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Key Influences on Students' Academic Success: Insights from Scholarly Research

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Abstract

Literature reveals that there are numerous factors that affect students' academic achievement. These factors range from internal factors with varying degrees of influence. Determining the dominant factors is highly useful as part of the effort and the planning of potential actions regarding what can be done to improve students' academic achievement. The present study employed a systematic literature review method to identify the dominant factors. Results show that there are four dominant factors that affect students' academic achievement. They are academic motivation, emotional intelligence, teachers, and peers. This finding confirms the complex nature of the factors that affect students' academic achievement, which involve internal and external factors. Without disregarding the other factors, these findings suggest that schools and parents should pay close attention to the dominant factors in order to improve students' achievement.



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1. Introduction

Students' academic achievement is the main indicator of students' success in their future lives because today's job opportunities require skillful individuals [1]. Students who are academically successful in their school time are the prospective main players in the development of technology and knowledge [2]. Therefore, the topic of academic achievement and the issues surrounding it have been widely studied by educational researchers around the world. In the literature, students' mathematics skills are commonly used to explain students' academic achievement. This is reasonable because mathematics skills are fundamental skills that

cannot be separated from a student's daily life and professional life [3]. Mathematics is highly related to the skills of the 21st century, such as problem-solving skills and logical, critical, and creative thinking skills [4]. Unfortunately, despite various attempts by stakeholders, students' mathematics achievement in most countries remains a challenge. In Indonesia, for example, Programme for International Student Assessment (PISA) results show that Indonesian students still lack mathematics skills such as reasoning and problem-solving [5]. In fact, published results of PISA 2022 suggest that there has been a decline in Indonesian students' mathematics achievement [5].

Investigating the factors that affect students' academic performance has been the focus of educational research for decades, as identifying the factors serves as the foundation of any endeavor to improve students' achievement; educational practitioners and researchers around the world strive to investigate what factors are related to student's academic achievement. Literature has emphasized that academic achievement is a multifaceted problem that involves numerous factors, including students' internal factors, family factors, and school factors [6]. In investigating these factors, some literature focuses on a single aspect of the factors, such as internal factors, family factors, or school factors alone. For example, Wang et al. [7] investigated the effect of anxiety on students' mathematics performance; and Ahmetović et al. [8] explored the effect of anxiety and motivation on students' academic achievement. On the other hand, other literatures take account more than one aspect into consideration. For example, Trigueros et al. [9] assessed the effects of emotional intelligence, academic motivation, and resilience on students' academic achievement.

While all of the factors that have been identified in the literature are important and influential to varying degrees on students' academic achievement, there is a need to pinpoint the dominant factors. Focusing on the dominant factors enables stakeholders to plan necessary actions that are workable to improve students' academic performance. Based on our search, there have been very few publications that focus on reporting the dominant factors that affect students' academic achievement. A notable mention is probably the work of Koçak and Göktas [10], whose review reports a detailed analysis of various factors and their varying effect sizes on students' achievement. Most research papers focus and report their findings on the significance of previously selected factors on students' academic performance [11, 12]. On the other hand, existing literature review papers usually list and describe the factors that affect students' academic achievement [13]. Therefore, the present study aims to fill this gap. This literature review is part of a larger research aiming at constructing a mathematical model of students' academic achievement. A mathematical model is a simpler version of a highly complex real-life problem that involves only the dominant factors [14]. Therefore, the objective of the present literature review was to answer the following research question: What are the dominant factors that significantly affect students' academic achievement?

2. Materials and Methods

The present study employed a systematic literature review method. A literature review is a powerful research

method that creates a solid base of knowledge by "integrating findings and perspectives from many empirical findings" [15]. A systematic literature review is a type of research that utilizes primary research findings on a certain topic to answer a research question [16]. The procedures of the review consisted of six stages as follows: 1) formulating the research question, 2) defining inclusion and exclusion criteria, 3) literature search and study selection, 4) quality of evidence, 5) data extraction, and 6) synthesis of evidence [17].

In the first stage of the review, we formulated the research question in accordance with the objective of the study, which was to investigate the factors that affect high school students' academic achievement. In the second stage, we classified the inclusion criteria using the Population, Intervention, Comparison, Outcome, and Type of Study (PICOT) framework. We also determined the year of publication and language used in the publication of the studies. In this study, we focus on literature that was published in academic journals from 2010 to 2021 and written in English.

