

Analysis of factors affecting students' learning outcomes: a case study on mid-semester mathematics assessment results

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Abstrak

Hasil belajar siswa merupakan indikator kunci untuk mengukur pencapaian pendidikan. Tingkat prestasi akademik mencerminkan sejauh mana siswa telah berhasil mencapai tujuan pendidikan mereka. Tujuan dari penelitian ini adalah untuk mengetahui faktor - faktor apa saja yang mempengaruhi prestasi akademik siswa. Penelitian dilakukan di SMAN 1 Taman Sidoarjo pada siswa kelas X E 3. Metode penelitian yang digunakan yaitu metode penelitian kualitatif deskriptif. Data kualitatif diperoleh dari hasil wawancara dan data hasil PTS siswa. Teknik pengumpulan data dilakukan dengan tiga tahapan yaitu observasi, wawancara dan dokumentasi. Hasil dari penelitian ini adalah hasil belajar siswa SMAN 1 Taman tidak terpenuhi dipengaruhi oleh dua faktor. Dua faktor utama yang mempengaruhi hasil belajar yaitu faktor internal dan faktor eksternal. Faktor internal yang menjadi pengaruh prestasi akademik siswa adalah manajemen waktu. Sedangkan faktor eksternal yang menjadi pengaruh prestasi akademik siswa adalah cara mengajar guru yang kurang tepat, pemberian kisi - kisi yang terlalu mendadak, waktu mengerjakan yang singkat, ketidaksesuaian antara kisi - kisi dan soal PTS dan sistem aplikasi yang masih baru bagi anak kelas X membuat banyak kendala terjadi.

Kata Kunci: Prestasi akademik, penilaian tengah semester, matematika, siswa Sekolah Menengah Atas

Abstract

Student learning outcomes are a key indicator for measuring educational achievement. The level of academic performance reflects the extent to which students have successfully achieved their educational goals. The purpose of this study is to identify the factors that influence students' academic achievement. The research was conducted at SMAN 1 Taman Sidoarjo, specifically involving students from class X E 3. The research method used was descriptive qualitative. Qualitative data were obtained from interviews and students' midterm exam (PTS) results. Data collection was carried out in three stages: observation, interviews, and documentation. The findings of this study reveal that the learning outcomes of students at SMAN 1 Taman were not met due to two main factors. These two primary factors influencing academic performance are internal and external factors. The internal factor that affected students' academic achievement was time management. The external factors included ineffective teaching methods, last-minute distribution of study guides, limited time for completing exams, inconsistency between the study guide and the exam questions, and a new exam application system for grade X students, which caused various difficulties.

Keyword: Academic achievement, midterm assessment, mathematics, high school students

INTRODUCTION

Education is essential and inseparable from human life (Januarti, et al. 2015). Education is a fundamental pillar in the development of society and the formation of individuals. At the senior high school (SMA) level, education plays a crucial role in preparing the younger generation to face future changes and challenges. Education is a key instrument in efforts to enlighten the nation and develop well-rounded Indonesian individuals (Apriyanto, 2020). In the educational context, students' academic achievement at the high school level serves as a key indicator for measuring educational success (York et al., 2015; Tian & Sun, 2018). One parameter commonly used to measure students' knowledge, mastery, and skills in a subject is academic achievement, generally represented in the form of grades (Januarti, et al. 2015). An in-depth analysis of academic performance at this level is valuable for improving the education system.

Learning outcomes are evidence of progress or achievement gained by students, indicating the presence or absence of success within an educational program (Ocvitasari, et al. 2020). Academic achievement reflects students' understanding, mastery, and application of subject material. A student's success in learning can be observed through their academic performance (Apriyanto, 2020). The level of academic performance reflects how far students have succeeded in reaching their educational goals.



Therefore, analyzing academic achievement is key to evaluating the effectiveness of educational programs and identifying areas in need of improvement. According to Lemmens (2010), academic readiness is a characteristic related to students' persistence and academic achievement, which can be divided into four categories: (1) Personal and demographic factors, including family background and personal identity; (2) Non-cognitive factors, such as personality and motivation; (3) Cognitive factors, including ability, skills, and prior academic achievement; and (4) Other factors, such as external community, external motivation/commitment, financial matters, bureaucratic aspects, and environment.

