Influence of Self and Peer-Assessment in Enhancing Mathematics Performance among Adolescents in Lagos-state"(Implications for Evaluators).

AKANNI, OLUBUKOLA OLUTOSIN (Ph.D)
Orcid Id.:0000-0002-8860-767x
Department of Educational Foundations, (With Educational Psychology)
University of Lagos, Akoka, Nigeria.
E-mail:oakanni@unilag.edu.ng or drakanni.olubukola@yahoo.com

Abstract

In Nigerian secondary schools, traditional assessment practices are predominantly teacher-led and largely depend on summative testing. While these methods serve evaluative purposes, they often fall short in promoting students' active engagement and metacognitive growth. Conversely, 21st-century assessment approaches emphasize learner-centered strategies that encourage students to take ownership of their learning. This study investigated the transformative influence of self and peer assessment as formative evaluation strategies in enhancing mathematics performance among adolescents in Lagos State, Nigeria. The study employed a quasi-experimental control group design, with Senior Secondary School Two (SS2) students in public schools as the population. A multi-stage sampling technique was used to select participants. Instruments for data collection was a researcher-developed questionnaire titled Influence of Self and Peer Assessment on Mathematics Performance (ISPAMP) and a Mathematics Achievement Test (MAT), with Cronbach's Alpha reliability coefficient of 0.794 for the questionnaire and MAT yielded 0.82. Three research hypotheses were formulated and tested at the 0.05 level of significance. Findings revealed that self and peer assessment had a significant positive effect on students' mathematics performance. Learners who participated in structured self and peer evaluation demonstrated higher achievement levels and developed more positive attitudes toward mathematics compared to those assessed using traditional methods. The study therefore recommends that schools and educational stakeholders in Lagos State and beyond should adopt self and peer assessment as integral components of classroom assessment practices, particularly in mathematics education. Teachers should be equipped through professional development programs to effectively design, implement, and monitor these strategies using well-structured rubrics, feedback protocols, and reflective tools.

Keywords: **Adolescents, Influence, M*athematics Performance, Self and Peer-assessment.***

Introduction

In the 21st century, educational systems worldwide are shifting from traditional assessment models toward more learner-centered and formative approaches. This transformation recognizes assessment not merely as a grading tool, but as a powerful mechanism for improving

learning. Among these innovative strategies, self- and peer-evaluation have emerged as vital components of formative assessment, fostering student engagement, reflection, and accountability. Assessment provides valuable feedback to both teachers and students on progress toward learning objectives and supports informed decision-making in the teaching–learning process. However, traditional forms of assessment, such as teacher-made achievement tests, often provide limited opportunities for students to develop metacognitive skills, which are essential for deep learning (Nicol & Macfarlane-Dick, 2006).

In contrast, self- and peer-assessment offer opportunities for reflection and metacognitive growth (Boud, 1995; Topping, 1998). Self-assessment involves students evaluating their own work against criteria, while peer-assessment engages them in evaluating one another's work. Research evidence suggests that both approaches can enhance learning outcomes across subjects, including mathematics (Nicol & Macfarlane-Dick, 2006; Black & Wiliam, 1998). For example, Topping and Ehly (1998) found that peer-assessment in mathematics improved not only achievement but also students' attitudes toward the subject. Similarly, Falchikov and Goldfinch (2000) reported that self-assessment supported motivation, confidence, and achievement

Self and peer-assessment can help to promote a more collaborative and supportive learning environment. Moreover, self and peer-assessment should be used in conjunction with other forms of assessment, such as teacher-administered tests, to provide a more comprehensive and accurate picture of students' learning outcomes (Boud, 2025; Nicol and Macfarlane-Dick, 2016). By working together to evaluate their own and each other's work, students can develop a sense of shared responsibility for their learning and a greater appreciation for the diversity of perspectives and approaches to problem-solving. However, the success of self and peer-assessment depends on the quality of the criteria used for evaluation and the training provided to students (Topping and Ehly, 2023; Falchikov and Goldfinch, 2000).

Self and peer-assessment have the potential to enhance students' learning outcomes in mathematics and promote a more collaborative and supportive learning environment However, traditional approach to assessment leaves much than what is desired as it is highly teacher-centered; this is corroborated by Asuai and Adeleye (2013) that in traditional method of assessment, students are seen as passive receivers of information in the classroom, the teachers serve as both personnel who give out instructions and as the judge who evaluate the student achievement. Similarly, Shams and Tavakoli (2014) asserted that only the teacher alone has the power to make decisions on what is learned and how it is assessed. This makes the learners to be ignorant of required standard for grading as contained in examiners rubrics; hence their inability to provide responses accordingly.

Conversely, traditional approach to classroom assessment being adopted by the teachers fails to avail the learners with the skills applicable to solve majority of classroom problems. In our usual classroom assessment, only the teachers have the knowledge of the scoring guides which are criteria for judging the

quality of the responses given by a student in an examination. By this, we have methods of assessment which is not only negatively impacting attitude to learning but also promoting poor performance of students especially in external examinations. The attempts to alter this ugly state of affair have gained acute attention of scholars in the literatures with prescription of self and peer-assessment techniques among others as alternative approaches to ameliorate the shortcomings inherent in traditional system of classroom assessment.

