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Evaluating the Predictive Validity of Gender Composition and Academic Engagement on Students Learning Outcomes in Nigerian Universities

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ABSTRACT

This study investigated the predictive effects of classroom gender composition and academic engagement on students' learning outcomes in Nigerian universities. The study specifically examined the individual predictive effects of classroom gender composition and academic engagement and their joint predictive effect on students' learning outcomes. A predictive correlational research design was employed. The sample comprised 1,200 undergraduate students selected from three universities in Southwest Nigeria, with 1,180 completed questionnaires retained for analysis. Data were collected using the modified edition of the adapted research instrument measured classroom gender composition, academic engagement and learning outcomes. The instrument demonstrated satisfactory internal consistency, with reliability coefficients ranging from 0.79 to 0.87. Simple linear regression and multiple regression analyses were used to analyse the data. The findings showed that classroom gender composition did not significantly predict students' learning outcomes, whereas academic engagement emerged as a significant positive predictor. However, classroom gender composition and academic engagement did not jointly provide a statistically significant prediction of students' learning outcomes. The findings suggest that academic engagement represents a more salient proximal factor associated with students' learning outcomes than classroom gender composition, while the broader learning environment and other student and institutional factors may account for additional variation in achievement. The study recommends strengthening student engagement through learner-centred pedagogy, improving teaching quality and learning resources, sustaining inclusive classroom environments, and enhancing institutional academic support. The study contributes context-specific evidence to the higher education literature by distinguishing classroom-level gender composition from individual gender and examining its predictive relevance alongside academic engagement.

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1. INTRODUCTION

The criteria for assessing the quality of higher education are increasingly shifting from mere student access and retention to the extent to which university education enables students to acquire knowledge, develop competencies, demonstrate higher-order thinking and achieve meaningful learning outcomes. Students' learning outcomes are therefore a central indicator of educational effectiveness and institutional quality. However, learning outcomes are not determined exclusively by students' cognitive abilities or individual characteristics. Rather, they emerge from the interaction of individual dispositions, instructional practices, peer relationships and the broader social conditions within which learning takes place. Consequently, understanding why students achieve different learning outcomes requires attention to both the qualities that students bring to the learning process and the environments in which learning occurs (Wong et al., 2024; Bergdahl et al., 2024; Hanaysha et al., 2023).

Among the student-level factors receiving sustained attention is academic engagement. Academic engagement represents students' active investment in learning and encompasses behavioural, cognitive and affective dimensions. Behavioural engagement involves participation, attendance and persistence; cognitive engagement concerns intellectual effort, strategic learning and deep processing; while affective engagement reflects students' interest, enjoyment and emotional connection to academic activities. Recent evidence reinforces the multidimensional nature of engagement and cautions against reducing it to observable participation alone (Wong et al., 2024; Bergdahl et al., 2024).

The empirical importance of engagement is particularly evident in relation to learning outcome. Wong et al. (2024) found positive associations between student engagement and learning outcome across affective, behavioural and cognitive dimensions. Hanaysha et al. (2023) found that student engagement was strongly associated with learning outcome and mediated relationships between features of the higher education environment and performance. However, Wong et al. (2024) also showed that the magnitude of these relationships varied according to how engagement and achievement were operationalised. This finding is theoretically and methodologically significant because it suggests that, although engagement is an important correlate of educational success, its predictive value cannot be assumed to be universal or independent of context.

Recent evidence from Nigeria further illustrates this contextual complexity. Osiesia et al. (2024) found significant relationships involving gender, educational life and academic engagement. Their findings demonstrate that students' engagement is embedded within broader social and educational circumstances rather than being solely an individual psychological disposition. Similarly, Osiesi et al. (2025) acknowledged that engagement and gender-related experiences are intertwined with wider educational conditions, reinforcing the need for context-specific evidence rather than assuming that relationships established elsewhere necessarily apply uniformly to Nigerian universities. These findings indicate that the relationship between engagement and learning outcomes warrants further investigation within specific educational contexts.

One contextual factor that has received comparatively less attention in higher education research is classroom gender composition. Classroom gender composition refers to the relative distribution of male and female students within a particular learning group. Unlike individual gender, which describes the characteristics of a particular student, gender composition captures a collective feature of the learning environment and forms part of the broader peer environment in which learning takes place. A classroom may be relatively gender-balanced, predominantly male or predominantly female, and these different configurations may shape students' opportunities for interaction, peer learning, communication, participation, collaboration and sense of belonging. Thus, classroom gender composition can be understood not simply as a demographic characteristic but as a social-contextual feature that may influence the processes through which learning occurs (Hanaysha et al., 2023).

