



Academic Resilience, Locus of Control and Goal Orientation as Correlates of Secondary School Students' Achievement in Mensuration

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Abstract

The study investigated academic resilience, locus of control and goal orientation as correlates of secondary school students' achievement in mensuration. Four research questions and four null hypotheses guided the study which adopted correlational research design. A sample of two hundred (200) SS I students was drawn for the study using two stage sampling procedure. Data were gathered using SARMQ, SLCQ, SAGOQ and MAT whose reliability indices were 0.876, 0.891, 0.821 and 0.76 respectively obtained using Cronbach Alpha and Kuder-Richardson20. Data were analyzed using linear regression and regression ANOVA to test the null hypotheses at 0.05 level of significance. Findings among others showed that: 19%, 6.9%, and 6.4% of secondary students' achievement in mensuration is predicted by their academic resilience, locus of control, and goal orientation towards mensuration. It was recommended that: students should learn how to develop academic resilience, locus of control and goal orientations to improve their mathematics achievement.

Keywords: Academic Resilience, Achievement, Goal Orientation, Locus of Control, Mensuration

Introduction

Mathematics is often recognized as one of the most important subjects in the school curriculum around the world. It is a subject that is having strong ties to other subjects, particularly science and technology subjects (Federal Republic of Nigeria (FRN), 2014), and hence, it is a compulsory subject at both the primary and secondary levels of education in Nigeria. Its obligatory condition for admission to tertiary institutions (i.e., having a pass credit level) also demonstrate the subject's importance in the country's development.

In spite of the compelling importance of mathematics to the development of the individual and the nation, students' achievement in the subject have been poor. Academic achievement is defined by Amalu (2017) as the extent to which students, teachers, or institutions have achieved educational goals and reflects the amount to which a person has accomplished certain goals that were normally the focus of activities in school. In this sense, academic achievement is a measure of the skills, abilities, aptitudes and knowledge acquired by the students as a result of teaching and learning. In this study, academic

achievement is defined as the marks, scores, abilities and knowledge students acquired in mathematics in school.

Students' academic achievement in Nigeria have been reported by many researchers to be poor. A study by Zalmon and Wanu (2017) for instance indicates the pass rate of students in Mathematics from 2015 and 2016 in WAEC were 34.18% and 38.68% respectively. A look at the above results indicates that majority of the students could not score up to a credit pass in mathematics for these years. This paints a very worrisome picture about the students' achievement in mathematics. Hence, there is need for research to investigate factors responsible for the abysmal state of students' achievement in mathematics in Nigeria.

One major area of weakness for students in mathematics as reported by the West African Examination Council (WAEC, 2013, 2016 & 2018) in her chief examiners' report is mensuration. Charles-Ogan and George (2018) defined mensuration as a branch of mathematics that deals with geometric shapes and measurements in general. Mensuration is a critical aspect of mathematics since the majority of the



objects that humans interact with have some shape that has either area or volume (Yakubu & Bolaji, 2019). This implies that the study of mensuration is important to the individual as well as the development of skills needed to achieve highly in mathematics. Nonetheless, students perceive the topic to be difficult (Bichi, Ibrahim & Ibrahim, 2018; Charles-Ogan & George, 2018), thereby leading to poor achievement of students in it. Therefore, it is necessary to investigate possible factors that may influence students' achievement in mensuration, so as to find solutions to the problems of poor achievement in it and mathematics in general.

Hence, students may need some level of academic resilience, locus of control and goal orientation so as to tackle difficulties in mensuration. Romano, Buonomo, Callea and Fiorilli (2019) defined academic resilience as the ability to successfully face setbacks and chronic difficulties in the academic context. This implies that resilient students are those that are able to face setbacks and difficult situations like solving a difficult problem. In the present study, academic resilience is defined as the students' ability or capacity to overcome difficult situations related to learning of mathematics. Students' level of academic resilience appears to predict their achievement in school. For instance, Zhaomin (2014) revealed that academic resilience significantly accounted for the variance in students' mathematics performance. Similarly, Mwangi, Okatcha, Kinai and Ileri (2017) in their study stated that a positive and significant relationship exist between academic resilience and academic achievement. In a similar vein, Karabyık (2020) revealed that positive correlations exist between GPA and perseverance and reflecting and adaptive help-seeking. The above findings may be true, but, the magnitude of such relationship is yet to be stated clearly in research studies. Therefore, there is the need for further research on the relationship between academic resilience and students' achievement in mensuration specifically while also considering the role of students' locus of control.

