

## The Effect of Academic Self-Efficacy and School Climate on Academic Achievement in Mathematics with Achievement Motivation as Mediator

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Submitted: 05 December 2022

Accepted: 21 December 2022

Published: 30 December 2022

### Abstrak

**Tujuan:** Penelitian ini bertujuan untuk mengetahui pengaruh efikasi diri akademik dan iklim sekolah terhadap prestasi akademik matematika dengan motivasi berprestasi sebagai mediator. Populasi penelitian ini merupakan seluruh siswa-siswi di SMK Sasmita Jaya, Pamulang. Sampel penelitian ini berjumlah 410 orang dan pengambilan sampel dilakukan dengan tehnik *probability sampling* dengan *simple random sampling*. Peneliti menggunakan nilai rapor siswa sebagai alat ukur prestasi akademik matematika sesuai dengan teori Winkel (2007), efikasi diri akademik menggunakan alat ukur yang dikembangkan oleh Sagone dan Caroli (2014), iklim sekolah menggunakan alat ukur yang dikembangkan oleh Gage et al. (2015), motivasi berprestasi menggunakan alat ukur yang dikembangkan oleh McClelland (1987). Analisis data yang digunakan dalam penelitian ini dengan teknik statistik *structural equation modeling* menggunakan AMOS dan untuk menguji validitas konstruk menggunakan LISREL 8.7.

**Hasil:** motivasi berprestasi tidak secara signifikan mempengaruhi prestasi akademik matematika secara langsung, hal tersebut dapat dilihat dari t hitung  $-0,454$ . Efikasi diri akademik secara signifikan mempengaruhi prestasi akademik matematika, dikarenakan nilai t hitung  $6,411$ . Iklim sekolah secara signifikan mempengaruhi prestasi akademik matematika dengan nilai t hitung  $3,234$ .

**Kesimpulan:** Data penelitian ini dianalisis dengan teknik statistik *structural equation modeling* dan menghasilkan kesimpulan bahwa ada pengaruh yang signifikan antara efikasi diri akademik dan iklim sekolah terhadap prestasi akademik matematika. Hasil uji model struktural dengan motivasi berprestasi sebagai variabel mediator menunjukkan bahwa motivasi berprestasi memiliki pengaruh yang tidak signifikan dalam memoderisasi pengaruh efikasi diri akademik dan iklim sekolah terhadap prestasi akademik matematika.

### Kata Kunci

Efikasi diri akademik; iklim sekolah; motivasi berprestasi; prestasi akademik matematika; structural equation model

### Abstract

**Aim:** This study aims to determine the effect of academic self-efficacy and school climate on mathematics academic achievement with achievement motivation as a mediator. The population of this research is all students at SMK Sasmita Jaya, Pamulang. The sample of this research was 410 people, and the sample was taken using a probability sampling technique with simple random sampling. Researchers used student report cards as a measure of academic achievement in mathematics according to Winkel's theory (2007), academic self-efficacy used as a measure developed by Sagone and Caroli (2014), school climate used as a measure developed by Gage et al. (2015), achievement motivation uses a measuring tool developed by McClelland (1987). Analysis of the data used in this study with the statistical technique of structural equation modeling using AMOS and to test the validity of the constructs using LISREL 8.7.

*Results: achievement motivation does not directly affect academic achievement in mathematics; it can be seen from the t count -454. Academic self-efficacy significantly affects mathematics achievement because the value of t arithmetic is 6,411. School climate significantly influences mathematics academic achievement with a t value of 3.234.*

*Conclusion: The research data were analyzed using the statistical structural equation modeling technique. It concluded that there was a significant effect between academic self-efficacy and school climate on mathematics academic achievement. The results of the structural model test with achievement motivation as a mediator variable indicate that achievement motivation has an insignificant effect in moderating the effect of academic self-efficacy and school climate on mathematics academic achievement.*

### **Keywords**

*academic self-efficacy; school climate; achievement motivation; mathematics academic achievement; structural equation model*

## **Introduction**

The development of science and technology leads to dynamics of global life changes. One of the most influential fields underlying modern technology development is mathematics. To master technology and create future progress, it is necessary to master mathematics early. Every individual has potential in mathematics which is further developed by studying various fields of mathematics. Various mathematical skills are expected to be achieved in learning mathematics from elementary to high school.

