



Time Management Test-Taking Strategy and Students' Mastery Goal Orientation On Students' Academic Achievement in Biology

Onoja, Emmanuel Agada, Basil, C. E. Oguguo & Efuribe Victoria David

Department of Science Education, University of Nigeria, Nsukka

Corresponding author: basil.oguguo@unn.edu.ng

Abstract

This study investigated the predictive role of time management test-taking strategy and students' mastery goal orientation on students' academic achievement in Biology. Two research question and corresponding hypotheses guided the study. The study adopted correlation survey research design. Three instruments; Time Management Test-taking Strategy Questionnaire (TMTSQ), Students' Mastery Goal Orientation Scale (SMGOS) and Biology Achievement Test (BAT) developed by the researchers were used for data collection. These reliability estimates showed that the instruments were reliable. The data collected were analysed using linear regression analysis. The findings of the study revealed among others that 36% variation in students' achievement in Biology is predicted by their time management test-taking strategy, which was statistically significant. ($p < .05$). Based on these findings, it was concluded that a significant amount of students' academic achievement in Biology is predicted by time management test-taking strategy and students' mastery goal orientation. Consequently, it was recommended among others that Educational institutions should implement workshops focused on time management and effective test-taking strategy. This training can equip students with essential skills to optimize their study habits and exam performance.

Key Words: Time Management, Mastery Goal Orientation and Academic Achievement

Introduction

Improving students' academic achievement in Biology at the secondary school level is a critical area of educational research, particularly as biological sciences become increasingly vital in our technology-driven society. As stakeholders in the education system strive to enhance students' academic achievement in the subject, two influential factors have emerged: time management test-taking strategy and students' mastery goal orientation. Effective time management equips students with the skills to allocate their study time wisely, prioritize tasks, and maintain a balanced workload, all of which are essential for mastering complex biological concepts. Meanwhile, mastery goal orientation fosters a deep engagement with learning, encouraging students to focus on understanding and improving their skills rather than merely seeking grades. This dual approach not only supports academic achievement but also promotes lifelong learning and resilience in the face of challenges. By examining the predictive potency of these two factors, stakeholders in

education can better understand how to cultivate an environment that empowers students to excel in Biology.

Biology is a life science that focuses on the scientific study of plant and animal with their morphology, systematics, physiology, taxonomy and ecology. Michael (2018) defined Biology as the study of life. Biology as a science subject occupies a central position in the science curriculum in Nigeria (FRN, 2014). This is because the subject serves as a prerequisite to many essential disciplines and is also essential to industrialization and other areas of the economy, thereby making the study of Biology indispensable for the growth of any country.

Despite the relevance of Biology and the number of enrolment in secondary schools coupled with government efforts through provision of adequate laboratory equipment and qualified teachers to aid effective teaching and learning of Biology in secondary schools in Nigeria, the academic achievement of



students in the subject has not been encouraging. Scholars like Joda (2018) have raised alarm over the dwindling state of students' academic achievement in the subject particularly in public examinations like the West African Examination Council (WAEC) and the National Examination Council (NECO). This assertion is also in line with the Chief examiner's report from the West African Examinations Council from 2015-2022 which noted that students' achievement in Biology is dwindling and below average for these years. These raise serious concern on the part of stakeholders in education and education researchers on possible ways to correct this ugly menace and improve students' academic achievement in Biology. Academic achievement represent the scores students obtain in test/examination. Kpolovie et al. (2014) described academic achievement as grades used by schools and examination bodies to define the extent of students' learning outcomes based on pre-stated objectives. Academic achievement of students to a great extent is associated with human growth and cognitive, emotional and socio physical development. Little wonder that academic achievement is considered a multifaceted construct that comprised different domains of learning. Students' dwindling academic achievement in Biology in secondary schools in Nigeria may be influence by so many factors which could be students-related ones, teacher-related, school related and environmental-related factors. To curb this problem, researchers have been trying to investigate possible factors that could help in improving students' academic achievement. Some of the factors investigated include: students motivation and self-efficacy (Ugwanyi et al., 2020); learning environment, teaching pedagogy, teacher's attitude and mode of assessment (Ozcan, 2021), students' task persistence (Udo, 2023) among other with the sole aim of improving students' academic achievement in the subject. Even with their useful recommendation, this problem still persist which is evident in the level of students' poor achievement in Biology still found in public examinations. This calls for more research into other factors that are directly connected or linked to students' achievement in a test such as time management test-taking strategy and students' mastery goal orientation that are modifiable variables that can be addressed through interventions.

