

# The Moderating Role of Individual Differences: Theoretical Pathways of How Incentive Mechanisms Influence Learning Motivation

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**Abstract:** *This study aims to review theoretical perspectives in educational management, deeply analyze the influence mechanism of incentive mechanisms on middle school students' learning motivation, with a particular focus on the moderating role of individual differences, to design personalized incentive strategies aligned with the spirit of SDG4. Through theoretical analysis of existing literature, this paper first defines three core incentive mechanisms—material incentives, spiritual incentives, goal incentives—and key dimensions of individual differences including personality traits, learning abilities, and family background. Building upon this foundation, the article integrates Maslow's hierarchy of needs theory, achievement motivation theory, and the Big Five personality theory to construct a theoretical framework for analyzing the complex pathways of "incentive mechanism-individual differences -learning motivation." This study argues that the impact of incentive mechanisms on learning motivation is not universal, but rather significantly moderated by individual differences. Effective educational management must transcend a "one-size-fits-all" incentive model and shift toward personalized, differentiated incentive strategies based on student characteristics. This research provides a theoretical perspective for deepening understanding of the complexities of incentive mechanisms and lays the groundwork for future localized empirical research and optimization of incentive systems in educational practice.*

**Keywords:** Incentive Mechanism; Learning Motivation; Individual Differences; Quality Education (SDG4); Theoretical Framework

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## 1. Introduction

In the field of educational management, how to effectively stimulate and sustain students' learning motivation is a core issue concerning educational quality and students' holistic development. As global educational philosophy shifts from "standardization" to "personalization," and with China's "Double Reduction" policy explicitly requiring strengthened intrinsic motivation (Ministry of Education, 2021), exploring scientific and efficient incentive mechanisms has become particularly urgent. Traditional educational management models are gradually transitioning toward approaches that emphasize students' agency and personalized development, during which the importance of incentive mechanisms has become increasingly prominent (Lin & Tsai, 2022).

This transformation trend is highly congruent with the core concept of the United Nations Sustainable Development Goal 4 (SDG4)—"Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." SDG4 emphasizes not only universal access to education but also requires education systems to attend to learner diversity, ensuring that students from different backgrounds and with varying abilities can obtain effective learning incentives and developmental opportunities through differentiated support strategies (Sachs-Israel, 2016). In this context, an in-depth exploration of how incentive mechanisms influence learning motivation through the moderating role of individual differences holds significant theoretical value and practical significance for realizing the inclusive teaching and learning practices advocated by SDG4.

Extensive theoretical and practical evidence indicates that a single incentive approach often fails to continuously and effectively motivate all students. While material incentives (e.g., scholarships, school supplies) can improve task completion rates in the short term, excessive dependence may lead to "reward fatigue" and undermine intrinsic interest (Li et al., 2024; Singh & Singh, 2023). Spiritual incentives (e.g., praise, honors) and goal incentives (e.g., setting specific learning objectives) are considered more effective for cultivating long-term motivation (Ryan & Deci, 2017; Davis, 2023). However, educational practice frequently faces dilemmas of uniform incentive methods and insufficient targeting, failing to adequately consider individual differences among students and resulting in inconsistent incentive effects (Lin & Tsai, 2022).

More critically, identical incentive measures applied to different students may yield vastly different effects. For instance, extroverted students respond positively to public praise, whereas introverted students may develop anxiety from it (Davis, 2023); high-ability students pursue challenging goals, while low-ability students require more immediate feedback and incremental rewards (Zhang et al., 2023); students from different family economic backgrounds also exhibit significant differences in perception and need for material incentives (Zhou et al., 2024). These phenomena suggest that individual difference factors—such as students' personality traits, learning abilities, and family backgrounds—may play an important moderating role in the relationship between incentive mechanisms and learning motivation.

### **Objective of the study**

Therefore, the core objective of this study is to systematically integrate core theories on how incentive mechanisms (material, spiritual, goal) influence learning motivation through theoretical review and analysis, and to deeply explore the moderating effects of individual differences (personality, ability, family) in this process, thereby constructing a more comprehensive and nuanced theoretical analytical framework. This article does not involve data collection and analysis, but is research focused on theoretical review and integration, aiming to provide clear theoretical guidance for subsequent empirical research and a conceptual foundation for educational managers to design differentiated incentive strategies.

