SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 7 | July 2024 - Peer Reviewed Journal

STUDENT'S SELF-ESTEEM AND SELF-CONTROL AS PREDICTORS OF ACADEMIC ACHIEVEMENT OF STUDENTS IN MATHEMATICS

Jayson N. Carabeo, LPT[1], Paulino P. Tado, PhD[2]
[1]MAED Mathematics, St. Mary's College of Tagum, Inc., Tagum City, Davao del Norte, Philippines
[2] Graduate Education Faculty, St. Mary's College of Tagum, Inc., Tagum City, Davao del Norte, Philippines

Article DOI: https://doi.org/10.36713/epra17796
DOI No: 10.36713/epra17796

ABSTRACT

This study aimed to determine whether self-esteem and self-control significantly influence the student's academic achievement in mathematics. A descriptive-correlational research design was used. The respondents of this study were 310 Grade 10 students in five public secondary high schools in the Division of Davao del Norte and were chosen through stratified random sampling. This study used three adopted questionnaires. Mean, Standard Deviation, Pearson r, and Regression Analysis were used as statistical tools. The findings showed that student's self-esteem was fairly manifested while student's self-control was fairly observed. The academic achievement of grade 10 students in mathematics did not meet expectations. The findings also revealed that both self-esteem and self-control have a significant relationship on students' academic achievement in mathematics. The findings also demonstrated that self-control is a significant predictor of academic achievement in mathematics but not self-esteem. The results emphasized that educators and school administrators should focus on enhancing social and physical acceptance, addressing procrastination, attention control, and impulse control, and boosting mathematics achievement. These interventions may include teamwork activities, body positivity programs, and creating a safe space for discussing social anxieties. Strategies may include time management workshops, mindfulness exercises, and role-playing scenarios. Future research could explore the link between self-control and mathematics achievement, suggesting that incorporating self-control strategies into classrooms, effective study time planning and focused teaching techniques could improve test scores.

KEYWORDS: *Math education, self-esteem, self-control, mathematics achievement, descriptive and correlational design, regression analysis, Davao del Norte, Philippines*

INTRODUCTION

In education, there has been a concern on mathematics achievement of students, particularly in certain countries where students are consistently performing below expectations (Newton, et al, 2019). According to Nabizadeh et al. (2019), the ability to demonstrate academic achievement through the attainment of the desired objective is an essential component of academic progress. Nevertheless, despite mathematics' widely accepted importance and the fact that it is a requirement for many courses, poor academic attainment among learners remains an issue in both industrialized and developing the educational institutions of the nation (Sharma et al., 2018). Moreover, research suggests that low mathematics achievement is still a problem not only in the Philippines but also in other countries (Andrade & Gutiérrez-García, 2020).

In Indonesia, the results in Programme for International Student Assessment (PISA) for mathematics went down, from 60th placed out of 72 countries in 2015 to 72nd placed out of 79 countries in 2018. It is abundantly evident that the rank implies a real problem in the subject of mathematics (Efendi & Kismiantini, 2022). Similar problems have been experienced by the students in Thailand, 53% did not meet the minimum academic requirement for mathematics in PISA 2018, which is significantly higher than the average of less than 30% of students across the Organization for Economic Cooperation and Development (OECD) (World Bank, 2021). Additionally, in T anzania, Africa, according to the National Examinations Council of Tanzania (NECTA), the state of students' mathematics academic achievement of the country is very poor, with an average rate of 19.54% (The Citizen, 2021). It indicates that students failed the subject and showed a significant failure rate in mathematics in the country (Kihwele & Mkomwa, 2022).