A case study focusing on the results of midterm exams among 10th-grade high school students is a relevant approach to analyzing academic achievement. To measure the extent to which learning objectives are met, assessments are necessary (Monica, 2019). Midterm exams serve as evaluations conducted halfway through an academic period. These assessments cover multiple subjects taught during that time and can provide early insights into students' academic progress. Measuring academic achievement is necessary to evaluate students' learning success, diagnose learning difficulties, and guide them toward better outcomes (Apriyanto, 2020).

Academic performance in grade 10 has significant long-term implications. Learning outcomes can influence students' career choices, college admissions, and further educational opportunities (Vermeulen & Schmidt, 2008; Kurlaender & Hibel, 2018; Wang & Chin-Chun, 2010). Learning outcomes encompass patterns of behavior, values, understandings, attitudes, appreciation, and skills (Pangestu, 2015). Student success in learning is influenced by various factors (Rohman, 2019). Therefore, a deep understanding of the factors that affect academic performance at this stage can help students make informed decisions based on their learning outcomes. Interest, as an internal factor, plays a role in supporting student achievement (Pangestu, et al.).

Grade 10 is also a critical stage in education, during which students begin preparing for final exams that will impact their chances of pursuing higher education. Improving academic performance is crucial, as students with strong academic records are more likely to meet the expectations of higher education institutions (Nurrahmaniah, 2019). Therefore, analyzing learning outcomes at this stage is essential to help students achieve academic excellence. Previous research has shown that various factors can affect high school students' learning outcomes (Harian, L. S., et al., 2018). Some studies highlight internal factors such as motivation and learning ability, while others focus on external factors like family support, teaching methods, and the school environment.

This study will review findings from previous researchers regarding student learning outcomes at the high school level. Understanding these findings will provide a solid foundation for the current case study. According to Harian, L. S., et al. (2018), student learning outcomes are influenced by factors such as the learning model used, IQ, and motivation. Inappropriate learning models can cause students to become bored quickly, leading to disengagement and declining performance. Another factor contributing to poor performance in mathematics is the lack of student interest. Many students perceive mathematics as difficult and intimidating.

Fullan (2014), an expert in educational reform, emphasized the importance of evidence-based learning to support the improvement of students' academic performance. In this context, analyzing exam data helps educators understand what works and what needs to be improved in the mathematics learning process. Dweck (2006), through her research on mindset, revealed that students' self-perception and views on success can significantly impact their academic achievement. Students with a growth mindset are more likely to overcome challenges and achieve better results.

Marzano, R. J., et al. (2001) identified effective teaching strategies and key factors that can improve student academic performance, including the use of feedback, clear learning goals, and student engagement. Past studies have also highlighted the critical role of **family support** in enhancing students' academic success. Families that are actively involved in their children's education tend to have children with better learning outcomes (Sari, et al., 2020). In this context, the current study will conduct an in-depth analysis of the factors influencing the academic performance of 10th-grade high school students, focusing specifically on the midterm exam results in mathematics. This research will evaluate internal factors such as learning ability and motivation, as well as external factors including learning environments and teaching methods. The findings are expected to offer valuable insights for schools, teachers, students, and parents in efforts to improve the quality of education at the high school level and support students in achieving better academic outcomes.

METHOD

This study employed a descriptive qualitative research method. Qualitative data were obtained in both oral and written forms. Oral data were collected through interviews, while written data were obtained from students' midterm exam (PTS) scores. The research was conducted at SMAN 1 Taman Sidoarjo. The research subjects were students of class X-E 3, consisting of 36 students. The technique for collecting qualitative data involved three stages:

1. Observation, carried out at SMAN 1 Taman Sidoarjo to understand the students' learning environment.
2. Interviews, conducted with several students, including two students each from the highest, average, and lowest scoring groups to gather information about the factors influencing their PTS results.
3. Documentation, which involved collecting relevant data for the research. Documentation served as a supporting source as it provided real, factual evidence based on actual field conditions during the research process.

The data analysis technique for qualitative research involved gathering data from various sources. The collected data were summarized according to the needs of the researcher. The data were then reduced to help form a clear picture and facilitate the collection of subsequent data. After reduction, the data were displayed. In qualitative research, data presentation is typically done in the form of brief descriptions or narrative texts. The final step involved drawing conclusions based on verified data.

