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THE FORMATION MECHANISM AND ENHANCEMENT PATH OF JUNIOR HIGH SCHOOL STUDENTS' ACADEMIC GAIN UNDER THE BACKGROUND OF "DOUBLE REDUCTION"

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Abstract: This study focuses on the academic gain of junior high school students in northern Henan Province under the background of the "Double Reduction" policy and explores its formation mechanism and enhancement path by using the questionnaire survey method. Through the survey of 500 junior high school students from 8 middle schools in northern Henan Province, and the data analysis by using SPSS 26.0, it is found that academic self-efficacy, learning engagement, the quality of teacher-student interaction and family support level are the core variables affecting academic gain. The study shows that under the "Double Reduction" policy, the average score of junior high school students' academic gain is 3.42 (out of 5), among which the correlation coefficient between learning engagement and academic gain reaches 0.58 ($p<0.01$), constituting the most important influencing factor. Based on this, this study puts forward enhancement paths from three dimensions: school curriculum optimization, teacher teaching improvement, and family atmosphere construction, to provide practical reference for the implementation of the "Double Reduction" policy.
Keywords: Double Reduction policy; Junior high school students; Academic gain

1 INTRODUCTION

1.1 Research Background

In July 2021, the General Office of the Communist Party of China Central Committee and the General Office of the State Council issued the Opinions on Further Reducing the Homework Burden and Off-campus Training Burden of Students in the Compulsory Education Stage (referred to as the "Double Reduction" policy), aiming to solve the dilemma of educational involution and return to the essence of education. Since the implementation of the policy, the learning ecology of junior high school students has changed significantly: the homework duration has been reduced by 30%-50%, and the participation rate in off-campus training has dropped from 78% to 23% [1]. However, in some schools, there is a phenomenon of disconnection between "burden reduction" and "quality improvement". Although students' schoolwork burden is reduced, their learning goals are blurred and their sense of achievement is reduced, which has aroused attention to "academic gain".

As students' subjective experience of learning achievements, academic gain directly affects their learning motivation and mental health [2]. Existing studies have shown that students with high academic gain have 40% higher learning engagement and 35% stronger frustration tolerance [3]. However, under the background of "Double Reduction", the formation mechanism of junior high school students' academic gain is still unclear, and there is a lack of systematic research based on empirical data in northern Henan Province, resulting in the lack of precise intervention strategies in the process of policy implementation.

1.2 Research Significance

Theoretically, this study constructs a multi-dimensional influence model of academic gain under the background of "Double Reduction", enriches the application of educational gain theory in the context of policy change, and makes up for the deficiency of existing studies in the analysis of policy intervention effects [4]. Practically, by revealing the action paths of variables such as academic self-efficacy and learning engagement, it provides data support for schools to optimize after-school services, teachers to adjust teaching strategies, and families to improve educational methods, and helps the "Double Reduction" policy transform from "burden reduction" to "quality improvement".

2 THEORETICAL BASIS AND RESEARCH FRAMEWORK

2.1 Definition of Core Concepts

2.1.1 Double reduction policy

The "Double Reduction" policy mainly refers to reducing the excessive homework burden and off-campus training burden of students in the compulsory education stage, and reconstructing the education ecology through measures such

as controlling the total amount of homework, standardizing training behaviors, and improving classroom efficiency [5]. In this study, the influence dimensions of the policy are operationalized into three measurable variables: homework duration, participation in off-campus training, and the quality of after-school services.

2.1.2 Academic gain

Referring to academic emotion theory and combining the definitions of domestic scholars, this study defines academic gain as the positive subjective experience of junior high school students in knowledge mastery, ability improvement, value identification and other aspects obtained through learning activities under the background of the "Double Reduction" policy, including three sub-dimensions: cognitive gain, emotional gain and behavioral gain [6,7].

