A Survey and Research on High School Students' Motivation for Mathematics Learning

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Abstract. In our real life, any activity of people is motivated and directed towards a certain purpose, so learning activities are also the same. At the same time, high school grades are to some extent determined by learning motivation. This survey of high school students' learning motivation is not only conducive to discovering the current situation, but also to developing students' mathematical literacy. The following conclusions are drawn in this article: (1) The overall level of mathematical motivation among high school students is relatively high, but in both dimensions, external learning motivation is weaker. (2) There are differences in learning motivation among different grades, and the second year of high school is a low period. (3) There is no significant difference between mathematical motivation and gender. (4) There is not much difference between math motivation and math grades, so poor math grades do not necessarily mean poor math learning motivation. (5) The factors of teachers, parents, and classmates cannot be ignored.

Keywords: High School Students' Motivation; Mathematics Learning; Cultivate Students' Mathematical Literacy.

1. Introduction

The quality of students' math scores is to some extent determined by their learning motivation. Some students' poor academic performance may lead to a decline in learning motivation. The purpose of this article is to analyze the factors that affect students' learning motivation and explore ways to enhance students' learning motivation from various dimensions.

2. Analysis of Research Results

2.1 Analysis of Mathematics Learning Motivation of All High School Students

2.1.1 An Overall Analysis of High School Students' Motivation for Mathematics Learning

Mathematical motivation can be divided into self-improvement drive, cognitive drive, and accessory drive. Descriptive statistics of the sample's self-improvement drive, cognitive drive, and accessory drive are presented in Table 1.

Table 1. Descriptive Statistics of High School Students' Mathematical Motivation

	N	min	max	mean	standard deviation
ego-enhancement need	210	1.63	3.88	2.7232	.42635
cognitive drive	210	1.60	4.20	2.7457	.45328
affiliative drive	210	1.29	4.00	2.6612	.50551

According to the statistical data in the table, the average self-improvement internal drive of the high school student is 2.7232, the average cognitive internal drive is 2.7457, and the average affiliated internal drive is 2.6612. This indicates that overall, the high school student's mathematical motivation has reached an average level, but the difference between the maximum and minimum values of the three types of internal drives is around 3, indicating a significant individual difference in their level of mathematical motivation.

2.1.2 Analysis of Various Dimensions of High School Students' Motivation for Mathematics Learning

Starting from the two dimensions of mathematical motivation, data analysis is conducted to understand the level of high school students' mathematical learning motivation in each dimension. According to the data in Table 2, the internal learning score of high school students is 2.7281, and the external learning motivation score is 2.6862, which is at an average level.

Table 2. Descriptive Statistics on Various Dimensions of High School Students' Mathematical Attitudes

	N	min	max	mean	standard deviation
Internal learning motivation	210	1.90	4.10	2.7281	.34974
External learning motivation	210	1.60	4.00	2.686	.43655

From the data in Table 3, it can be found that in internal learning motivation, the score of curiosity is 2.7457, the score of autonomy is 2.7105, and in external learning motivation, the score of personal future is 2.7400, and the score of recognition is 2.6324, all of which belong to the average level and need to be improved.

Table 3. Descriptive Statistics of Various Factors in the Two Dimensions of High School Students' Mathematical Motivation

	N	min	max	mean	standard deviation
Internal learning motivation					
curiosity	210	1.60	4.20	2.7457	.45328
need for autonomy	210	1.20	4.20	2.7105	.59309
External learning motivation					
Personal Future	210	2.00	4.20	2.7400	.45171
Recognized	210	1.20	4.40	2.6324	.59060

2.2 Analysis of Mathematics Learning Motivation of High School Students of Different Grades

Firstly, the K-W method with multiple independent samples was used for difference analysis, with the aim of understanding whether there are differences in learning attitudes among high school students of different grades. The results are shown in Table 5. The K-W test indicates that there are significant differences in self-improvement drive, affiliated drive, and cognitive drive among the three grades of high school students.