Locus of control is conceived as whether or not an individual perceives an action as being internal or external. Mohamed, Mohammed and Ahmed (2018) defined locus of control as a person's belief that their actions affect the special upcoming outcome. In line with this, locus of control can be seen as a broad expectation of how much a person believes that occurrences in their life are the result of their actions. In this paper, locus of control is defined as students' belief about the causes and consequence of their

actions. Locus of control can be categorized into two components: internal and external locus of control with each exerting influence on individuals and indeed students' learning differently.

Research reports support the fact that locus of control could predict students' achievement. A study by Tella, Tella and Adeniyi (2011) revealed that locus of control, interest in schooling and self-efficacy jointly and relatively contribute significantly to the prediction of academic achievement of the Junior Secondary School Students. Similarly, Enike (2021) concluded that the locus of control when taken jointly with other variables and relatively, predicted academic achievement of students. However, the present study sought to determine the relationship between locus of control in general and students' achievement.

It could be seen that locus of control may correlate with goal orientation to influence students' achievement. Goal orientation refers to the purposes for which a person engages in achievement behavior (Pahljina-Reinić & Kolić-Vehovec, 2017). Kassaw and Astatke, (2017) defined goals orientations as academic motives that are used to guide students classroom behaviour. Accordingly, students are engaged in academic tasks to achieve their goals. It therefore means that goal orientation appears to be a major determinants for students to approach difficult task and this may influence their achievement. In this study, goal orientation is defined as the purpose or reason students engage in an academic learning task.

In line with this definition, goal orientation can be categorized into mastery and performance goals (Ng'ang'a, Mwaura & Dinga, 2018). Mastery goals involves students motivated to understand learning material and develop skills, while performance goals involves students trying to outperforming others, and students may differ in their goals. A study by Ng'ang'a, Mwaura and Dinga (2018) revealed that all the domains of achievement goal orientation significantly correlated to academic achievement. However, Anyanwu and Emesi (2020) reported that achievement goal orientation had a very low positive relationship with students' achievements in mathematics. This implies that though achievement goal orientation is related to achievement, the magnitude of such a relationship is small. This therefore calls for more research to determine the magnitude of relationship that exist between student achievement goal orientation and their academic achievement in mensuration.



In spite of the fact various research have stated that academic resilience, locus of control and academic goal orientation are individually linked to students' achievement. Research focusing on the relationship between these constructs and students' achievement in mensuration aspect of mathematics is lacking. This created a gap in literature that warrant the conduct of the present study. Hence, the study sought to examine academic resilience, locus of control and goal orientation as correlates of secondary school students' achievement in mensuration.

Research Questions

1. What is the predictive power of academic resilience on secondary school students' achievement in mensuration?
2. What is the predictive power of locus of control on secondary school students' achievement in mensuration?
3. What is the predictive power of goal orientation on secondary school students' achievement in mensuration?
4. What is the regression model for predicting students' academic achievement in mensuration by their academic resilience, locus of control and goal orientation?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance in line with the research questions

- H₀₁:** Academic resilience does not significantly predict secondary school students' achievement in mensuration.
- H₀₂:** locus of control does not significantly predict secondary school students' achievement in mensuration
- H₀₃:** goal orientation does not significantly predict secondary school students' achievement in mensuration
- H₀₄:** The regression model for predicting students' achievement in mensuration by their academic resilience, locus of control and goal orientation is not statistically significant.