However, many students still think that mathematics is a complicated subject and very difficult to understand. Many students have a different view of mathematics, that mathematics is full of formulas, never changes, or subjects that do not develop and are only devoted to people who are engaged in mathematics (Ajai & Imoko, 2015). This is to the results of interviews conducted by researchers at one of the South Tangerang area's high schools and vocational schools. The results of the interviews conclude that they think mathematics is the most complex and complicated subject.

Many kinds of obstacles are faced by students in the process of learning mathematics activities. For most students, mathematics is considered a complex subject. It requires a higher ability to solve each math problem so that it impacts students' academic achievement at school.

In line with this negative view of mathematics, the results of the TIMSS (*Trend of International on Mathematics and Science Study*) assessment conducted by the IEA (*International for the Evaluation of Education Achievement*) on grade VIII Indonesian junior high school student achievement are as follows: Indonesia in 1999 was ranked 34th out of 38 countries. In 2003, Indonesia was ranked 35th out of 46 countries. In 2007, Indonesia was ranked 36th out of 49 countries.

This ranking data shows that Indonesia's mathematics achievement is relatively low and is in the range of ranks 32 to 37 of the IEA member countries, which now number more than 50 countries. The math score in 1999 was 403; in 2003 was 411; in 2007 was 405. The average score of all participating countries was 500, with a standard deviation of 100. (Umar, Lutfi, & Miftahuddin, 2010).

In addition to the phenomenon of low mathematics achievement in Indonesia, another thing related to mathematics subject scores is the National Examination (UN), which experienced a decline in 2016 with a total of 890 schools with an average of 65.05. In 2017, the number of schools using UNBK was 8,882, with an average result of 55.51, while in 2018, with a total of 17,760 schools, it achieved an average of 52.96. From these data, it can be concluded that achievement in mathematics in Indonesia still needs to be improved and is relatively low compared to other countries. Hence, examining what factors influence mathematics academic achievement (Republika.com, 2018) is essential.

Kuh, Buckley, Kenzie, Bridges, and Hayek (2006) illustrate that academic achievement is the success of students in academic achievement as indicated by the cumulative grade point average (GPA) scores in school and university institutions, economic benefits, and quality of life after graduating from college. Dweck and Elliot (2013) state that achievement is an indicator of competence.

Achievement of successful academic achievement can be in the form of mastery of content knowledge and skills that are summarized in the content on school subjects, and the results can be obtained through the process of periodic ability tests given by the teacher in the form of test scores or grades (Cizek, 1996). Several domains are involved in academic achievement, including the cognitive or intellectual, affective, and psychomotor domains (Sabornie, Cullin, Osborne, & Brock, 2005). Based on research conducted by Leary and Borsato (2006) states that academic achievement has a broad scope, including communication skills both verbally and non-verbally, mastery of knowledge, and the ability to think logically and critically.

Students with high academic achievement are expected to have a superior mentality and be able to contribute to the nation and state by becoming creative, productive, and innovative members of society. The failure of students with high academic potential is a loss for themselves, the surrounding community, and even the nation and state that need competent individuals; of course, this is a severe problem in Indonesia's education world.

Winkel (2004) argues that the factors that influence student achievement are student personality factors, family environment factors, school environment factors, and situational factors. Personality factors include intelligence, unique talents, learning styles, motivation, feelings, attitudes, and student interests. The student's attitude regarding belief in one's abilities, called self-efficacy (*self-efficacy*), is essential in every student.

Bandura (1997) defines self-efficacy as an individual's belief about his ability to organize and perform an action desired to achieve a planned performance. Self-efficacy determines whether individuals will exhibit certain behaviors, how strong individuals can survive in the face of adversity or failure, and how success or failure in a particular task influences individual behavior in the future.