Self-assessment is a **formative evaluation process** in which students **reflect on and evaluate their own learning, performance, or progress** based on defined criteria. It encourages learners to think critically about their strengths, weaknesses, and learning strategies. Unlike traditional assessment, self-assessment **shifts the role of evaluation from the teacher to the learner**, making students **active participants** in their educational journey.Ying and Liping (2016) opined that self-assessment involves students, guided by the teacher, who decides what the appropriate assessment criteria are, and then sees how well they have met these criteria. Self-assessment is defined as the ability of a student to judge his/her performance, to make decisions about one's self and one's abilities. It involves students judging the quality of their work, based on evidence and explicit criteria for the purpose of doing better work in the future. Blatchford (2017) in Brian and Rancy (2005) described self-assessment as a specific element of student self-concept, that is, academic achievement involve(s) judgments of one's own attainment in relation to other children.

In the same vein, Hamid and Marziyeh (2015), opined that self-assessment is an attractive alternative to traditional forms of assessment for the classroom teacher. It is a kind of metacognitive strategy which deserves special attention. Also, it helps students develop the characteristics of the good language learner, which involves the ability to assess their own performance and the ability to be self-critical. It also helps learners develop students" independent learning skills and to determine their own objectives and to monitor their progress. Those who use self-assessment argue that total reliance on teacher assessment results in students not assuming any responsibility for their own learning, and also it encourages dependency on the teacher.. There are several key concepts associated with self-assessment, including:

1. **Self-awareness:** The ability to accurately recognize and understand one's own emotions, thoughts, and behaviors.
2. **Self-reflection:** The process of thinking about and analyzing one's own experiences, actions, and thoughts.
3. **Self-evaluation:** The act of assessing personal performance and progress against established goals or standards.
4. **Self-improvement:** The process of taking action to enhance one's skills, knowledge, and performance in a particular area.
5. **Self-advocacy:** The ability to communicate effectively about one's own needs, goals, and accomplishments.

There are different types of self- assessment methods, they are highlighted below:

1. **Descriptive/Narrative Self-Assessment**: Students **write reflections** about their learning experience, performance, or understanding. Example: "I struggled with solving quadratic equations because I didn't understand the factoring method."
2. **Checklist-Based Self-Assessment**: Learners use a **yes/no checklist** to determine whether they have completed specific learning tasks or met objectives. Example: ✓ I completed all the questions. ✓ I checked my answers.
3. **Rubric-Based Self-Assessment**: Students use a **scoring rubric** to rate themselves on various aspects of a task. Example: 4 = Excellent understanding of the concept; 1 = Needs improvement.
4. **Rating Scale Self-Assessment**: Uses **Likert-type scales** (e.g., 1 to 5) to measure confidence, understanding, or effort. Example: "Rate your understanding of today's lesson from 1 (low) to 5 (high)."
5. **Goal-Setting and Reflection**: Students **set learning goals**, assess progress toward them, and reflect on outcomes. Example: "My goal was to improve in algebra. I practiced 3 times a week and now feel more confident."
6. **Portfolios for Self-Assessment**: Learners **collect and evaluate their work over time**, reflecting on their growth and areas needing improvement.

Characteristics of Effective Self-Assessment

The following are the characteristics of an effective self-assessment method:

1. **Learner-Centered**: Places students at the heart of the learning and evaluation process.
2. **Guided by Clear Criteria**: Involves rubrics, checklists, or learning goals that help students assess accurately.
3. **Reflective**: Encourages thinking about learning processes, strategies, and results.
4. **Constructive and Honest**: Promotes realistic and fair evaluation of one's performance.
5. **Developmental**: Focused on **growth over time**, not perfection.
6. **Ongoing Process**: Not a one-time event — it is integrated regularly into the learning process.
7. **Teacher Support**: Requires **training and scaffolding** to guide students in self-evaluating effectively.

Benefits of Self-Assessment

Benefit	Explanation
Enhances Metacognition	Students become aware of how they learn and what they need to improve.
Promotes Responsibility	Encourages ownership and accountability for learning.
Improves Learning Skills	Helps learners develop problem-solving and self-regulation skills.
Builds Confidence	Students gain trust in their abilities as they monitor their progress.
Supports Personal Growth	Fosters independence and motivation to improve.
Strengthens Academic Achievement	Helps identify and address gaps in understanding.
Encourages Lifelong Learning	Prepares students for continuous learning beyond the classroom.
Reduces Reliance on External Validation	Students learn to trust and improve themselves without needing constant teacher feedback.

