism, technology-driven educational innovations often default back to the metaphor of "acquisition," failing to genuinely achieve a paradigm shift toward "knowledge creation." The transmission model prioritizes the logistical packaging and sequencing of content, yet ontologically marginalizes the learner's subjectivity and the complex mechanisms of cognitive generation.

Amidst growing critical voices, the academic community urgently needs to re-examine the underlying assumptions about knowledge and cognition that support curriculum theory. The recent social realist turn in curriculum epistemology [8, 16], while emphasizing the importance of "powerful knowledge," often focuses on the objective structure of knowledge, lacking a micro-level genetic explanation of how knowledge is generated and stabilized within individual cognitive systems. This paper attempts to respond to this theoretical demand, proposing that the ontological and practical goals of curriculum design must shift from external information transmission to internal meaning construction.

Drawing upon the philosophical framework of Zhang Xusheng's *Knowing and Speaking* [24], this paper highlights the theory of "concept as cognitive stabilization scaffolding" to redefine the ontological status of concepts: concepts are

* Corresponding author: 1320389424@qq.com

not static classificatory labels, but dynamic structures that facilitate cognitive generation. This turn requires curriculum design frameworks to support learners' comprehensive engagement across the three-layer structure of "Soma-Emotion-Meaning," rather than merely transmitting symbols at the meaning layer.

The structure of the argument proceeds as follows: Section 2 provides a comprehensive literature review, critiquing the traditional "information transmission" paradigm and tracing the historical evolution of the "scaffolding" concept under Vygotsky's ZPD framework. Section 3 delves into the core concept of cognitive stabilization scaffolding and its ontological philosophical foundation. Section 4 details the RID cognitive generation model, specifically defining the rationale for naming "Imagine" and analyzing the dynamic cyclical mechanisms among the three dimensions. Section 5 places this framework in dialogue with classical curriculum theories and the latest educational philosophy research. Section 6 concludes with future prospects.

## 2 Literature Review and Theoretical Positioning

### 2.1 Critique of the "Information Transmission" Paradigm in Curriculum Theory

As the core link in educational practice, the theoretical foundation of curriculum design is profoundly constrained by underlying epistemological views. Traditional curriculum design generally relies on the "Information Transmission Paradigm," which views knowledge as divisible, transmissible, objective entities. The teaching process is simplified as a unidirectional flow of knowledge from teachers (senders) to students (receivers) [17, 18]. This model emphasizes the systematic organization and effective transmission of content, striving to ensure comprehensive coverage through rigorous syllabi.

The information transmission paradigm held significant influence in the mid-20th century, particularly aligning with behaviorist psychology, which viewed learning as a stimulus-response connection process, emphasizing the external acquisition of knowledge [15]. However, with the rise of cognitive psychology, scholars began to question the internal rationality of this mechanical transmission model. Ausubel [1] proposed that learning must be a meaningful process of cognitive structure assimilation, emphasizing that new knowledge must establish substantive connections with learners' existing cognitive structures, strongly opposing rote memorization.

Despite theoretical critiques, as Pinar [12] points out, many contemporary curriculum designs in practice still adhere to the linear logic of content division and scheduling, ignoring the complex and generative characteristics of learners' cognitive activities. Biesta [2] further notes that excessive emphasis on the measurement and transmission of knowledge leads to the profound obscuration of education's essential purpose–namely, "subjectification." Coelho et al. [5], in their recent review of Biesta's three purposes of education, reiterate that curriculum involves not only qualification and socialization but also concerns how individuals establish their subjective positions in the world.

In recent years, cognitive science's understanding of learning has become more complex, emphasizing the embodied and situated nature of cognition. Faella et al. [9]'s scoping review of embodied learning shows that educational practices integrating physical activity, cognition, and environmental interaction are crucial for breaking traditional cognitive dualism. These studies demonstrate that knowledge is not a statically transmitted commodity but a dynamically generated process in the interaction between learners and their environment [19]. Curriculum design must conform to this perspective of dynamic cognitive generation to reconstruct its ontological foundation.