## **2. Literature Review**

### **2.1 Core Conceptual Definitions**

#### **2.1.1 Incentive Mechanism**

Incentive mechanisms refer to the systematic series of rewards and guidance measures adopted by schools to stimulate and sustain students' learning behaviors (Chen, G.S., 1991). This study focuses on three classical types: (1) Material incentives, which use tangible resources (e.g., scholarships, school supplies, meal vouchers) as carriers to directly satisfy students'

physiological or safety needs (Li et al., 2024). Their effectiveness depends on the match between rewards and students' actual needs, but overuse may lead to motivational externalization (Deci & Ryan, 2000). (2) Spiritual incentives, which satisfy students' social, esteem, and self-identification needs through non-material forms (e.g., praise, honorary titles, emotional support) (Brown, 2024). Their essence is to transmit recognition signals through "symbolic interaction," enhancing students' self-efficacy and sense of belonging. (3) Goal incentives, which guide and stimulate students' achievement motivation by setting specific, achievable, and time-bound learning objectives (Locke & Latham, 2023). Their core is to provide clear future direction and behavioral standards, cultivating long-term motivation through the linkage of "goal → effort → achievement."

### 2.1.2 Learning Motivation

Learning motivation is the internal psychological process or dynamic state that drives individuals to engage in and sustain learning activities. From Maslow's (1943) hierarchy of needs theory, it is viewed as an internal driving force to satisfy needs ranging from physiological to self-actualization. McClelland's (1961) achievement of motivation theory refines it as "the difference between the tendency to pursue success and the tendency to avoid failure." In the Chinese context, Lin (2009) emphasizes that learning motivation is "the individual's willingness to sustain learning under the combined influence of cultural background, family expectations, and self-awareness," highlighting the importance of external motivation in collectivist cultures. This study primarily focuses on behavioral manifestations of learning motivation, such as classroom participation, duration of autonomous learning, and task persistence.

### 2.1.3 Individual Differences

Individual differences in this study refer primarily to those relatively stable traits and background factors that moderate students' responses to incentive mechanisms, mainly encompassing three dimensions: (1) Personality traits: Based on the Big Five personality theory (Costa & McCrae, 1992), the focus is on extraversion (social orientation), neuroticism (emotional stability), and conscientiousness (self-discipline and goal-orientation), which have been confirmed to be closely related to incentive preferences (Davis, 2023; Zhang et al., 2023). (2) Learning ability: Core indicators include students past academic performance (e.g., exam rankings) and knowledge absorption speed, reflecting their cognitive foundation and learning self-efficacy, which directly influence their adaptability to goal difficulty and preference for challenging tasks (Zhang et al., 2023). (3) Family background: Covers family economic status (monthly income), parental education level, and parenting styles. Family background not only shapes students' initial resources and needs hierarchy (Maslow, 1943) but also influences their valuation of different incentive methods through value transmission (Zhou et al., 2024; Chen, 2023).

## 2.2 Integration of Theoretical Foundations: Constructing an Analytical Framework

To deeply analyze how incentive mechanisms ultimately influence learning motivation through the "filter" of individual differences, this study integrates three major psychological and educational theories to construct a multi-level theoretical analytical framework.

First, Maslow's hierarchy of needs theory (Maslow, 1943) provides the classification basis for incentive types and the foundation for motivation generation. This theory posits that human needs form a pyramid structure from low to high. Material incentives primarily correspond to the satisfaction of physiological and safety needs; for example, providing school supplies for economically disadvantaged students can directly alleviate their resource pressures (Singh &

Singh, 2023). Spiritual incentives focus on meeting belongingness and esteem needs; teacher praise and collective honors can enhance students' group identity and self-worth (Brown, 2023). Goal incentives are associated with the highest level of self-actualization needs, enabling students to explore their potential and realize their ideals by setting and achieving personal growth goals (Zhao et al., 2022). This theory suggests that effective incentives must target the level of needs at which students are situated.

Second, achievement motivation theory (McClelland, 1961) primarily explains the mechanism of goal incentives. This theory holds that individuals' achievement-seeking intensity depends on their evaluation of success probability. When goal difficulty matches perceived ability (i.e., moderate difficulty), achievement motivation is strongest (Chen, 2023). This provides the core principle for goal incentive design: goals must be specific, measurable, and moderately difficult (Davis, 2023). Simultaneously, this theory acknowledges individual differences in achievement motivation, with high achievers more inclined to choose challenging tasks (Atkinson, 1964).

