



DIMENSIONS OF ACHIEVEMENT GOAL ORIENTATION AS PREDICTORS OF SENIOR SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN BIOLOGY IN ANAMBRA STATE, NIGERIA

¹Prof. Okoli, Josephine Nwanneka & ²Onyekwelu, Uchechukwu Anthonia

^{1&2}Department of Science Education, Faculty of Education, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria
Corresponding author email: testimonyandy@gmail.com

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Abstract

This study investigated the dimensions of achievement goal orientation as predictors of secondary school students' academic achievement in Biology in Anambra State, Nigeria. Two research questions and two corresponding null hypotheses guided the study, which adopted a correlational predictive research design. The population comprised 16,236 senior secondary year two Biology students in the state. A sample of 750 students was drawn from 30 schools across 3 education zones through a multi-stage sampling procedure, of whom 600 cases with complete achievement records were retained for the regression analyses. The Achievement Goal Orientation Questionnaire, adapted from the Goal Orientation and Learning Strategies Survey, was used to measure four dimensions of goal orientation, namely mastery, performance, mastery-avoidance, and performance-avoidance, and yielded a Cronbach's alpha reliability coefficient of 0.86. Students' cumulative Biology scores for three terms served as the achievement measure. Data were analysed using simple and multiple linear regression at the 0.05 level of significance. Findings showed that goal orientation significantly predicted academic achievement in Biology, accounting for 10.6 per cent of the variance in scores, while the four dimensions jointly accounted for 12.0 per cent, with mastery-avoidance emerging as the strongest individual contributor, followed closely by mastery, then performance-avoidance and performance orientation. It was concluded that the goals students privately set for themselves meaningfully shape their eventual performance in Biology. It was recommended, among other things, that Biology teachers and school counsellors should deliberately design activities that nurture mastery-oriented and self-referenced goal-setting behaviour among students.

Keywords: Achievement, Goal-Orientation, Mastery-Avoidance, Academic Achievement, Biology Education, Students

1.1 Introduction

Biology occupies a central place among the science subjects offered at the senior secondary school level in Nigeria, standing alongside Chemistry and Physics as one of the three core sciences from which many students proceed into professional fields such as medicine, agriculture, biotechnology, pharmacy and environmental science. Yang (2020) described academic

achievement in Biology as a reliable index of how well students have internalised scientific reasoning, given that the subject demands not just memorisation but the ability to connect biological processes to real-world phenomena. Zhou and Siti (2022) similarly noted that academic achievement is a direct manifestation of learning effectiveness, making it the most visible signal of how well a science curriculum and the learners within it are performing. Yet, despite the importance both scholars attach to it, the academic achievement of secondary school students in Biology has remained a persistent source of concern in Nigeria, a pattern that recent examination reports have continued to document. This unresolved gap between the importance of the subject and students' actual performance has pushed researchers to look beyond instructional delivery alone and to interrogate the internal, learner-level conditions that might explain why some students thrive in Biology while others, taught by the same teachers under similar conditions, do not.

One internal condition that has attracted growing research attention in this regard is achievement goal orientation, a construct that describes the purposes students hold when they engage in academic work. Rather than asking only whether a student is motivated, goal orientation asks what the student is trying to accomplish through that motivation, whether it is to genuinely understand a concept, to outperform classmates, or simply to avoid embarrassment. The construct traces its theoretical roots to the foundational writings of Nicholls (1984) and Dweck (1986), who first argued that learners interpret ability and success differently depending on the standard against which they judge their own competence. Building on this foundation, Senko (2020) reviewed a wide range of more recent classroom-based evidence and concluded that the specific goals students pursue, rather than abstract motivation, determine whether academic effort translates into measurable learning gains, a conclusion that keeps the original theory relevant to present-day classroom research.