Example in a Mathematics Classroom: A teacher provides a rubric for solving algebraic expressions. After completing the task, students use the rubric to evaluate their work, identify errors, and write a brief reflection on what they did well and what they need to improve before final submission.By engaging in self-assessment, individuals can gain insights into their own strengths and weaknesses, identify areas for improvement, and develop strategies for achieving their goals. It is an important tool for personal growth and development, as well as for achieving success in one's personal and professional life.

While, peer-assessment involves students making judgment about, or commenting upon other's work. Asuai and Adeleye (2013) defined peer-assessment as the systematic process of peers assessing each other's' work using instructional rubrics for grading. Peer-assessment' is an arrangement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status. It is "the process of having the learner to critically reflect upon, and perhaps suggest grades for the learning of their peers", and being judged for the quality of the appraisals made. This process generates immediate support in the classroom, gains for both the assessor and the assessed, and being individualized and interactive are some benefits of peer-assessment. It is also upheld that peer-assessment encourages reflective learning through observing others' performances and becoming aware of performance criteria. Peer-assessment is a formative evaluation method where students evaluate the work, performance, or contributions of their peers, using specific criteria or rubrics provided by the teacher. It allows learners to actively engage in the assessment process, providing constructive feedback and reflecting on quality standards in learning.It is not just about grading it involves critical thinking, collaborative learning, and shared responsibility, which are core elements of 21st-century education. There are different types of peer-assessment as highlighted below

1. **Qualitative Peer-assessment**: Students provide **narrative feedback** (comments, suggestions, questions).Example: "Your explanation is clear, but the example could be more detailed."
2. **Quantitative Peer-assessment**: Students use **numerical ratings**, scores, or rubrics to evaluate. : Example: Rating clarity of presentation on a scale of 1 to 5.
3. **Formative Peer-assessment**: Focused on **improvement and learning**: Feedback is given **during the learning process**, not after. Example: Reviewing a classmate's math solution before final submission.
4. **Summative Peer-assessment**: Done at the **end of a task or unit**, sometimes contributing to final grades. Used in group projects or final assignments.
5. **Individual Peer-assessment**: Students assess the work of **one peer individually**, giving personal feedback.
6. **Group Peer-assessment**: Teams assess the **contributions of each member** in a group project.
7. **Reciprocal Peer-assessment**: Two students assess **each other's** work and provide feedback.

Characteristics of Effective Peer-assessment

The following are the characteristics of an effective Peer-assessment method:

1. **Clear Assessment Criteria**: Rubrics or guidelines must be provided to ensure fair and consistent evaluation.
2. **Training and Guidance**: Students need to be taught **how to assess** and **give feedback** constructively.
3. **Anonymity (Optional)** : In some settings, anonymous feedback can encourage honesty and reduce bias.
4. **Reflective and Dialogic**: It encourages students to **reflect on their own work** and **engage in dialogue**.
5. **Teacher Monitoring**: Teachers supervise and guide the process to ensure it is supportive and fair.
6. **Focus on Learning, Not Just Judgment**: The main goal is **improvement**, not punishment or competition.

Benefits of Peer-assessment

Benefit	Explanation
Promotes Active Learning	Students take responsibility and engage with learning more deeply.
Develops Critical Thinking	Evaluating others' work enhances analytical and evaluative skills.
Builds Communication Skills	Giving and receiving feedback fosters respectful communication.
Encourages Self-Reflection	Students compare their work to others and improve.
Improves Academic Performance	Continuous feedback helps correct errors and reinforce concepts.
Fosters Collaboration	It enhances peer-to-peer learning and teamwork.
Reduces Teacher Workload	Students assist in feedback delivery, especially in large classes.
Prepares for Real-World Evaluation	Mimics professional feedback systems used in jobs and academia.

The use of these assessments is considered to facilitate the learning process, enhances self-directed learning, and encourages learning strategies and the like. Similarly, self and peer-assessment make students to become active learners by taking more responsibilities in learning; it as well inculcate skills to become realistic judges of their own performance, by enabling them to monitor their peer and own learning without relying only on their teachers for feedback. By and large, it is obvious from foregoing that Peer and Self-assessment are essentially powerful educational tools for improving learning.

Correspondently, Kathryn (2016), maintained that, with these two assessment techniques, students are encouraged to participate in a legitimized, elaborated, and systematic process that supports learning. The students take ownership of their learning. Participating in self-assessment helps prevent unfair judgments. She added that, students are also more highly motivated and engaged when they understand the criteria and standards. Through participation in this collaborative community, students are more cooperative and able to peer evaluate and support each other's learning. Moreover, Shams and Tavakoli (2014), opined that peer-assessment leads to the development of self-awareness, as noticing the gap between one's fellow students responses in given work can facilitate further learning and taking responsibility for it. Also, focusing on peers' strength and weaknesses has the tendency to enhance students learning, raise their level of critical thinking. Zhi-Feng and Yi Lee (2013) added that, students made modifications to their work with the help of feedback from others after participating in peer-assessment activities. Similarly, arguments in favour of self-assessment maintain that, it enables the learners to become skilled judges of own strength and weaknesses and to stay focused on their learning. All these indices serve and propel positive attitude towards learning .The use of these methods of assessments promote positive attitude to learning and consequently impressive performance.

