http://journal.uny.ac.id/index.php/jpms

Jurnal Pendidikan Matematika dan Sains, 14 (1), 2026, 71–78

The Relationship between Students' Personality Traits and Their Achievement in Mathematics in Ogun State Nigeria

Abiodun Oluwadayo Taiwo[1]*, Akorede Ayoola Asanre[2], Abimbola Ismail Arigbabu[3]

[1]Department of Mathematics, Tai Solarin University of Education, Nigeria.

[2] Department of MSTE, University of Zululand, South Africa.

[3]Department of STED, Olabisi Onabanjo University, Nigeria.

*Correspondence Email: abiodunto@tasued.edu.ng

Abstract

This study examines the relationship between students' personality traits and their achievement in mathematics in Ogun State, Nigeria. A descriptive survey design was employed in the study. Three research questions guided the study. The study's population consisted of all students at Senior Secondary School Two (SSS2) in Ogun Central Senatorial District, Ogun State, Nigeria. Using a random sample method, ten (10) secondary schools in Ogun Central Senatorial District of the State were selected. From each school, forty-two (42) responders were chosen. This method was selected in accordance with particular standards, including the schools' size, type, location, and demographic makeup. The study's sample consisted of seven hundred and twenty (420) respondents from the Senior Secondary School II (SSSII) class. The instruments used for data collection are: NEO Personality Inventory (r= 0.79) using Cronbach's alpha technique and Mathematics Achievement Test (MAT) with reliability, r = 0.86 using Kuder Richardson formula 20 (K-R20). Multiple Regression Analysis (MRA) and Pearson Product-Moment Correlation (PPMC) were used as inferential statistics to analyze the data at the 0.05 level of significance. The results of the findings showed that conscientiousness, extroversion, and agreeableness have positive and significant influence on students' academic performance in a public senior secondary school in Ogun State.

Keywords: *Achievement, Personality, Relationship, Traits*

How to Cite: Taiwo, A. O., Asanre, A. A., & Arigbabu, A. I. (2026). The Relationship between Students' Personality Traits and Their Achievement in Mathematics in Ogun State Nigeria. *Jurnal Pendidikan Matemaika dan Sains, 14*(1). 71–78. https://doi.org/10.21831/jpms.v14i1.90467

DOI: https://doi.org/10.21831/jpms.v14i1.90467

INTRODUCTION

Numerous aspects of human endeavors have benefited from mathematics, from basic everyday mathematical tasks to intricate technical innovations. Mathematics has infinite value, and a country's level of wealth is determined by the amount and quality of mathematics taught in its educational system. It is impossible to remove mathematics from any human endeavor, because mathematics is essential to practically every aspect of life. Smith and colleagues (2022) and Ayanwoye et al. (2022) expounded on the potential role of mathematics in the study of other academic fields. Mathematics is the foundation of science and technology, and mathematical competency is required to develop the highly trained personnel required for science, technology, and industry. (Ayanwoye and Hamzat (2022), Berger et al. (2020), and Wekesa (2017). Therefore, without mathematics, comprehending national issues would be superficial. Akanmu (2017) postulated that mathematics is not only essential to these but also the language of science since science has been acknowledged on a global scale as a tool for developing technology, social growth, and economic advancement. Anaduaka and Olaoye (2018) assert that mathematics is an essential skill for survival in the modern technological age. Because mathematics is all about solving problems, Malik and Salman (2018) asserted that teaching it is essential to human existence. The government of Nigeria feels that mathematics should be taken seriously in the country's educational system and as it advances technologically, which is why it is now required in the curriculum at both the basic and secondary school levels (Federal Republic of Nigeria (FRN, 2013).

Since mathematics is essential to a nation's development, students' achievement in the subject is highly valued and important in any school (Oladipo & Tomori, 2016). Curriculum, assessment, and teaching strategies have all changed significantly in Nigerian mathematics education during the last few decades. According to Abiodun et al. (2025), students' performance on public exams indicates that their attainment is much below average, indicating that mathematics education still seems to be a problem in this country despite all the efforts and reforms. It is possible to argue that a variety of factors contribute to studens' poor mathematics performance. Teachers, schools, students, parents, and the government are some of these factors (Akinoso, 2011). Research on how non-cognitive variables, such as personality traits, impact mathematics performance is frequently disregarded. It is on this bases that this study examines the relationship between students' personality traits and their achievement in mathematics in Ogun State, Nigeria.