In the Philippines, a study conducted by Bernardo et al. (2022) found that students' low achievement in mathematics is a really big issue in the Philippines. Moreover, the country of the Philippines finished second to last among those taking part in the latest Programme for International Student Assessment (PISA) 2018. This alarming discovery revealed that Filipino learners had a mean score in mathematical literacy of 353 points, which was significantly less than the OECD average of 489 points. Additionally, only 19.7% of Filipino learners, or 1 in 5, are said to have reached the required level of math skills (Callaman & Itaas, 2020). Additionally,

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 7 | July 2024 - Peer Reviewed Journal

the mathematical achievement exam results of Filipino students in International Mathematics and Science Studies (TIMSS) 2019 were much lower than those of our neighboring countries like Singapore, Taiwan, and Korea (Tan, 2021). Furthermore, similar results are shown in the study of Gonzales (2019), that the proficiency level of Filipino students in the National Achievement Test (NAT) has declined, particularly in the subject of mathematics.

In the Division of Davao del Norte particularly in Carmen District, students from public junior high schools scored poorly on the mathematics proficiency test during the first quarter examination for the school year 2022–2023. This was reflected in the student's examination scores. The mean percentage score (MPS) of the students is 69.24%, which is lower than the standard mean percentage score, which is 75%, which results in a low proficiency level. Additionally, the National Achievement Test (NAT) average results for Carmen District students dropped from 78.02 percent in 2017 to 70.96 percent in 2018, particularly in mathematics (Cruda, 2022).

This study explored the association between students' self-esteem and academic achievement (Ramirez-Castillo et al., 2018), as well as the link between self-control and academic achievement (Duckworth et al., 2019). Despite the existence of several studies on the association between self-esteem and academic success (Nasseer-Abu & Rahamim, 2020; Aryana, 2010; Subon et al., 2020), and between self-control and academic achievement (Jung et al., 2017; Fernandez & Rice, 2018), there remained a significant gap in our understanding of the specific impact of these factors on Junior High School students' mathematical achievement. This is mainly manifest in the lack of empirical reports that examine the direct relationship between self-esteem, self-control, and mathematical achievement, particularly in the Junior High School setting. Further investigation is needed to understand the mechanisms more fully through which self-esteem and self-control influence mathematical achievement and to inform interventions aimed at promoting positive outcomes in this critical area of development among students experiencing new normal education, particularly in the context of the global pandemic.

OBJECTIVES

The purpose of the investigation was to see if the Grade 10 students' self-esteem and self-control impact their academic achievement in mathematics at five public schools in Davao del Norte for the school year 2023-2024. Specifically, this study aimed to answer the following questions.

1. What is the level of the learners' self-esteem in terms of self-acceptance, self-competence, social and physical self-acceptance and academic self-competence.
2. What is the level of the self-control of learners in terms of procrastination, attentional control, impulse control, emotional control, goal orientation, and self-control strategies
3. What is the level of academic achievement of grade 10 learners in terms of summative score in grade ten (10) Mathematics subject?
4. Is there a significant relationship between (a) self-esteem and academic achievement of grade 10 learners in mathematics and (b) self-control and academic achievement of grade 10 students in mathematics?
5. Do self-esteem and self-control significantly influence the academic achievement of grade 10 learners in mathematics?

METHODOLOGY

Research Design

This quantitative non-experimental research utilized the descriptive and correlational approach. The researcher used this approach to ensure the effectiveness of attaining the general objectives of the study and to guarantee the suitability of the study approach pertaining to possible data results of the study.

Descriptive approach is a type of quantitative research approach with the purpose of summarizing, organizing, and displaying data that describes characteristics of a population or phenomenon. It does not aim to explain or analyze the data or answer questions about cause and effect, but rather to simply describe the data. Its data can be collected through surveys, observational studies, and interviews. The data is then organized and presented in tables, charts, and other descriptive forms (Mohammad et al., 2020).