Time management test-taking strategy is a crucial test-taking strategy that can help the examinee allocate time wisely and ensure that there is sufficient time to answer all the questions on the test. Such strategy include reading through the entire questions

first and allocating time for each question or section in the question, using a timer, not getting stuck to a difficult question attempting easier questions first etc. Nasrullah and Khan (2015) explained that time plays a vital role in improving students' academic achievements in a test-taking situation particularly when students utilize it effectively. Effective time management is a crucial test-taking strategy that can significantly impact a test-taker's academic achievement.

Effective time management is essential for success on standardized tests, ensuring that students can complete the test within the allotted time and maximize their scores. According to Cyril (2015), poor time management during tests can lead to miss of important points and consequently lower scores especially in a speed test. The author explained that proper time management skills are associated with improved academic achievement, as students who effectively manage their time tend to be more organized, focused, and efficient in their studies. Witchita State University (2024) also added that having a clear plan for how to allocate time during the test helps alleviate the pressure and anxiety that often comes with the time crunch of exams. This allows the test-taker to stay focused and calm. By spending the right amount of time on each question, the test-taker can carefully read the question, consider all the answer choices, and select the best response. This reduces careless mistakes that can happen when rushing through the test. Proper time management strategy also gives students ample opportunity to utilize other strategy during the test such as ruling out wrong option strategy all of which are essential for mastering complex concepts in the subject.

Mastery goal orientation is a type of achievement orientation in which students focus on learning, developing new skills, and mastering tasks according to self-set standards. According to Dweck (2008) mastery goal orientation refers to a students' belief in the ability to improve on skills through effort and learning. The author noted that it is a critical factor in academic achievement and motivation. Hsieh (2011) explained that students with a mastery orientation tend to value competence, expect success, and seek challenges. They are not influenced by external performance indicators, such as grades, and find satisfaction in their work. These students are more likely to engage in activities that increase their knowledge, pay more attention, process information at a higher level, and are not afraid to ask for help. Daumiller, *et al* (2022) added that mastery-oriented



students often set learning goals rather than performance goals. The focus of mastery-oriented students is on understanding and improvement which leads to greater intrinsic motivation. Identifying students' subject-specific achievement goal orientation profiles can provide insights into students' academic well-being and performance. Wang, *et al* (2021) explained that mastery orientation has been found to be positively related to learning engagement and academic adjustment among newly admitted students. This is in line with the findings by Barzegar (2012) and Yeung *et al.* (2014) who maintained that mastery goal orientation have a significant influence on students' academic performance and other learning outcomes. From the above, it can be deduced that students' mastery goal orientation is an important predictor of academic achievement and performance. Mastery-oriented students tend to engage in more adaptive patterns of motivation and learning strategies, which lead to better academic achievement. These findings not withstand need to be investigated further and particularly with Biology students in Secondary Schools to be able to reaffirm or disprove earlier claims by researchers on the predictive potency of students' mastery goal on their academic achievement. This study strengthens empirical evidences in literature on the predictive potency of effective time management test-taking strategy and students' mastery goal orientation at the secondary school level in Nigeria. This study investigated the predictive potency of time management test-taking strategy and students' mastery goal orientation on academic achievement of Biology students in secondary schools in Benue South Senatorial Zone. The following issues were addressed;

1. What is the predictive potency of time management test-taking strategy on students' academic achievement in Biology?
2. What is the predictive potency of students' mastery goal orientation on students' academic achievement in Biology?

Review of Literature

Time management test-taking strategy

Cemaloğlu and Filiz (2010) carried out a study on the relationship between time management skill and academic achievements of students who were potential teachers and studying at the faculty of education in Gazi University and found out that there was a meaningful and positive relation between time planning and time traps and the academic achievement of the students.

Indreica *et al.* (2011) also investigated the effect of time management and learning styles on students' academic achievement and revealed that efficient time management under guidance of an educational councillor lead to significant increase in students' academic achievement and consequently lead to academic success. Nasrullah and Khan (2015) carried out a research on the impact of time management on students' academic achievement and revealed that there was a significant and positive relationship between time management and academic achievement of students. Cyril (2015) noted that that proper time management skills are associated with improved academic achievement, as students who effectively manage their time tend to be more organized, focused, and efficient in their studies. These findings not withstand needs to be investigated further particularly with secondary schools students in Nigeria to ascertain if the same result would be obtainable in different location with varying factors and to also ascertain the amount of students' academic achievement that can be attributed to effective time management skill during test.