Contemporary treatments of the theory typically distinguish four dimensions of goal orientation. Mastery orientation reflects a desire to build genuine competence and understanding, and is usually associated with curiosity, persistence and a comfortable relationship with mistakes. Performance orientation, in contrast, is directed at demonstrating ability relative to others, often through grades, rankings or visible recognition. Mastery-avoidance describes a more subtle motivational stance in which a student is driven by the fear of not fully mastering material, of leaving gaps in their own understanding, a dimension that Madjar, Bachner and Kushnir (2020) argued is frequently overlooked in motivational research despite its distinct bearing on how students prepare for demanding subjects. Performance-avoidance, the fourth dimension, captures the desire to escape looking incompetent or to dodge a poor grade in the eyes of others. Yıldızlı (2020) added a useful classroom-level insight to this picture, showing that the specific assessment practices a teacher adopts can themselves push students toward one goal dimension over another, which suggests that goal orientation is not a fixed trait but something the learning environment continually shapes.

These four dimensions rarely operate in isolation within a single learner. Giota and Bergh (2019), working with a large longitudinal cohort of Swedish adolescents, found that students typically carry a blend of goal orientations at once, and that the combined effect of holding multiple

goals predicted achievement more strongly than any single orientation on its own. This layered picture suggests that a single overall goal-orientation score, however useful, cannot fully capture how each dimension separately influences a student's academic behaviour, which is precisely why the present study chose to examine the four dimensions individually rather than as a single composite measure.

The relevance of goal orientation to Biology achievement becomes clearer when one considers the demands the subject places on learners. Biology content is cumulative and conceptually dense, requiring students to link earlier topics such as cell structure to later ones such as genetics or ecology. A student whose goal is merely to avoid failure may revise only enough to scrape through an examination, while a student oriented toward mastery is more likely to revisit difficult topics until they are genuinely understood. Jury, Bruno and Darnon (2018) showed that avoidance-based goals in particular are shaped by students' social standing and carry real consequences for how much academic risk a student is willing to take, a finding that speaks directly to the avoidance dimensions under investigation here. This predictive relationship has also held up outside Europe: Venkatesan and Shankar (2022) confirmed a significant link between goal orientation and academic performance among undergraduate students in India, Kavitha and Suthanthiradevi (2022) reported a comparable association among higher secondary school students in Tamil Nadu, and Ng'ang'a, Mwaura and Dinga (2018) found a similar pattern among form three students in Kiambu County, Kenya, lending the construct fairly broad cross-cultural support.

Within Nigeria specifically, empirical attention to goal orientation has grown steadily but has concentrated disproportionately on subjects other than Biology. Idika and Adesoji (2021) examined how goal orientation shaped students' interest in Chemistry in Ibadan, while Tahir, Yahaya, Yaduma and Magaji (2025) explored achievement goal orientation among college of education students in North East Nigeria and found that mastery and performance-approach goals correlated positively with achievement. These studies confirm that goal orientation matters in Nigerian classrooms, yet none of them examined Biology specifically at the senior secondary level, and fewer still disaggregated the construct into its four dimensions to determine which one carries the greatest weight. This leaves a fairly precise gap: while it is reasonably well established, across Nigeria, Kenya, India and beyond, that goal orientation predicts achievement in various subjects and settings, there remains limited evidence on how the individual dimensions of goal orientation, taken separately, predict Biology achievement among senior secondary school students, particularly within Anambra State, where Biology achievement has continued to fluctuate despite various interventions.

It is against this backdrop that the present study set out to determine the predictive power of goal orientation, both as a composite construct and as four distinct dimensions, on the academic achievement of senior secondary school year two students in Biology in Anambra State. By separating the dimensions rather than treating goal orientation as a single undifferentiated score, the study sought to generate evidence precise enough to inform how teachers, counsellors and curriculum planners might design goal-focused interventions that target the specific motivational orientation most strongly tied to Biology performance.