The theory of self-efficacy has developed, especially in the academic field, which is called academic self-efficacy, so that it can be explicitly used in the world of education. Academic self-efficacy greatly influences the mechanism of student behavior. If students believe they can produce something they want, then these students will try to achieve it. However, if students are not confident about producing something they want, the subject will not try to make it happen (Bandura, 1997).

Research conducted by Rumsfeld, Dale, Kovas, and Plomin (2016) examined *Predicting Academic Achievement From Personality* and revealed that the personality variable has a significant influence as a predictor of academic achievement. Students' academic self-efficacy or self-confidence in learning and performance is very important in their academic achievement (Zimmerman, 2000). Motivation and self-efficacy are related to academic achievement (Chemers, Hu, & Garcia, 2001); (Valentine, DuBois, & Cooper, 2004); (Zajacova, Lynch, & Espenshade, 2005).

Research by Motlagh et al. (2011) stated that academic self-efficacy is one factor that influences academic achievement. This is also supported by research by Yazici, Seyis, and Altun (2011), which states that age, gender, and *self-efficacy* are significant predictors of academic achievement. Likewise, Fatimah (2005) states that self-efficacy is a positive and significant contribution to mathematics learning achievement. The results of Ly's research (2012) also stated that *attitude* and *self-efficacy* influence academic achievement. Good academic achievement is associated with increased *self-efficacy* and encourages students to take greater responsibility for successful task completion (Zimmerman & Kitsantas, 2005).

Academic self-efficacy or individual confidence in their abilities is crucial concerning academic achievement. Based on all previous studies, information was obtained that self-efficacy significantly affects academic achievement. Therefore, researchers will use the independent variable, academic self-efficacy, as an internal factor in this study.

Apart from internal factors, external factors also affect academic achievement. One external factor that influences academic achievement is the school environment or *climate*. School climate (*school climate*) is the soul of a school's students, teachers, administrators, and other employees who make a school exist and live (Freiberg, 1999). School *climate* is based on patterns of students, parents, and school personnel's experiences of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structure.

Demir, Kilic, and Depren (2009) research revealed that things that can affect academic achievement in mathematics are student background, learning strategies, cognitive abilities, and school climate. Gregory and Weinstein (2004) and Walker (2008) found that teachers who show high support for students will also have students with high achievement.

The results of Gregory, Cornel, and Fan's (2012) research reflect increasing recognition of the importance of the school climate for positive student development. A positive school climate

has been defined in many versions. However, most definitions emphasize the norms and values of the school setting concerning the social, emotional, and physical well-being of students and the environment (Cohen et al., 2009).

Research on *Teacher Safety and Authoritative Schools Climate in High Schools* Gregory, Cornell, and Fan (2012) revealed that student support based on school records has implications for teacher safety and performance. Stewart's research (2008) *on the influence of school and individual-level factors on academic achievement* suggests that school structure has a relatively small effect on student academic achievement.

The results of PISA research (2015) revealed variations in the acquisition of scientific literacy achievements based on three aspects. One of them is that the aspect of the school's role has proven to affect the achievement of students' science scores. It was noted that students who scored high on scientific literacy were due to the role of the school principal, namely, carrying out his responsibility for good school governance. A positive *school climate (school climate)* will encourage student development in a productive learning process, contribution, and a good life in society. A good school climate can also stimulate teachers to be more creative and enthusiastic (DeWitt & Slade, 2014).

Lawrence (2012) states that the environment stimulates the learning process. A positive learning environment will affect student performance and increase learning motivation so. That it has an impact on increasing student academic achievement. Vice versa, a hostile learning environment will impact low student motivation and performance, thus affecting low academic achievement.

From the information above, the role of the school or school *climate* is an essential variable concerning student academic achievement because students spend most of their time at school with activities related to academics and socialization. Therefore, researchers use school climate as an independent variable that is very important to measure and relate to a mediator variable, namely achievement motivation.

Motivation is one of the most critical factors that lead someone to their goal. In the realm of education, this drive is known as achievement motivation. Motivation is a source that can make individuals enthusiastic and have a determination that leads them to persevere in achieving stronger desires. Motivation comes from internal or external sources (Singh, 2011). Intrinsic motivation refers to the self-directed activity, and pleasure and satisfaction come from inner drives. Intrinsic motivation is essential for achievement, competence, and academic learning (Anwar, 2017).