Correlational research is a type of research method that investigates the relationship between two or more variables. This approach is used to study cause and effect relationships between variables, and to make predictions about future events. This approach is used to determine if two variables are related and to what degree but does not identify the strength of the relationship or the cause of the relationship (Garcia et al., 2020). On the other hand, non-experimental quantitative design is a type of research that does not involve manipulation or control of the environment, but instead seeks to investigate relationships between variables. It is most often used in surveys and correlational studies, where the researcher collects data from different participants or groups and then looks for patterns or relationships between the variables (Cooper, 2019).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 7 | July 2024 - Peer Reviewed Journal

Furthermore, the role of regression analysis in this investigation is to identify the extent to which self-esteem and self-control predict academic achievement in mathematics. In this study, regression analysis was employed in this study to identify the intensity and pace of the correlation among self-esteem, self-control, and academic achievement in mathematics. The findings of regression analysis were used to determine the extent to which self-esteem and self-control are important predictors of academic achievement in mathematics, and whether the relationship between these variables is linear or nonlinear.

Sampling Design

The respondents in this investigation were the Grade 10 junior high school students who were enrolled in the SY 2023-2024 of five public schools in the Division of Davao del Norte. They were identified as schools A, B, C, D, and E. The researcher utilized the Qualtrics online sample size calculator in determining the final number of respondents for the entire study. By allowing a 95% confidence level, and a 5% margin of error, it is identified that the ideal sample size for this study will be 301 students out of 1,370 population size. There were 1,370 grade 10 students in all throughout the five chosen schools, with 870 in school A, 150 in school B, 100 in school C, 160 in school D, and 90 in school E. Investigators used stratified random sampling when they sought to study data from various subgroups or categories. This method allowed them to attain a sample demographic that precisely represented the entire group being examined (Qualtrics, 2022). This sample size was then proportionally distributed across the five schools based on their populations, resulting in the following allotment: School A had 191 respondents, School B had 33, School C had 22, School D had 35 and School E had 20.

Research Instrument

This study utilized two adapted research instruments and a researcher-made summative test in mathematics 10. The researcher modified these instruments to align with the overall objectives of the study. Additionally, a panel of experts validated these instruments, and ensured that an appropriate tool is used to obtain the data. Pilot testing was conducted to check the reliability of the instrument.

Self-Esteem Scale (SES). In measuring students' self-esteem, the researcher utilized an adapted instrument titled Self-Esteem Scale developed by Rifai et al. (1999). The scale consisted of 29 items. These items represented its four dimensions: Self-acceptance (9 items), Self-competence (8 items), Social and Physical Self-acceptance (6 items), and Academic Self-competence (6 items).

Multidimensional Self-Control Scale (MSCS). The researcher employed an adapted questionnaire survey to explore student individual differences in self-control. This survey, the Multidimensional Self-Control Scale (MSCS) developed by Nilsen et al. (2020), consisted of 29 items that measured six (6) factors: procrastination (5 items), attentional control (5 items), impulse control (5 items), Emotional Control (4 items), Goal Orientation (4 items), and Self-Control Strategies (6 items).

Mathematics Summative Test (MST). The researcher created a 40-item summative test to assess the students' academic achievement in Mathematics 10. The items were made according to the mathematics 10 module. The coverage was only on Math 10 contents in Algebra, plane, and solid geometry based on the MELCs. Specifically, it consisted of 30% easy questions, 40% average questions, and 30% for difficult questions. Moreover, the table of specifications reflected the results of the summative test.

Statistical Design

To analyze and understand the data, the following statistical methods were employed:
Mean. This was also known as an arithmetic mean, which was a value that helped summarize a large number set. This tool for statistics was employed to determine the level of students' self-esteem, self- control, and academic achievement in mathematics 10.

Standard Deviation. A standard deviation was an estimation of the dispersion of a data collection in relation to its mean. This statistical tool was utilized to find out if the scores were equally distributed or if they were near to the mean.

Pearson-r. Pearson-r was a measure of correlation used to evaluate the strength of a linear relationship between two variables. This analysis of statistics was used to determine the presence of a relevant relationship among the students' self-esteem and academic achievement in mathematics 10, self-control and academic achievement in mathematics 10.