Attitude is defined as tendency to react favorably or unfavorably towards a designated

class of stimuli; it is a predisposition or well-established mental state which determines responses and reactions of a person towards an idea, event and the like. (Okoli, 2014; Anastasi, 2012; Silverman, 2018). More importantly, the self-efficacy of the students is developed as they acquire skills and techniques in judging quality work through their exposures to the rubrics or the assessment benchmarks set by the teacher. Furthermore, it builds learners self-confidence and personal assurance of success in academic work especially when these two assessment techniques are used among adolescents who are overly conscious of peer acceptance which is based on attaining certain behaviors established among the group. This is because according to Osarenren (2015), the main values of the peer culture among the adolescents are social participation, group loyalty, individual achievement and responsibility. Importantly, adolescence as a transitional period of life in which a child moves from childhood to adulthood is significantly characterized by intense influences from peer group. It is a period of increasing influence of one's peers and peer values and a diminishing role of one's parents as a primary reference group. (Osarenren, 2015; Adams, 2015). In order for students to be able to evaluate their own and each other's work effectively, they need to have a clear understanding of the learning objectives and the criteria for success. Teachers also need to provide guidance and feedback to students on how to use the criteria to evaluate their work. Teachers should also be aware of the potential biases that may arise from self and peer-assessment, such as the tendency for students to inflate their own or their peers' achievements (Topping and Ehly, 2018).

Mathematics performance is a domain-specific component of academic achievement, referring to a student's ability to understand, apply, and reason with mathematical concepts and procedures. It is often measured through standardized tests, classroom assessments, or national/international examinations (e.g., WAEC, NECO, TIMSS, PISA).Mathematics is considered a core subject due to its critical role in logical reasoning, problem-solving, scientific understanding, and everyday decision-making. Poor performance in mathematics has been associated with limited career choices, especially in science, technology, engineering, and mathematics (STEM) fields (Mullis & Martin, 2017). The following are the factors influencing mathematics performance include: Conceptual understanding and computational skills; student attitudes and anxiety toward mathematics; teaching methods and use of technology; assessment strategies, including formative assessment tools such as self and peer evaluation among others. Mathematics, often perceived as a challenging subject by many adolescents, particularly benefits from such participatory assessment methods. Involving learners in evaluating their own work and that of their peers cultivates metacognitive skills, encourages active learning, and fosters a deeper understanding of mathematical concepts. This paradigm shift aligns with global educational goals that emphasize collaboration, critical thinking, and self-directed learning. Based on this foregoing, it is obvious that the use of these two assessment techniques are loaded with potentials to impact positively on academic

achievement of learners. In order to justify these theoretical postulations, the study therefore seeks to investigate the role of self and peer - assessment in Enhancing Mathematics Performance among Adolescents in Education District II of Lagos State by updating or transforming traditional assessment practices to better fit 21st-century learning goals.

Statement of the Problem

Despite ongoing efforts to improve students' academic achievement in Mathematics, performance among adolescents in Education District II has remained consistently below expectations in both internal and external assessments. Traditional teacher-led evaluation methods dominate classroom assessment practices, often leaving students as passive recipients of feedback rather than active participants in the assessment process. This has raised concerns about student engagement, motivation, and the development of critical thinking skills necessary for mastering mathematical concepts. Globally and locally, emerging research has shown that formative assessment strategies particularly self-assessment and peer-assessment can play a vital role in enhancing students' academic outcomes by promoting reflective learning, metacognitive awareness, and student autonomy. However, in the context of Education District II, the extent to which these alternative assessment methods influence Mathematics performance remains underexplored and underutilized in practice. Therefore, the problem this study seeks to address is the limited empirical evidence and practical integration of self- and peer-assessment strategies in improving Mathematics performance among adolescents in Education District II.

Purpose of Study

The purpose of this study is to seek the role of self and peer assessment in enhancing Mathematics Performance among Adolescents in Lagos State"**,** this study specifically seeks to:

1. Examine the influence of self-assessment on mathematics performance among adolescent in Education district II of Lagos-state compared to the control group.
2. Assess the influence of peer- assessment on mathematics performance among adolescent in Education district II of Lagos-state compared to the control group.
3. Determine the influence of self and peer-assessment in enhancing mathematics performance among adolescent in Education district II of Lagos-state compared to the control group.

Research Hypotheses

This study was designed to test the following hypotheses:

1. There is no significant influence of self-assessment on mathematics performance among adolescent in Education district II of Lagos-state compared to the control group.
2. There is no significant influence of peer-assessment on mathematics performance among adolescent in Education district II of Lagos-state compared to the control group.
3. There is no significant influence of self-assessment and peer-assessment inn enhancing mathematics performance among

adolescent in Education district II of Lagos-state compared to the control group.