In the third stage, we conducted study selection based on the inclusion and exclusion criteria. A literature search was conducted using the PoP application employing relevant keywords. The keywords are "academic achievement" OR "academic performance" OR "academic outcome" OR "academic output" OR "academic success" OR "student achievement" OR "student performance" OR "student outcome" OR "student performance" OR "student success" AND "high school". The search was conducted using the Scopus online database. This stage was first carried out independently by each researcher and then discussed collectively.

In the fourth stage, we assessed the quality of the studies based on the clarity of study objectives, participants, methodology, outcomes, and citations [18]. In the fifth stage, we conducted data extraction in order to gain detailed information on the studies. We recorded the names of the authors and the publication, country of origin, population and sample, research questions, methodology, and key findings. Finally, in the sixth stage, we synthesized the research findings of the studies using a synthesis matrix to organize the presentation and interpretation of the review [19]. The matrix would reveal common findings and differences in the literature in terms of the significance of the factors affecting students' academic achievement, and from there, a conclusion could be made regarding the dominant factors that affect students' academic achievement.

Table 1. PICOT framework.

PICOT Component	Inclusion Criteria	Exclusion Criteria
Population	High school students of formal educational institutions	1. Students whose ages are outside of the high school age range 2. Students with special cases such as refugees, traumatized, special needs, etc.
Intervention	Academic achievement is assessed based on internal and external factors.	Certain interventions or treatments.
Comparison	NA	NA
Outcome	The significance of the factors being studied.	Not describing the significance of the factors being studied.
Type of study	Empirical findings of quantitative or mixed method studies published in academic journals written in English	1. Literature reviews and meta-analysis. 2. Qualitative studies.

Table 2. Assessment of reviewed literature.

Items	Answer
1. Is the article cited?	Yes
2. Are the aims of the study clearly stated?	Yes
3. Are the study participants clearly described?	Yes
4. Are the research approach and data analysis clearly explained?	Yes
5. Are the findings credible/methodologically clear?	Yes

3. Results and Discussion

The present literature review was initiated by formulating the research question. As stated in the earlier section, the aim of the present systematic literature review was to determine the factors affecting the academic achievement of high school students. Reviewing the determinants of high school students' academic successes or failures is crucial because it has an impact on the accomplishment of the educational system of a country [13]. High school students are at a special stage of education in their lives where their view of their academic success is greatly associated with their sense of life purpose and future success [20].

After the research question was defined, the next stage in the literature review was to define the inclusion and exclusion criteria. Precise criteria are needed in order to discover the literature that reports empirical findings about the factors affecting high school students' academic achievement. As stated earlier, the present study focused on literature that was published in academic journals from 2010 to 2021 and written in English. Therefore, books and proceedings are excluded. The studies concentrate on high school students from formal institutions. Therefore, non-high school students or students coming from special institutions, such as international schools, are excluded. The aim of the study is to assess the significance of factors affecting students' academic achievement. These inclusion and exclusion criteria are presented in more detail in the PICOT framework, as shown in Table 1.

Based on the inclusion and exclusion criteria listed in Table 1, we conducted our search of literature. An initial search with the above keywords resulted in 1400 articles. The next step was the screening of the articles based on the titles and the abstracts. Screening results showed that 266 out of the 1400 articles met the inclusion criteria in terms of the topic of study, which was students' academic achievement. Further investigation was conducted by thorough exploration of the articles, and results showed that 122 met all the components of the inclusion criteria. Therefore, these 122 articles were included in the next step of the literature review, which was to assess the quality of the articles.

The quality of evidence was assessed based on the clarity of the random sample, research methodology, completeness of data, and minimization of bias [19]. To assess this, we utilized a guidance list, shown in Table 2, to assess the quality of each of the literature [19].

Table 2 shows that all the 122 articles were cited. Citation is seen as a quality indicator, and it describes the impact of a study on the academic community and the benefit of the study for the wider audience [21]. Cited articles are the articles that were read and used by other researchers. In that way, the articles have an impact on the growth or the spread of a research topic [21].

