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Analysis of factors influencing academic achievement of middle school students

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Abstract

This paper aims to explore the influence of middle school students learning achievement of a variety of factors, emphasizing the importance of learning achievement for the future development of students. Academic achievement not only affects students' academic performance, but also has a profound impact on their self-confidence, social adaptability and career choice. Through literature review and empirical research, this paper systematically expounds the background and significance of the research, and points out the complexity of middle school students' learning achievement and the diversity of its influencing factors. In the course of the study, we pay special attention to the influence of individual factors, family factors, school factors as well as sociocultural factors on learning achievement, aiming to provide practical strategies for educational practice.

Keywords: Middle school students, Academic achievement, Family factors, social culture

As educational reforms advance, assessment criteria for student performance are becoming increasingly diversified. Therefore, a comprehensive analysis of the factors affecting students' academic achievements can help us better understand their learning processes and provide robust support for educational reforms. The factors influencing middle school students' academic success are multifaceted and interact to affect students' academic development. Here are the main factors:

Family Environment

The family, being the first classroom for children, significantly impacts middle school students' academic achievements. Firstly, parents' educational levels, educational philosophies, and the family's economic status directly influence their children's academics. Higher parental education levels provide more support and guidance for learning. Shuo Yu[1] and others found that institutional capital, specific parental involvement, and the mediating effect of families' objectified expectations are significantly impactful. Thus, improving students' performance can be supported by increasing parental involvement and fostering positive educational developments and attitudes. A good family economic condition provides better resources and environments for learning. Secondly, the family atmosphere, parent-child relationships, and parenting styles also affect children's academic emotions and motivation. A harmonious and positive family environment benefits children's academic development. Ye Xue[2] and others, through two-level hierarchical analysis, showed that socioeconomic status positively correlates with individual achievement and enhances family-related achievements in schools. In contrast, the interaction 'X' is not significant, with surveys indicating a close gap in academic support and educational services needed by families with lower socioeconomic statuses in China. Keqiao Liu's research investigated the relationship between middle school students' mental health in China and their performance in Chinese, Mathematics, and English[3]. Furthermore, the

study explored the potential mitigating effects of parental involvement variables (non-academic activities and parent-child communication) on the adverse impacts of mental discomfort on academic performance. The examination of parental involvement also considered the differing impacts of mother's and father's involvement. Using nationally representative longitudinal data from the China Education Panel Survey (CEPS), the two-level hierarchical linear model (HLM) analysis indicated that mental discomfort in seventh grade negatively impacted academic performance in the aforementioned subjects in eighth grade. Nonetheless, these adverse effects were alleviated when considering parental involvement variables. Moreover, results showed that mother-son and father-son communications moderated the negative relationships between mental discomfort and academic performance in Chinese and English, respectively. This study contributes to the existing literature by elucidating the beneficial impacts of parental involvement and highlighting the different involvements of mothers and fathers. All these factors indicate that the family environment and parents significantly impact middle school students' academic achievements.

School Education

School education is a significant factor influencing the academic achievement of middle school students. The school's educational

philosophy, teaching quality, faculty strength, and educational resources all directly impact students' learning outcomes. High-quality school education can provide students with a good learning environment, advanced teaching equipment, and an excellent teaching team, thereby improving their academic performance. According to a study by Surbhi et al.[4], a positive school atmosphere and school values are positively correlated with middle school students' academic performance. The learning environment is also an essential factor affecting students' academic achievements. A good learning environment can enhance students' motivation and learning efficiency, while a poor environment may negatively impact academic performance. Inyang Bassey[5] investigated the relationship between school management and English language performance among secondary school students in Calabar, Cross River State, Nigeria. To achieve the study's objective, four null hypotheses were formulated. A descriptive design was used, with a sample of 200 respondents selected through simple random sampling. Data collection was done using a language achievement test instrument validated by expert measurement, and reliability was established through the test-retest method. Pearson Product-Moment Correlation analysis was used to test each hypothesis at a 0.05 significance level. The results indicated a significant relationship between school management and academic performance. Based on these findings, it was recommended that managers play an effective role in enhancing students' abilities. Additionally, emergent