Multiple Regression Analysis. Regression analysis was employed as a set of methods for statistical analysis to investigate the relationships between various factors. This technique was used to determine the significant influence of learners' self-esteem and self-control on academic achievement in Mathematics 10.

RESULTS

1. For the level of self-esteem, among its four (4) indicators, self-acceptance has the highest mean of 3.67, a standard deviation of 0.72, with a descriptive equivalent of high. This indicates a moderately high level of self-acceptance on average, with

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 7 | July 2024 - Peer Reviewed Journal

some variation among students. This is followed by self-competence with a mean of 3.31, a standard deviation of 0.60, with a descriptive equivalent of moderate. On the other hand, students scored lowest in Social and Physical Acceptance with a mean of 3.06 and a standard deviation of 0.75. This suggested a moderate level of self-esteem on average in social and physical acceptance but with a wider range of scores compared to self-acceptance. The overall mean on the level of students' self-esteem is 3.33 with a descriptive equivalent of moderate and a standard deviation of 0.56.

2. For the level of self-control, among its indicators, it is noted that students scored highest in Emotional Control with a mean of 3.74 and a standard deviation of 0.82, indicating a high level of self-control in this area. The students also showed high self-control in Goal Orientation with a mean of 3.69 and a standard deviation of 0.89); and Self-Control Strategies with a mean of 3.69, and a standard deviation of 0.94. On the other hand, Procrastination, Attentional Control, and Impulse Control had lower means (3.08) and lower standard deviations (0.56) compared to the top three. These scores translated to a moderate level of self-control. The overall mean on the level of students' self-control is 3.40 with a descriptive equivalent of moderate and a standard deviation of 0.55.

3. For the level of the status of academic achievement of students in mathematics, the average score on the math assessment was 33.36. The standard deviation was 10.28, indicating a spread of scores around the mean. Based on the results, academic achievement in mathematics fell below expectations.

4. For the relationship of all variables, self-esteem was found to have a statistically significant positive relationship with math achievement, indicating that students with higher levels of self-esteem tend to achieve better in mathematics. The correlation coefficient ($r = 0.235$) suggests a weak to moderate positive correlation between self-esteem and math achievement.

5. On the other hand, self-control also showed a statistically significant positive relationship with math achievement. Students who exhibit greater self-control tend to achieve higher scores in mathematics, as indicated by a correlation coefficient ($r = 0.272$) reflecting a weak to moderate positive correlation.

6. For the influence, self-control is a significant predictor of students' academic achievement in mathematics, supported by a p-value of 0.002, which is below the significance level ($\alpha = 0.05$). This indicates a statistically significant relationship, suggesting that students with higher levels of self-control achieve better in mathematics. On the other hand, self-esteem has a p-value of 0.057, a bit higher than the significance level. While there is a positive trend suggesting that higher self-esteem scores are associated with better achievement, it cannot be definitively concluded that self-esteem is a significant predictor at the chosen significance level. The overall model is statistically significant, as indicated by an F-ratio of 13.911 with a p-value of 0.000, much lower than 0.05, demonstrating that self-esteem ($\beta1$) and self-control ($\beta2$) collectively explain a statistically significant portion of the variance in mathematics achievement scores (Adjusted R-squared = 0.079). The regression formula used, Math Achievement = $\beta0 + \beta1 \times$ Self-esteem + $\beta2 \times$ Self-control + ε, confirms its influences.