According to Beehler and Snowman (1993), an essential motivation in education is achievement motivation, where a person tends to struggle to achieve success and chooses an activity that is goal oriented. Elliot and Dweck (2015) and Uguroglu and Walbert (1979)

revealed that motivation is essential to student achievement. Research has shown that motivation relates to curiosity, persistence, learning, and performance (Deci & Ryan, 1985). Pienda et al. (2002) revealed that *parental involvement, motivational, and aptitude characteristics* significantly influence academic *achievement* with the moderator variable *self-concept*. Bhat and Bahadur, (2018) and Azar (2013) state that their research shows a strong correlation between *self-efficacy* and *self-esteem* on achievement motivation. Based on the results of research conducted by Afudaniati (2014), the higher the level of self-efficacy and achievement motivation, the higher the student achievement. Castella and Bryne's research (2015) also revealed that *self-efficacy* significantly influences motivation, academic achievement, and *school dissatisfaction*.

Andartari's research (2011) regarding the effect of intellectual ability, motivation, and self-concept on student achievement in Lab school Rawamangun. The result of this research is that students with high IQs have better motivation and self-concept than those with low IQs; students will obtain high achievement with good motivation and self-concept.

Research by Scherer and Nilsen (2016) and Han and Lynch (2013) revealed that *school climate* influences student motivation. Latifah (2010) examined *self-regulated learning*, motivation, and learning achievement in a meta-analysis study with different samples, namely elementary, junior high, and high school students. The study results show that *self-regulated learning* greatly influences students' motivation to achieve. Therefore, achievement motivation is the main thing in achieving academic achievement.

McClelland (1987) suggests that achievement motivation is the process of generating or driving a person to take action to achieve results and objectives. Djaali (2009) defines achievement motivation as an impulse in a person who always tries or struggles to improve or maintain his ability as high as possible in all activities by using a standard of excellence.

Based on the explanation above, achievement motivation is a variable related to academic achievement and is essential to study. It can be concluded, based on the literature review that has been described, that there is a relationship between self-efficacy and achievement motivation, self-efficacy and academic achievement, school climate and achievement motivation, school climate and mathematics academic achievement, and achievement motivation and academic achievement.

The findings obtained by researchers from previous research are that there are no internal factors (*academic self-efficacy*) that are directly related to achievement motivation as a mediator variable and mathematics academic achievement as the dependent variable using modeling, no external variables are found, namely school climate that is directly linked to the mediating variable, namely achievement motivation on the dependent variable, namely mathematics academic achievement. This will be a novelty and uniqueness in the latest research that researchers will carry out.

The data and phenomena that have been described, it gives an illustrate to researchers that mathematics academic achievement is a significant and interesting variable to study. In this study, researchers will comprehensively examine internal factors, namely academic self-efficacy, and external factors, namely school climate, on academic achievement, and involve a mediator variable, achievement motivation. These variables deserve to be investigated by developing a model. Knowing the relationship between academic self-efficacy and school climate on students' academic achievement in mathematics, we can find out what strategies are promising for interventions in improving academic achievement by seeing whether the relationship between the independent variables and the mediator variables has significant implications for students' academic achievement in mathematics. So, researchers will conduct research titled "The Influence of Academic Self-Efficacy and School Climate on Mathematics Academic Achievement with Achievement Motivation as a Mediator".

### ***Academic Self-Efficacy***

Sagone and Caroli (2014) argue that academic self-efficacy is an individual's belief that they will succeed in a given academic task. Refers to academic self-concept to personal knowledge and perceptions of themselves in situations for achievement. Bosscher and Smit (1998) define self-efficacy as a person's belief in his ability to organize and carry out specific behaviors needed to produce the desired achievement. Self-efficacy also serves to identify how much effort one will make when faced with difficulties and how one will act in different situations (Davies & Hodnett, 2002).

### ***School Climate***

According to (Cohen, 2010), school climate is a pattern of students' experiences about school life that reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structure. Students' views or perceptions of their school are subjective, so students' assessment of the norms and conditions of the school environment can be different from the actual situation. A positive school climate can be perceived negatively by students. These differences also affect the behavior and feelings of students at school (Purwita & Tairas, 2013).