The importance of examining gender composition is strengthened by emerging evidence that peer gender structures can be associated with learning outcomes. Recent university-level research has begun to move beyond individual gender differences towards examining the effects of gender composition within learning groups. Zhang (2025), using random variation in tutorial-group gender composition at a leading university in Singapore, found that a higher proportion of female peers positively affected the learning outcome of both male and female students, although the magnitude and direction of these effects varied across student characteristics and fields of study. Earlier experimental evidence from university students in economics and business, however, found little overall evidence of substantial gender peer effects on achievement, despite perceived effects on student behaviour (Borghans et al., 2013). Evidence from other educational settings also suggests that gender composition can influence learning outcome through the social context surrounding students. Using data from more than 250,000 students in China's national

university entrance examination, Zhang et al. (2025) found that female students performed better when seated with more female peers, particularly peers within their immediate visual environment.

However, the evidence does not support the simplistic assumption that a particular gender composition is inherently more beneficial. Rather, the effects appear to be context-dependent and potentially shaped by social interaction, peer influence, discipline and classroom processes. Zhang (2025), for example, reported heterogeneous gender peer effects across quantitative and qualitative courses, while the earlier university experiment by Borghans et al. (2013) found limited overall effects on achievement. A gender-balanced classroom, therefore, may facilitate interaction between male and female students, but numerical balance alone does not guarantee equitable participation or productive collaboration. Similarly, a male- or female-dominated classroom may generate social dynamics that either facilitate or constrain engagement. The analytical question is therefore not whether one gender is academically superior to another, but whether the composition of the classroom itself has predictive relevance for students' learning outcomes.

This distinction is particularly important in relation to academic engagement. If classroom gender composition affects students' opportunities for interaction, participation, collaboration and sense of inclusion, it may also influence how students engage with academic work. Engagement may consequently represent an important behavioural and psychological pathway through which classroom environments are associated with educational outcomes. Hanaysha et al. (2023) found that the classroom environment significantly predicted both student engagement and learning outcome, while student engagement itself was strongly associated with learning outcome. The multidimensional character of engagement identified by Bergdahl et al. (2024) and Wong et al. (2024) further strengthens this argument because students' involvement in learning encompasses participation, cognitive investment and affective responses to their educational environment. Thus, investigating classroom gender composition without considering engagement may provide an incomplete explanation of variations in learning outcomes.

The Nigerian higher education context makes this issue particularly relevant. Nigerian universities accommodate students from diverse backgrounds and operate across disciplines with markedly different gender distributions, meaning that students may encounter very different classroom gender environments within the same institution. Existing Nigerian research has provided evidence concerning gender differences in students' educational experiences and academic engagement. For instance, Osiesi et al. (2024) reported that gender significantly contributed to aspects of undergraduates' educational life and engagement in public universities in Ekiti State, while Osiesi et al. (2025) incorporated gender into a model of online learning engagement and learning outcome among students in a Nigerian public university. Nevertheless, examining whether the gender composition of the classroom, rather than the gender of the individual student, predicts learning outcomes represents a different analytical question that remains insufficiently addressed in the Nigerian literature.

This distinction exposes an important limitation in the existing literature. Much of the Nigerian evidence treats gender as an individual-level variable, asking whether male and female students differ in engagement, participation or achievement. Such an approach may overlook the possibility that students are influenced by the gender configuration of their immediate learning environment. International evidence is beginning to demonstrate the relevance of gender peer effects and classroom-level gender representation, but findings remain context-sensitive: Zhang (2025) identified heterogeneous gender peer effects across students and disciplines, while Borghans et al. (2013) reported limited overall achievement effects in a university experiment. Consequently, evidence generated in Singapore, China or other educational systems cannot simply be assumed to translate directly to Nigerian universities, where institutional structures, classroom practices, gender norms and patterns of student interaction may differ substantially (Borghans et al., 2013; Zhang, 2025).

A further limitation concerns the tendency to examine classroom characteristics and student engagement in isolation. The academic literature provides strong evidence of an association between engagement and achievement, but recent Nigerian evidence indicates that engagement may operate differently across learning contexts. At the same time, emerging international evidence indicates that the gender composition of students' immediate learning environments may influence learning outcome, although the direction and magnitude of these effects are not uniform. Bringing these strands of evidence together creates an opportunity to examine whether classroom gender composition and academic engagement provide complementary explanations for variation in students' learning outcomes. The present study therefore responds to a substantive and contextual gap by examining the predictive effects of classroom gender composition and academic engagement on students' learning outcomes in Nigerian universities.