SUGGESTION

Educators may focus on enhancing social and physical acceptance. Given that this indicator has the lowest score, interventions may target improving students' feelings of acceptance from peers and good body image. This may involve social activities that promote teamwork and cooperation; educational programs on body positivity and healthy self-image; and creating a safe space for students to discuss social anxieties. School administrators may also address procrastination, attention control, and impulse control among students. While the overall self-control is moderate, these specific areas may need improvement. Strategies may include time management workshops to combat procrastination; mindfulness exercises to improve focus and attention control; and role-playing scenarios to practice resisting impulsive decisions among students. Students, with overall mathematics achievement falling below expectations, there is a clear need for improvement. Addressing this could involve offering personalized tutoring or small group support to assist struggling students, designing math lessons that are engaging and applicable to real-world scenarios, and implementing positive reinforcement strategies to celebrate and encourage students' progress. Future research may leverage the link between self-control and mathematics achievement. Given that self-control is a significant predictor of mathematics achievement, promoting these skills may have a positive impact on test scores among students. Therefore, this may include integrating the self-control strategies mentioned above into math classrooms; encouraging students to plan their study time effectively for mathematics; and teaching techniques for staying focused during mathematics lessons.

CONCLUSION

Students' self-esteem was fairly manifested. Students' self-control was fairly observed. Students' academic achievement in mathematics did not meet expectations. Both self-esteem and self-control had statistically significant positive relationships with students' mathematics achievement. Self-control is a significant predictor of academic achievement in mathematics, whereas self-esteem shows a positive trend but does not predict academic achievement in mathematics.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 7 | July 2024 - Peer Reviewed Journal

Figures

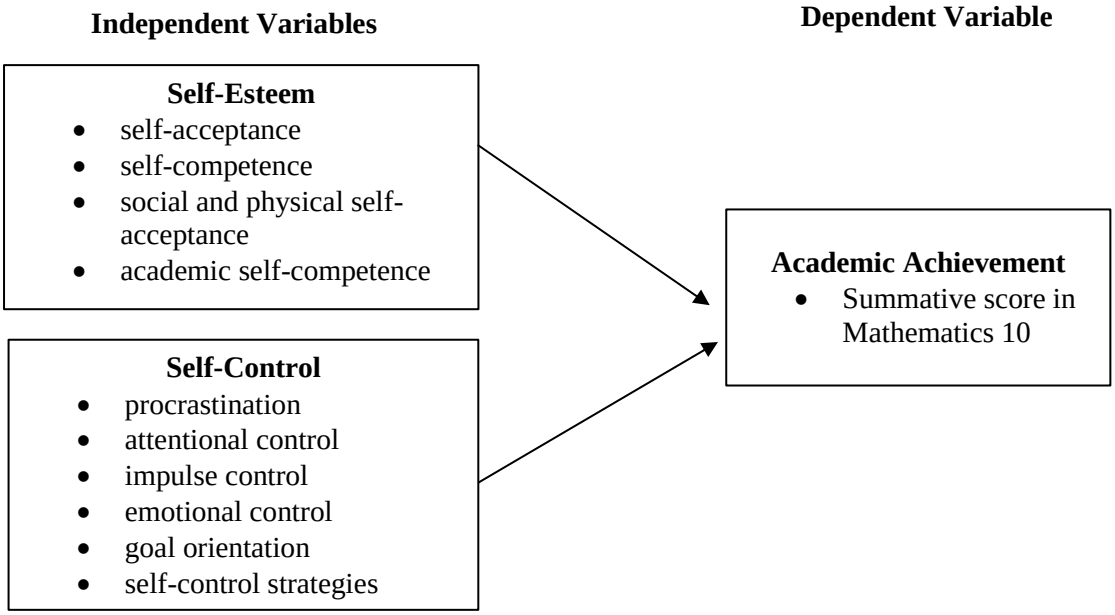


Figure 1. Conceptual Framework of the Study



Source: https://google.com/maps/davaodelnorte

Figure 2. Local Map of the Division of Davao del Norte.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 7 | July 2024 - Peer Reviewed Journal

TABLES

Table 1. Level of Self-Esteem of the Students

Indicators	Mean	SD	Description Equivalent
Self-Acceptance	3.67	0.72	High
Self-Competence	3.31	0.60	Moderate
Social and Physical Acceptance	3.06	0.75	Moderate
Academic Self-Competence	3.26	0.75	Moderate
Overall Category Mean	**3.33**	**0.56**	**Moderate**