### 2.2 Historical Evolution and Limitations of the "Scaffolding" Concept

As a core metaphor in educational practice and theory, "scaffolding" was initially proposed by Wood, Bruner, and Ross [22], referring to the appropriate support provided by adults or more experienced peers to help learners complete tasks they could not accomplish independently. This concept is deeply rooted in Vygotsky's [20] Zone of Proximal Development (ZPD) theory, emphasizing the critical role of social interaction in cognitive development.

In the ensuing decades, scaffolding theory has been widely applied in instructional design, emphasizing the shift in the teacher's role from knowledge transmitter to learning facilitator. However, as Reiser [13] criticized, early scaffolding concepts mostly focused on external teacher support or technical interventions, paying less attention to the dynamic stabilization process of learners' internal cognitive structures.

Recently, researchers have begun to expand scaffolding theory from the perspective of cognitive generation. For instance, Dahl and Mørch [6], in analyzing the tensions between learning objects and constructivism, point out that true instructional scaffolding should support learners' "participation" and "knowledge creation," rather than merely facilitating information "acquisition." Nevertheless, most existing scaffolding theories still view it as an external instructional strategy, lacking an ontological definition at the level of individual cognitive genesis.

### 2.3 Uniqueness and Innovations of This Paper's Theory

Based on Zhang Xusheng's *Knowing and Speaking* [24] theory of "concept as cognitive stabilization scaffolding," this paper breaks through the limitations of traditional "scaffolding," which focuses on external support, by internalizing it as the cognitive system's own structural generation mechanism. Unlike previous theories, this paper focuses on the ontological role of concepts–namely, achieving the internal stability and continuous generation of cognition by compressing experiential differences and maintaining judgmental consistency.

Furthermore, this paper introduces the RID cognitive generation model (Discover-Imagine-Regulate) to construct a

three-dimensional, dynamically cyclical framework for curriculum design. This model not only focuses on the internal construction of knowledge but also emphasizes the social validation of rule expression, thereby establishing a theoretical bridge between individual cognitive genesis and collective social norms.

## 3 Concept as Cognitive Stabilization Scaffolding: A New Ontological Perspective

### 3.1 Ontological Philosophical Foundation: The Progressive Weakening-Compensation Principle

To profoundly understand the connotation of "concept as cognitive stabilization scaffolding," one must first trace its ontological philosophical foundation. Wang Dongyue, in *The Theory of Universal Evolution* [21], proposed the "Progressive Weakening-Compensation Principle": in the course of material evolution, the higher the form of existence, the lower its self-subsistence capability (Degree of Existence), but the stronger its compensation mechanism (Degree of Compensation). As the most fragile entity with the lowest degree of existence in nature, human beings have developed the cognitive system with the highest degree of compensation.

From this perspective, cognition–including perception, emotion, concept, and language–is not a human privilege over nature, but a fundamental compensation mechanism for humans to maintain survival. The generation of concepts is essentially a high-level compensatory structure established in the nervous system to cope with complex and volatile environments. This ontological perspective allows us to fundamentally subvert the static understanding of concepts in traditional curriculum theory.

### 3.2 Core Functions of Concept as Cognitive Stabilization Scaffolding

Based on the aforementioned ontological foundation, Zhang Xusheng [24] explicitly proposes in *Knowing and Speaking* that a concept is not a mirror reflection of the external objective world, but a "stabilization scaffolding" constructed by the cognitive subject to maintain its continuity and effective action. This scaffolding has three core functions:

#### 3.2.1 Compressing Experiential Differences

The world is continuous and full of differences, but a limited cognitive system cannot process infinite information. Concepts selectively compress and integrate diverse differences in experience, simplifying complex phenomena into manipulable cognitive units. This compression is not a simple abstract stripping, but a process of retaining key survival features while eliminating redundant interference, thereby constructing a cognitively operable internal structure.

#### 3.2.2 Maintaining Judgmental Consistency

As a baseline for stabilizing cognition, concepts enable learners to maintain coherent and consistent judgments of similar phenomena across different times and contexts. This stability is the foundation for the cognitive system to avoid chaos and achieve cross-contextual transfer of knowledge. Without this internal stabilization scaffolding, any coherent thought and communication would be impossible.