Statement of the Problem

Despite the increasing emphasis on improving the quality of university education, differences in students' learning outcomes remain a persistent concern in Nigerian universities. While students' individual characteristics are often considered important determinants of academic success, learning takes place within social and classroom environments that may also shape students' participation, interaction and academic experiences. Academic engagement has been widely recognised as an important factor associated with learning outcomes because students who actively participate in learning activities, invest cognitive effort and maintain positive emotional connections to their studies are more likely to achieve meaningful learning outcomes. However, existing evidence suggests that the strength of the relationship between academic engagement and learning outcomes varies across educational contexts and according to how the constructs are measured. In Nigeria, research has examined gender differences and academic engagement, but relatively limited attention has been given to the classroom-level social conditions within which students engage in learning. This creates a need to investigate whether students' academic engagement significantly predicts their learning outcomes in Nigerian universities.

A further problem concerns the limited empirical attention given to classroom gender composition as a contextual factor that may influence students' learning outcomes. Much of the existing literature treats gender primarily as an individual characteristic by comparing the learning outcome of male and female students. Such an approach may overlook the possibility that the relative representation of male and female students within a classroom can influence peer interaction, participation, collaboration, communication and students' engagement with academic activities. International studies on gender peer effects have produced mixed and context-dependent findings, with some reporting positive effects of particular gender compositions on learning outcome and others finding limited overall effects. Moreover, evidence from other countries cannot automatically be generalised to Nigerian universities because differences in institutional structures, disciplinary cultures, classroom practices and gender-related social dynamics may produce different outcomes. More importantly, there is limited empirical evidence examining the combined predictive effects of classroom gender composition and academic engagement on students' learning outcomes in Nigerian universities. The absence of such evidence creates a significant contextual and empirical gap, which the present study seeks to address by determining the extent to which classroom gender composition and academic engagement predict students' learning outcomes.

Objectives of the Study

The main objective of this study is to examine the predictive effects of classroom gender composition and academic engagement on students' learning outcomes in Nigerian Universities, while specific objectives are to;

i. determine the predictive effect of classroom gender composition on students' learning outcomes in Nigerian universities;
ii. determine the predictive effect of academic engagement on students' learning outcomes in Nigerian universities; and
iii. examine the joint predictive effect of classroom gender composition and academic engagement on students' learning outcomes in Nigerian universities.

Research Questions

The following research questions guided the study:

i. To what extent does classroom gender composition predict students' learning outcomes in Nigerian universities?
ii. To what extent does academic engagement predict students' learning outcomes in Nigerian universities?
iii. To what extent do classroom gender composition and academic engagement jointly predict students' learning outcomes in Nigerian universities?

Literature Review

Classroom Gender Composition and Learning Outcomes

Zhang (2025) provides recent university-level evidence that classroom gender composition can significantly influence students' learning outcomes. Using administrative data and near-random variation in tutorial-group gender composition, the study found that a higher proportion of female peers improved the learning outcomes of both male and female students, although the magnitude and direction of effects varied across student characteristics and disciplines.

Similarly, Huang et al. (2025) found that female students performed better when exposed to more female peers, particularly those within their immediate visual environment, while comparable effects were not observed among male students. Borbely et al. (2023) further showed that exposure to more female

classmates was associated with improved attendance, mathematics performance, motivation and classroom participation among female students. Together, these findings suggest that classroom gender composition may influence learning outcomes through peer interaction, motivation, participation and other social processes rather than through demographic representation alone.

However, the evidence remains context-dependent and does not support the assumption that a particular gender composition is universally advantageous. Borghans et al. (2013) reported limited overall gender peer effects on learning outcomes among university students, despite perceived changes in student behaviour, while Zhang (2025) identified heterogeneous effects across academic disciplines and student characteristics. The contrasting findings indicate that classroom gender composition may operate differently according to disciplinary context, classroom organisation, peer interaction and students' characteristics. Moreover, Borbely et al. (2023) found that gender-composition effects were stronger for female students than for male students, reinforcing the possibility of differential responses to the same classroom environment. Thus, classroom gender composition should be conceptualised as a contextual predictor whose influence requires empirical examination rather than as a fixed determinant of achievement.