Table 2. Level of Self-Control of the Students

Indicators	Mean	SD	Descriptive Equivalent
Procrastination	3.08	0.56	Moderate
Attentional Control	3.24	0.60	Moderate
Impulse Control	3.08	0.56	Moderate
Emotional Control	3.74	0.82	High
Goal Orientation	3.69	0.89	High
Self-Control Strategies	3.69	0.94	High
Overall Category Mean	**3.40**	**0.55**	**Moderate**

Table 3. Status of Academic Achievement of Students in Mathematics

Variable	Mean	SD	Descriptive Equivalent
Academic Achievement in Mathematics	33.36	10.28	Did not Meet Expectation

Table 4. Significance of the Relationship Between Self-Esteem and Self-Control towards Academic Achievement of Students in Mathematics

Variables Correlated	r	p-value	Decision on Ho	Decision on Relationship
Between Self-Esteem & Academic Achievement of Students in Mathematics	0.235	0.000	Reject Ho	Significant
Self-Control & Academic Achievement of Students in Mathematics	0.272	0.000	Reject Ho	Significant

Table 5. Regression Analysis on the Students' Self-Esteem and Self-Control as Predictors of Academic Achievement of Students in Mathematics

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t-stat	p-value	Decision@ α = 0.05
	β	Standard Error	B			
(Constant)	12.523	4.019				
Self-Esteem	2.344	1.227	0.125	1.910	0.057	Not Rejected
Self-Control	3.839	1.223	0.206	3.139	0.002	Rejected

Dependent Variable: Mathematics Achievement
Adjusted R Square: 0.079
F-ratio: 13.911
p-value: 0.000

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 7 | July 2024 - Peer Reviewed Journal