The clarity of study objectives, population sample, and methodology is fundamental in assessing the quality of an article [16]. Results show that all 122 articles described their aims of the study, study participants, research approach, and data analysis clearly. The articles that we included in the present study were those published in

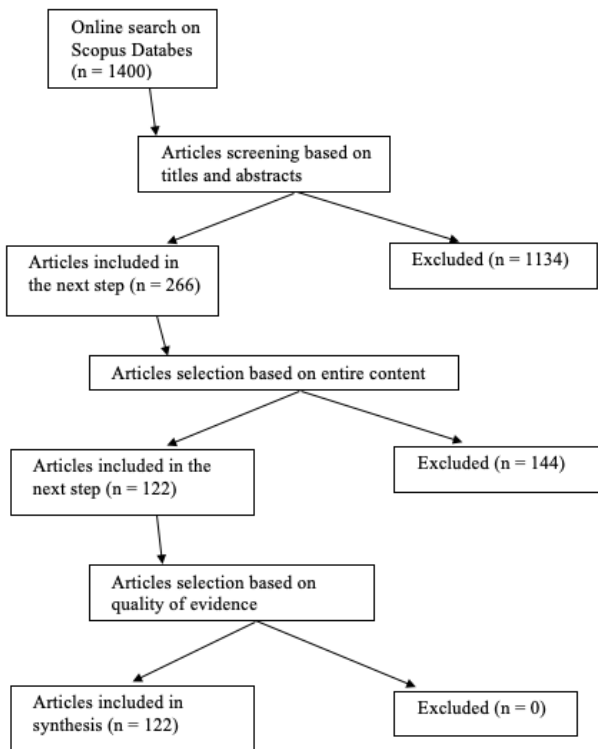


Figure 1. Flow diagram of systematic literature review.

peer-reviewed journals in the Scopus database. Peer-reviewed articles are of good quality in terms of reporting and clarity of main features, such as participants and methodology, because they have been screened, sometimes multiple times, before publication [22].

A careful assessment of the literature shows that all 122 articles satisfied the quality of evidence, as stated in Table 2. Therefore, these articles are included in the next stage of the systematic literature review. Figure 1 illustrates the stages of systematic literature review. As many as 122 articles were included in the next step of the literature review, which is data extraction. In this step, each literature was thoroughly read in order to obtain important information from the literature. The information includes authors' names, names of publications and years, country of origin, research questions, study participants, method of study, and findings. These data were extracted and recorded in a table.

From data extraction, it was discovered that the studies focused on various determinants of academic achievement. Some studies focus on a certain internal factor or external factor. For example, studies focusing on an internal factor such as gender [11], healthy lifestyle [12, 23], attitude [24, 25], academic motivation [8, 9, 26], emotional intelligence [27, 28], personality trait [29], and cognitive skills [30, 31]. Other studies focus on external factors, such as family social and economic status [32, 33], parents' involvement [34], peers [35, 36], and

teachers [32]. On the other hand, some studies assess more than one factor, for example, gender and lifestyle [33], hope, anxiety and healthy lifestyle [34], academic motivation and attitude [35], attitude and parents' involvement [36], academic motivation and perceived ability [37] academic motivation and teachers' qualification [38], emotional intelligence and peers [39], personality traits, social economy status, and parents' expectation and involvement [40], parents' involvement and school starting time [41].

From the previous stage, it could be concluded that according to the literature, there are 24 factors that affect students' academic achievement. Among these 24 factors, 12 are internal factors, and 12 are external factors. The internal factors include factors originating from individuals, such as academic motivation, emotional intelligence, attitude, and so on. The external factors include parents, peers, and teachers. The literature reports various findings regarding the significance of a factor or factors affecting students' academic achievement, with some literature stating a factor to be significant while other literature states the factor is a mediating factor or even not significant for academic achievement. In order to map the significance of the factors affecting students' mathematics achievement according to literature, we utilized a synthesis matrix as shown in Tables 3 and 4. Table 3 presents the synthesis matrix of the internal factors affecting students' academic achievement.