The collection of internal and environmental variables that can affect an individual's behavior is known as personality. Revelle (2013) asserts that personality is a psychological trait that plays a role in a person's consistent and unique thought, emotion, and behavior patterns. The study of human nature is the focus of personality psychology, and theories pertaining to personality must take into account the five fundamental concepts of motivation, unconsciousness, self, development, and maturity (Steel, 2017). Each person has unique personality features that influence their level of mastery. A person's personality is a dynamic organization linked to their psychophysical system for environmental adaptation. (Azizi & Shahrin,2008). If two people of the same age have different hobbies, pastimes, emotions, and ways of thinking, it indicates that they have various personalities. According to the earliest psychologists, personality is the culmination of a person's entire psychological makeup. The similar idea of personality was put out by Allport (2017), who defined it as the dynamic organization within the individual of those psychophysical processes that dictate his particular adaptations to his surroundings. Simply said, personality is the collection of both internal and external characteristics that might influence a person's behaviour. Therefore, the main factor in determining a person's personality is their attributes or characteristics (Allport, 2017). According to McCrae (2018), personalities are biologically based dispositions that influence an individual's unique way of adapting to life and, as a result, result in comparatively stable thought, emotion, and behaviour patterns throughout time. According to the OCEAN model, the five dominant individual personalities are separated into five fundamental characteristics: neuroticism, conscientiousness, extroversion, agreeableness, and openness to new experiences. (Lanning, Pauletti, King, & McAdams, 2018; John, Naumann, & Soto, 2008).

Inquisitiveness, attraction to uncommon persons and ideas, and the use of unfettered imagination in daily life are all characteristics of openness to experience (Vedel, 2016). According to research, students who score well in exam are more likely to test out ideas, exhibit greater intellectual curiosity, and outperform their peers (Vedel, 2016). As well as being creative, imaginative, and intellectually curious, those who possess this quality come up with fresh and intriguing ideas. These individuals have an open mind and think creatively and unconventionally. According to Cooper et al. (2014), these individuals are characterized by qualities like innovation, imagination, adventure, idealism, and passion. According to several studies, academic success is positively correlated with agreeableness, a quality focused on interpersonal interactions that is characterized by cooperating, forgiving others, and having self-control over one's disposition (Ashton & Lee, 2015). To maintain social peace, students with stronger interpersonal skills get along and establish trust with one another. According to Furnham et al. (2003), these students are characterized by trust, friendliness, cooperation, affection, kindness, and sympathy.

Confident students, feel good about themselves, and like engaging with others are more likely to be extraverted. Compared to students who score poorly on this attribute, those who score highly are upbeat and optimistic (Ashton & Lee, 2015). Students in this group are enthusiastic about connecting and engaging with both the outside world and other classmates. These students favoured

more intensely experienced mood states and interpersonal interactions. Their main characteristics include being talkative, gregarious, vivacious, friendly, and optimistic (Rollings, et al., 2022). One characteristic of conscientiousness is the ability to directly control and regulate emotions in order to strive toward objectives, plan efficiently, and be eager to achieve great achievement in order to prevent suffering. This characteristic is displayed by students who may have issues with self-control, self-discipline, and perseverance. Such individuals are characterized by qualities like organization, diligence, dependability, and responsibility (Shrestha & Dangol, 2020). In terms of self-perception, self-esteem, reaction to emotional pain, openness to experiences, tolerance, and appreciation of novel concepts and experiences, this state is linked to emotional instability and personal adjustment levels. Antagonism, self-rejection, moodiness, insecurity, and anxiety are characteristics of these individuals (Kwon & Weed, 2007).