Gage et al. (2014) stated that school climate is the quality and characteristics of the school's social environment, which is a set of formed values, norms, roles, and structures. Furthermore, Hendron (2014) states that the school climate is not only school safety, school relations, teaching, learning, and the external school environment. However, it also includes social interactions between students and teachers, parental involvement in schools, and views on education and connectedness, where students feel accepted, valued, and respected.

### ***Achievement motivation***

Achievement motivation is the process of generating or driving a person to take action to achieve results and objectives (McClelland, 1987). According to McClelland (1987), there are three types of human needs: the need for achievement, the need for power, and the need for affiliation. All motives are learned, making everything arranged in a hierarchy with the

potential to influence behavior that varies from individual to individual. Someone able and happy in completing challenging tasks can be told that this person has high achievement motivation. Nicholls (1984) revealed that academic achievement is a behavior that aims to develop or demonstrate to oneself or others the abilities they have. This implies that in terms of achievement, individuals have the drive to try to achieve their goals and avoid failure.

McClelland (1987) defines achievement motivation as a desire within a person that encourages that person to try to achieve a standard of achievement. The measure of this excellence can be concerning other people's achievements, but can be compared with his previous achievements; he revealed that achievement motivation: *"what should be involved in the achievement motive is doing something better for its own sake, for the intrinsic satisfaction of doing something better"* It can be interpreted that in achievement motivation one has to do something better than before in order to feel satisfied with what has been done and achieved. Spence and Helmreich (1983) defined achievement motivation as a task-oriented effort and expected achievement results. This is related to performance efforts, expertise, and competitiveness, especially in the academic field.

## Method

### *Participants*

The population in this study were students in classes X and XI aged 15-18 who attended SMK Sasmita Jaya Pamulang, South Tangerang. The number of samples in this study was 410 students.

**Table 1.**  
General Description of Research Subjects

Description	Amount	Percentage
<b>Academic Achievement Score</b>		
Above KKM ( $\geq 75.00$ )	243	59.3 %
Below KKM ( $< 75.00$ )	167	40.7 %
<b>Age</b>		
15 years	31	7.6 %
16 years	180	43.9%
17 years	194	47.4%
18 years	5	1.2%
<b>Gender</b>		
Man	144	33.1 %
Woman	291	66.9%

### *Statistical analysis*

Statistical analysis of the data in this study used the statistical technique of *structural equating modeling* using AMOS software.

### *Research instrument*

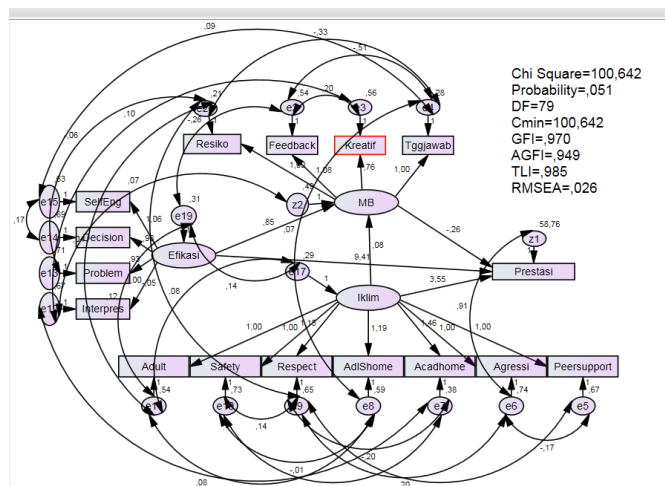
Researchers used student report cards as a measure of academic achievement in mathematics according to Winkel's theory (2007), academic self-efficacy used as a measure developed by Sagone and Caroli (2014), school climate used as a measure developed by Gage et al. (2015),



achievement motivation uses a measuring tool developed by McClelland (1987).