Mastery goal orientation

Yeung *et al.* (2014) examined the influence of mastery goal and perceived competence on educational outcome. Results showed that students' sense of competence was a stronger predictor of all three outcomes - achievement, status and self-efficacy whereas mastery goal was a strong predictor of status and self-efficacy. Li *et al.* (2021) investigated the association among achievement goal orientation, academic performance and academic well-being among Chinese medical students. The aim of the study was to explore the status of achievement goal orientations among medical students in China and to further identify the association among academic performance, academic well-being, and achievement goal orientations. The results show that both mastery and performance-avoidance goals were associated with academic performance, subjective academic stress, subjective learning adaptability, subjective sleep quality, and subjective well-being. The findings emphasize the importance of mastery goals for promoting the academic performance and well-being of medical students. Alfaf *et al.* (2023) also carried out a study to ascertain when and why the role of mastery goal becomes prominent in science students' academic achievement at secondary school level. The study aim to explore how different factors including gender and educational institute (public and private schools) affect



goal orientation of students which in turn affect their academic achievement. The findings revealed that there is a positive association between mastery goal and academic accomplishment. However, performance avoidance and work avoidance goals were the negative predictors of academic accomplishment. Furthermore, male respondents were seen more mastery goal oriented as compared to female respondents.

Based on the above results, the researchers are interested in investing the predictive role of students' mastery orientation in secondary schools to ascertain if mastery goal orientation could account for students' academic achievement in Biology. Also, to ascertain if similar results can be achieved in Nigeria with varying factors as most of the reviewed works were carried out outside the country. Hence the need for the present study.

Methodology

The study adopted correlation survey research design and was carried out in Benue South Senatorial Zone of Benue State, Nigeria. The Benue South Senatorial Zone popularly known as "Zone C" comprised of nine local government areas namely: Ado, Agatu, Apa, Obi, Ogbadibo, Ohimini, Oju, Okpokwu and Otukpo. The population of the study comprises all the 4,646 senior secondary school two (SSSII) students in public secondary schools in the zone for the 2022/2023 academic session. Multistage sampling procedure was employed in constituting the sample for the study. According to Ali (2006), multistage sampling procedure is one which requires several stages of sampling the elements of a population. In the first stage, simple random sampling involving balloting with replacement was used to draw four local governments out of the nine local governments that made up the Benue South Senatorial Zone. This was done to give every local government equal and independent chances of being included in the study. At the second stage, proportionate stratified random sampling was used to draw 15 schools from the four local government areas sampled and also at the third state proportionate stratified random sampling was also used to draw a sample of 355 SSII students from the 15 schools sampled from the four local government areas. This was done to ensure a relatively fair representation of the sample to population of the study and also to give room for smaller component of the population to be included in the sample.

Three instruments; Time Management Test-taking Strategy Questionnaire (TMTSQ), Students'

Mastery Goal Orientation Scale (SMGOS) and Biology Achievement Test (BAT) were used for data collection. The instruments were face validate by three experts one from Biology education unit, the other from Research, Measurement and Evaluation unit and the last from Psychology of Education Unit all from the Faculty of Education, University of Nigeria, Nsukka. A table of specification also known as test blue print was prepared for the BAT to ensure content validity of the items. The internal consistency of the TMTSQ, SMGOS and BAT were ascertained by trial testing the instrument on 25 SSSII students from Benue North-West Senatorial Zone which is not part of the study area but shares similar characteristics with the area under study. Cronbach alpha method of estimating reliability was used to ascertain the reliability of the TMTSQ and SMGOS and a reliability index of 0.78 and 0.81 were obtained respectively. While Kuder Richardson formula 20 (K-R20) was used to estimate the reliability of the BAT and a reliability index of 0.90 was obtained. Face to face administration and retrieval method were employed in the data collection with the help of the 15 Biology teachers who served as a research assistants. The data collected were analysed using linear regression for research question one and two while the ANOVA emanating from the respective analysis were used to test the hypotheses posed to guide the study at 0.05 level of significance.

Results

Table 1: Regression analysis of the predictive potency of time management test-taking strategy on students' academic achievement in Biology (SAAB)

Correlated variable	N	R	R ²
Time management and SAAB	355	.60	.36

Predictors: (Constant), Time Management

Criterion: Students' Academic Achievement in Biology (SAAB)

Results in table 1 shows that when the responses of the students on time management test-taking strategy was correlated with their academic achievement in Biology (SAAB). The result shows that a correlation coefficient (R) of .60 with associated coefficient of determination (R²) of .36 was obtained. This coefficient of determination (R²) of .36 denotes that 36% variation in students' academic achievement in Biology is predicted by time management test-taking strategy.