evidence suggests[6] that a positive school atmosphere may be a promising population-level intervention for promoting academic achievement and student well-being. However, researchers have called for more extensive evidence on school climate to better describe how this structure relates to student performance. The purpose of their study was to determine the association between 10 school climate domains and academic performance among middle school students. Findings suggest that school climate is associated with academic performance in middle and high school students. Correctly identifying key aspects of the school climate by grade level can provide improved and developmentally appropriate recommendations for teaching and school-based interventions, thereby promoting positive school well-being and student performance. Schools are the most important environment for students to learn, and their conditions can have a significant impact on students' academic success.

Personal Factors

Personal factors are internal influences on middle school students' academic achievement. A student's intellectual level, interest in learning, attitude towards learning, and learning methods all affect their academic performance. Students with higher intellectual levels generally possess stronger learning abilities and innovative thinking. Those with a strong interest in learning and a positive attitude are usually more motivated and

self-driven. Effective and scientific learning methods help students improve their learning efficiency and outcomes. Souhail Hermassi[7] examined the differences in physical health and academic performance among male middle school students of different physical condition categories. The highest and lowest BMI groups showed similar physical and academic performance, emphasizing the importance and appropriateness of engaging young Qatari schoolchildren in physical activities, as these are associated with excellent academic performance. Furthermore, İlhan İlter[8] explored the mediating role of school absenteeism in the relationship between different types of motivation and academic performance. Structural Equation Modeling (SEM) was used to assess the hypothesized research. The participants were 311 eighth-grade students who had missed at least three days of school during the 2018-2019 spring semester. Data were collected through an academic motivation scale, which included four types of motivation. The significance of the indirect effect on performance was tested using bootstrapping methods. Results showed that each absenteeism predictor was robust. SEM analysis results indicated that motivation, including beliefs about ability and the effort placed on tasks, directly predicted students' academic performance, with bootstrapping revealing partial mediation effects. However, traits did not predict performance directly, and this relationship was entirely mediated by absenteeism. The findings provide preliminary evidence that combining absenteeism with

interest may lead to higher risk. Suchithra Rajendran's study is one of the first to use machine learning algorithms (MLA) based on various socio-demographic data (e.g., age, gender, obesity, average household income, family size, parental marital status), school-related (type, gender, education level), and student-related (stress, lifestyle) variables to predict middle and high school students' academic performance[9]. GPA, which reflects performance, was considered the model output. Five different MLAs determined ranking parameters affecting performance: multinomial logistic regression, artificial neural networks, random forest, gradient boosting, and stacking methods. Three metrics—precision, recall, and F1 score—were used to evaluate the MLAs. This method was observed to outperform other techniques by producing excellent results, followed by random forest. The analysis concluded that a healthy lifestyle was positively correlated with existing stress, while stress had a negative impact. However, no significant factors predicting student performance were found.

Mounir Bouzaboul's research[10] aimed to determine the relationship between executive function and academic performance in middle school students from the Middle Atlas of Morocco. Results concluded that students with learning disabilities performed poorly in three basic components of executive function. Therefore, thorough neuropsychological diagnoses are necessary to identify learners with potential cognitive or behavioral disabilities and to allow for appropriate interventions to improve their

executive function and thus their academic success. Research indicates[11] that regular physical exercise positively impacts mental health, contributes to the development of cognitive functions, and is considered beneficial for academic achievement. This study aimed to analyze the impact on students. Among the 227 participants, 112 were male (49.3%) and 115 were female (50.6%), aged 10 to 13 years, from 5th and 6th grades in Portuguese public schools. The Susan Hart self-concept scale, validated for the population, was used to describe grip strength and aerobic capacity levels through descriptive reasoning analysis. Linear regression was used to interpret the predictive variables, and the effect sizes were calculated. Results indicated that students' strength and capacity were enhanced. Moreover, the education curriculum, personal sports, and team-based activities highly emphasized the relationships described. A healthy lifestyle is crucial for the current and future development and health of school-aged children. Another study[12] aimed to analyze the relationship between daily life habits and academic performance among a sample of adolescents from Aragon, Spain. A cross-sectional study analyzed the daily life habits and academic performance of 1,745 middle school students from 43 randomly selected schools in the Aragon region during the 2018-2019 academic year. Data were collected via an anonymous, previously validated questionnaire, covering diet, sleep, physical activity, screen use, substance use, and academic performance. A statistically significant association was found