Third, the Big Five personality theory (Costa & McCrae, 1992) provides refined dimensions for understanding the moderating role of individual differences. Research shows that students high in extraversion respond more positively to social rewards (e.g., public praise); highly conscientious students better execute and persist in goal plans; while students high in neuroticism are prone to anxiety in competitive incentive environments and require gentler feedback (Davis, 2023; Zhou et al., 2024; Zhang et al., 2023). This theory explains why identical incentive measures produce differential effects on students with different personalities.

These three theories are not isolated but collectively form the core thread for understanding this study's research: incentive mechanisms (material/spiritual/goal) aim to satisfy students' needs at different levels (Maslow's theory), among which goal incentives stimulate achievement motivation by setting appropriately difficult goals (McClelland's theory). However, this "incentive-motivation" pathway is not directly connected but is significantly moderated by individual differences (Big Five personality, etc.). For example, a scholarship (material incentive) may have a much greater motivational effect on low-income students (family background difference) than on high-income students; a public commendation (spiritual incentive) may motivate extraverts while making introverts uncomfortable (personality trait difference). Therefore, an integrated theoretical framework must position individual differences at the core of moderating variables.

### **3. Research Methodology**

This study employs theoretical analysis and literature review, without involving original data collection or statistical analysis. Its objective is to construct and elucidate a theoretical model depicting the relationship among "incentive mechanisms → individual differences → learning motivation" through integrated synthesis and logical reasoning.

#### **3.1 Analytical Framework: Explanatory Theoretical Modeling**

This study adopts an explanatory theoretical modeling approach to uncover the underlying mechanisms among variables (Creswell, 2018). The analytical framework consists of:

### 3.1.1 Theoretical Model Structure

Independent Variables: Material incentives, non-material incentives, and goal incentives, which directly or indirectly influence the dependent variable—students' learning motivation—through psychological pathways (need satisfaction and goal-direction guidance).

Moderating Variables: Personality traits, learning ability, and family background. These do not directly determine motivation levels but alter (strengthen or weaken) the intensity or direction of the relationship between incentive mechanisms and learning motivation.

### 3.1.2 Analytical Focus

The analysis centers on moderating effect mechanisms, specifically examining how individual differences modulate incentive effectiveness. For instance, it investigates "how extraversion moderates the facilitative effect of public praise on classroom participation."

## 3.2 Literature Sources and Analytical Procedure

### 3.2.1 Literature Identification and Selection

A systematic search was conducted across core journals, authoritative monographs, and key conference proceedings in psychology and education. Selection criteria included: (a) relevance to incentive mechanisms, learning motivation, or individual differences; and (b) theoretical grounding in behaviorist, cognitivist, or humanist perspectives. A final corpus of 72 seminal documents was selected, comprising 38 international cutting-edge studies and 34 representative domestic studies.

### 3.2.2 Analytical Process

A four-step integrated analysis was implemented:

- i. 1. Thematic Classification: Core themes ("incentive mechanisms," "learning motivation," "individual differences") and their sub-dimensions were identified and categorized.
- ii. 2. Comparative Synthesis: Key viewpoints, theoretical developments, and scholarly debates across different traditions were summarized and contrasted.
- iii. 3. Logical Inference: Potential theoretical linkages among variables were deduced, with particular emphasis on articulating the theoretical rationale and pathways of individual differences as moderators.
- iv. 4. Framework Integration: Dispersed theoretical perspectives were synthesized into a coherent framework characterized by internal logical consistency, explanatory power for educational phenomena, and contextual adaptability to local educational settings.

## 4. Findings and Discussion

Through systematic review of the provided literature, this study reaches the following key findings that constitute the core content of the theoretical framework:

### 4.1 Differential Influence Pathways of Incentive Mechanisms on Learning Motivation

Literature indicates that the three incentive mechanisms influence learning motivation by satisfying needs at different levels and triggering different psychological processes.

The pathway of material incentives is most direct, with "double-edged sword" effects. By providing tangible resources, they quickly satisfy students' basic needs (especially economically disadvantaged students), thereby significantly enhancing learning participation in the short term (Singh & Singh, 2023; Karna & Rimpelä, 2023). However, the behaviorist's "reinforcement" logic has limitations. Deci and Ryan's (2000) cognitive evaluation theory points out that if material incentives are perceived as controlling behavior or are used too

frequently, they may trigger the "over justification effect," causing students to attribute learning to obtaining rewards, thereby weakening intrinsic interest in knowledge itself. Long-term effects are unstable and prone to "reward fatigue" (Li et al., 2024).