RESULT AND DISCUSSION

The students' academic achievement results were obtained from the Midterm Assessment (PTS) scores, which were completed by the students and used as data in this study. The Midterm Assessment scores served as the basis for determining students' academic performance in mathematics. In addition, interviews were conducted to identify the various factors that influenced the students' midterm scores. Based on preliminary data surveys, the learning outcomes of one sample class are presented. Students whose scores meet or exceed the Minimum Mastery Criteria (KKM)—which is set at 75—are categorized as having achieved mastery. Conversely, students whose scores fall below 75 are categorized as not achieving mastery. Below is a presentation of the Midterm Assessment (PTS) scores in Mathematics for class X E 3 at SMAN 1 Taman for the 2023/2024 academic year.

Tabel 1. Results of Mathematics Midterm Students Class of X E 3 SMA N 1 Taman

NO	NAME	SCORE	DESCRIPTION
1	AMG	17,47	Not Achieved
2	ANR	18,73	Not Achieved
3	AFM	26,22	Not Achieved
4	AIP	31,45	Not Achieved
5	ADZ	10,08	Not Achieved
6	CFR	14,88	Not Achieved
7	CAC	22,23	Not Achieved
8	DAK	53,67	Not Achieved
9	DARD	68,2	Not Achieved
10	DA	14,58	Not Achieved
11	EAPL	21,13	Not Achieved
12	EAR	18,87	Not Achieved
13	GMDY	70,28	Not Achieved
14	GSB	40,33	Not Achieved
15	KDK	55,87	Not Achieved
16	KWP	14,7	Not Achieved
17	LRI	19,82	Not Achieved
18	LDZS	19,8	Not Achieved
19	MVNR	13,17	Not Achieved
20	MTI	32,6	Not Achieved
21	MSWR	19,75	Not Achieved

22	MA	44,52	Not Achieved
23	MRFA	17,32	Not Achieved
24	MWPA	8,87	Not Achieved
25	MYS	10,67	Not Achieved
26	NAM	15,53	Not Achieved
27	NNF	24,32	Not Achieved
28	NVM	14,2	Not Achieved
29	NUU	8,32	Not Achieved
30	NAR	37,08	Not Achieved
31	PSM	22,67	Not Achieved
32	RDE	40,1	Not Achieved
33	SANS	31,55	Not Achieved
34	SHM	22,43	Not Achieved
35	WDN	21,42	Not Achieved
36	ZAP	15,08	Not Achieved

Based on the results of the interviews conducted by the author, the following section outlines the factors that can influence students' learning outcomes as reflected in their Midterm Assessment (PTS) scores in mathematics. The interviews were conducted with students who had the highest, average, and lowest scores in class X E 3, with two students selected from each category. S1 and S2 are two students with the highest mathematics PTS scores in class X E 3. They stated that they had prepared thoroughly for the exam, especially in mathematics. Their preparation included doing practice problems and watching YouTube videos to review materials they found difficult to understand. Below are the detailed interview responses from S1 and S2.

Interview with S1

"I started studying two days before the PTS by reviewing all the material that had been taught, and I also used YouTube if there was something I didn't understand. In my opinion, the exam outline (study guide) provided was not very aligned with the PTS questions. Actually, if it's given by the teacher, it should be accurate, but we just couldn't always figure out which formula was appropriate to solve the questions. The time given for the PTS was too short for that kind of exam, and there were technical errors with the application used for the PTS. I didn't attend any tutoring; I studied on my own. I'm involved in OSIS and other extracurriculars at school, but they don't interfere with my home study time, because I usually study from 7 to 8 p.m. My advice is to study even harder in the future, understand each question thoroughly, and do more practice problems."

From this interview, the author observed that S1 made good use of their time to study, as reflected in their thorough preparation for the mathematics PTS. Even though S1 understood the study guide, they were sometimes confused about applying the correct formula.

Interview with S2

"I also prepared for the PTS by studying all the provided outlines and doing practice problems. I'm a curious person, so if there's something I don't know, I make sure to study it. I use YouTube and sometimes ask my older sibling for help. I think the outline didn't match the PTS questions well. Even though I understood the formulas, I still got confused about which one to use during the test. Also, the outline didn't match the actual test questions. I didn't attend any tutoring. I have extracurricular activities outside school, but they don't interfere with my study time. I usually study from the afternoon until 7 p.m. My suggestion is to focus more on understanding the formulas so we can solve the problems."