Edward and Kwabena (2016) used college students in Ghana's Accra Region to study academic achievement and personality attributes. Examining if personality traits and academic achievement are correlated was the primary goal. A sample of 300 people between the ages of 18 and 40 filled out the Big Five questionnaire. The results showed that college students' academic success was positively correlated with their conscientiousness, agreeableness, and openness. A study on personality traits was carried out by Moyosola (2013) using a Nigerian secondary school. To form the sample, 398 students were included. They were between the ages of 10 and 19. Big Five Inventory, was employed. The results showed that academic achievement was predicted by the correlation between conscientiousness and agreeableness. Additionally, the data showed that academic achievement was highly predicted by openness to experience. The study found that extraversion had the weakest correlation with academic achievement. Hogan and Wong (2013) looked into what influences academic success. Participants in this study included a sample of 333 Canal University students. They were able to gather data on personality qualities by using the Big Five Personality Inventory. According to the study's findings, personality qualities in students cannot be disregarded because they significantly affect their performance. It is necessary to do more study using a different target and a different instrument.

This study is guided by the following research questions. (i) What personality traits are possessed by students in Ogun-State? (ii) What is the relationship between the five-factor personality traits and student performance in mathematics? (iii) How do the five-factor personality traits impact the student's performance?

RESEARCH METHOD

For the study, a descriptive survey design was chosen. A total of 10,708 pupils from all SS2 Public Senior Secondary Schools in the Abeokuta North, Abeokuta South, and Ewekoro Local Government areas of Ogun State made up the study's population.

Four hundred twenty-one (421) SS 2 students made up the study's sample. The Taro Yemane formula was used to select this sample. Simple random procedures were used in the study to determine the sample size. The three (3) Local Government Areas (Abeokuta North, Abeokuta South, and Ewekoro) in the Ogun Central Senatorial District were chosen using the purposive sampling technique. From each Local Government Areas, two secondary schools were chosen at random. Every member of the population had an equal chance of being represented.

Two instruments used for data collection are: Mathematics Performance Test and NEO Personality Inventory.

(i) Mathematics Performance Test (MPT). Thirty multiple-choice questions with four alternative responses make up the Mathematics Performance Test. The mathematics performance test was developed by the researchers to measure students' achievement in mathematics. The questions are from National Examination Council (NECO) and the West African Examination Council (WAEC). The thirty-item MPT was administered to a sample of forty SSS2 students who were not part of the main study in order to ascertain the reliability of the instrument. The Mathematics Performance Test's reliability was assessed using the test-retest reliability technique, which yielded a coefficient of 0.86.

(ii) NEO Personality Inventory.

This psychological test was modified from Costa and McCrae (1992). The NEO Personality Inventory uses a four-point Likert scale for its items: four points for strongly agreed (SA), three points for agreed (A), two points for disagreed (D), and one point for severely disagreed (SD) for positive statements. The students were given the test to evaluate their neuroticism, extraversion, conscientiousness, agreeableness, and openness to new experiences. The questionnaire asked about the respondents' biographical details, the degree to which the students' five-factor personality qualities predominated, and how the students' five-factor personality traits affected their academic achievement. There are twenty-five (25) items in the modified NEO Personality Inventory, which has been modified to fit the study's objectives. Its reliability coefficient is 0.79 using Cronbach's alpha technique. Following their briefing and consent to participate in the study, the respondents were physically given the questionnaire. 421 copies of the instruments were sent to randomly chosen respondents during the administration process, and they filled out the forms the same day they were delivered. Only 420 copies were actually retrieved at the point of recovery, resulting in a 99.7% return rate. The data was analyzed using Pearson Product Moment Correlation and Multiple Regression Analysis.

RESULT AND DISCUSSION

Table 1 discusses the first research question. Finding the mean of a coded four-point structured questionnaire that is anchored on a continuum of strongly agreed (SA) at four points, agree (AG) at three, disagreed (DA) at two, and strongly disagree (SD) at one point yields the mean benchmark of 2.5. According to Table 1, the average of every item answered is higher than the average benchmark. The findings indicated that the five-factor personality traits were possessed by the students in the research area. The most prevalent of them was openness to experience (M = 3.60, SD =.918), followed by conscientiousness (M = 3.43, SD =.589), and finally, neuroticism (M =2.82, SD =.764), which was the least prevalent.