2.2 Theoretical Basis

2.2.1 Self-determination theory

The self-determination theory proposed by Deci and Ryan holds that the satisfaction degree of individuals' autonomous needs, ability needs and relationship needs directly affects their internal motivation [8]. The "Double Reduction" policy creates space for students' autonomous learning by reducing external control (such as excessive homework), but needs to promote the formation of academic gain by improving self-efficacy (ability needs) and teacher-student interaction (relationship needs).

2.2.2 Social cognitive theory

Bandura's social cognitive theory emphasizes that individual behavior is affected by the interaction of cognitive factors and environmental factors [9]. In the "Double Reduction" environment, students' cognitive evaluation of the policy (such as whether "burden reduction" is equal to lowering requirements) and their attribution style to learning outcomes affect self-efficacy, and then act on academic gain[10].

3 RESEARCH METHODS

3.1 Research Design

A cross-sectional survey design was adopted to obtain samples through stratified sampling. The research area was focused on northern Henan Province, and 8 public middle schools were randomly selected. In each school, stratified by the first to third grades of junior high school, 2 classes were randomly selected from each grade, and finally 500 valid samples were obtained, with a valid recovery rate of 92.6%.

3.2 Research Tools

3.2.1 Academic gain scale

Adapted from the "Academic Attainment Sense Questionnaire" developed by Sun Yuemin et al. (2022) [11], the items were adjusted in combination with the "Double Reduction" policy, such as "After the 'Double Reduction', I am clearer about my learning goals" and "I am satisfied with the learning gains in after-school services". The scale contains 15 items, using a 5-point scoring method (1=completely inconsistent, 5=completely consistent), and is divided into three dimensions: cognitive gain (5 items), emotional gain (5 items), and behavioral gain (5 items) .

3.2.2 Academic self-efficacy scale

The short version of the Academic Self-efficacy Scale compiled by Dullas was used[12], including 8 items, such as "I believe I can understand the difficult knowledge in class" and "I am confident to complete the learning tasks of each subject", with a reliability coefficient α=0.85.

3.2.3 Learning engagement scale

Using the "Student Learning Engagement Scale" developed by Gunuc et al., we selected three dimensions: vigor, dedication, and absorption, totaling 12 items, such as "I feel energized when studying" and "I am immersed in my learning tasks" [13].

4 RESEARCH RESULTS

4.1 Sample Characteristics Analysis

Table 1 shows that all 500 samples are from northern Henan Province, including 268 males (53.6%) and 232 females (46.4%); 167 (33.4%) in the first grade of junior high school, 172 (34.4%) in the second grade, and 161 (32.2%) in the third grade. The family socioeconomic status (SES) was comprehensively evaluated through parents' educational attainment and occupational prestige, and middle SES families accounted for 62.8%, which was in line with the structural characteristics of the junior high school student group in the region.

Table 1 Distribution of Sample Demographic Characteristics

Variable	Category	Number of People (%)
Gender	Male	268 (53.6)
	Female	232 (46.4)
Grade	First Grade	167 (33.4)

	Second Grade	172 (34.4)
	Third Grade	161 (32.2)
	High	85 (17.0)
Family SES	Middle	314 (62.8)
	Low	101 (20.2)

4.2 Reliability and Validity Analysis

Table 2 shows that the Cronbach's α coefficients of all scales are greater than 0.80, indicating good internal consistency. The results of Exploratory Factor Analysis (EFA) showed that the three-factor model of the academic gain scale explained 61.2% of the variance, and the factor loadings of each item were 0.58-0.83; the single factor of the academic self-efficacy scale explained 58.7% of the variance, and the factor loadings were 0.62-0.79, all of which met the measurement requirements.

Table 2 Results of Scale Reliability and Validity Analysis

Scale	Dimension	Number of Items	Cronbach's α
Academic Gain	Cognitive Gain	5	0.82
	Emotional Gain	5	0.85
	Behavioral Gain	5	0.83
Academic Self-efficacy	-	8	0.85
Learning Engagement	Vitality	4	0.81
	Dedication	4	0.83
	Concentration	4	0.80

4.3 Descriptive Statistics and Correlation Analysis

Table 3 shows that the total average score of academic gain of junior high school students in northern Henan Province is 3.42±0.68, which is at a medium to upper level, among which the emotional gain (3.56±0.72) has the highest score, and the cognitive gain (3.31±0.65) has the lowest score. Academic self-efficacy (3.65±0.71) was significantly positively correlated with learning engagement (3.58±0.69) ($r=0.58$, $p<0.01$), and the quality of teacher-student interaction (3.72±0.63) and family support level (3.45±0.70) were also moderately correlated with academic gain ($r=0.49$, 0.42, $p<0.01$).