Table 2: Regression ANOVA test of significance of the predictive potency of time management test-taking strategy

Model		Sum Squares	of Df	Mean Square	F	Sig.
1	Regression	1802.202	1	1802.202	4.964	.027 ^b
	Residual	128151.308	353	363.035		
	Total	129953.510	354			

a. Dependent Variable: Academic achievement

b. Predictors: (Constant), Time management test-taking strategy

The result in table 2 shows that time management test-taking strategy significantly predict students' academic achievement in Biology, ($F(1, 354) = 1802.202, p = .03$). This is due to the fact that the associated probability (sig.) value of .027 is less than

0.05 ($p < .05$) when compared with 0.05 ($p < .05$). Hence, the null hypothesis one was rejected and the inference drawn was that time management test-taking strategy significantly predict students' academic achievement in Biology.

Table 3: Regression analysis of the predictive potency of students' mastery goal orientation on students' academic achievement in Biology (SAAB)

Correlated variables	N	R	R ²
Students' mastery goal orientation and SAAB	355	.65	.42

Predictors: (Constant), Time Management

Criterion: Students' Academic Achievement in Biology (SAAB)

Results in table 3 shows the responses of the students on mastery goal orientation correlated with students' academic achievement in Biology. The result revealed that when the scores from the responses of the students on mastery goal orientation were correlated with Biology academic scores, a correlation coefficient

(R) of .65 with associated coefficient of determination (R²) of .42 was obtained. This coefficient of determination (R²) of .42 is indicative that 42% variation in students' academic achievement in Biology is predicted by mastery goal orientation.

Table 4: Regression ANOVA test of significance of the predictive potency of students' mastery goal orientation on students' academic achievement in Biology (SAAB)

Model		Sum Squares	of Df	Mean Square	F	Sig.
1	Regression	2550.972	1	2550.972	7.068	.008 ^b
	Residual	127402.538	353	360.914		
	Total	129953.510	354			

a. Dependent Variable: Academic achievement

b. Predictors: (Constant), Students' mastery goal

The result in table4 shows that students' mastery goal orientation significantly predict students' academic achievement in Biology, ($F(1, 354) = 7.068, p = .008$). this is based on the fact that the associated probability (Sig.) value of .008 when compared with 0.05 level of significance was found to be significant

because .008 is less than 0.05 ($p < .05$). On this note, the null hypothesis two was rejected, and the inference drawn was that students' mastery goal orientation significantly predicts students' academic achievement in Biology.



Discussion

The findings of the study with respect to research question one showed that 36% variation in students' academic achievement in Biology is predicted by time management test-taking strategy which was statistically significant. This finding corroborate with the outcome of the study by Cemaloğlu and Filiz (2010) and Indreica et al. (2011) who sperately noted that efficient time management lead to significant increase in students' academic achievement. The finding is also in consonance with the outcome of the study by Nasrullah and Khan (2015) that there was a significant and positive relationship between time management and academic achievement of students. The finding also add credence to Cyril (2015) who noted that that proper time management skills are associated with improved academic achievement, as students who effectively manage their time tend to be more organized, focused, and efficient in their studies. This finding can be so because time management test-taking strategy can help the students allocate time wisely for each question or section in the question, using a timer, not getting stock to difficult question, attempting easier questions first, among others. Moreover, proper time management test-taking strategy can give students ample opportunity to utilize other strategy during the test such as ruling out wrong option strategy. Effective time management also help the students in reducing the likelihood of rushing or leaving question unanswered. This tactic can contribute to boosting students' academic achievement in Biology.

The finding of the study with respect to research question two found that 42% variation in students' academic achievement in Biology is predicted by mastery goal orientation of the students, which was statistically significant. The finding corroborate with the outcome of the study by Yeung et al. (2014) and Li et al. (2021) which showed that mastery goal orientation has a significant influence on students' academic achievement. Likerwise et al. (2023) revealed that there is a positive association between mastery goal and academic achievement performance. This finding could be so because as students who focused on mastering content usually tend to engage more deeply with the material, leading to better understanding and retention. It also helps students to develop new skills and master task according to self-set standards.

Conclusion

The study investigated the relationships between time management test-taking strategy, mastery goal orientation, and academic achievement in Biology. The findings indicate a significant positive correlation between effective time management test-taking strategy and students' academic achievement in Biology. Additionally, students with a mastery goal orientation demonstrated higher levels of academic achievement, suggesting that intrinsic motivation plays a crucial role in learning outcomes. These results underscore the importance of both strategic approaches to studying and goal-setting in enhancing academic success in Biology. The following recommendations were made based on the findings:

1. Educational institutions should implement workshops focused on time management and effective test-taking strategy. This training can equip students with essential skills to optimize their study habits and exam performance.
2. Teachers should encourage a mastery-oriented environment by emphasizing learning and understanding over performance. This can be done through formative assessments, feedback, and collaborative learning opportunities.