Methods

The study adopted a correlational research design. The study was conducted in Aninri Local Government Area, Enugu state, Nigeria. The population of the study consist of 491 SS I students in all the 16 public secondary schools in Aninri LGA for 2023/2024 academic session. SSI students were

chosen because the content of mensuration is taught at this level. The sample for the study was 200 SS 1 students drawn using two stage sampling technique. Four instruments developed by the researcher titled: 'Students' Academic Resilience towards Mathematics Questionnaire' (SARMQ), 'Students' Locus of Control Questionnaire' (SLCQ), 'Students' Academic Goal Orientation Questionnaire' (SAGOQ) and Mensuration Achievement Test (MAT) were used for data collection. SARMQ elicited information on students' academic resilience towards mathematics; SLCQ elicited information on students' locus of control towards mathematics; SAGOQ elicited information on students' goal orientation towards academics. The instruments had 10 items each and were rated on a four-point likert type questionnaire with response options of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) with numerical values of 4, 3, 2 and 1 each. The MAT was a 20 item multiple choice questions with response options of A, B, C and D prepared following bloom taxonomy of educational objectives. A test blue print was prepared for the test and weights assigned to the cognitive domains and the contents. Areas and perimeters of plane shapes had 10 questions and surface areas and volumes of solid objects had 10 questions.

The instruments were validated by three experts, one from Mathematics Education Unit and two from Measurement and Evaluation Unit, all from the Department of Science Education, University of Nigeria, Nsukka. For content validity of the MAT, a test blue print was prepared and weights assigned to the cognitive domains and the contents. Areas and perimeters of plane shapes and surface areas and volumes of solid objects had 10 questions each. The instruments were trial tested on 20 students in a school that was not part of the study. The internal consistency reliability coefficients of the SARMQ, SLCQ, and SAGOQ were established using Cronbach Alpha method and the reliability coefficients obtained were 0.876, 0.891 and 0.821 respectively. The internal consistency reliability coefficient of the MAT was established using Kuder-Richardson 20 method and the reliability coefficient of was 0.76.

The researchers first seek the permission of the school authorities to allow them use their schools for the study. When the permission was granted, the researcher recruited 10 mathematics teachers one from each school as research assistants and briefed them on the method of administration and retrieval of the

instruments. The research assistants administered the instruments on the spot and retrieved same on the spot upon completion by the students. The reason for on the spot administration and retrieval was to ensure a high return rate. Data collected were analyzed using regression analysis. The regression coefficients of determination (R^2) were used to answer the research

questions while the regression F-statistics from the regression ANOVA table were used to test the null hypotheses at 0.05 level of significance. Nworgu (2015) criteria was used for interpretation of the correlation coefficient (r) thus: $r = 0.00-0.30$ (low relationship), $0.30-0.80$ (moderate relationship), 0.80 and above (high relationship).

Results

Table 1: Pearson’s product moment correlation analysis the predictive power of academic resilience on students’ achievement in mensuration

| Variable | N | \bar{X} | SD | R | r^2 |
|--------------------------------------|-----|-----------|------|-------|-------|
| Students’ Achievement in Mensuration | 200 | 30.66 | 2.83 | 0.439 | 0.19 |
| Students’ Academic Resilience | 200 | 30.27 | 3.63 | | |

Note: N = Number of respondents, \bar{X} = Mean, SD = Standard Deviation, r = Correlation coefficient, r^2 = Coefficient of determination.

Result in Table 1 shows that the correlation coefficient (r) of 0.439 and a coefficient of determination (r^2) of 0.19 were obtained. The correlation coefficient (r) of 0.4390 means that there is a positive but moderate relationship between the variables. In other words, there is a positively moderate relationship ($r = 0.439$) between students’

academic resilience and students’ achievement in mensuration. Furthermore, the coefficient of determination (r^2) of 0.19 implies that 19% of secondary school students’ achievement in mensuration is predicted by their academic resilience towards mensuration.

Table 2: ANOVA of the significance of the prediction of secondary school students’ achievement in mensuration by their academic resilience in mensuration

| Model | Sum of Squares | Df | Mean Square | F | Sig. |
|--------------|----------------|-----|-------------|--------|-------------------|
| 1 Regression | 307.818 | 1 | 307.818 | 47.343 | .000 ^b |
| 1 Residual | 1287.377 | 198 | 6.502 | | |
| Total | 1595.195 | 199 | | | |

a. Dependent Variable: mach
 b. Predictors: (Constant), SUMAR

The result in Table 2 shows that students’ academic resilience significantly predicts’ secondary school students’ achievement in mensuration ($F(1, 198) = 47.34, p < .05$), thus the null hypothesis was rejected. This is because the associated probability (p)

value of 0.000 was less than 0.05 level of significance. Thus, inference drawn is that students’ academic resilience significantly predicts’ secondary school students’ achievement in mensuration.