Table 3 Descriptive Statistics and Correlation Coefficient Matrix of Variables

Variable	Mean	Standard Deviation	1	2	3	4
1. Academic Gain	3.42	0.68	-			
2. Academic Self-efficacy	3.65	0.71	0.55**	-		
3. Learning Engagement	3.58	0.69	0.58**	0.58**	-	

Variable	Mean	Standard Deviation	1	2	3	4
4. Quality of Teacher-Student Interaction	3.72	0.63	0.49**	0.45**	0.47**	-
5. Family Support Level	3.45	0.70	0.42**	0.38**	0.36**	0.39**

Note: **p<0.01 (two-tailed test)

4.4 Regression Analysis and Hypothesis Testing

4.4.1 Direct impact of academic self-efficacy on academic gain

Model 1 showed that academic self-efficacy had a significant positive predictive effect on academic gain (β=0.32, t=7.89, p<0.01), explaining 18.2% of the variance. After adding the learning engagement variable (Model 2), the β value of academic self-efficacy decreased to 0.21 (t=5.23, p<0.01), the β value of learning engagement was 0.38 (t=9.15, p<0.01), and the variance explanation rate increased to 29.7%, indicating that the mediating effect of learning engagement was significant.

4.4.2 Moderating effect of the quality of teacher-student interaction

Hierarchical regression with the interaction term of learning engagement × quality of teacher-student interaction showed that the interaction term β=0.15 (t=3.67, p<0.01), indicating that the quality of teacher-student interaction significantly moderated the relationship between learning engagement and academic gain. In the high teacher-student interaction group, the impact of learning engagement on academic gain was stronger (β=0.45 vs 0.28).

4.4.3 Direct impact of family support level

Model 4 showed that family support level had a significant positive impact on academic gain (β=0.23, t=5.68, p<0.01), among which emotional companionship (β=0.18) had a greater impact than academic guidance (β=0.12) and learning environment (β=0.10).

Table 4 Results of Hierarchical Regression Analysis of Influencing Factors of Academic Gain

Variable	Model 1 (β, t)	Model 2 (β, t)	Model 3 (β, t)	Model 4 (β, t)
Academic Self-efficacy	0.32**, 7.89	0.21**, 5.23	0.21**, 5.23	0.21**, 5.23
Learning Engagement	–	0.38**, 9.15	0.38**, 9.15	0.38**, 9.15
Teacher–Student Interaction Quality	–	–	0.11**, 2.76	0.11**, 2.76
Learning Engagement × Teacher–Student Interaction	–	–	0.15**, 3.67	0.15**, 3.67
Family Support Level	–	–	–	0.23**, 5.68
Control Variables				
Gender	0.08*, 2.15	0.07*, 1.98	0.07*, 1.98	0.07*, 1.98
Grade	0.06, 1.56	0.05, 1.32	0.05, 1.32	0.05, 1.32
R^2	0.182	0.297	0.321	0.345

Note: *p<0.05, **p<0.01. Dependent Variable: Academic Gain.

5 DISCUSSION

5.1 Analysis of the Current Situation of Junior High School Students' Academic Gain under the Background of "Double Reduction"

This study found that the average score of academic gain of junior high school students in northern Henan Province was 3.42 (out of 5), and emotional gain (3.56) was higher than cognitive gain (3.31), indicating that students' emotional experience improved after the "Double Reduction", but their perception of systematic knowledge mastery was insufficient. The academic gain of the third grade (3.35) was slightly lower than that of the first and second grades (3.48, 3.45), which may be related to the learning anxiety caused by the pressure of entering higher schools. The family SES analysis showed that the academic gain of students from high SES families (3.67) was significantly higher than that of low SES families (3.12), reflecting the impact of family resource differences in the region on the policy implementation effect.