Table 3 lists 12 internal factors that were studied by various research. The factors include gender or gender stereotypes, age, hope and anxiety, healthy lifestyle, attitude and behavior, academic motivation, emotional intelligence, learning goals, utility value, perceived ability/self-efficacy, personality traits, and cognitive skills. These findings enrich previous literature reviews that state that gender, cognitive skills, learning goals, and health are the internal factors that influence the academic achievement of high school students [13, 42]. In the present literature review, we found that other internal factors such as hope and anxiety, healthy lifestyle, academic motivation, emotional intelligence, and personality traits have been proven to affect students' academic achievement with varying degrees of significance. Based on Table 3, internal factors that have a significant effect on students' academic achievement are academic motivation and emotional intelligence.

Table 4 displays the synthesis matrix of external factors influencing students' academic achievement as outlined in the literature. It presents 12 such factors studied across various research endeavors, encompassing aspects such as family dynamics, teacher influence,

Table 3. The synthesis matrix of internal factors affecting students' academic achievement.

Factors	Significance		
	Significant	Not Significant	Mediating Factor
1. Gender/gender stereotype	[33]	-	[11]
2. Age	-	[43]	-
3. Hope/anxiety	[44-49]	[7, 34, 50, 51]	[52-54]
4. Healthy lifestyle	[23, 33, 34, 55-70]	[71-74]	[34]
5. Attitude and behavior	[24, 25, 35, 51]	-	[75]
6. Academic motivation	[8, 9, 26, 35, 37, 38, 76-78]	-	-
7. Emotional intelligence	[26-28, 79]	-	-
8. Learning goals	[80-82]	-	[54, 73]
9. Utility value	[80]	[83]	-
10. Perceived ability/self-efficacy	[49, 84-88]	[37, 54]	[83, 89]
11. Personality traits	[29, 33, 90, 91]	[40, 92, 93]	-
12. Cognitive skills	[30, 31]	[58]	-

Table 4. The synthesis matrix of external factors affecting students' academic achievement.

Factors	Significance		
	Significant	Not Significant	Mediating Factor
1. Social and economic status	[94, 95]	[40]	-
2. Parents' involvement and expectation	[36, 96-98]	[40, 99, 100]	[41]
3. Peers	[39, 101-103]	-	-
4. Teacher's enthusiasm	-	-	[104]
5. Culturally responsive teaching practice	-	[97]	-
6. Teacher qualification	[32, 38, 105]	-	-
7. School starting hour	[106]	[107]	[41]
8. School landscape	[108, 109]	[110]	-
9. School engagement	[43, 45, 77, 91, 105, 111, 112]	[76, 84]	-
10. School climate	[113]	-	[114]
11. Principal's support	[115]	-	[116]
12. Private tutoring	-	[117]	-

school environment, peers, and private tutoring. The family factors include family social and economic status, parents' involvement, and expectations. School factors include peers, teacher's enthusiasm, culturally responsive teaching practice, teacher qualification, school starting hour, school landscape, school engagement, school climate, and principal's support. These findings support previous literature review that truancy, parental socioeconomic status, and teacher and school engagement are the determinants of academic success [13]. However, in the present study, we also found that other external factors, such as school climate, principal support, school starting hours, and school landscape, have an impact on students' academic achievement with varying degrees of significance. The studies reported varied findings regarding the significance of the factors under study. Based on Table 4, external factors that significantly affect students' academic achievement are peers and teachers.

As stated earlier in this article, the present study was conducted as part of a larger research aiming at constructing a mathematical model of students' academic achievement. A mathematical model is a mathematical representation of a highly complex real-life

problem [14]. A good mathematical model is not a model that includes all factors in the real-life problem; instead, a good mathematical model is a simplified model of a real problem that involves only the dominant factors so that the real-life problem can be solved [14]. Therefore, based on the synthesis matrix as shown in Tables 3 and 4, it can be concluded that the dominant factors affecting students' academic achievement are academic motivation, emotional intelligence, peers, and teachers. These four factors cover internal and external determinants of students' academic achievement. Figure 2 describes the four dominant factors of students' academic achievement.