Research Methodology

Research Design

This study employed a **quasi-experimental control group design** to determine the effect of self and peer assessment on students' achievement in mathematics. A quasi-experimental design is a type of experimental research in which participants are not randomly assigned to groups but are instead placed into pre-existing groups (such as intact classes), while still allowing for the manipulation of an independent variable and comparison with a control group (Creswell & Creswell, 2018). This design is appropriate in educational settings where random assignment of students is often impractical or impossible. The design structure can be represented as follows:

Group	**Pre-Test (O_1)**	**Treatment (X)**	**Post-Test (O_2)**
Experimental	O_1	X (Self & Peer Assessment)	O_2
Control	O_1	– (Traditional Assessment)	O_2

Data collected were analyzed using statistical methods such as **t-test** and **Analysis of Covariance (ANCOVA)** to compare the post-test achievement scores of the groups, controlling for pre-test differences. This ensured that any observed differences could be attributed to the intervention

Population of the Study

The population for the study were drawn from all public junior secondary schools under Education District II of Lagos State.

Sample and Sampling Techniques

The study adopted a **multi-stage sampling technique**. At the first stage, one school was randomly selected from each of the three Local Government Areas (LGAs) that constitute the district Shomolu, Kosofe, and Ikorodu using the simple random sampling method. At the second stage, a total of fifty (50) students were drawn from each of the selected schools, giving a combined sample of 150 students across the three LGAs. Within each school, three intact classes at the same grade level were purposively selected. Two of these classes were designated as the **experimental groups**, where students received mathematics instruction integrated with self and peer assessment strategies. The third school served as the **control group**, which was taught the same mathematics topics but assessed solely through traditional teacher-led methods.To establish baseline performance, all groups were administered a **Mathematics Achievement Test (MAT)** as a **pre-test**. Following a four-week intervention period, the same instrument (or an equivalent parallel form) was administered as a **post-test** to both experimental and control groups to measure changes in students' mathematics performance.

Research Instruments

Two instruments will be used in collecting data for this study. The first is a self-constructed

questionnaire title: Influence of Self and Peer-assessment on Mathematics Performance among Adolescents in Education District II of Lagos State (ISPAMP)" questionnaire. The questionnaire was made up of two sections A and B; section A contains data pertaining to useful demographic variables such as: gender, age, and class while section B deals with a total of thirty research questions. The questionnaire was closed ended type which allows for Strongly Agree (SA), Agree (A), Strongly Disagree (SD) or Disagree (D) responses from respondents..

While the second instrument was a Mathematics Achievement Test (MAT) will be used to test the academic performance of the students. Twenty (20) Mathematics questions was set from past questions paper of Junior Secondary School Basic Education Certificate Examination (BECE) of Y (2019-2023)

Validity and Reliability of Research Instrument

The draft version of the instrument was submitted to three experts in the field of Measurement and Evaluation to assess whether the items were appropriately structured to measure the variables of interest in the study. This process helped to establish the face, expert, and content validity of the research instrument. Based on the experts' feedback, the items were reviewed, modified, and deemed suitable for the study. All corrections and constructive criticisms provided were carefully considered and incorporated into the final version of the instrument.

A pilot study was conducted on twenty students, from Lagos Mainland Local Government Area which was not included in the main study. Cronbach's Alpha reliability analysis was employed (with the aid of Statistical Package for Social Sciences-SPSS 25) the "r" calculated showed positive coefficient of 0.79 (self-assessment) and 0.77 (peer-assessment) and 0.82 for the Mathematics Achievement Test (MAT).

Test of Hypotheses and Results

Hypothesis One: There is no significant influence of Self-assessment on Mathematics performance among adolescents in Education District II of Lagos- state compared to the control group.

Table 1: Independent Samples t-test Analysis of the Influence of Self-Assessment on Students' Mathematics Performance

Variables	N	Mean	SD	Df	t-value	P-value	Sig. Value	Decision
Self-assessment	50	65.42	8.57					
		59.10	7.94	98	4.26	0.000*	0.05	H_0 Rejected
Performance in Mathematics	50							

*Significant at $p < 0.05$

The results in Table 1 above shows that students in the experimental group (M = 65.42, SD = 8.57) scored higher in mathematics than those in the control group (M = 59.10, SD = 7.94). The independent samples t-test yielded a t-value of 4.26 with a p-value of 0.000**,** which is less than 0.05. This indicates that the difference in mean scores between the two groups is statistically significant. Therefore, the null hypothesis (H_0) stating that self-assessment has no significant effect on mathematics performance is **rejected**, while the alternative hypothesis (H_1) is accepted. This implies that self-assessment significantly enhances students' mathematics performance compared to the control group.

Hypothesis Two: There is no significant influence of peer-assessment on mathematics performance among adolescents in Education District II of Lagos State compared with the control group.