Table 1: The five-factor personality traits possessed by the secondary school students

Traits	Mean	Standard deviation	Rank
Openness to experience	3.60	.918	1
Conscientiousness	3.43	.589	2
Agreeableness	3.27	.773	3
Extraversion	2.93	.656	4
Neuroticism	2.82	.886	5
Grand Mean	3.21	.764	

Table 2 discusses the second research question. Table 2 demonstrates that all five of the students' personality factors (conscientiousness, extraversion, agreeableness, neuroticism, and openness to experience) have a positive relationship with their mathematical performance.

Table 2. Correlation matrix among students' personality traits and students' academic performance

Correlation						
	Performance	1	2	3	4	5
Performance	1	.164**	.162**	.115**	.009	.004
Openness to experience (1)		1	.062**	.079**	.076**	.031
Conscientiousness (2)			1	.085**	.069**	.104**
Agreeableness (3)				1	.073**	.094**
Extraversion (4)					1	.011*
Neuroticism (5)						1

Table 3 discusses the third research question. All of the characteristics had a positive, impact on students' performance, according to the multiple regression analysis. The results show that students' performance is positively impacted by their openness to experience [β=0.012, p-value=0.758 >0.05]. To put it another way, a student's performance will rise by 0.012 if their openness to experience improves by one unit. As evidenced by conscientiousness [β=0.014, p-value= 0.765>0.05], students' consciousness has a favorable effect on their performance. Stated differently, a student's performance will rise by 0.014 for every unit increase in consciousness. According to the data, students' performance is significantly impacted by their agreeableness [β = 0.026, p-value = 0.146 > 0.05]. To put it another way, student performance will rise by 0.026 if a teacher's agreeableness increases by one. There is a favorable correlation between extraversion and student achievement [β = 0.092, p-value = 0.021 > 0.05]. Put differently, a student's performance will rise by 0.092 if their extraversion level rises by one. Neuroticism [β=0.112, p-value=0.447 > 0.05] indicates that a student's neuroticism is associated with his mathematical performance. This indicates that performance will rise by 0.112 in the research area for every unit increase in neuroticism. Although it is important to note that students' personality qualities have an impact on their performance, other factors also have an impact on students' performance.

Table 3. Multiple regression analysis

Traits	**B**	**SE**	**T**	**P-value**
Constant	9.472	4.834	10.235	.000
Openness to experience	.012	.038	.308	.758
Conscientiousness	.014	.048	.299	.765
Agreeableness	.026	.183	-1.458	.146
Extraversion	.092	.040	2.323	.021
Neuroticism	.112	.147	.762	.447

The results showed a positive relationship between students' personality qualities and their mathematical achievement. This implies that non-cognitive variable like personality traits, in addition to cognitive ability, are important in determining academic success. This is in line with Costa and McCrae's (1992) Big Five Personality Model, which identifies neuroticism, agreeableness, extraversion, conscientiousness, and openness as the main predictors of behaviour and success. The findings of this study also corroborate earlier research showing a favourable correlation between students' mathematical achievement and agreeableness. This may be the case because agreeableness encouraged cooperative learning, which had a good impact on students' performance. Students who are agreeable are more likely to ask for assistance, exchange ideas, and work in groups, all of which might tangentially enhance their mathematical ability (Poropat, 2009). This study supports Digman's (2010) assertion that there is a positive correlation between students' academic achievement and agreeableness. Additionally, students who score highly on agreeableness tend to be loved, respected, and considerate of others' needs. In addition to being loving toward their friends and loved ones and understanding of the suffering of strangers, they probably have few adversaries.

Similarly, performance in mathematics was positively correlated with extraversion and openness to experience. students with high openness levels can tackle challenging mathematics tasks with creativity and adaptability because they are inquisitive, creative, and more inclined to investigate abstract concepts (Komarraju et al., 2011). Additionally, extraverted students are more likely to participate actively in group projects and class discussions, which helps them better grasp mathematical ideas through peer interaction (O'Connor & Paunonen, 2007). This finding is consistent with Poropat (2014), who claims that students with high extroversion scores are more likely to form friendships and enjoy social interactions, but they might want to focus more on making thoughtful decisions and taking other students' needs and sensitivities into account at the expense of their academic performance.

