

*Abdul Muhid, Ahmad Yusuf,  
Kusaeri,  
Dian Candra Rini Novitasari,  
Ahmad Hanif Asyhar*  
Indonesia

*Ali Ridho*  
Indonesia

## **Determining Scholastic Aptitude Test as Predictors of Academic Achievement on Students of Islamic School in Indonesia**

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### **Abstract**

Selection of new students is based on student potential. Research on the potential of the cognitive abilities and records of Islamic school students' academic achievement in Indonesia are still very rare. This paper presents empirical data about the predictive ability of a test of scholastic ability for the academic achievement of Islamic school students in Indonesia. This research used a quantitative approach with a survey method that used the Ministry of Religious Affair (MORA)'s Scholastic Aptitude Test (SAT) and Students' scores on 5 subjects in the first semester. The subjects of this study were 9609 Islamic school students selected using a quota sampling technique that represented Islamic schools in Indonesia. The results of this study indicate that all of the SAT subsets, those are verbal, numerical, analytical and spatial, are significant predictors of academic achievement of Islamic school students in Indonesia. The empirical analytical sub-test is the strongest predictor of Islamic school students' academic scores. While, the analytical sub-test has very significant correlation with the academic score on Islamic Studies subjects. Meanwhile the verbal sub-test has a very strong relationship with academic achievement in Arabic and English subjects, the numerical sub-test very strongly relates to academic achievement in science and mathematics subjects. Among the four SAT subtests, the spatial sub-test had the lowest correlation with all subjects

**Key words:** *academic achievement, cognitive abilities, predictor, scholastic aptitude test*

## **Introduction**

The purpose of selecting new students is to select students who are ready and have the potential to do academic assignments. Through the process of selecting new students, information will be obtained about factors that affect student academic performance (Thiele et al., 2016). Researchers and educational practitioners pay attention to initial competence and about the potential of new students in order to predict academic success. As a result, curriculum and learning material can be developed to improve students' academic performance (O'Connor & Paunonen, 2007).

Until now, it is still rare to find research on initial information about the potential of Islamic school students in Indonesia. Theoretically, the facts show that cognitive potential is very important for student academic performance (Komarraju et al., 2013). In addition, cognitive ability can be a predictor of student academic achievement (Veas et al., 2015). According to Barreiro (2014) cognitive ability is a very significant predictor of student academic performance. Bazelais et al., 2016 show that students' cognitive abilities are very significant predictors for academic performance and academic success. Likewise, Brandt et al., 2019 state that cognitive ability is a predictive variable in mathematics learning achievement.

Previous studies have shown that students' cognitive abilities are significant predictive variables that influence their academic performance (Rajalaxmi et al., 2019). Pedaste et al., 2015 assume that cognitive abilities are related to intrinsic motivation and are able to predict students' academic performance. According to Mandelman et al., 2016, tests of cognitive ability such as analytical, practical, and creative cognitive abilities are able to predict the academic achievements of students. Similarly, according to Demetriou et al., 2020, cognitive abilities such as mathematical, causal, spatial, and social reasoning become predictive variables that are very significant in school performance, especially mathematics, science, and language. This finding correlates with previous research which shows that cognitive abilities such as inductive, deductive, quantitative, causal, and spatial skills are predictors of school performance in mathematics, science, and language (Demetriou et al., 2019). In addition, Chong & Yeo (2016) claim that cognitive abilities such as critical thinking, creative thinking, and metacognition significantly predict academic performance.

Many researchers measure cognitive abilities with the SAT. Cognitive abilities such as those measured on standardised tests like the SAT have a high predictive validity for academic achievement (Sulphey et al., 2018), Duckworth et al., 2019 also found the SAT to be a predictor of student academic achievement. In addition, Ana-

zia, 2019 found that the Quantitative Aptitude Test and the Verbal Aptitude Test are very significant predictors for academic performance in secondary school students.

There is little research, if any, on the potential cognitive abilities and personality among students of religious program of Islamic schools in Indonesia such as Muhid et al., 2020. Therefore, we need empirical data to demonstrate whether the SAT is able to predict academic achievement specifically for Islamic school students in Indonesia. This article aims to describe the findings of empirical studies on the four subtests of the SAT, namely whether the verbal, numerical, analytical, and spatial tests both together and individually function as predictive variables that relate to the academic achievement of Islamic school students in Indonesia, particularly in Islamic Studies, Arabic, English, science, and mathematics.

## **Methodology of Research**

### **General Background of Research**

This research used a quantitative approach with a correlation causality design. The survey method was used to collect data by distributing instruments to participants.

Quota sampling was used to select participants, who were 9609 research subjects from Islamic school students around Indonesia, 4492 state Islamic School students and 5117 private Islamic school students.