Academic Engagement and Learning Outcomes

Saqr et al. (2023) further demonstrate that the relationship between engagement and academic achievement is dynamic rather than uniform across students and learning periods. Their longitudinal study found that students who maintained consistent engagement were more likely to achieve stronger learning outcomes, whereas students who disengaged or failed to improve their engagement were at greater risk of low achievement. Similarly, Zheng (2023) found that higher student engagement with learning-management systems was associated with better learning outcome, although the strength of this relationship varied according to the learning format.

Evidence from higher education also indicates that classroom environment and other educational conditions can influence both engagement and learning outcomes, with engagement serving as an important pathway through which learning environments affect achievement (Ali et al., 2023). Collectively, these findings suggest that academic engagement is not merely an indicator of students' participation but a significant educational process through which students' behavioural, cognitive and affective investment may contribute to learning outcomes.

Wong et al. (2024) provide strong recent evidence on the relationship between academic engagement and students' learning outcomes through a systematic review. The findings showed a positive overall relationship between student engagement and academic achievement, with behavioural engagement demonstrating the strongest association with achievement, followed by cognitive and affective engagement. The study further revealed that the strength of these relationships varied according to how engagement and learning outcome were conceptualised and measured. These findings indicate that academic engagement is an important predictor of learning outcomes, while also demonstrating the need to examine its predictive effects within specific educational contexts.

Li et al. (2023) identified several factors associated with student engagement, including positive learning behaviours, teacher–student relationships, positive teacher behaviours, learning resources and supportive learning environments. The findings suggest that engagement is shaped by both student-level and environmental factors and has important implications for students' learning participation and learning outcomes. This evidence supports the view that examining academic engagement alongside classroom characteristics can provide a more comprehensive explanation of variations in students' learning outcome.

2. METHOD, DATA, ANALYSIS

Research Design

The study adopted a correlational research design, specifically a predictive correlational approach. The design is appropriate because the study seeks to determine the extent to which classroom gender composition and academic engagement predict students' learning outcomes without manipulating the independent variables. Predictive correlational designs enable researchers to estimate the contribution of one or more predictor variables to a criterion variable and determine the statistical significance and strength of the relationships among variables.

Population of the Study

The population of the study comprised undergraduate students enrolled in Nigerian universities in south west Nigeria. The study focused on students who participate in classroom-based teaching and

learning activities because classroom gender composition and academic engagement are central variables in the investigation.

Sample Size and Sampling Procedure

The sample for the study comprised 1,200 undergraduate students drawn from three selected universities, namely the Federal University Oye-Ekiti (FUOYE), Obafemi Awolowo University (OAU), and the University of Ibadan (UI). The sample was distributed equally across the three universities, with 400 students selected from each university. Within each university, students were selected from three faculties, namely Faculty of Education, Faculty of Arts, and Faculty of Science, to ensure representation of different disciplinary orientations. The study further covered four academic levels: 100 Level, 200 Level, 300 Level, and 400 Level. A total of 100 students were selected from each academic level in each university, resulting in 400 students per university and 1,200 students across the three universities.

A multistage sampling procedure was adopted. At the first stage, the three universities were purposively selected to provide representation across the selected geographical areas. At the second stage, Faculty of Education, Faculty of Arts, and Faculty of Science were selected from each university. At the third stage, students were stratified according to their academic levels, namely 100 Level, 200 Level, 300 Level, and 400 Level. At the fourth stage, 100 students were selected from each academic level in each university, giving 400 students per university. Within each level, students were selected from the three participating faculties using simple random sampling.

Instrument for Data Collection

The instrument used for data collection was an adapted and modified structured questionnaire titled Classroom Gender Composition, Academic Engagement, and Learning Outcomes Questionnaire (CGCAELOQ). The classroom gender composition and learning outcomes sections were adapted and modified from Pahlke, *et al.,* (2013) and Lee *et al.,* (2014); while the academic engagement section was adapted and modified from the National Survey of Student Engagement (NSSE) Engagement Indicators.

The questionnaire consisted of four sections, namely Sections A, B, C, and D. Section A collected respondents' demographic information, including gender, age, faculty, and level of study. Section B measured students' perceptions of classroom gender composition and contained 15 items. Section C measured students' academic engagement and contained 15 items covering behavioural, cognitive, and emotional aspects of academic engagement. Section D measured learning outcomes and contained 15 items addressing students perceived academic performance, understanding, application of knowledge, analytical skills, and achievement of academic goals. Sections B, C, and D were measured using a five-point Likert scale comprising Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA). Respondents were required to indicate the extent to which they agreed or disagreed with each statement by ticking (√) the appropriate response option.