Students' mathematical success was not significantly positively correlated with neuroticism. These results imply that there is little correlation between those characteristics and mathematics achievement of students. Emotionally disturbed students are stressed and anxious during tests, which prevent them focus and perform low on mathematics assignments (Chamorro-Premuzic & Furnham, 2003). This result is consistent with Judge and Ilies (2012) report, which found that neuroticism has been associated with decreased motivation, including motivation for self-efficiency and goal-oriented or setting motivation, as well as poor academic achievement. It was also noted that the neurotic traits of anxiety and self-consciousness have a negative correlation with performance values and a favourable correlation with more conventional values. Additionally, the results somewhat contradict existing research that suggests conscientiousness is less associated with students' procrastination and more positively connects with student accomplishment and intrinsic academic desire (Kertechian, 2018). Higher conscientiousness is consistently associated with improved mathematical proficiency, according to meta-analyses. (O'Connor & Paunonen, 2007; McAbee & Oswald, 2013).

CONCLUSIONS

The greatest and least prevalent personality qualities in relation to students' academic success in mathematics were determined to be openness to new experiences and neuroticism respectively. In addition, it was thought that each of the five characteristics had a slight but favorable effect on students' performance in mathematics. So, while neuroticism has been associated with poor academic performance or performance and lower motivation, including motivation related to goal setting and self-efficacy, openness to experience leads to gains in skills and knowledge, and it naturally increases as a person age and has more experience to learn from. The study also concluded that conscientiousness, extroversion, and agreeableness have positive and significant influence on students' academic performance in public senior secondary school in Ogun State.

REFERENCES

Abiodun, T. O., Asanre, A. A., & Chinaka, T. W. (2025). Mathematical skills as predictors of students' performance in secondary school mathematics in Ogun State, Nigeria. *Journal of Mathematics Instructions, Social Research and Opinion, 4*(3), 569–578.

Akanmu, I. A. (2017). Integration of GeoGebra software into teaching and learning of mathematics in Nigerian senior secondary schools. *Mathematics Association of Nigeria, 42*(1), 1–11.

Akinoso, S. O. (2011). Correlates of some factors affecting students' achievement in secondary school mathematics in Osun State. *International Journal of Education, Science, Mathematics and Environmental Studies, 3*(10), 83–95.

Allport, P. (2017). Conscientiousness and self-motivation as mutually compensatory predictors of university-level GPA. *Personality and Individual Differences, 17*(6), 817–830.

Anaduaka, A. O. S., & Olaoye, A. E. (2018). Effect of think-pair-share cooperative strategy on mathematics achievement of attention-deficit hyperactive students. *Mathematics Association of Nigeria, 43*(1), 41–48.

Ashton, M. C., & Lee, K. (2015). A defense of the lexical approach to the study of personality structure. *European Journal of Personality, 19*(1), 5–24. https://doi.org/10.1002/per.541

Ayanwoye, O. K., & Hamzat, S. A. (2022). Mathematics teachers' knowledge of and attitude to information and communication technology (ICT) as predictors of teaching effectiveness in ICT integration in Oyo. *FUOYE International Journal of Education, 5*(1), 10–19.

Azizi, Y., Yusof, B., & Shahrin, H. (2008). *Personaliti gaya hidup remaja*. Univision Press.

Berger, N., Mackenzie, E., & Holmes, K. (2020). Positive attitudes towards mathematics and science are mutually beneficial for student achievement: A latent profile analysis of TIMSS 2015. *The Australian Educational Researcher, 47*, 409–444.

https://doi.org/10.1007/s13384-020-00379-8

Chamorro-Premuzic, T., & Furnham, A. (2003). Personality traits and academic examination performance. *European Journal of Personality, 17*(3), 237–250.

Cooper, G. M., Jay, S., Kircher, M., Witten, D. M., Preti, J., & O'Roak, B. J. (2014). A general framework for estimating the relative pathogenicity of human genetic variants. *Nature Genetics, 46*(3), 310–315.

Digman, J. (2010). Conscientiousness and self-motivation as mutually compensatory predictors of university-level GPA. *Personality and Individual Differences, 47*(8), 817–822.