Spiritual incentives function by satisfying higher-order psychological needs. Teacher praise, peer recognition, and collective honors can effectively satisfy students' belongingness and esteem needs, thereby enhancing their self-worth and identification with the learning environment (Brown, 2023). Social learning theory (Bandura, 1977) further suggests that observing others receiving spiritual rewards for certain behaviors can enhance observers' self-efficacy and imitative motivation. The effectiveness of spiritual incentives heavily depends on feedback specificity and contextual appropriateness. Specific, effort-based praise enhances self-efficacy more than generic compliments; the effects of public versus private praise also vary by student personality (Davis, 2023).

The core mechanism of goal incentives lies in providing clear direction and challenge. Locke and Latham's (1990) goal-setting theory confirms that specific, difficult but achievable (SMART principle) goals most effectively direct effort and improve performance. Goal incentives stimulate students' achievement motivation; when students clearly see the gap between "current state" and "goal" and believe it can be bridged through effort, motivation is strongest (Chen, 2023). The sense of competence from successfully achieving goals can further strengthen intrinsic motivation (Ryan & Deci, 2017).

#### **4.2 Individual Differences as Key Moderating Variables**

Literature strongly supports that individual differences are the core reason why the same incentive produces different effects, with moderating functions primarily manifested in the following aspects:

**Moderating effects of personality traits:** The Big Five personality traits serve as stable moderators. Students high in extraversion tend to gain energy from social interaction and public recognition, thus responding more positively to public spiritual incentives (e.g., classroom praise, collective honors) (Davis, 2023). Conversely, highly introverted students are more sensitive to private, low-key affirmation (e.g., individual after-class conversations, written comments), and public praise may instead cause stress (Chen & Li, 2020). Students high in neuroticism (emotionally unstable) are sensitive to stress and prone to anxiety under highly competitive material incentives (e.g., scholarship rankings) or excessively difficult goal incentives, leading to decreased motivation; they require safer, non-comparative incentive environments (Zhang et al., 2023). Highly conscientious students with strong self-discipline and planning abilities can better execute and persist in goal incentives, performing better in goal decomposition and plan implementation (Zhou et al., 2024).

**Moderating effects of learning abilities:** Learning abilities primarily moderate incentive effectiveness by influencing "goal commitment" and "expectancy of success." High-ability students typically have higher self-efficacy and are more attracted to challenging, long-term goals (e.g., participating in subject competitions, conducting project research), and are willing to invest more time and energy (Zhang et al., 2023). For them, ability-based affirmation in spiritual incentives is more effective than simple encouragement. Low-ability students or those with temporary academic difficulties may have lower self-efficacy due to repeated failure experiences. Overly difficult goals may deter them. They are more motivated by immediate, small-step reinforcements, such as small prizes after completing specific tasks (material

incentives) or teachers' explicit encouragement of minor progress (spiritual incentives). They need more feedback on effort processes to gradually rebuild confidence (Zhang et al., 2023).

**Moderating effects of family background:** Family background shapes students' initial need structures and value systems. Economic conditions directly affect the utility of material incentives. For low-income students, material rewards (especially practical school supplies) can directly address resource scarcity problems, with significant motivational effects (Zhou et al., 2024; Karna & Rimpelä, 2023). For high-income students, material rewards have lower marginal utility; they may value more the symbolic meaning or spiritual recognition attached to rewards. Parental education levels and parenting styles also moderate incentive effects. Students from families with high educational expectations and democratic parenting better internalize school spiritual incentives (e.g., praise, honors) into self-identity, showing stronger learning autonomy (Chen, 2023). Additionally, under collectivist cultural backgrounds, families' emphasis on "home-school cooperation" and recognition of their children's school honors can significantly amplify the effects of spiritual incentives (Liu, 2022).

## 5. Theoretical Integration and Model Elucidation

Based on the above findings, this study proposes an integrated theoretical model to systematically explain the complex relationship among incentive mechanisms, individual differences, and learning motivation. The model's core is to elucidate that individual differences are not external to the incentive process but are key mechanisms embedded within it that dynamically moderate its effectiveness.