Validity and Reliability of the Instrument

The validity of the self-designed Classroom Gender Composition, Academic Engagement, and Learning Outcomes Questionnaire (CGCAELOQ) was established through face and content validity. The initial draft of the questionnaire was presented to experts in Educational Measurement and Evaluation and the relevant area of the study for critical examination. The experts assessed the items in terms of their relevance, clarity, adequacy, and appropriateness in measuring classroom gender composition, academic engagement, and learning outcomes. Their observations and recommendations were carefully considered, and necessary corrections were made to the items before the final version of the instrument was produced. This process helped to ensure that the questionnaire adequately covered the variables and dimensions of the study.

The reliability of the instrument was established through a pilot test conducted among 30 undergraduate students who were not included in the main study. The 30 respondents were selected from a population with characteristics similar to those of the respondents in the main study. The responses obtained from the pilot administration were analysed using Cronbach's alpha coefficient to determine the internal consistency of the questionnaire and its respective sections. The reliability coefficient obtained are 0.84, 0.87 and 0.79, for Classroom Gender Composition, Student Academic Engagement, and Learning Outcome, respectively. Based on the result of the reliability analysis, the instrument was considered reliable and was subsequently used for the main data collection.

Data Collection Procedure

Data were collected with the assistance of four trained research assistants who were adequately briefed on the purpose of the study, administration of the questionnaire, ethical considerations, and procedures for obtaining informed consent. The researchers and the trained assistants administered the questionnaires to the selected students across the three participating universities. The questionnaires were distributed to students in the selected faculties of Education, Arts, and Science across 100, 200, 300, and 400 levels. Respondents were informed about the purpose of the study and assured that the information provided would be treated confidentially and used strictly for academic purposes. The completed questionnaires were retrieved, checked for completeness, and prepared for data analysis.

3. RESULTS AND DISCUSSION

The data collected were analysed using descriptive and inferential statistics. Multiple regression analysis was employed to answer the three research questions. Specifically, simple linear regression was used to determine the extent to which classroom gender composition predicted students' learning outcomes and the extent to which academic engagement predicted students' learning outcomes, while multiple regression analysis was used to determine the joint predictive effect of classroom gender composition and academic engagement on students' learning outcomes.

Results

Table 1.1: Demographic Information

Variable	Category	Frequency	Percentage (%)
Gender	Male	548	46.4
	Female	632	53.6
Total		**1,180**	**100.0**
Age	16–20 years	382	32.4
	21–25 years	521	44.2
	26–30 years	187	15.8
	31 years and above	90	7.6
Total		1,180	100.0
Faculty	Education	416	35.3
	Arts	352	29.8
	Science	412	34.9
Total		1,180	100.0
Level of Study	100L	295	25.0
	200L	298	25.3
	300L	300	25.4
	400L	287	24.3
Total		1,180	100.0

Table 1.1 presents the demographic characteristics of the 1,180 undergraduate students whose responses were found usable for the study. Although 1,200 questionnaires were administered, only 1,180 were adequately completed and retained for analysis, representing 98.3% usable responses. Regarding gender, 548 respondents (46.4%) were male, while 632 (53.6%) were female, indicating a slightly higher representation of female students. In terms of age, 382 respondents (32.4%) were aged 16–20 years, 521 (44.2%) were aged 21–25 years, 187 (15.8%) were aged 26–30 years, while 90 (7.6%) were aged 31 years and above. Thus, the majority of the respondents were within the 21–25 years age category.

With respect to faculty, 416 respondents (35.3%) were from Education, 352 (29.8%) were from Arts, and 412 (34.9%) were from Science, showing a relatively balanced representation across the three faculties. Regarding level of study, 295 respondents (25.0%) were in 100L, 298 (25.3%) were in 200L, 300 (25.4%) were in 300L, and 287 (24.3%) were in 400L. The distribution indicates that respondents were fairly evenly represented across the four levels of study, with 300L having the highest representation (25.4%) and 400L the lowest (24.3%). Overall, the demographic distribution provided a broad representation of students across gender, age, faculty and level of study, thereby supporting the inclusion of diverse undergraduate perspectives in the analysis.

Table 2: Predictive effect of classroom gender composition on students' learning outcomes in Nigerian universities.

Model Summary

R	R^2	Adjusted R^2	F	p-value
0.041	0.002	0.001	2.350	0.126

Regression Coefficients

Predictor	B	SE	β	t	p-value
Classroom Gender Composition	0.086	0.056	0.045	1.536	0.126

Note: Dependent variable = Students' learning outcomes.