Edward, M. M., & Kwabena, A. L. (2016). Assessing the impact of personality traits on academic performance: Evidence from tertiary students in Ghana. *International Journal of Research in Engineering, IT and Social Sciences, 6*(3), 2250–0558. https://doi.org/10.1016/j.sbspro.2016.01.055

Federal Republic of Nigeria. (2013). *National policy on education*. NERDC Press.

Furnham, A., Chamorro-Premuzic, T., & McDougall, F. (2003). Personality, cognitive ability and beliefs about intelligence as predictors of academic performance. *Learning and Individual Differences, 14*, 47–64.

Hogan, M., & Wong, K. (2013). A predictor of medical student performance. *Journal of Personality and Social Psychology, 31*(2), 109–117.

John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, measurement, and conceptual issues. *Theory and Research, 15*(1), 114–158.

Judge, C. R., & Ilies, T. (2012). Predictors and outcomes of openness to change in a reorganizing workplace. *Journal of Applied Psychology, 97*(2), 1–15.

Komarraju, M., Karau, S. J., Schmeck, R. R., & Avdic, A. (2011). The Big Five personality traits, learning styles, and academic achievement. *Personality and Individual Differences, 51*(4), 472–477.

Kwon, S., & Weed, N. C. (2007). Neuroticism. In *Encyclopedia of social psychology* (Vol. 1, pp. 619–620).

Lanning, K., Pauletti, R. E., King, L. A., & McAdams, D. P. (2018). Personality development through natural language. *Nature Human Behaviour, 2*(5), 327–334.

Lukashova, S., & Kadyr, D. (2023). Mathematics teachers' personality and intelligence potential predicting their teaching style. *Docens Series in Education, 5*, 93–112.

Malik, N. A., & Salma, M. F. (2018). Teachers' perceptions of the use of Bridge IT mobile application for teaching mathematics at basic schools in Lagos State, Nigeria. *Mathematics Association of Nigeria, 43*(1), 25–40.

McCrae, S. A. (2018). Competition, cooperation, and an adversarial model of sport. *Journal of the Philosophy of Sport, 45*(1), 53–67.

Moyosola, J. A. (2013). Personality characteristics as predictors of academic performance of secondary school students. *European Journal of Science and Mathematics Education, 4*(2), 1–10. https://doi.org/10.5901/piq.657

O'Connor, M. C., & Paunonen, S. V. (2007). Big Five personality predictors of post-secondary academic performance. *Personality and Individual Differences, 43*(5), 971–990.

Oladipo, I. D., & Tomori, A. (2016). Investigating the feasibility of introducing computer-aided instruction (CAI) application in distance learning systems in Nigeria. *Mathematics Association of Nigeria, 41*(1), 187–197.

Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin, 135*(2), 322–338.

Revelle, W. (2013). *Psych: Procedures for personality and psychological research* (R package version 1.3.2). http://personality-project.org/r/psych-manual.pdf

Rollings, J., Micheletta, J., Van Laar, D., & Waller, B. M. (2022). Personality traits and social network size in older adults. *Personality and Social Psychology Bulletin, 43*(2), 146–167.

Shrestha, M., & Dangol, R. (2020). Conscientiousness and motivator factors: Can they contribute to each other among TVET teachers in Nepal?

Journal of Interdisciplinary Studies in Education, 9(1), 117–137.

Smith, T. J., Walker, D. A., Hsu, W., Lu, Y., Hong, Z., & McKenna, C. M. (2022). Teacher characteristics as predictors of mathematics attitude and perceptions of engaged teaching among 12th-grade advanced mathematics students in the U.S. *Education Inquiry, 13*(3), 338–353. https://doi.org/10.1080/20004508.2021.1883910

Steel, P. (2017). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin, 133*(1), 65–94.

Vedel, A. (2016). Big Five personality group differences across academic majors: A systematic review. *Personality and Individual Differences, 92*, 1–10. https://doi.org/10.1016/j.paid.2015.12.011

Wekesa, D. W. (2017). Computer-based instruction: A springboard to students' performance in mathematics. *International Journal of Innovative Research and Development, 6*(1), 39–45.