#### 3.2.3 Supporting Subsequent Actions

Concepts are not only the terminal products of early experiential processing but also the cognitive interfaces supporting subsequent reasoning, problem-solving, and knowledge innovation. Their dynamic nature enables learners to continuously adjust and expand their cognitive structures in new practical contexts, driving new meaning generation.

### 3.3 Soma-Emotion-Meaning: Support from the Three-Layer Cognitive Structure

The construction of conceptual scaffolding is not a purely logical operation but is deeply embedded in the three-layer cognitive structure of "Soma-Emotion-Meaning" [24]. This framework has gained extensive empirical support. For example, Zhang et al. [23] integrated embodied cognition theory with the Progressive Weakening-Compensation Principle, proving the effectiveness of the "Soma-Emotion-Meaning" three-layer pathway in intervening in autism and depression comorbidity.

In curriculum design, this means that the generation of concepts must be built upon solid somatic perception (the first layer) and emotional motivation (the second layer). Damasio's [7] somatic marker hypothesis has long proven that cognition without emotional participation is incomplete. If curriculum design merely stays at the meaning layer (the third layer) for direct symbolic indoctrination, failing to activate learners' somatic experience and emotional engagement, the established "concepts" will be fragile, rootless castles in the air, unable to truly function as cognitive stabilization scaffolding.

## 4 The RID Cognitive Generation Model in Curriculum

To translate the cognitive stabilization scaffolding theory into specific curriculum design practices, this paper proposes the RID cognitive generation model based on *Knowing and Speaking*, covering three core dimensions of meaning construction in curriculum design: Discover, Imagine, and Regulate.

### 4.1 Three-Dimensional Synergy of the RID Model

#### 4.1.1 Discover: Creating Cognitive Disequilibrium

The starting point of cognitive generation is not the presentation of ready-made answers, but the encounter with real problems. In curriculum design, the Discover dimension requires the creation of situations with genuine complexity and challenge to break learners' original cognitive equilibrium [11]. This disequilibrium is not merely a logical contradiction, but a profound "embodied disequilibrium": learners encounter environmental resistance and hindrance at the somatic perception level, generating internal tension of surprise, confusion, or desire for knowledge at the emotional level. It is this holistic disequilibrium across the three-layer structure that

provides truly powerful internal drive for subsequent concept construction. Curriculum design should consciously create real situations that can trigger this holistic disequilibrium, rather than merely presenting abstract logical puzzles.

#### 4.1.2 Imagine: Constructing Stabilization Scaffolding

Facing cognitive disequilibrium, learners need to restore stability through imagination and conceptual reorganization. Here, using "Imagine" rather than the traditional "Construct" or "Organize" has profound theoretical considerations. As Johnson [10] stated, imagination is the core mechanism connecting embodied experience with abstract concepts. In this stage, learners compress and integrate dispersed experiential elements through metaphors, analogies, and mental simulations, thereby "generating" new cognitive stabilization scaffolding in their minds. This process is highly creative and non-linear.

#### 4.1.3 Regulate: Achieving Social Validation

The individually constructed conceptual scaffolding must undergo the test of public order. The Regulate dimension requires learners to transform internal implicit structures into external public languages or rule systems. Through expression, peer negotiation, and critical reflection, individual cognitive generation is integrated into the social knowledge network. As Ruan [14] emphasized in exploring the philosophical framework of information literacy, cultivating complex thinking cannot be separated from examining and reconstructing information rules in social interactions. This dimension not only achieves the social validation of knowledge but also triggers deep metacognitive regulation.

### 4.2 Dynamic Cyclical Mechanisms and Curriculum Implications

The three dimensions of RID are not linear instructional steps, but a dynamically cyclical, mutually reinforcing cognitive generation system. Discover activates cognitive needs; Imagine satisfies these needs and forms internal stability; Regulate achieves social validation, while new conflicts during validation trigger a new round of Discover.