References

- Ali, A. (2006). *Conducting research in education and social sciences*. Enugu: Tashiwa Networks Ltd.
- Altaf, S., Bibi, A., Daad, H. & Ahmad, M. (2023). When and why the role of mastery goal becomes prominent in science students' academic achievement at secondary school level. *Kepes-Journal 21(2)*, 156-167.
- Barzegar, M. (2012). The relationship between goal orientation and academic achievement-The mediation role of self-regulated learning strategies--A path analysis. *Online Submission*
- Cemaloğlu, N. & Filiz, S. (2010). The relation between time management skills and academic achievement of potential teachers. *Educational Research Quarterly, 33(4)*, 3-23.
- Cyril, V. A. (2015). Time management and academic achievement of higher secondary school students. *I-Manager's Journal of School Education Technology 10(3)*, 38-43.
- Daumiller, M., Fasching, M. S., Steuer, G., Dresel, M. & Dickhäuser, O. (2022). From teachers' personal achievement goals to students' perceptions of classroom goal structures: Via student-oriented



- goals and specific instructional practices. *Teaching and Teacher Education*, 111, 103617.
- Federal Republic of Nigeria (2014). *National Policy on Education (4th edition)* Yaba, Lagos: NEDRC Press.
- Hsieh, P. H. (2011). Mastery Orientation. In: Goldstein, S., Naglieri, J.A. (eds) *Encyclopedia of Child Behavior and Development*. Springer, Boston, MA. https://doi.org/10.1007/978-0-387-79061-9_1722.
- Indreica, E. S., Cazan, A. M., & Truta, C. (2011). Effects of learning styles and time management on academic achievement. *Procedia-Social and Behavioral Sciences*, 30, 1096-1102.
- Joda, F. M. (2018). Effect of concept mapping teaching approach on senior secondary school Biology students Achievement in Biology in Adamawa State, Nigeria. *Jigawa Journal of Multi-disciplinary Studies (JJMS)*, 1(1), 140-147.
- Kpolovie, P. J., Joe, A. I. & Okoto, T. (2014). Academic achievement prediction: role of interest in learning and attitude towards school. *International Journal of Humanities, Social Sciences and Education (IJHSSE)*, 1(11), 73-100.
- Li, Q. L., Zhao, J. Y., Tian, J., Sun T., Zhao, C. X., Guo, H. C., Zhu, L. Y., Gao, R, Yang, L. B., Cao, D. P. & Zhang, S. E. (2021) The Association Among Achievement Goal Orientations, Academic Performance, and Academic Well-Being Among Chinese Medical Students: A Cross-Sectional Study. *Front Psychol.* 2;12:694019. doi: 10.3389/fpsyg.2021.694019. PMID: 34408710; PMCID: PMC8365171.
- Micheal, M. C. (2018). *Essential Biology for senior secondary schools*. Lagos: Tonad Publishers.
- Nasrullah, S., & Khan, M. S. (2015). The impact of time management on the students' academic achievements. *Journal of Literature, Languages and Linguistics*, 11, 66-77.
- Ozcan, M. (2021). Factors affecting students' academic achievement according to teachers' opinion. *Educational Reform Journal* 1; 1-18.
- Udo, A. P. (2023) *Task persistence, motivation and locus of control as predictors of senior secondary school students' academic achievement in Physic*. Unpublished M.Ed Thesis Submitted to the Department of Science Education, University of Nigeria, Nsukka.
- Ugwuanyi, C. S., Okeke, C. I. O. & Ageda, T. A. (2020). Motivation and self-efficacy as predictors of learner's academic achievement. *Journal of Sociology Soc. Anth*, 11(3-4), 215-222.
- Wang, H., Xu, M., Xie, X., Dong, Y. & Wang, W. (2021). Relationships between achievement goal orientations, learning engagement, and academic adjustment in freshmen: Variable-centered and person-centered approaches. *Frontiers in psychology*, 12, 250-263.
- West African Examination Council (WAEC, 2015-2022) *Chief Examiners Report Lagos*.
- Wichita State University (2024). Time management and students' success. Retried on the 10th of May, 2024 via <https://www.wichita.edu/services/studentssuccess/shocker-secrets-to-success/03-time-management.php>
- Yeung, A. S., Craven, R. G. & Kaur, G. (2014). Influence of mastery goal and perceived competence on educational outcome. *Australian Journal of Education and Developmental Psychology* 14, 117-130.