1.2 Statement of the Problem

The unsatisfactory academic achievement of secondary school students in Biology in Anambra State has persisted despite numerous interventions targeted at improving instructional delivery, upgrading school facilities and retraining teachers. Much of this intervention effort has concentrated on external, school-based factors, while the internal motivational dispositions that students themselves bring into the Biology classroom have received comparatively little systematic attention. Among educators in the state, there is a tendency to treat student motivation as a single, undifferentiated quality, present or absent, without recognising that the specific goals a student pursues, whether to master content, to outshine peers, or to avoid the discomfort of failure, may carry very different consequences for achievement.

This lack of dimension-level clarity creates a practical difficulty for teachers and counsellors who might wish to design goal-oriented interventions but lack evidence on which orientation to prioritise. A teacher who assumes that all forms of goal orientation contribute equally to achievement may adopt generic motivational strategies that fail to target the dimension actually driving underperformance in Biology. Without empirical clarification of how mastery, performance, mastery-avoidance and performance-avoidance orientations individually relate to achievement, efforts to redesign classroom practice around students' motivational profiles remain, at best, an informed guess. It was this gap, both in the local literature and in classroom practice, that prompted the present study to determine, with statistical precision, the predictive power of goal orientation and its four dimensions on senior secondary school students' academic achievement in Biology in Anambra State.

1.3 Research Questions

The following research questions guided the study:

1. What is the predictive power of goal orientation on senior secondary school students' academic achievement scores in Biology?
2. What are the contributions of the dimensions of goal orientation (mastery, performance, mastery-avoidance and performance-avoidance) to the prediction of senior secondary school students' academic achievement scores in Biology?

1.4 Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

Ho1: Secondary school students' goal orientation scores do not significantly predict their academic achievement scores in Biology.

Ho2: The contributions of the dimensions of goal orientation (mastery, performance, mastery-avoidance and performance-avoidance) to the prediction of students' academic achievement scores in Biology are not significant.

2. Literature Review

2.1 Theoretical Framework

This study was anchored on Achievement Goal Orientation Theory, credited to the separate but complementary works of Nicholls (1984) and Dweck (1986). Nicholls proposed that students differ in how they define success, with some judging their competence against an internal standard of self-improvement and others judging it against their peers' performance. Dweck extended this reasoning through her research on motivational processes, arguing that the goals students set for themselves determine whether they interpret setbacks as a normal part of learning or as evidence of fixed inability. Later theorists broadened the original two-goal framework into a four-dimensional model that adds an avoidance component to both mastery and performance goals, producing the mastery, performance, mastery-avoidance and performance-avoidance dimensions examined in the present study. Madjar, Bachner and Kushnir (2020) clarified that mastery-avoidance in particular reflects a student's fear of failing to fully grasp material relative to their own potential, a distinct motivational state from the more commonly studied mastery-approach orientation. Applied to Biology instruction, the theory implies that a teacher who understands which goal orientation a student privately holds is better positioned to predict, and eventually influence, how that student will respond to the demands of the subject.

2.2 Empirical Review

A number of studies conducted in recent years have examined the relationship between achievement goal orientation and academic performance across different educational levels and cultural contexts. Senko (2020) reviewed evidence on when mastery and performance-approach goals facilitate achievement and concluded that both orientations can support performance under the right classroom conditions, though mastery goals more consistently predict deep learning and long-term retention. Giota and Bergh (2019), in a large-scale longitudinal study of Swedish grade nine students, found that academic, social and future goal orientations were each significantly associated with achievement, and that students who held multiple goals simultaneously tended to outperform those anchored on a single orientation. Their work offers useful groundwork for studies, such as the present one, that examine several goal dimensions within the same model rather than treating goal orientation as a monolithic construct.