### **Instrument**

This study used scores on five of the subjects in the Islamic school: Islamic Studies, Arabic, English, science, and mathematics. The academic / learning achievement test was developed by the national team for question compilation from the Ministry of Religious Affairs of Indonesia (MORA) assessment team. Whereas, to measure SAT the MORA's Scholastic Aptitude Test (MORA-SAT) which consisted of four subtests- verbal, numerical, analytical, and spatial was used .

### **Data Analysis**

Multiple linear regression was used to analyze the data. The stepwise technique was used to analyze the relationship between each sub-test of the SAT and the academic achievement of the Islamic school students. The data was analysed using IBM SPSS Version 25. Data analysis results consist of multiple correlation coefficients ( $r$ ), coefficients of determination ( $r^2$ ), F-ratios ( $F$ ), p-values ( $P$ ), Subtest coefficients ( $B$ ) and t-values ( $T$ ).

### Results of Research

The results of the statistical analysis show that there is a simultaneous relationship between all the SAT subtests; verbal, numerical, analytical, and spatial and the academic achievement of Islamic school students ( $r = .689$ ;  $r^2 = .474$ ;  $F = 216.603$ ;  $P = .000$ ). The four SAT subtests are significant predictive variable for the academic achievement of Islamic school students. Table 1 shows that the four SAT subtests; verbal, numerical, analytical, and spatial have a significant positive relationship with the academic achievement of Islamic school students. The analytical sub-test was the strongest predictor of academic achievement in Islamic school students.

**Table 1.** The Relationship between Each Subtest of SAT and Academic Achievement

Subtest SAT	B	T	P
Verbal	.795	26.803	.000
Numerical	.691	24.718	.000
Analytical	.876	29.015	.000
Spatial	.575	17.096	.000

The results of the statistical analysis show that all of the SAT subtests; verbal, numerical, analytical, and spatial are related to the achievement in Islamic Studies subjects in Islamic school students ( $r = .389$ ;  $r^2 = .151$ ;  $F = 426,939$ ;  $P = .000$ ). Similarly, all the four SAT subtests are significant predictive variables for achievement in Islamic Studies subjects in Islamic school students. Table 2 shows that the four subtests of the SAT have a significant positive relationship with the achievement in Islamic Studies subjects in Islamic school students. The verbal and analytical subtest had the strongest correlation as predictors of achievement in Islamic Studies subjects in Islamic school students.

**Table 2.** The Influence of Each Subtest SAT on Islamic Studies Achievement

Subtest SAT	B	T	P
Verbal	.191	16.832	.000
Numerical	.081	7.604	.000
Analytical	.130	11.202	.000
Spatial	.107	8.340	.000

The results of the statistical analysis show that all the SAT subtests; verbal, numerical, analytical, and spatial skills relate to achievement in Arabic in Islamic

school students ( $r = .202$ ;  $r^2 = .041$ ;  $F = 101,874$ ;  $P = .000$ ). The four subtests of the SAT are significant predictive variables for achievement in Arabic in Islamic school students. Table 3 shows that the four subtests of the SAT have a significant relationship with the achievement in Arabic in Islamic school students. The verbal sub-test is the strongest predictor of achievement in Arabic in Islamic school students.

**Table 3.** The Relationship between Each Subtest on SAT and Achievement in Arabic

Subtest SAT	B	T	P
Verbal	.119	8.533	.000
Numerical	.055	4.185	.000
Analytical	.076	5.348	.000
Spatial	.053	3.344	.000

Results of the statistical analysis show that all of the SAT sub-tests verbal, numerical, analytical, and spatial correlate with achievement in English in Islamic school students ( $r = .625$ ;  $r^2 = .390$ ;  $F = 153.603$ ;  $P = .000$ ). All the SAT sub-tests are significant predictive variables for the achievement of Islamic school students in English. Table 4 shows that the four sub-tests of SAT have a significant relationship with the achievement of Islamic school students in English. The verbal and analytical subtests were the strongest predictors of Islamic school students' achievement in English.

**Table 4.** The Relationship of Each Subtest on SAT and Achievement in English

Subtest SAT	B	T	P
Verbal	.210	24.021	.000
Numerical	.140	16.981	.000
Analytical	.231	25.953	.000
Spatial	.153	15.493	.000

Results of the statistical analysis show that all of the SAT sub-tests verbal, numerical, analytical, and spatial correlate with the Islamic school students' achievement in science ( $r = .562$ ;  $r^2 = .316$ ;  $F = 111.103$ ;  $P = .000$ ). All the SAT sub-tests function as significant predictive variables for achievement in science in Islamic school students. Table 5 shows that the four sub-tests of SAT have a significant relationship with the achievement in science in Islamic school students. The

numerical and analytical subtests were the strongest predictors of Islamic school students' achievement in science.