Academic motivation and emotional intelligence are categorized as internal factors. The first factor, academic motivation, is a basic component of a student's academic development [118]. It is an inner drive that moves a student forward to achieve good things in their life [119]. A highly motivated student is interested in being present and involved in school activities, while a demotivated student feels disengaged [119]. The second factor is emotional intelligence, which is defined as the ability to manage one's emotions [120]. Emotional intelligence greatly influences a student's perspective and reaction

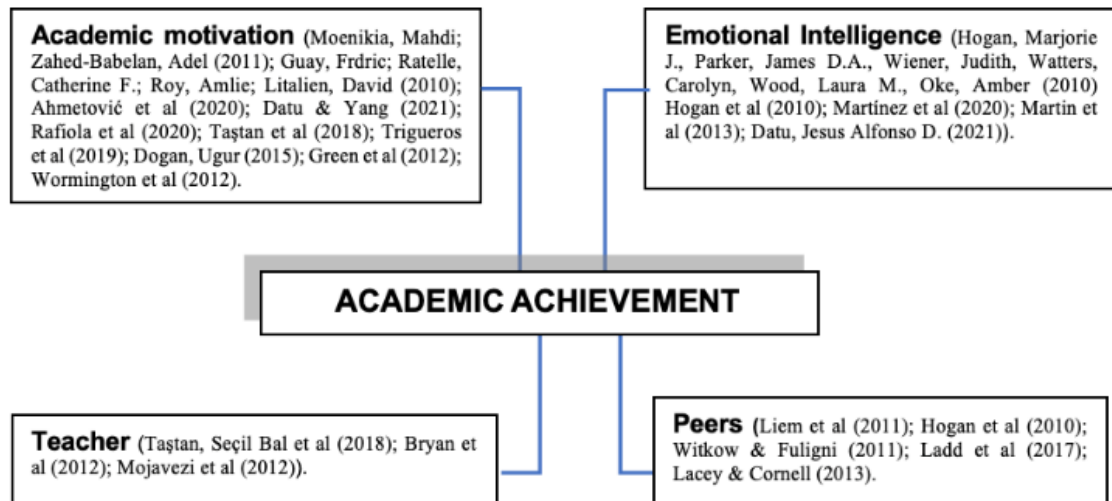


Figure 2. The dominant factors that affect students' academic achievement.

when dealing with problems. A student who possesses high emotional intelligence can adapt and interact well with their surroundings and, therefore, is more likely to succeed in their study [120].

The third and fourth dominant factors are teachers and peers, which are the external factors affecting students' academic achievement. Research findings show that the teacher factor is among the most essential factors that affect achievement [38]. Effective teachers who possess satisfactory cognitive and pedagogical knowledge profoundly influence students' cognitive development [10]. The role of teachers is so important that they affect students' psychology, learning activity, self-confidence, and collaborative skills [10]. Therefore, it is clear that teachers' mastery of content and pedagogical knowledge are highly correlated with students' mastery of knowledge.

Similarly, the peer effect is another external factor that is significant for students' academic achievement. The dynamic and duration of students' interaction with peers greatly influence their performances in the classroom [121]. Literatures suggest that students spend a lot of time with their peers and that the interaction affect their cognitive development socially and psychologically [122]. Students who have good relationships with and receive encouragement from peers perform well in their academic tasks [123].

4. Conclusions

The research question of the present study was to investigate the dominant factors that affect students' academic achievement. Based on our study, it is concluded that there are four dominant factors that affect high school students' academic achievement. These factors are academic motivation, emotional

intelligence, teachers, and peers. These findings highlight the complex nature of the factors affecting students' academic achievement, which involves internal and external factors. Without undermining the other internal and external factors, these findings indicate the importance of the four dominant factors on students' academic achievement. Therefore, proper actions should be considered by educational practitioners and stakeholders in order to improve students' academic motivation and emotional intelligence, teachers' quality, and peer interactions in order to boost high school students' academic performance. The findings of the study provide a base for further research in educational settings, such as the mathematical modeling of students' academic achievement based on the four dominant factors. The limitation of the present study is that it covers one database, which is the Scopus database. Future studies could expand the coverage to include other databases.

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Informed Consent Statement: Not applicable.

Data Availability Statement: The present study acquired data from the literature that were included in the review. Therefore, the data are available in the literatures as listed in the references section.

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Conflicts of Interest: All the authors declare that there are no conflicts of interest.

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