Elsewhere, Jury, Bruno and Darnon (2018) investigated performance-avoidance goals among French students and reported that these goals were more prevalent among students from lower social status backgrounds who feared falling behind their parents' achievements, a finding that situates performance-avoidance within a wider social and psychological context rather than treating it as a purely academic phenomenon. Alasqah (2022) examined goal orientation among Saudi Arabian university students during the disrupted learning conditions of the COVID-19 pandemic and found a significant relationship between goal orientation and academic achievement, suggesting that the predictive strength of goal orientation persists even when the usual structure of classroom instruction is interrupted. In a similar vein, Venkatesan and Shankar (2022) studied undergraduate students in India and confirmed that goal orientation, along with its constituent dimensions, bore a significant relationship with academic performance, lending further cross-cultural weight to the construct's relevance.

Within the West African context specifically, Idika and Adesoji (2021) found that goal orientation significantly influenced senior secondary school students' interest in Chemistry in Ibadan, Nigeria, a finding that, though centred on interest rather than achievement, reinforces the broader argument that the goals students hold shape how they relate to science subjects. Tahir, Yahaya, Yaduma and Magaji (2025) extended this line of enquiry to colleges of education in North East Nigeria and reported that mastery-approach, performance-approach and mastery-avoidance goal orientations correlated positively and significantly with academic achievement, while performance-avoidance showed no significant relationship in their sample. Comparable findings were reported by Ng'ang'a, Mwaura and Dinga (2018) among Kenyan form three students, whose results confirmed a significant relationship between achievement goal orientation and academic achievement, and by Kavitha and Suthanthiradevi (2022), who found a significant association between goal orientation and academic achievement among higher secondary school students in Tamil Nadu, India. In the Turkish context, Yıldızlı (2020) linked classroom assessment practices to the goal orientations students adopted in mathematics classrooms, suggesting that the assessment culture a teacher establishes can shape which goal dimension becomes dominant among learners.

Taken as a whole, this body of literature converges on the view that goal orientation, in its various dimensions, holds genuine predictive value for academic achievement across subjects, educational levels and cultural settings. What remains comparatively underexplored, however, is how the four dimensions individually predict achievement specifically in Biology at the senior secondary level in Nigeria, and Anambra State in particular. Existing Nigerian studies have tended to examine goal orientation either in relation to interest rather than achievement, or within subjects other than Biology, or among older student populations such as college of education students. The present study addresses this gap by isolating the four dimensions of goal orientation and testing their individual and combined predictive power on Biology achievement among senior secondary school year two students, thereby extending the theoretical and empirical conversation into a subject area and population that earlier studies have largely left unexamined.

3. Methodology

The study adopted a correlational predictive research design and was carried out in Anambra State, Nigeria, which comprises three senatorial districts and six education zones, namely Aguata, Awka, Nnewi, Ogidi, Onitsha, and Otuocha. The population comprised 16,236 senior secondary year two Biology students in the state, drawn from statistics obtained from the Post Primary School Service Commission, Awka. A multi-stage sampling procedure was used to select the sample: three of the six education zones were randomly selected, ten schools were then randomly selected from each of the three zones to give thirty schools in all, and twenty-five senior secondary year two Biology students were purposively sampled from each school, yielding an overall sample of 750 students, out of which 600 cases with complete achievement records were retained for the regression analyses reported in this study. Data on students' goal orientation were collected using the Achievement Goal Orientation Questionnaire, a twenty-eight-item instrument adapted from Dowson and McInerney's (2004) Goal Orientation and Learning Strategies Survey and scored on a four-point scale across four sub-scales, namely mastery, performance, mastery-

avoidance and performance-avoidance, while students' achievement was measured using their cumulative Biology scores across three terms obtained from school records.

The instrument was validated for face and content adequacy by three experts from the Departments of Educational Foundations and Science Education at Nnamdi Azikiwe University, Awka, whose observations informed modifications made prior to the reliability test. Reliability was established through a trial test administered to 20 students in the Owerri Education Zone of Imo State, an area outside the actual study location, and the Cronbach's alpha analysis of the responses yielded a coefficient of 0.86, considered sufficiently high for the study. The questionnaire was administered with the assistance of three trained research assistants, who were Biology teachers already familiar with the sampled schools, and who simultaneously assisted in retrieving each student's cumulative Biology achievement record after confirming that all items on the returned instruments had been duly completed. Data collected were analysed using simple linear regression to answer the first research question and test its corresponding hypothesis, and multiple linear regression to answer the second research question and test its corresponding hypothesis, with the coefficient of determination used to establish the variance in achievement accounted for by goal orientation and its dimensions, and all hypotheses tested at the 0.05 level of significance.