Table 2: **Independent Samples t-test Analysis of the Effect of Peer-Assessment on Students' Mathematics Performance**

Variables	**N**	**Mean**	**SD**	**Df**	**t-value**	**p-value.**	**Sig. Value**	**Decision**
Experimental Peer-assessment	50	67.84	7.62	98	40.68	3.10	0.002*	H_0 Rejected
Mathematics Performance	50	62.30	8.10					

*Significant at $p < 0.05$

As shown in Table 2, students in the peer-assessment group (M = 67.84, SD = 7.62) outperformed their counterparts in the control group (M = 62.30, SD = 8.10). The independent samples t-test yielded a t-value of 3.15 and a p-value of 0.002**,** which is less than 0.05. This indicates a statistically significant difference in mathematics performance between the two groups.Therefore, the null hypothesis (H_0) is rejected**,** and the alternative hypothesis (H_1) is accepted**.** This finding implies that peer-assessment significantly improves students' mathematics performance compared with traditional teacher-led assessment.

Hypothesis Three: There is no significant influence of self-assessment and peer-assessment on mathematics performance compared to the control group.

Table 3. ANOVA Summary Table Showing significant influence of self-assessment and peer-assessment on mathematics performance compared to the control group.

Source of Variation	Sum of Squares	df	Mean Square	F	Sig. (p-value)
Between Groups	2134.56	2	1067.28	13.24	0.000 ***
Within Groups	19960.45	147	80.80		
Total	22095.01	149			

***p < 0.05 = Significant**

Post-Hoc (Scheffé) Test

Comparison	Mean Difference	Sig. (p-value)	Remark
Self vs. Peer	-1.67	0.412	Not Significant
Self vs. Control	6.61	0.000 ***	Significant
Peer vs. Control	8.28	0.000 ***	Significant

The ANOVA result ($F(2,147) = 13.24$, $p < 0.05$) shows a statistically significant difference among the three groups.Post-hoc tests reveal that both self-assessment and peer-assessment groups performed significantly better than the control group.However, there was no significant difference between self-assessment and peer-assessment groups. Since the p-value is less **t**han 0.05**,** we reject the null hypothesis (H_0) and conclude that: Self-assessment and peer-assessment significantly enhance mathematics performance among adolescents in Education District II of Lagos State compared to the control group.

Summary of Findings

The findings obtained are as follows;

1. There is a significant influence of Self-assessment on Mathematics performance among adolescents in Education District II of Lagos- state compared to the control group.
2. There is a significant influence of peer-assessment on mathematics performance among adolescents in Education District II of Lagos State compared with the control group.
3. There is a significant influence of self-assessment and peer-assessment on mathematics performance compared to the control group.

Discussion of Findings

Findings from Hypothesis One indicated that self-assessment has a significant influence on Mathematics performance among students in Education District II of Lagos- state compared to the control group. This implies that students who engage in self-assessment tend to perform better in Mathematics, as the technique encourages critical reflection and deeper engagement with the subject. Self-assessment fosters a learning environment where students actively evaluate their own performance and that of their peers,

promoting a sense of responsibility, academic independence, and collaborative understanding. It enables students to reflect on their learning processes, which contributes to improved academic achievement and a stronger learning community. This study supports Ying and Liping (2016) that asserted that self-assessment involves learners under the guidance of the teacher defining appropriate assessment criteria and evaluating their own performance against those criteria. It is the ability of students to judge their academic work**,** make informed decisions about their abilities, and use the feedback to improve future performance. In line with this, Blatchford (2017)**,** as cited in Brian and Rancy (2025)**,** described self-assessment as an essential element of students' academic self-concept, wherein learners evaluate their achievement in comparison to others. Similarly, Hamid and Marziyeh (2015) asserted that self-assessment presents a valuable alternative to traditional teacher-led assessments. As a metacognitive strategy**,** it plays a crucial role in developing students' ability to evaluate their own learning, set personal academic goals, and monitor their progress. It also cultivates independent learning skills**,** which are essential for lifelong learning. Proponents of self-assessment argue that an over-reliance on teacher assessment can lead to student passivity and dependency**,** whereas self-assessment encourages learners to take ownership of their learning journey and develop a sense of academic accountability.

Findings from Hypothesis two revealed that peer-assessment significantly influences Mathematics performance among adolescents in Education District II of Lagos- state compared to the control group.. This suggests that peer-assessment positively correlates with students' performance in Mathematics within the district. Ayoade and Oyelekan (2020) also reported that peer-assessment strategies significantly improved mathematics achievement and student engagement among senior secondary school students in Southwest Nigeria, including parts of Lagos State. According to Asuai and Adeleye (2013)**,** peer-assessment is a structured process where students evaluate each other's work using defined instructional rubrics. It involves individuals assessing the quality, value, and success of their peers' learning outcomes, often providing suggestions for improvement. This reflective process benefits both the assessor and the assessed, providing immediate classroom feedback. It is interactive, individualized, and supports deeper learning by helping students become more aware of performance standards through observation and critique. However, Ogunyemi (2015) presented a contrasting view, finding no significant improvement in Mathematics performance in Lagos State public schools where peer-assessment was introduced without teacher moderation or feedback.Similarly, Topping (2009) acknowledged that while peer-assessment generally has a positive impact, its effectiveness largely depends on the training provided to students. Without proper guidance, untrained peer-assessors may inadvertently reinforce errors or offer inaccurate feedback.The National Council of Teachers of Mathematics (NCTM, 2014) affirms that peer-assessment is a vital element of effective mathematics instruction. It helps reveal misconceptions and informs instructional adjustments. Similarly, the National Science Teachers Association (NSTA, 2019)

endorses peer-assessment as a tool to activate prior knowledge, engage learners, and improve teacher feedback strategies.