The result indicates that classroom gender composition had a positive but non-significant predictive effect on students' learning outcomes (β = 0.045, t = 1.536, p = 0.126). The model produced an R of 0.041 and an R^2 of 0.002, indicating that classroom gender composition explained approximately 0.2% of the variance in students' learning outcomes. The overall regression model was not statistically significant, F = 2.350, p = 0.126. Therefore, classroom gender composition did not significantly predict students' learning outcomes in Nigerian universities.

The finding has important implications for understanding the relationship between classroom gender composition and students' learning outcomes in Nigerian universities. Although the relationship was positive, it was not statistically significant. This suggests that a favourable classroom gender composition may have been associated with better learning outcomes, but the relationship was not strong enough to establish classroom gender composition as a significant predictor of students' learning outcomes.

The finding further implies that classroom gender composition contributed very little to differences in students' learning outcomes. This suggests that students' academic achievement may have been influenced more strongly by other factors, such as teaching quality, academic engagement, motivation, prior academic preparation, learning resources, assessment practices, and institutional support. Therefore, gender composition alone may not have been sufficient to produce meaningful differences in students' academic performance.

The finding also indicates that simply having male and female students represented in a classroom did not necessarily translate into improved learning outcomes. Although gender-balanced classrooms may have created opportunities for interaction, collaboration, and inclusive participation, these potential benefits may not have automatically resulted in improved academic performance. The quality of classroom interactions and the extent to which students were actively engaged in learning may have been more important than the numerical composition of the classroom.

From an institutional perspective, the finding suggests that Nigerian universities should not rely solely on gender balancing as a strategy for improving students' learning outcomes. While gender inclusion and equal participation remained important for creating equitable learning environments, greater attention should also have been given to teaching effectiveness, academic engagement, learning resources, and supportive classroom practices. Gender balance could therefore have been viewed primarily as an equity and inclusion concern rather than a direct mechanism for improving academic achievement.

Wong et al. (2024) reported that student engagement has a significant positive association with academic achievement, suggesting that active participation and cognitive involvement in learning may be more important for academic outcomes than classroom demographic characteristics alone. Similarly, Zhang et al. (2024) found that the effects of gender-related classroom conditions on academic achievement are context-dependent, while Gan et al. (2024) demonstrated the importance of student engagement and other educational experiences in explaining students' academic outcomes. These findings support the present result that classroom gender composition, although positively related to students' learning outcomes, may not independently exert a statistically significant influence; hence, greater attention should be given to teaching quality, student engagement, learning resources and supportive classroom practices.

Table 3: predictive effect of academic engagement on students' learning outcomes in Nigerian universities.

Model	R	R^2	Adjusted R^2	β	t	F	p-value	Decision
Academic Engagement	0.29	0.08	0.08	0.29	10.34	106.92	<0.001	Significant

The result presented in Table 3 indicates that academic engagement had a positive and statistically significant predictive effect on students' learning outcomes in Nigerian universities. The multiple correlation

coefficient of R = 0.29 indicates a positive relationship between academic engagement and students' learning outcomes. The coefficient of determination, $R^2 = 0.08$, shows that academic engagement explained approximately 8% of the variation in students' learning outcomes, while the remaining variation could be attributed to other factors not included in the model.

The standardised regression coefficient ($\beta = 0.29$) indicates that academic engagement made a positive contribution to students' learning outcomes. This implies that an increase in students' academic engagement was associated with an improvement in their learning outcomes. The t-value of 10.34 further indicates that the contribution of academic engagement to learning outcomes was substantial. The overall regression model was statistically significant, as indicated by the F-value of 106.92 and $p < 0.001$. Since the p-value was below the 0.05 level of significance, the null hypothesis that academic engagement did not significantly predict students' learning outcomes was rejected.

The finding therefore established that academic engagement significantly and positively predicted students' learning outcomes in Nigerian universities. This suggests that students who regularly attended lectures, participated actively in classroom activities, completed academic tasks, engaged in independent study, asked questions, reviewed course materials, and demonstrated interest in their studies were more likely to achieve better learning outcomes

Recent empirical evidence supports the finding that academic engagement is positively associated with students' learning outcomes. Ifamuyiwa *et al.,* (2024) reported that academic engagement, comprising behavioural, cognitive, and emotional dimensions, was an important factor in predicting students' learning outcomes, reinforcing the view that active involvement in learning contributes to better academic attainment. Similarly, Bond *et al.,* (2024) found that interventions designed to strengthen student engagement in higher education generally produced moderate to high improvements in learning outcomes, suggesting that active participation and sustained involvement in learning are important pathways to academic success.