This dynamic mechanism poses fundamental requirements for curriculum design:

- Abandon linear content coverage, shifting to designing spiraling problem-solving sequences.
- Provide ample "generative space", allowing learners to experience trial and error, metaphorical mapping, and conceptual reorganization in the Imagine stage, rather than rushing to provide standard answers.
- Strengthen social negotiation links, transforming the classroom into a public validation ground for knowledge, making Regulate an opportunity to deepen understanding.

## 5 Theoretical Dialogue: Transcending Classics and Responding to Frontiers

### 5.1 Dialogue with Bruner and Ausubel

Bruner [4] emphasized discovery learning, advocating the stimulation of inquiry spirit; Ausubel [1] emphasized meaningful learning, advocating the assimilation and integration of new and old knowledge. The RID model inherits the core spirit of both but achieves transcendence at the ontological level.

Compared to Bruner, the RID model explicitly points out that the endpoint of discovery must be the generation of "cognitive stabilization scaffolding," otherwise inquiry will degenerate into chaotic fragmented experiences. Compared to Ausubel's relatively static assimilation metaphor, the Imagine dimension in the RID model highlights the dynamism and imagination of concept generation, while the Regulate dimension compensates for the relatively weak sociocultural dimension in Ausubel's theory.

### 5.2 Deepening Biggs's "Constructive Alignment"

Biggs's [3] "constructive alignment" is the cornerstone of contemporary higher education curriculum design, emphasizing consistency among intended learning outcomes, teaching activities, and assessment tasks. The RID model aligns highly with Biggs's goal of pursuing "deep learning" but provides a more micro-level explanation in its genetic mechanisms.

Biggs's "construction" often presupposes clear disciplinary endpoints, whereas the RID model emphasizes that before achieving external "instructional alignment," learners must first achieve "cognitive alignment" internally across the "Soma-Emotion-Meaning" three-layer structure. Only when concepts truly stabilize internally as scaffolding does external assessment alignment possess genuine educational significance.

### 5.3 Responding to Contemporary Social Realism in Curriculum Epistemology

In recent years, Social Realism, represented by Michael Young and Zongyi Deng, has set off a wave of "bringing knowledge back in" within curriculum theory. Deng [8] emphasizes that the curriculum must provide "powerful knowledge" that transcends everyday experience.

The cognitive stabilization scaffolding theory provides micro-level cognitive psychology support for this grand proposition. Powerful knowledge is "powerful" precisely because it provides a "super scaffolding" with high compressibility, extremely strong cross-contextual consistency, and broad action support capability. However, the RID model simultaneously reminds social realists: no matter how powerful knowledge is in its objective structure, if it cannot resonate at the learner's "Soma-Emotion" level and be actively reconstructed by the subject in the Imagine stage, it degenerates into an oppressive external dogma rather than an emancipatory cognitive tool.

## 6 Conclusion and Future Prospects

Based on the philosophical work *Knowing and Speaking* [24] by Zhang Xusheng, this paper proposes a new paradigm of curriculum design–"concept as cognitive stabilization

scaffolding"–systematically critiquing the traditional information transmission model. By establishing the ontological foundation of the "Soma-Emotion-Meaning" three-layer cognitive structure and the Progressive Weakening-Compensation Principle, this paper reveals the generative, embodied, and dynamically stable characteristics of cognition.

To translate theory into practice, this paper constructs the RID cognitive generation model (Discover-Imagine-Regulate), providing a three-dimensional, dynamically cyclical practical framework for curriculum design. This framework not only forms a deep dialogue with classic theories such as Bruner and Ausubel but also provides a micro-level genetic supplement to the social realist turn in contemporary curriculum epistemology.

Future curriculum research should strive to empirically test the applicability of the RID model in different disciplinary contexts and further explore how to use technological environments to better support (rather than replace) the generation of learners' internal cognitive scaffolding in the digital and artificial intelligence era. The ultimate mission of education lies not in how much information is transmitted to the brain's hard drive, but in helping every living individual construct their own resilient and agile scaffolding of meaning in a complex, ever-changing world.

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