### Results and Discussion

**Figure 1 .**  
Fit Measurement Model Test Results



**Table 2.**  
Results of fit model based on criteria (GOF)

Model fit criteria	The results of the fit model after modification
<i>Probability</i> : > 0.05	<i>Probability</i> : 0.051
GFI ( <i>Goodness Of Fit Index</i> ): > 0.9	GFI ( <i>Goodness Of Fit Index</i> ): 0.970
AGFI ( <i>Adjusted Goodness Fit Index</i> ): > 0.9	AGFI ( <i>Adjusted Goodness Fit Index</i> ): 0.952
TLI ( <i>Tucker Lewis Index</i> ): > 0.9	TLI ( <i>Tucker Lewis Index</i> ): 0.981
RMSEA: < 0.05	RMSEA: 0.026

This study examines the effect of academic self-efficacy and school climate on mathematics academic achievement with achievement motivation as a mediator. Winkel (2004) argues that the factors that influence student achievement are student personality factors, family environment factors, school environment factors, and situational factors. Personality factors include intelligence, unique talents, learning styles, motivation, feelings, attitudes, and student interests.

Research on the effect of academic self-efficacy and school climate on mathematics academic achievement with achievement motivation as a mediator was analyzed using the *structural equation model technique*. The results show that academic self-efficacy significantly affects mathematics academic achievement. This study corroborates several previous studies which revealed a significant effect of academic self-efficacy on mathematics academic achievement (Zimmerman, 2000; Chemers, Hu, & Garcia, 2001; Valentine, DuBois, & Cooper, 2004; Zajacova, Lynch, & Espenshade, 2005). This is because students' *efficacy* will increase trust

and will encourage students to take more responsibility in every academic task (Zimmerman & Kitsantas, 2005).

The results also show a positive effect between academic self-efficacy and mathematics academic achievement, meaning that the higher the self-efficacy of students, the higher the academic achievement in mathematics. In line with this, previous studies have shown that the higher the academic self-efficacy, the higher the academic achievement in mathematics, and vice versa (Fatimah, 2005).

Furthermore, this study's results indicate a significant influence between school climate and mathematics academic achievement. This is in line with what was revealed in previous studies that school climate significantly influences mathematics academic achievement (Demir, Kilic & Depren, 2009; Gregory & Weinstein, 2004; Walker, 2008). This is because the school climate is the soul of a school consisting of students, teachers, administrators, and other employees who make a school exist and live and influence student achievement (Freiberg, 1999).

The results of this study show a positive relationship between school climate and mathematics academic achievement, meaning that the higher the school climate, the higher the mathematics achievement. It can happen because a positive school environment will shape the personality and develop students' abilities in a better direction (Gregory, Cornel, & Fan, 2012).

Furthermore, an exciting finding in this study is the role of achievement motivation as a mediator variable between academic self-efficacy and school climate on mathematics academic achievement. The results of this study indicate that achievement motivation has no significant effect in mediating the relationship between academic self-efficacy and school climate on mathematics academic achievement. From the results, it can be seen that there is a negative effect of achievement motivation which does not have a significant effect in mediating the relationship between efficacy and motivation mathematics academic achievement; this can happen because extrinsic motivation in this study does not play a role. This happened because the average condition of the research subjects was in the middle to lower-class economy, and the measuring instruments used needed to be corrected. It is recommended that future researchers use appropriate theories and instruments to measure the variables of mathematics academic achievement comprehensively.

Previous academic self-efficacy and school climate have a significant direct effect on mathematics academic achievement; after being mediated by both achievement motivation no significant effect. That is, achievement motivation in this study does not show its role as a mediator variable, and the model tested in this study is not fit.

### **Conclusion**

Academic self-efficacy in the results of this study has a significant and positive effect on achievement motivation. Achievement motivation will also be high when academic self-

efficacy is high and vice versa. This study's results align with previous research (Bhat & Bahadur, 2018; Azar, 2013). Similarly, the school climate has a significant and positive effect on achievement motivation, meaning that when a good school climate will make students' achievement motivation tends to increase (Scherer & Nilsen, 2011; Han & Lynch, 2013). In conclusion, this study has revealed that academic self-efficacy and school climate directly influence mathematics academic achievement without being mediated by achievement motivation.

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