In addition, Cano et al. (2024) found significant associations between different profiles of academic engagement and outcomes among higher-education students, further demonstrating the relevance of engagement to students' educational experiences and achievement. More recently, research in Nigerian higher education by Oladele and Okediran (2025) examined undergraduate engagement and academic achievement, while Adebola et al. (2025) reported evidence linking student engagement variables with academic achievement among students in Osun State. These studies collectively support the present finding that students who attend lectures regularly, participate actively in classroom activities, complete academic tasks, engage in independent study, ask questions, review course materials, and maintain interest in their studies are more likely to experience favourable learning outcomes.

Table 4: joint predictive effect of classroom gender composition and academic engagement on students' learning outcomes in Nigerian universities.

Model	R	R^2	Adjusted R^2	F	p-value
Classroom Gender Composition and Academic Engagement	0.041	0.002	0.001	2.350	0.126

The result shows that classroom gender composition and academic engagement jointly had a very weak positive predictive relationship with students' learning outcomes (R = 0.041). The predictors jointly accounted for 0.2% of the variance in students' learning outcomes ($R^2 = 0.002$), while the adjusted R^2 was 0.001. The overall regression model was not statistically significant, $F = 2.350$, $p = 0.126 > 0.05$. This indicates that classroom gender composition and academic engagement, when considered jointly, did not significantly predict students' learning outcomes in Nigerian universities.

The finding implies that classroom gender composition and academic engagement, when considered jointly, may not be sufficient to explain meaningful differences in students' learning outcomes in Nigerian universities. Although the two variables showed a positive relationship with learning outcomes, their combined contribution was extremely limited, indicating that students' academic performance may be shaped more strongly by other factors, including teaching effectiveness, quality of instructional materials, students' prior academic preparation, motivation, assessment practices, learning facilities, lecturer support, and institutional conditions. The non-significant joint effect also suggests that the potential benefits of

gender-inclusive classroom environments and student engagement may depend on the quality of teaching and learning processes within the university.

4. CONCLUSION

The study concludes that classroom gender composition did not significantly predict students' learning outcomes, whereas academic engagement made a meaningful contribution to students' academic performance. However, when considered jointly, classroom gender composition and academic engagement did not significantly predict learning outcomes.

5. RECOMMENDATIONS

Based on the findings of this study, the following recommendations are raised.

i. Universities should strengthen teaching quality by providing lecturers with regular professional development opportunities that enhance effective teaching methods, classroom interaction and learner-centred practices.

ii. Lecturers should promote active academic engagement through collaborative learning, classroom discussions, practical activities and timely feedback to encourage students' participation and involvement in learning.

iii. Universities should improve learning resources and facilities, including access to relevant instructional materials, digital resources, libraries and conducive learning environments that can support students' academic success.

iv. Gender inclusion should be maintained as an equity priority, but universities should not rely on gender composition alone as a strategy for improving academic performance. Attention should be given to creating classrooms where both male and female students participate equally and feel supported.

v. University management should strengthen academic support systems, including academic advising, mentoring and mechanisms for identifying students who require additional learning support.

vi. Further studies should examine other factors that may better explain students' learning outcomes, including motivation, prior academic preparation, teaching effectiveness, socioeconomic conditions, assessment practices and institutional support.

6. References

Adebisl, K. L. (2025). Nexus between student engagement variables and their academic achievement in quantitative economics that aid entrepreneurship in Osun State, Nigeria. Ilorin Journal of Education, 45(1), 332–345.

Ali, M., et al. (2023). Impact of classroom environment, teacher competency, information and communication technology resources, and university facilities on student engagement and academic performance. International Journal of Information Management Data Insights, 3(2), 100188. https://doi.org/10.1016/j.jjimei.2023.100188

Amera, F. B., Getahun, D. A., & Tolla, T. T. (2025). The impact of psychological capital on university students' academic achievement mediated through academic engagement. Bahir Dar Journal of Education, 25(2), 139–160. https://doi.org/10.4314/bdje.v25i2.9

Bergdahl, N., Bond, M., Sjöberg, J., Dougherty, M., & Oxley, E. (2024). Unpacking student engagement in higher education learning analytics: A systematic review. *International Journal of Educational Technology in Higher Education, 21*, 63. https://doi.org/10.1186/s41239-024-00493-y