### 5.1 Core Relationship Pathways

The theoretical framework contains three direct influence pathways: material incentives influence learning motivation through basic need satisfaction, spiritual incentives function through social identification pathways, and goal incentives exert influence through achievement-oriented pathways. These three pathways collectively constitute multiple channels through which incentive mechanisms affect learning motivation. However, the core innovation of this model is the proposal of three parallel, powerful moderating pathways. The three categories of individual differences—personality traits, learning abilities, and family backgrounds—act like different lenses, respectively moderating the intensity, direction, and even nature of the three direct influence pathways. Specifically, moderating effects manifest at three levels: First, individual differences determine students' initial preferences and sensitivity to different incentive types, shaping the "receiving port" of incentives. Second, they profoundly influence how students perceive and interpret the same incentive measures—that is, how they "understand" incentives. Finally, they also affect whether incentive effects can be sustained and internalized into stable personal characteristics.

### 5.2 Model Dynamism and Cultural Contextual Embeddedness

This theoretical model possesses dynamism. First, dimensions of individual differences may interact to produce more complex moderating patterns. For example, students with a combination of introverted personality and high learning abilities may respond differently to challenging goals than introverted, low-ability students. Second, different types of incentive measures also have synergistic or conflicting effects. Literature indicates that cautious combination of short-term material incentives with long-term spiritual or goal incentives may produce synergistic effects of "one plus one greater than two" (Jones, 2024); conversely, mismatched combinations may lead to motivational weakening (Lepper, 2023).

Particular emphasis must be placed on understanding and applying this model within the specific cultural context of Chinese education. The "Double Reduction" policy orientation requires incentive mechanism design to shift focus from external ranking to intrinsic drive, enhancing the qualitative importance of spiritual and goal incentives (Ministry of Education, 2021). China's collectivist cultural background means that group-recognition incentives (e.g., class progress awards) often motivate students more than individual rewards alone (Chen, M. & Li, W., 2020). Simultaneously, the "face culture" and deep-rooted "home-school cooperation" tradition significantly amplify the social effects of spiritual incentives, making family attitudes and feedback critical external variables for successful internalization of incentives (Liu, 2022). These unique cultural factors are indispensable components for constructing and understanding incentive theories applicable to local Chinese educational contexts.

## 6. Conclusion

Through theoretical review and integration, this study systematically explores the impact of incentive mechanisms on middle school students' learning motivation and demonstrates the key moderating role played by individual differences. The main conclusions are as follows:

First, material, spiritual, and goal incentives influence learning motivation through different psychological pathways, each with its own advantages and limitations. Effective educational incentives cannot rely on a single approach but should explore synergistic combinations among the three, balancing short-term behavioral reinforcement with long-term motivation cultivation.

Second, and the core argument of this study: the effectiveness of incentive mechanisms is not "universally applicable," but highly dependent on student characteristics. Personality traits (e.g., extraversion, neuroticism, conscientiousness), learning ability levels, and family backgrounds (economic status, parenting styles) collectively constitute a complex moderating system that profoundly influences students' perception, preferences, and response patterns to incentive measures. A "one-size-fits-all" approach that ignores these differences is an important cause of "incentive failure" phenomena in practice.

Based on this, we construct an analytical framework integrating Maslow's hierarchy of needs theory, achievement motivation theory, and the Big Five personality theory. This framework explicitly identifies that individual differences play a core moderating role in the "incentive mechanism → learning motivation" relationship. This requires educational managers and researchers to shift their thinking from "finding the universally optimal incentive" to "designing individualized incentives adapted to differences."

This study has important theoretical and practical significance. At the theoretical level, it organically integrates fragmented incentive theories and individual difference theories, providing a more refined and dynamic perspective for deeply understanding the mechanisms of learning motivation stimulation. At the practical level, it strongly calls for personalized incentives in educational practice: schools need to establish more comprehensive student development profiles to identify characteristics in personality, ability, and family aspects; teachers need to master a richer toolbox of incentive strategies and flexibly apply them according to contexts and student characteristics—for example, providing more private affirmation for introverted students, setting stepwise small goals with immediate feedback for

low-ability students, and collaboratively reinforcing the value of spiritual incentives in communication with families.

## 7. Future Research Directions

This study is a theoretical exploration. Future research urgently needs to conduct in-depth localized empirical studies based on this framework. For example, quantifying the moderating strength of different individual difference dimensions on various incentive effects through large-scale surveys; deeply understanding Chinese students' (especially urban-rural students) unique perceptions and experiences of incentives in specific cultural contexts through qualitative interviews; and piloting and evaluating differentiated incentive programs based on individual differences in schools through action research. Only by closely integrating theoretical frameworks with empirical evidence and educational practice can we truly construct incentive mechanisms that are both equitable and efficient—capable of stimulating extrinsic motivation while nourishing intrinsic interest—ultimately promoting the comprehensive development of every student.

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## Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this study.

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