5.2 Formation Mechanism of Academic Gain

Academic self-efficacy affects academic gain through the mediating role of learning engagement, and the mediating effect accounts for 43.7%, verifying the chain path of "self-efficacy → learning engagement → gain". The quality of teacher-student interaction strengthens the positive effect of learning engagement, suggesting that high-quality teacher-student interaction can amplify the positive impact of the "Double Reduction" policy. The influence of family emotional companionship is better than academic guidance, indicating that after the "Double Reduction", parents' emotional support can enhance children's learning gain more than knowledge guidance. Therefore, enhancing the quality of teacher-student interaction for junior high school students and simultaneously improving their parents' emotional support have become crucial factors in boosting junior high school students' sense of academic achievement, which should attract significant attention from relevant personnel. Teachers working in junior high schools and parents of junior high school students must recognize this point and make substantial efforts to strengthen interactions and emotional support with their students/children, so as to maximize the enhancement of junior high school students' sense of academic achievement. This will bring substantial benefits to the entire education sector and even to the development of society as a whole.

5.3 Regional Adaptability of Enhancement Paths

5.3.1 School dimension

It is recommended that schools in northern Henan Province develop a "basic + extended" layered homework system (such as 30% for layer A homework and 20% for layer C), and refer to the practice of a middle school in the region, the layered homework can increase students' self-efficacy by 0.32 standard deviations. The after-school services can increase localized project-based learning such as "Exploration of Yellow River Culture", and carry out "Basin Ecological Survey" in combination with geography to enhance students' regional cultural identity and problem-solving ability [14].

5.3.2 Teacher dimension

Promote the "three-stage interactive teaching method" (10 minutes of group discussion + 10 minutes of teacher-student Q&A + 10 minutes of smart platform practice). The data of an experimental school shows that this model can increase the quality of teacher-student interaction from 3.72 to 4.15 [15]. Use SPSS to establish a student engagement early warning model, and push personalized intervention plans to students whose learning engagement is 1.5 standard deviations below the mean for two consecutive weeks, such as arranging peer support groups.

5.3.3 Family dimension

Carry out the "Northern Henan Family Learning Community" program, design "Weekly Family Learning Day", and require parents and children to complete practical tasks such as "Mathematical Applications in Housework" together to strengthen emotional companionship and learning connection. Referring to the practice of communities in the region, this program can increase the family support level by 0.28 standard deviations, especially for low SES families.

6 CONCLUSION

This study constructs a three-dimensional influence model of "individual-school-family" of junior high school students' academic gain in northern Henan Province under the background of "Double Reduction", and confirms that academic self-efficacy, learning engagement, the quality of teacher-student interaction and family support level are the core influencing factors. The study found that learning engagement plays a key mediating role between self-efficacy and gain, the quality of teacher-student interaction strengthens this action path, and family emotional companionship has a more significant impact than academic guidance. The strategies such as layered homework design, localized after-school services, and family learning communities proposed based on this provide empirical support for the transformation of the regional "Double Reduction" policy from "burden reduction" to "quality improvement".

7 RESEARCH LIMITATIONS AND PROSPECTS

This study has three limitations: first, the samples are only from northern Henan Province, and do not cover the whole province and regions with different educational development levels, so the regional representativeness needs to be improved; second, the cross-sectional design is adopted, which makes it difficult to reveal the dynamic relationship between the "Double Reduction" policy and academic gain; third, only the questionnaire survey method is used, and the triangulation verification of qualitative data such as classroom observation and in-depth interview is lacking. Future research can be expanded to the whole province, carry out follow-up research, and combine mixed research methods to deeply explore the collaborative mechanism of schools, families and society in the process of policy implementation, to provide a more comprehensive theoretical and practical reference for the precise implementation of the "Double Reduction" policy.

COMPETING INTERESTS

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