between all the analyzed daily life habits and academic performance ($p < 0.001$). Based on the findings, it is recommended that health promotion and healthy lifestyle education be integrated into middle school curricula to enhance academic performance and, more importantly, promote adolescents' current and future health outcomes.

Social Environment

The impact of the social environment on middle school students' academic achievement cannot be ignored. Social culture, societal norms, and social competition all exert certain influences on students' academic performance. The development and progress of social culture provide middle school students with broader learning opportunities; positive societal norms contribute to the cultivation of students' character and values, while social competition can inspire students' drive and determination.

Yuanguang Ma[13] conducted a study investigating the effects of environmental scents on middle school students' academic emotions in an actual educational setting. The study used a pre- and post-test experimental design with three parallel classes of second-year middle school students ($n = 109$) in China. These classes were randomly assigned to one of three experimental conditions (no scent, daily scent, or alternating day scent). The Academic Emotion Questionnaire for Adolescents was used to measure students' academic emotions twice: once before the use of aromatherapy

and once 8 weeks after its use. Comparisons of score changes from baseline to post-test showed that, compared to the control class, joy, hope, positive high-arousal academic emotions, and relaxation were significantly higher under the environmental scent conditions, while anger and negative high-arousal academic emotions were significantly lower in these conditions. The results suggested that over time, the environmental scent of sweet orange essential oil could alleviate the reduction of positive academic emotions and improve negative academic emotions among students.

After 30 years of social reform and opening up, China's educational development has made significant progress, but the issue of unequal resource distribution has gradually become more prominent[14]. From the results of the 2015 and 2018 PISA (OECD Programme for International Student Assessment) in China, it can be seen that different regions were selected to compete. Changes in rankings reflected differences in the quality of education across several participating regions (Beijing, Shanghai, Jiangsu, Guangdong, Zhejiang). These studies focused on exploring regional inequality in Chinese education. The collected comparative data on basic participation showed that investments in human, financial, and material resources had a significant impact. This revealed a two-tier gradient based on administrative divisions, suggesting the existence of potential mechanism gaps nationwide, highlighting the imbalance in financial and material resources.

Chenchen Fang[15] used feedback data from 17,424 middle school students in the 2014 China Education Panel Survey (CEPS 2014) to analyze the effects of school selection on students' academic performance. The results showed that students from families with higher socioeconomic status and those from urban areas were more likely to choose their schools, but students' Chinese, math, foreign language, or overall performance were not affected. This suggests that school choice can improve student performance. The unequal distribution of schools increases opportunities for high-quality education but reduces the efficiency of educational resources. Therefore, the government should take measures to equitably allocate high-quality resources, increase supply, and guide parents to make reasonable use of resources.

In addition, the social health environment can also impact students' academic achievement. Research has found[16] that the academic and mental health status of middle school students in Sichuan Province continued to be negatively affected by the COVID-19 pandemic, even after the restrictions were lifted. Education policymakers and institutions should consider students' academic performance, academic issues, and mental health status to improve both their academic and mental well-being.

Conclusion

In summary, the factors influencing middle school students' academic achievement include family environment, school education, personal factors, and social environment. These factors interact and collectively affect students' academic development. Therefore, improving students' academic achievement requires joint efforts from families, schools, society, and individuals to create a conducive environment for student growth.

Although many scholars have conducted in-depth research on the factors affecting students' academic achievement, several issues still need further exploration. For example, some studies may have sample selection bias or inaccuracies in data collection, leading to potential errors in the results. Additionally, student achievement is not solely influenced by a single factor but may be affected by the interaction of multiple factors. Future research should consider various factors comprehensively to better understand student achievement.

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