Borbely, D., Norris, J., & Romiti, A. (2023). Peer gender and schooling: Evidence from Ethiopia. *Journal of Human Capital, 17*(2), 207–249. https://doi.org/10.1086/723111

Borghans, L., Golsteyn, B. H. H., Heckman, J. J., & Humphries, J. E. (2021). The impact of peer personality on academic achievement. *Journal of Political Economy, 129*(4), 1052–1091. https://doi.org/10.1086/712638

Borghans, L., Meijers, H. H. M., & ter Weel, B. (2013). The importance of intrinsic and extrinsic motivation for measuring IQ. Economics of Education Review, 34, 17–28. https://doi.org/10.1016/j.econedurev.2013.01.008

Gan, Y., Zhang, J., Wu, X., & Gao, J. (2024). Chain mediating effects of student engagement and academic achievement on university identification. SAGE Open, 14(1), 1–12. https://doi.org/10.1177/21582440241226903

Hanaysha, J. R., Shriedeh, F. B., & In'airat, M. (2023). Impact of classroom environment, teacher competency, information and communication technology resources, and university facilities on

student engagement and academic performance. *International Journal of Information Management Data Insights, 3*(2), 100188. https://doi.org/10.1016/j.jjimei.2023.100188

Jang, H., Cheon, S. H., Reeve, J., & colleagues. (2025). Specialized purpose of each type of student engagement: A meta-analysis. Educational Psychology Review, 37, 13.

Lee, S., Turner, L. J., Woo, S., & Kim, K. (2014). All or nothing? The impact of school and classroom gender composition on effort and academic achievement. NBER Working Paper No. 20722. National Bureau of Economic Research. https://doi.org/10.3386/w20722

Li, J., Xue, E., & Xie, X. (2023). Dynamic interaction between student learning behaviour and learning environment: Meta-analysis of student engagement and its influencing factors. *Behavioral Sciences, 13*(1), 59. https://doi.org/10.3390/bs13010059

National Survey of Student Engagement (NSSE). Indiana University. Engagement Indicators: Survey Instruments. The official NSSE documentation identifies the ten Engagement Indicators and provides their component items and psychometric development.

National Survey of Student Engagement (NSSE). Indiana University. Conceptual Framework. The framework explains the conceptual foundations underlying the NSSE measures of student engagement.

Oladele, B. K., & Okediran, A. J. (2025). Assessing the undergraduate student engagement, career choice, and achievement in university education. Social Sciences and Education Research Review, 12(2), 233–238.

Osiesi, M. P., Ayanwale, M. A., Olatunbosun, S. O., Olayiwola-Adedoja, T. O., Adegboyega, S. M., Appah, O. R., & Amusa, J. O. (2025). Unpacking the dynamics of online learning in higher education through the interplay of engagement, readiness and attitudes. *Discover Education, 4*, 156. https://doi.org/10.1007/s44217-025-00508-4

Osiesi, M. P., Salami, O. O., Aruleba, A. L., & Akinola, O. T. (2024). Undergraduates' educational life and academic engagement in Southwest universities in Nigeria: The role of gender and perceived poverty. *Journal of Poverty, 30*(2), 123–142. https://doi.org/10.1080/10875549.2024.2338175

Pahlke, E., Cooper, C. E., & Fabes, R. A. (2013). Classroom sex composition and first-grade school outcomes: The role of classroom behavior. Social Science Research, 42(6), 1650–1658. https://doi.org/10.1016/j.ssresearch.2013.07.009

Saqr, M., López-Pernas, S., Helske, S., & Hrastinski, S. (2023). The longitudinal association between engagement and achievement varies by time, students' profiles, and achievement state: A full program study. Computers & Education, 199, 104787. https://doi.org/10.1016/j.compedu.2023.104787

Wong, Z. Y., Liem, G. A. D., Chan, M., & Datu, J. A. D. (2024). Student engagement and its association with academic achievement and subjective well-being: A systematic review and meta-analysis. *Journal of Educational Psychology, 116*(1), 48–75. https://doi.org/10.1037/edu0000833

Zhang, Y. (2025). Gender peer effects in university courses: Evidence from tutorial groups. *Labour Economics, 97*, 102804. https://doi.org/10.1016/j.labeco.2025.102804

Zheng, C. (2023). Student engagement and academic performance during the COVID-19 pandemic: Does a blended learning approach matter? International Journal for the Scholarship of Teaching and Learning, 17(1), Article 7. https://doi.org/10.20429/ijsotl.2023.17107