REFERENCES

1. *Aryana, M. (2010). Relationship between self-esteem and academic achievement amongst pre-university students. Journal of Applied Sciences, 10(20), 2474-2477.*
2. *Bernardo, A. B., Cordel, M. O., Lapinid, M. R. C., Teves, J. M. M., Yap, S. A., & Chua, U. C. (2022). Contrasting profiles of low-performing mathematics students in public and private schools in the Philippines: Insights from machine learning. Journal of Intelligence, 10(3), 61. https://doi.org/10.3390/jintelligence10030061*
3. *Callaman, R. A., & Itaas, E. C. (2020). Students' mathematics achievement in Mindanao context: A meta-analysis. JRAMathEdu (Journal of Research and Advances in Mathematics Education), 5(2), 148-159.*
4. *Cooper, H. (2019). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE Publications.*
5. *Cruda, R. M. (2022). The Decline in National Achievement Test (NAT) Scores in Carmen District: An Analysis. Journal of Educational Assessment and Research.*
6. *Duckworth, A. L., Taxer, J. L., Eskreis-Winkler, L., Galla, B. M., & Gross, J. J. (2019). Self-control and academic achievement. Annual Review of Psychology, 70(1), 373-399. https://doi.org/10.1146/annurev-psych-010418-103230*
7. *Efendi, R., & Kismiantini. (2022). Analysis of PISA 2018 results in Indonesia: Perspective of socioeconomic status and school resources. Proceedings of the 4th International Seminar on Innovation In Mathematics And Mathematics Education (Isimmed) 2020: Rethinking the Role of Statistics, Mathematics and Mathematics Education in Society 5.0: Theory, Research, and Practice. https://doi.org/10.1063/5.0108065*
8. *Fernandez, K.P., & Rice,K.G. (2017). Developing a more Accepting Sense of Self: Examining Self-Acceptance as a Mediator of the Association between Perceived Parenting practices and College Student Performance. Journal of Family Issues, 38(11), 1496-1521.*
9. *Garcia, J. F., Soriano, M. P., & Gómez-Benito, J. (2020). Correlational research: Types, examples, and characteristics. Frontiers in Psychology, 11(1517). https://doi.org/10.3389/fpsyg.2020.01517*
10. *Gonzales, E. (2019). Year-end report: DepEd in 2019: The quest for quality education continues. Manila Bulletin. https://mb. com. ph/2019/12/29/year-end-report-deped-in-2019-the-questfor-qualityeducation-continues.*
11. *Jung, K. R., Zhou, A. Q., & Lee, R. M. (2017). Self-efficacy, self-discipline and academic performance: Testing a context-specific mediation model. Learning and Individual Differences, 60, 33-39.*
12. *Kihwele, J. E., & Mkomwa, J. (2022). Promoting students' interest and achievement in mathematics through "King and Queen of Mathematics" initiative. Journal of Research in Innovative Teaching & Learning.*
13. *Li, J., Han, X., Wang, W., Sun, G., & Cheng, Z. (2018). How social support influences university students' academic achievement and emotional exhaustion: The mediating role of self-esteem. Learning and individual differences, 61, 120-126.*
14. *Li, Y. Y., Wang, Y. H., & Wang, Y. (2019). The relationship between self-esteem and academic achievement among college students. Journal of Educational Research, 12, 156-164. https://doi.org/10.1080/00220671.2018.1488497*
15. *Nabizadeh, S., Hajian, S., Sheikhan, Z., & Rafiei, F. (2019). Prediction of academic achievement based on learning strategies and outcome expectations among medical students. BMC Medical Education, 19(1), 1-11.*
16. *Nasseer-Abu, Z, & Rahamim, L. (2020). Body Image and Self-Esteem in Relation to Academic Achievement among University Students in Jordan. Journal of Child & Adolescent Behavioral Health, 6(2), 222-231.*
17. *Newton, S. M., Chang, P., Jacobsen, J., Custódio, A., Wheeler, J. J., et al. (2019). Self-Esteem and Self-Discipline Predict Mathematics Performance in a 3rd-Grade Sample. The Spanish Journal of Psychology, 22, 1-7.*
18. *Nilsen, F. A., Bang, H., Boe, O., Martinsen, Ø. L., Lang-Ree, O. C., & Røysamb, E. (2020). The Multidimensional Self-Control Scale (MSCS): Development and validation. Psychological Assessment, 32(11), 1057. https://www.researchgate.net/publication/344194832*
19. *Ramirez-Castillo, D., Lopez, A., & Martinez, J. (2018). The relationship between students' self-esteem and academic achievement. Journal of Educational Research and Development*
20. *Rifai, F. (1999). Development and validation of a self-esteem scale. Prr.hec.gov.pk. http://prr.hec.gov.pk/jspui/handle/123456789/5593*
21. *Sharma, A., Adhikari, T., & Pangeni, S. K. (2018). Challenges in mathematics education in developing countries. International Journal of Educational Research, 90, 1-10. https://doi.org/10.1016/j.ijer.2018.05.003*
22. *Subon, F., Unin, N., & Sulaiman, N. H. B. (2020). Self-Esteem and academic achievement: the relationship and gender differences of Malaysian University Undergraduates. IAFOR Journal of Psychology & the Behavioral Sciences, 6(1). https://doi.org/10.22492/ijpbs.6.1.03*
23. *Tan, E. A. (2021). A call to arms to fight mediocre education (No. 2021-01). UPSE Discussion Paper. https://www.econstor.eu/bitstream/10419/266055/1/1765629179.pdf*
24. *The Citizen (2021). Why students continue to perform poorly in maths. https://www.thecitizen.co.tz/tanzania/magazines/success/-why-students-continue-to-perform-poorly-in-maths-2669752*
25. *World bank (2021). PISA 2018. https://documents1.worldbank.org/curated/en/6833115934 15205230/Thailand-Programme-for-International-Student-Assessment-PISA-2018-Country-Report.docx*