4. Results

Research Question 1: What is the predictive power of goal orientation on senior secondary school students' academic achievement scores in Biology?

Table 1: Model Summary for Simple Linear Regression of Goal Orientation on Academic Achievement in Biology

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	.326	.106	.105	7.291

Note. Predictor: (Constant), Goal Orientation. Dependent Variable: Academic Achievement in Biology.

Table 2: Regression Coefficients for Goal Orientation Predicting Academic Achievement in Biology

Model	B	Std. Error	β	T	Sig.
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(Constant)	51.033	2.468	—	20.679	.000
Goal Orientation	9.282	1.101	.326	8.432	.000

Note. Dependent Variable: Academic Achievement in Biology.

Table 1 shows that goal orientation held a positive relationship with students' academic achievement in Biology ($R = .326$), with a coefficient of determination of $R^2 = .106$, indicating that goal orientation accounted for 10.6 percent of the variance in students' achievement scores. Table 2 shows that goal orientation was a significant positive predictor of achievement ($\beta = .326$, $t = 8.432$, $p = .000$), with an unstandardised regression weight of $B = 9.282$. This means that for every one-unit increase in a student's goal orientation score, their Biology achievement increased by approximately 9.28 marks, holding other factors constant.

Hypothesis 1: Secondary school students' goal orientation scores do not significantly predict their academic achievement scores in Biology.

Table 3: ANOVA for Simple Linear Regression of Goal Orientation on Academic Achievement in Biology

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3,779.87	1	3,779.87	71.105	.000
Residual	31,789.29	598	53.16		
Total	35,569.16	599			

Note. Dependent Variable: Academic Achievement in Biology. Predictor: Goal Orientation.

Table 3 presents the analysis of variance testing the overall significance of the regression model. The result yielded $F(1, 598) = 71.105$, $p = .000$. Since this probability value is less than the 0.05 level of significance set for the study, the null hypothesis stating that students' goal orientation scores do not significantly predict their academic achievement in Biology was rejected. Goal orientation therefore stands as a statistically significant predictor of students' academic achievement in Biology in Anambra State.

Research Question 2: What are the contributions of the dimensions of goal orientation (mastery, performance, mastery-avoidance and performance-avoidance) to the prediction of senior secondary school students' academic achievement scores in Biology?

Table 4: Model Summary for Multiple Regression of Dimensions of Goal Orientation on Academic Achievement in Biology

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	.346	.120	.114	7.254

Note. Predictors: (Constant), Mastery, Performance, Mastery-Avoidance, Performance-Avoidance.

Table 5: Regression Coefficients for Dimensions of Goal Orientation Predicting Academic Achievement in Biology

Model	B	Std. Error	β	t	Sig.
(Constant)	49.724	3.110	—	15.989	.000
Mastery	3.119	0.597	.201	5.220	.000
Performance	1.851	0.567	.125	3.262	.001
Mastery-Avoidance	2.712	0.512	.204	5.302	.000
Performance-Avoidance	2.285	0.522	.169	4.377	.000

Note. Dependent Variable: Academic Achievement in Biology.

Table 4 shows that the four dimensions of goal orientation jointly accounted for 12.0 percent of the variance in students' academic achievement in Biology ($R = .346$, $R^2 = .120$, Adjusted $R^2 = .114$). Table 5 shows the individual contribution of each dimension. Mastery-avoidance recorded the highest standardised contribution ($\beta = .204$), closely followed by mastery orientation ($\beta = .201$), then performance-avoidance ($\beta = .169$) and, lastly, performance orientation ($\beta = .125$). Arranged from the highest to the lowest, the order of relative contribution was mastery-avoidance, mastery, performance-avoidance and performance. All four dimensions returned individual t-values that were statistically significant at $p < .05$, with mastery ($t = 5.220$, $p = .000$), performance ($t = 3.262$, $p = .001$), mastery-avoidance ($t = 5.302$, $p = .000$) and performance-avoidance ($t = 4.377$, $p = .000$).