S2's statement supports S1's view regarding the misalignment between the study guide and the actual PTS questions, as well as the difficulty in applying the correct formulas. The author noticed similarities between S1 and S2 in their preparation and concerns.

Students S3 and S4, who had average PTS scores, expressed similar views about the alignment of the study guide with the actual questions and the limited time to complete the PTS. Here are the interviews with S3 and S4.

Interview with S3

"I studied using the outline that was given, but it turned out that the questions were different. I also reviewed from previous quizzes and read the student workbook (LKS). The time to finish the exam was also very short. My PTS result didn't reflect my efforts, because I really did study. I study every night even though I don't attend tutoring. My suggestion is not to give the study guide at the last minute."

The response from S3 is consistent with S1 and S2—students with high PTS scores—in that they all studied using the guide and practice problems. The author also noted that, like S1 and S2, S3 felt that their PTS result did not match their efforts. However, unlike the top-performing students who studied independently, S3 studied with their parents.

Interview with S4

"I studied, but just before the test, I had an event so I couldn't study the day before. I studied using the practice problems given. My PTS result was really disappointing. I don't go to tutoring and I struggle to manage my time. My suggestion is to make the teaching more fun and engaging, and to make the test questions easier."

S4's response is similar to S3's in that both prepared using the study guide and practice questions. However, unlike S3, who studied the day before the test, S4 did not due to other commitments. S3 was able to manage their time well, while S4 found it difficult. Both felt that their PTS results didn't match the effort they had put in.

Students S5 and S6, who had the lowest PTS scores, also shared similar sentiments. Here is S5's response:

Interview with S5

"I studied using the practice questions and the study guide. I didn't go to tutoring but I study every night with my parents. My PTS result didn't reflect my effort, and I think my answers were actually correct, but there were technical errors, so my answers ended up being marked wrong. I can actually manage my time, but the extracurricular activities I joined often have changing schedules."

S5's response is similar to those of the previous four students: they all studied using the guide and practice questions, but their results still didn't meet their expectations. The author also noted that S5, like S3, studied with their parents and highlighted technical issues during the test.

Interview with S6

"I studied using the shared study guide. I even looked for guides from other classes to study more. I did independent practice and discussed problems with friends. I studied on my own. My PTS result didn't reflect my effort—I even cried while studying. I usually attend tutoring, but my tutor was unavailable, so I studied with friends instead. I also have other activities outside school, but I know how to manage my time well and I know when I need to study."

The author noted that all respondents—regardless of score level—had made efforts to study. However, their PTS results still didn't match their efforts. The answers provided by S5 closely resemble those of both high and average-performing students.

Learning outcomes refer to the maximum results students achieve after engaging in learning a specific topic. According to Baharuddin and Esa Nur Wahyuni (2009: 19–28), there are two main factors that influence student learning outcomes: internal and external factors.

1. Internal factors come from within the student, such as physiological conditions, psychological state, and physical and emotional maturity.
2. External factors come from outside the student, including family economy, school environment, and community surroundings.

From the observations, the learning environment at SMAN 1 Taman was found to be very comfortable, and the available classroom facilities were highly supportive. Students also helped each other both during and outside of class.

Based on the interviews with students from class X E 3 at SMAN 1 Taman, several factors influencing learning outcomes were identified. These can be categorized into internal and external factors, as presented in the following table.

Table 2. Factors affecting students' learning outcomes as seen from the results of interviews

RESPONDENT		EXTERNAL FACTOR	INTERNAL FACTOR
S1	Highest Score	Lack of mastery in understanding the questions and their solutions (formula used)	Mismatch with the provided grid, too short time for completion
S2	Highest Score	Lack of mastery in understanding the questions and their solutions (formula used)	Mismatch with the provided grid
S3	Medium Score	Lack of mastery in understanding the questions and their solutions (formula used)	Mismatch with the provided grid, too short time for completion, sudden provision of the grid
S4	Medium Score	Lack of mastery in understanding the questions and their solutions (formula used), Difficulty in managing study time	Mismatch with the provided grid, difficulty level of the PTS questions
S5	Lowest Score	Lack of mastery in understanding the questions and their solutions (formula used), Difficulty in managing study time	Mismatch with the provided grid, error during the PTS
S6	Lowest Score	Lack of mastery in understanding the questions and their solutions (formula used)	Mismatch with the provided grid