Findings from Hypothesis Three revealed that self-assessment and peer-assessment have a significant influence in enhancing Mathematics performance among adolescents in Education District II of Lagos- state compared to the control group. This outcome aligns with the study by Falchikov and Goldfinch (2000), which established that peer-assessment is generally reliable and positively impacts learning outcomes, including in Mathematics. Similarly, Ndoye (2017) supported the view that both peer- and self-assessment foster reflective thinking and enhance mathematics performance among adolescents in sub-Saharan Africa. The study further confirmed that peer- and self-assessment strategies enhance student engagement, boost motivation, and cultivate a sense of ownership in the learning process. These outcomes ultimately contribute to improved academic achievement and student well-being. Furthermore, empirical evidence from the district, such as Ogunyemi (2020), indicated a notable improvement in students' problem-solving skills and Mathematics scores when peer- and self-assessment were regularly practiced with adequate teacher support.

Conclusions

It can be concluded from the study that there is significant influence of peer-assessment on mathematics performance among adolescent in Education District II. Since peer-assessment helps students to track their progress, identify areas for improvement, and adjust their learning strategies accordingly, leading to a positive feedback from their peers, and when students are actively involved in assessing their peers' work, they are more likely to be motivated and invested in their own learning. It is also concluded that there is significant influence of self-assessment on mathematics performance among adolescent in Education District II of Lagos State.

Finally, the study concluded that there is a significant influence of self-assessment and peer-assessment Mathematics performance among adolescent in Education District II.. With positive attitude towards learning, students become more self-regulated learners, taking responsibility for their own learning and setting goals for improvement. Encouraging students to reflect on their own learning and progress, which can help them take ownership of their learning

Recommendations

In view of the findings obtained and the conclusion reached, the following recommendations were made for the study:

1. Teachers should emphasis on the important of peer-assessment, since it helps students to track their progress, identify areas for improvement, and adjust their learning strategies accordingly, leading to a positive feedback from their peers.
2. Schools and educational stakeholders in Lagos State and beyond should integrate self and peer assessment as core components of classroom assessment practices, particularly in mathematics education.
3. Teachers should be trained and supported through professional development Programmes to effectively design, implement, and supervise self and peer

assessment activities using clear rubrics, feedback protocols, and reflection tools.

4. The Ministry of Education and curriculum planners should consider embedding formative assessment strategies such as self and peer assessment into the secondary school mathematics curriculum, recognizing their role in promoting deeper learning, critical thinking, and improved academic performance.
5. Class sizes and teacher-student ratios should be managed to allow adequate time and support for these learner-centered practices.

Implications of the Study for Evaluators

The following are the implication of the study for evaluators:

1. **Integration of Formative Assessment Tools*:*** The study highlights the need to integrate self- and peer-assessment into regular classroom assessment practices as valid and reliable formative tools in measuring students' progress in Mathematics.
2. **Reinforcement of Alternative Assessment Methods:** It validates the effectiveness of alternative assessment techniques beyond traditional tests (e.g., objective tests), encouraging their use in evaluating deeper learning and cognitive processes**.**
3. **Development of Student-Centered Assessment Systems:** Emphasizes the shift towards learner-centered evaluation approaches, where students play an active role in assessing their own and peers' academic work, thereby promoting reflective learning.
4. **Need for Valid and Reliable Assessment Instruments:** Calls for the development and validation of structured self- and peer-assessment rubrics to ensure consistency, fairness, and objectivity in classroom assessments.
5. **Capacity Building for Teachers**: Suggests the necessity of training educators in the effective design, administration, and interpretation of self- and peer-assessment results for use in instructional planning and decision-making.
6. **Improved Feedback Mechanisms**: Encourages the use of peer-assessment as a tool for formative feedback, which aids learners in identifying their strengths and areas needing improvement, thus enhancing learning outcomes.

References

Adams, M. J. (2015). *Thinking About Word Meanings: Implications for Literacy Acquisition*. In *Raising Literacy Levels* (pp. 103–124). Harvard University Press

Alade, O. M., & Augustine, A. A. (2008). *Assessment of Students' and Parents' Attitudes to Continuous Assessment: A Baseline Study for School-Based Assessment Practice. International Journal of Educational Research*, 4(1), 91–100 ceadese.funaab.edu.ng.