Table 3: Pearson’s product moment correlation analysis of the predictive power of locus of control on students’ achievement in mensuration

| Variable | N | \bar{X} | SD | R | r^2 |
|--------------------------------------|-----|-----------|------|-------|-------|
| Students’ Achievement in Mensuration | 200 | 30.66 | 2.83 | 0.264 | 0.069 |
| Students’ Locus of Control | 200 | 31.38 | 3.57 | | |

Result in Table 3 shows that the correlation coefficient (r) of 0.264 and a coefficient of determination (r^2) of 0.069 were obtained. The correlation coefficient (r) of 0.264 indicates that there is a low relationship between the variables. This can also be interpreted to mean that, there is a positively

low relationship ($r = 0.264$) between locus of control towards mensuration and students' achievement in mensuration. In addition, the coefficient of determination (r^2) of 0.069 implies that 6.9% of students' achievement in mensuration is predicted by their locus of control towards mensuration.

Table 4: ANOVA of the significance of the prediction of secondary school students' achievement in mensuration by their locus of control towards mensuration

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|--------|-------------------|
| 1 | Regression | 111.492 | 1 | 111.492 | 14.879 | .000 ^b |
| | Residual | 1483.703 | 198 | 7.493 | | |
| | Total | 1595.195 | 199 | | | |

a. Dependent Variable: mach
 b. Predictors: (Constant), SUMLOC

The result in Table 4 shows that students' locus of control towards mensuration significantly predicts' secondary school students' achievement in mensuration ($F(1, 198) = 14.879, p < .05$), thus the null hypothesis was rejected. This is because the

associated probability (p) value of 0.000 was less than 0.05 level of significance. Thus, inference drawn is that students' locus of control towards mensuration significantly predicts' secondary school students' achievement in mensuration.

Table 5: Pearson's product moment correlation analysis of the of the predictive power of goal orientation on students' achievement in mensuration

| Variable | N | \bar{X} | SD | R | r^2 |
|--------------------------------------|-----|-----------|------|-------|-------|
| Students' achievement in mensuration | 200 | 30.66 | 2.83 | 0.254 | 0.064 |
| Students' goal orientation | 200 | 31.50 | 4.00 | | |

The result in Table 5 shows that the correlation coefficient (r) of 0.254 and a coefficient of determination (r^2) of 0.064 were obtained. The correlation coefficient (r) of 0.254 depicts that there is a low relationship between the variables. This means that there is a low relationship between goal

orientation and students' achievement in mensuration. Furthermore, the coefficient of determination (r^2) of 0.064 is an indication that 6.4% of students' achievement in mensuration is predicted by their goal orientation towards mensuration.

Table 6: ANOVA of the significance of the prediction of secondary school students' achievement in mensuration by their goal orientation towards mensuration

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|--------|-------------------|
| 1 | Regression | 103.040 | 1 | 103.040 | 13.673 | .000 ^b |
| | Residual | 1492.155 | 198 | 7.536 | | |
| | Total | 1595.195 | 199 | | | |

a. Dependent Variable: mach
 b. Predictors: (Constant), SUMGO

The result in Table 6 shows that students' goal orientation towards mensuration significantly predicts secondary school students' achievement in

mensuration ($F(1, 198) = 13.673, p < .05$), thus, the null hypothesis was rejected. This is because the associated probability (p) value of 0.000 was less than

0.05 level of significance. Hence, the conclusion drawn is that students' goal orientation towards

mensuration significantly predicts secondary school students' achievement in mensuration.

Table 7: Regression model for predicting students' academic achievement in mensuration by their academic resilience, locus of control and goal orientation

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .471 ^a | .222 | .210 | 2.516 |

a. Predictors: (Constant), SUMGO, SUMAR, SUMLOC

The result in Table 7 shows that the correlation coefficient (r) of 0.471 and a coefficient of determination (r²) of 0.222 were obtained. The correlation coefficient (r) of 0.471 portrays that there is a moderate relationship between the variables and secondary school students' achievement in mensuration. That is to say, there is a positively moderate relationship (r = 0.471) between students'

academic resilience, locus of control and goal orientation and secondary school students' achievement in mensuration. Additionally, the coefficient of determination (r²) of 0.222 shows that 22.2% of secondary school students' achievement in mensuration is jointly predicted by their academic resilience, locus of control and goal orientation.