One of the internal factors that influence student learning outcomes is time management. Students who have activities outside of school often struggle to manage their study time effectively. Time management refers to the planning, organizing, arranging, and controlling of productive time. The results from the researcher's interviews showed that students were unable to balance their study time with extracurricular activities well. Respondents S4 and S5 admitted they couldn't manage their time properly. Respondent S4 stated that the extracurricular activities they joined required them to divide their focus, which negatively impacted their academic performance. Meanwhile, respondent S5 claimed to be able to manage time, but the constantly changing schedule of extracurriculars made it difficult to stay consistent, also resulting in lower academic performance. This indicates the importance of proper time management.

In addition, another factor is the students' own understanding of the questions and how to solve them. Some students still felt confused about which formulas to use when solving problems, even though they had prepared thoroughly. This can also reduce students' motivation to learn mathematics. If students are unable to find the correct answer—despite thinking they used the right formula—they may become discouraged from continuing. Student comprehension in mathematics learning is understandable, as not all students enjoy the subject. Teachers are usually aware of which students genuinely enjoy math and which ones do not.

An external factor that can influence students' learning outcomes is the teaching method used by the teacher in class. In learning, the teacher plays an important role in helping students understand the material. The way a teacher teaches, manages the classroom atmosphere, and delivers the content significantly affects learning. However, every teacher has their own style—even when teaching the same material, the delivery can differ. In the interviews, some students expressed that they liked their math teacher's teaching style because it helped them understand the material well, while others were less satisfied. Teachers provided study guides (kisi-kisi) aligned with the Mid-Semester Exam questions and explained them in ways they thought would be easier for students to understand. However, some students felt that the study guides were not entirely aligned with the actual exam and that the guides were given too close to the exam date, making them feel unprepared for practice before the Mid-Semester Exams.

Another external factor mentioned by the respondents as influencing their Mid-Semester Exam results was the exam duration and the digital system used during the assessment. According to two students who received the highest scores, the time allocated for solving the midterm questions—which were fairly difficult—was insufficient. Similarly, students with average and low scores complained that the

system used during the exam experienced technical issues, wasting some of their time. This system was new to them as 10th graders in senior high school, different from what they had used in junior high school. Nevertheless, the students interviewed stated that although their math scores did not fully meet their expectations, their parents still appreciated their efforts. Their parents remained supportive and served as a motivation for them to keep learning.

CONCLUSION

Many students at SMAN 1 Taman did not meet the expected learning outcomes. The results of the Mid-Semester Examination showed that many students did not reach the minimum mastery criteria (KKM). Only a small number of students scored above the minimum mastery criteria. The learning outcomes in class X E 3 illustrate that achieving the KKM is difficult. Compared to other classes, students in class X E 3 are generally more receptive to the material during classroom learning activities. Based on field observations, the learning environment at SMAN 1 Taman is very supportive. The school provides facilities that adequately meet students' needs. Students also help each other when someone experiences difficulty, especially during learning activities.

Each student's learning outcomes are, of course, influenced by various factors. There are two main factors affecting learning outcomes: internal and external factors. The internal factors influencing student achievement include time management and mastery in understanding questions and their solutions. Students still need to learn how to manage their time when they have other commitments outside of school. Students who are not good at managing their time will struggle to prioritize their studies. During exams, the amount of study time greatly affects how prepared a student is. In addition, students need to regularly practice solving problems so that they can more easily find the right solutions. External factors influencing students' academic performance include the teacher's teaching methods in class, limited exam duration, late distribution of study guides (kisi-kisi), and inconsistencies between the exam questions and the provided study guides. There are also external factors related to technical issues. The exam application system used was relatively new, as the grade X students were using it for the first time. Even though trial sessions or simulations had been conducted, students still experienced difficulties with the exam system. As a point of evaluation for the school, the implementation of the odd semester Mid-Semester Examination for the 2023/2024 academic year needs improvement. This includes internal factors from the students themselves, the teaching staff, and the exam system. It is hoped that students will be able to complete the exams successfully and achieve results above the minimum mastery criteria.

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