Table 4. Descriptive statistics of sample size for each grade

	frequency	percentage	Effective percentage	cumulative percentage
freshman	69	32.9	32.9	32.9
sophomore	70	33.3	33.3	66.2
junior	71	33.8	33.8	100.0
sum	210	100.0	100.0	

2.2.1 Analysis of Differences in Mathematics Learning Motivation among High School Students of Different Grades.

Table 5. K-W test of mathematical attitudes among high school students of different grades

	ego-enhancement need	cognitive drive	affiliative drive
chi-square	37.990	42.941	53.409
df	2	2	2
Asymptotic significance	.000	.000	.000

2.2.2 Comparative Analysis of Mathematics Learning Motivation among High School Students of Different Grades

Table 6. Descriptive Statistics of Learning Motivation for Each Grade

grade		ego-enhancement need	cognitive drive	affiliative drive
freshman	mean	2.7964	2.8114	2.5449
	min	1.63	1.80	1.29
	max	3.75	4.20	4.00
sophomore	mean	2.6938	2.7710	2.7308
	min	1.75	1.80	1.57
	max	3.63	3.80	4.00
junior	mean	2.6796	2.6563	2.7082
	min	1.88	160	1.71
	max	3.88	3.80	4.00

According to the data analysis in the table, the average self-improvement drive of each grade is 2.7964, 2.6938, and 2.6796. It can be seen that the self-improvement drive of the first grade is ranked first, followed by the second grade, and finally the third grade. This indicates that the internal drive for self-improvement is gradually decreasing, with the average cognitive internal drive of each grade being 2.8114, 2.7710, and 2.6563, respectively. From this, it can be seen that the cognitive internal drive of the first grade is ranked first, followed by the second grade and finally the third grade. This indicates that the cognitive internal drive is also showing a gradual decreasing trend, with the average affiliated internal drive of each grade being 2.5449, 2.7308, and 2.7082, respectively, and the second grade is ranked first, Next is the third year of high school, and finally the first year of high school.

3. Conclusion and Recommendations

3.1 Conclusion

(1) High school students have high overall motivation in mathematics, while their external learning motivation is average.

(2) There are differences in math attitudes among high school students of different grades, with their sophomore year at a low point.

(3) There is no gender difference in the motivation of high school students to learn mathematics.

(4) High school students' motivation to learn mathematics is related to their math grades, and poor math grades do not necessarily equate to poor math motivation.

3.2 Recommendation

3.2.1 Using Heuristic Teaching

Compared with traditional "cramming" teaching, heuristic teaching has great advantages. The key to implementing heuristic teaching lies in creating problem scenarios. The so-called problem situation refers to a learning situation that has certain difficulties and requires students to work hard to overcome, but is within their capabilities.

To create problem situations, teachers are first required to be familiar with the textbook, master its structure, and understand the internal connections between new and old knowledge; In addition, teachers are required to fully understand the existing cognitive structure of students, so that the new learning content forms an appropriate span with the students' existing development level. In this way, we can create problem situations.

3.2.2 Applying Memory Rules to Make Learning Easier for Students

When teaching, teachers should use memory rules appropriately according to the different difficulty levels of learning tasks to control the level of arousal of students' learning motivation. When learning easier and simpler topics, it is important to focus students' attention and make them nervous

as much as possible; When learning complex and difficult topics, it is important to create a relaxed and free classroom atmosphere as much as possible. When students encounter difficulties or encounter problems, it is important to guide them calmly and slowly to avoid excessive tension and anxiety.

4. Summary

The cultivation of learning motivation can be achieved through the process of education and teaching, such as inspiring students' self-awareness; Stimulate curiosity and thirst for knowledge, help students form stable learning interests through intuitive or practical activities; For students who lack learning motivation, they can also use their original motivation to enjoy games or sports to transfer their motivation through games or sports activities that require mastery of knowledge, in order to form a learning need. When students already have various learning needs, in order to maintain, strengthen or further develop them, it is also necessary to do a good job in motivating work, such as adopting innovative and vivid teaching methods, creating problem situations to inspire students' positive thinking, and conducting appropriate learning competitions.

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