**Table 5.** The Relationship between Each Subtest on SAT and Achievement in Science

Subtest SAT	B	T	P
Verbal	.163	17.371	.000
Numerical	.172	19.491	.000
Analytical	.187	19.594	.000
Spatial	.142	13.345	.000

The results of the statistical analysis show that all the SAT sub-tests verbal, numerical, analytical, and spatial correlate with achievement in mathematics in the Islamic school students ( $r = .631$ ;  $r^2 = .398$ ;  $F = 158.903$ ;  $P = .000$ ). All the SAT sub-tests are significant predictive variables for achievement in mathematics in Islamic school students. Table 6 shows that the four sub-tests SAT have a significant relationship with mathematics achievement in Islamic school students. The numerical and analytical subtests are the most significant predictors of achievement in mathematics in Islamic school students.

**Table 6.** The Relationship between Each Subtest SAT and Achievement in Mathematics

Subtest SAT	B	T	P
Verbal	.112	12.459	.000
Numerical	.243	28.525	.000
Analytical	.253	27.558	.000
Spatial	.120	11.688	.000

## Discussion

The results of this study show that all the sub-tests (verbal, numerical, analytical and spatial skills) of the Scholastic Aptitude Test (SAT), are significant predictors of academic achievement of Islamic school students in Indonesia. The result of this study is in accordance with previous studies which stated that SAT scores were the most significant predictors of student academic achievement (Hall et al., 2015).

Moreover, this study confirms that among the four SAT subtests, the analytical sub-test is the most significant predictor of Islamic school student academic achievement. Empirical analytical reasoning subtests have a very strong relation with student academic achievement. The finding of this study is in line with the research conducted by Rani, 2017 which assumes that there is a significant relationship between reasoning ability and academic achievement of secondary school students. Williamson III & Anderson, 2019 explain that reasoning ability is a predictor of student academic success. Reasoning ability is a problem-solving analysis capability that is very important in academic success (Barlow-Jones & van der Westhuizen, 2017). Research by Wang et al., 2020 also supports the results of this study that reasoning ability is the main predictor of student academic achievement.

Analytical reasoning ability has a significant relationship with academic achievement in all subjects such as Islamic Studies, English, mathematics and science. Abbasi & Izadpanah, 2018 also found that reasoning ability is a significant predictor of academic achievement in English. Similarly, Maiti, 2017, Schaap and Luwes, 2013, showed that reasoning ability relates to achievement in mathematics. Septia et al., 2019 showed that reasoning ability is related to mathematical ability, while Payadnya, 2019 showed that reasoning ability is related to mathematical problem-solving abilities. Dumas & Schmidt, 2015 found that reasoning ability is a predictor of academic achievement in science.

The verbal subtest was found to have a significant relationship with Arabic and English. Verbal test results are significant predictors of first-year academic achievement (Heeren et al., 2020). Similarly, Van Eeden et al., 2001, found that the verbal test is the best psychometric predictor of academic achievement. According to Aksamovic et al., 2019, verbal ability is significantly related to student academic achievement. Moreover, Farran et al., 2016 argue that verbal ability is a predictor of Arabic and English language abilities. Meanwhile, according to Ogunyemi et al., 2018, verbal ability is a significant predictor of students' language competence. In the same way, Andrew et al., 2005 found that verbal ability is a significant predictor of language ability which is related to effectiveness in language learning.

Numerical subtests are empirically effective predictors of academic achievement in science and mathematics subjects. This finding is in accordance with Aderogba & Olatoye, 2011 who show that numerical ability in an aptitude test is a predictor of achievement in science subjects. Similarly, Badru (2016) states that numerical ability is a determinant factor in the mathematics achievement of high school students. Again, Memisevic et al., 2018 confirms that numerical ability is a predictor of mathematical achievement. In addition, the numerical test is a predictor

of academic success in arithmetic (Lyons et al., 2014). Likewise, Desoete et al., 2009 conclude that numerical ability is a longitudinal predictor of achievement in arithmetic.

In short, this research confirms that cognitive ability as measured in standardized tests is a very strong predictor of student academic achievement. Cognitive ability tests are highly recommended by many researchers. Ciarrochi & Heaven, 2012 and Srimaharaj et al., 2020 show that cognitive abilities such as verbal, numerical, analytical, and spatial skills are predictors of students' academic achievement.

## **Conclusions**

Based on the explanation above, it can be concluded that all of the SAT subtests verbal, numerical, analytical and spatial skills are significant predictors of the academic achievement of Islamic school students in Indonesia. The empirical analytical subtest is the most significant predictor of Islamic school student academic achievement. In particular, the analytical sub-test has a very significant correlation with academic achievement in Islamic Studies, whereas the verbal sub-test has a very significant relationship with academic achievement in Arabic and English. The numerical sub-test was found to correlate very significantly with academic achievement in science and mathematics. Among the four SAT subtests, the spatial sub-test had the weakest relation to all the subjects. With the results of this study, it is expected that educators and researchers will pay more attention to students' scholastic ability as the basis for selecting new students.

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