Table 8: ANOVA of the significance of the regression model for predicting students' achievement in mensuration by their academic resilience, locus of control and goal orientation

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|--------|-------------------|
| 1 | Regression | 353.989 | 3 | 117.996 | 18.633 | .000 ^b |
| | Residual | 1241.206 | 196 | 6.333 | | |
| | Total | 1595.195 | 199 | | | |

a. Dependent Variable: mach

b. Predictors: (Constant), SUMGO, SUMAR, SUMLOC

The result in Table 8 shows that students' academic resilience, locus of control and goal orientation towards mensuration jointly predict secondary school students' achievement in mensuration significantly. ($F(1, 198) = 18.633, p < .05$), thus, the null hypothesis was rejected. This is because the associated probability (p) value of 0.000 was less than 0.05 level of significance. Thus, the conclusion drawn is that students' academic resilience, locus of control and goal orientation towards mensuration jointly predict secondary school students' achievement in mensuration significantly.

Discussions

The findings of the study showed 19% of secondary school students' achievement in mensuration is predicted by their academic resilience in mensuration and the prediction was significantly. The findings is in agreement with findings from previous studies conducted in similar areas. For instance, the findings corroborate previous findings from the study of Zhaomin (2014) who found that

academic resilience significantly accounted for the variance in students' mathematics performance. The findings also corroborate previous findings from Mwangi, Okatcha, Kinai and Ileri (2017) who revealed that a positive and significant relationship exist between academic resilience and academic achievement. The above means that students who are resilient in their academics have higher achievement scores than those with low academic resilience. This could be true because resilient students persist on given tasks and ensure that they try their best to solve given problems.

More so, findings revealed that 6.9% of secondary school students' achievement in mensuration is predicted by their locus of control towards mensuration and the prediction was significant. The above findings agrees with the findings of Atetwe, Aloka and Gudo (2018) who concluded that there was statistically significant, though weak, positive correlation between internal locus of control and Mathematics achievement, and the findings of Amalu and Dasel (2019) whose results



showed that internal academic locus of control and study habit had influence on academic achievement. These findings means that students who feel their achievement are based on themselves achieve higher scores than those who feel their achievement is based on others. People who also feel they can achieve without others commit personal efforts and strive harder to satisfy their desires. By so doing, they will want to achieve higher scores which serves as a source of inspiration to them.

Furthermore, the findings revealed that 6.4% of secondary school students' achievement in mensuration is predicted by their goal orientation towards mensuration which was significant. The study by Ng'ang'a, Mwaura and Dinga (2018) which revealed that all the domains of achievement goal orientation significantly correlated to academic achievement was affirmed by this findings. Also, the findings affirms that of Anyanwu and Emesi (2020) who discovered that achievement goal orientation had a very low positive relationship with students' achievements in mathematics. These findings means that students with higher goal orientations achieves higher scores in mathematics than students with low goal orientation. This could be so because every individual work had to achieve their goals. Accordingly, students with high achievement goal orientation will strive harder than those with low achievement orientation to achieve their goals. Consequently, they could achieve higher than students with low achievement goal orientation. Hence, there could be a positive relationship between goal orientation and students' achievement.

Lastly, the findings of the study showed that 22.2% of secondary school students' achievement in mensuration is jointly predicted by their academic resilience, locus of control and goal orientation towards mensuration which was significant. The above findings lend support to previous studies by Tella, Tella and Adeniyi (2011) who revealed that locus of control, interest in schooling and self-efficacy jointly and relatively contribute significantly to the prediction of academic achievement of the Junior Secondary School Students, and, Enike (2021) who concluded that the variables when taken jointly and relatively, predicted academic achievement of students. This means that academic resilience, locus of control and goal orientation accounted for a significant portion of students' achievement in mathematics. The remaining portion of students' achievement could be due to other variables other than these.

Conclusion

Based on the findings of the study, it was concluded the predictive power of academic resilience, locus of control and goal orientation singly and jointly predict secondary school students' achievement in mensuration. It revealed that the constructs positively and significantly predict secondary school students' achievement in mensuration.

Recommendation

Based on the findings of the study, it was recommended that

Students should learn how to develop academic resilience, built good locus of control and have good goal orientations so as to improve their mathematics achievement.

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