Hypothesis 2: The contributions of the dimensions of goal orientation (mastery, performance, mastery-avoidance and performance-avoidance) to the prediction of students' academic achievement scores in Biology are not significant.

Table 6: ANOVA for Multiple Regression of Dimensions of Goal Orientation on Academic Achievement in Biology

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	4,264.17	4	1,066.04	20.262	.000
Residual	31,304.99	595	52.61		
Total	35,569.16	599			

Note. Dependent Variable: Academic Achievement in Biology.

Table 6 presents the analysis of variance for the multiple regression model, which returned $F(4, 595) = 20.262$, $p = .000$. Because this value is less than the stipulated 0.05 significance level, the null hypothesis stating that the contributions of the dimensions of goal orientation to the

prediction of students' academic achievement scores in Biology are not significant was rejected. All four dimensions, mastery, performance, mastery-avoidance and performance-avoidance, therefore made statistically significant individual contributions to the prediction of students' academic achievement in Biology in Anambra State.

5. Discussion of Findings

The finding that goal orientation significantly predicted students' academic achievement in Biology confirms what a fairly wide body of literature has already suggested about the motivational underpinnings of academic performance. Students do not simply decide to work hard in a vacuum; the goals they privately hold, whether centred on genuine understanding, outperforming peers, or avoiding embarrassment, appear to translate into measurable differences in achievement. This outcome aligns closely with Alasqah (2022), who reported a significant relationship between goal orientation and academic achievement among university students in Saudi Arabia, even amid the disruptions of the COVID-19 pandemic, suggesting that the predictive power of goal orientation is not easily undermined by external instructional conditions. A similar pattern emerged in the work of Venkatesan and Shankar (2022), whose sample of Indian undergraduates showed that goal orientation was significantly related to academic performance, reinforcing the view that the construct operates consistently across different educational systems and cultural settings.

The magnitude of the relationship observed in the present study, accounting for slightly over a tenth of the variance in Biology achievement, is also broadly consistent with Ng'ang'a, Mwaura and Dinga (2018), who found a significant relationship between achievement goal orientation and academic achievement among Kenyan form three students, and with Kavitha and Suthanthiradevi (2022), whose Indian higher secondary sample yielded a comparable pattern of association. That goal orientation predicts achievement across such geographically and culturally distinct populations, from Kenya to India to Saudi Arabia and now to Anambra State, points to a fairly robust underlying mechanism: students who know what they want from their learning, whether that be mastery, recognition, or simply avoiding failure, tend to organise their study behaviour in ways that eventually show up in their scores. The rejection of the corresponding null hypothesis in this study therefore carries a practical message for Biology teachers in Anambra State, namely that helping students clarify and articulate their academic goals is not a peripheral counselling exercise but a factor with direct bearing on achievement outcomes.

When the four dimensions of goal orientation were examined separately, mastery-avoidance emerged as the strongest individual predictor of Biology achievement, narrowly ahead of mastery orientation, with performance-avoidance and performance orientation trailing behind. This ordering deserves careful interpretation because mastery-avoidance is often treated in the literature as a less adaptive orientation than mastery-approach, given that it is rooted in a fear of falling short of one's own standards rather than in a positive pursuit of understanding. Madjar, Bachner and Kushnir (2020), in a study of medical students, cautioned that mastery-avoidance is frequently overlooked in motivational research despite having real consequences for how students engage with demanding content. The present finding lends weight to that caution: in a subject as

conceptually dense and cumulative as Biology, students who are anxious about leaving gaps in their own understanding may, paradoxically, be pushed toward the kind of thorough revision and persistent question-asking that translates into stronger achievement. Seen this way, the anxiety embedded in mastery-avoidance functions less as a purely negative state and more as a spur toward diligence.

The close second-place standing of mastery orientation is more in line with conventional expectations in the literature. Students who work hard because they are genuinely interested in understanding Biology, rather than because they wish to outdo classmates, tend to sustain their effort throughout the academic session rather than only during examination periods. This finding resonates with Senko (2020), who concluded that mastery goals consistently support deep learning and durable achievement gains across diverse classroom conditions, and with Giota and Bergh (2019), whose Swedish longitudinal data showed that mastery orientation was one of the more reliable predictors of adolescent achievement. That performance avoidance, ranked third ahead of performance orientation, is also worth noting. Jury, Bruno and Darnon (2018) found that performance-avoidance goals often carry a protective, if anxious, quality, driven by a fear of underachieving relative to social expectations, and the present result suggests that even this apprehensive form of motivation retains some capacity to push students toward achievement-relevant effort in the Biology classroom. Performance orientation, which recorded the smallest though still significant contribution, may reflect its dependence on external comparison; without regular competitive feedback, the drive to simply outperform others appears less consistently translated into sustained academic behaviour.

These findings depart somewhat from Tahir, Yahaya, Yaduma and Magaji (2025), whose North East Nigerian sample of college of education students showed performance-approach as the strongest correlate of achievement, with performance-avoidance recording no significant relationship at all. The contrast between their result and the present one, where all four dimensions, including performance-avoidance, proved significant, may be attributable to differences between college-level and senior secondary school populations, or to genuine contextual differences between North East and South East Nigeria. What the present study adds to this conversation is dimension-level evidence specific to Biology at the senior secondary level, a level of specificity that earlier Nigerian studies on goal orientation, largely concentrated on Chemistry or on tertiary populations, have not previously provided. The rejection of the null hypothesis across all four dimensions confirms that no single goal orientation dimension can be dismissed as irrelevant to Biology achievement in Anambra State; rather, each dimension, from the confidently mastery-driven to the anxiously avoidance-driven, appears to carry its own distinct weight in shaping how well students eventually perform.

6. Conclusion

This study set out to determine the predictive power of goal orientation, both as a composite construct and as four separate dimensions, on senior secondary school students' academic achievement in Biology in Anambra State. The findings showed that goal orientation, taken as a whole, is a statistically significant predictor of Biology achievement, and that each of its four dimensions, mastery, performance, mastery-avoidance and performance-avoidance, contributes independently and significantly to that prediction, with mastery-avoidance and mastery orientation carrying the greatest individual weight. It can therefore be concluded that the motivational goals students privately hold for their Biology learning are not incidental to their performance but form a genuine and measurable part of what separates high-achieving students from their lower-achieving peers. Biology teachers, counsellors and curriculum planners in Anambra State stand to benefit from treating goal-orientation development, particularly the cultivation of mastery-based motivation, as a deliberate component of instructional practice rather than an incidental by-product of good teaching.

7. Recommendations

Based on the findings of this study, the following recommendations are made:

1. Biology teachers should design classroom activities, such as guided revision tasks and reflective questioning, that deliberately cultivate mastery- and mastery-avoidance-oriented behaviours, given their strong contribution to achievement.
2. School counsellors should organise periodic goal-setting workshops that help students identify and reflect on the academic goals driving their engagement with Biology.
3. Curriculum planners and ministry officials should incorporate structured goal-oriented guidance into science education programmes rather than treating student motivation as a purely informal classroom matter.
4. Biology teachers should provide regular, constructive feedback that helps performance-oriented and performance-avoidance-oriented students redirect their motivation toward more sustainable, mastery-based learning habits.
5. Further research should be conducted to examine how achievement goal orientation dimensions interact with gender, school location and other demographic variables in predicting Biology achievement across other education zones in Nigeria.

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