Andrade, H., & Du, Y. (2007). Student responses to self-assessment. *Assessment & Evaluation in Higher Education.*

Almahasneh, A. M. S., & Abdul-Hamid, S. (2019). *The Effect of Using Peer Assessment Training on Writing Performance among Arab EFL High School Students in Malaysia. Arab World English Journal, 10*(1), 105–115

Anastasi, A., & Urbina, S. (1997). *Psychological testing* (7th ed.). Prentice Hall.

Asuai, N. C., & Adeleye, B. A. (2013). *Impact of peer assessment on performance in mathematics among Senior Secondary School Students in Delta State, Nigeria. Journal of the Nigerian Academy of Education, 5*(2), 110–?

Ayoade, A., & Oyelekan, O. (2020). Self and peer assessment as determinants of students' achievement in mathematics. *Nigerian Journal of Educational Research.*

Basic Education Certificate Examination (BECE) of Y (2019-2023) Junior Secondary School

Black, P., & Wiliam, D. (2018). *Assessment and classroom learning*. Assessment in Education: Principles, Policy & Practice, 5(1), 7–74. https://doi.org/10.1080/0969595980050102

Blatchford, P., Bassett, P., & Brown, P. (2017). *Examining the effect of class size on classroom engagement in primary schools: A large-scale study in England. Learning and Instruction, 21*, 715–730.

Boud, D. (2025). *Sustainable assessment: Rethinking assessment for the learning society*. Studies in Continuing Education, 22(2), 151–167. https://doi.org/10.1080/713695728

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Thousand Oaks, CA: Sage.

Falchikov, N., & Goldfinch, J. (2000). *Student peer assessment in higher education: A meta-analysis comparing peer and teacher marks*. Review of Educational Research, 70(3), 287–322. https://doi.org/10.3102/00346543070003287 researchgate.net+9scirp.org+9journ

Kothari, K. O. (2000). Sex Education and Marital Guidance. Lagos. Lantern Books Ltd.

Kothari, C. R., & Garg, G. (2014). *Research Methodology: Methods and Techniques* (3rd ed.). New Age International.

Li, Y., & Chen, L. (2016). *Peer- and self-assessment: A case study to improve the students' learning ability.* Journal of Language Teaching and Research, 7(4), 780–789.

Mullis, I. V. S., & Martin, M. O. (Eds.). (2013). *TIMSS and PIRLS 2011: Relationships Among Reading, Mathematics, and Science Achievement at the Fourth Grade—Implications for Early Learning*. Chestnut Hill: TIMSS & PIRLS International Study Center, Boston College.

Mullis, I. V. S., & Martin, M. O. (2017). *TIMSS 2015 assessment frameworks*. TIMSS & PIRLS International Study Center, Boston College.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. NCTM.

National Research Council. (2011). *Successful K–12 STEM education: Identifying effective approaches in science, technology, engineering, and mathematics*. National Academies Press. https://doi.org/10.17226/13158

Ndoye, A. (2017). Peer/Self-assessment and student learning. *International Journal of Teaching and Learning.*

Nicol, D. J., & Macfarlane-Dick, D. (2016). *Formative assessment and self-regulated learning: A model and seven principles of good feedback practice*. Studies in Higher Education, 31(2), 199–218. https://doi.org/10.1080/03075070600572090

Ogunyemi, B. (2015). Challenges of formative assessment in public schools in Lagos. *Lagos Education Review.*

Osarenren, N. 2015). Human sexuality education and marital guidance. Lagos: Raytel communications Ltd.

Osarenren, N. A., & Otuagoma, F. (2019). *Assessment of commercial drivers' perception of road safety education on compliance to road rules and regulations in Delta State*. International Journal of Educational Research, January 2019.

Ross, J.A., Rolheiser, C., & Hogaboam-Gray, A. (1999). Effects of self-assessment training on narrative writing. *Assessment in Education.*

Shams, S. M. R., & Tavakoli, E. (2014). *Academic oral presentation self-efficacy: A cross-sectional comparative study. Studies in Higher Education* ERIC+15ResearchGate+15Taylor & Francis Online+15

Silverman, D. (2021). *Interpreting qualitative data* (7th ed.). SAGE Publications.

Singh, C. K. S., Samad, A. A., & Hussin, S. (2011). Portfolio as an assessment tool and its implementation in Malaysian ESL classrooms: A study in two secondary schools. *Pertanika Journal of Social Sciences & Humanities, 21*(4), 1255–1273.

Singh, H. (2016). Effect of Socio-emotional Climate of the School on the Adjustment of Students, Psycho-Lingua, 36(2), 133-143..

Topping, K. J. (2023). *Peer assessment between students in colleges and universities*. Review of Educational Research, 68(3), 249–276. https://doi.org/10.3102/00346543068003249

Topping, K. J., & Ehly, S. W. (2023). *Peer-assisted learning*. Lawrence Erlbaum Associates.

Williams, S., Persuad, V., and Tunner, R. (2018). Understanding the Dynamics of Crime in Lagos. Lagos. Spectrum Books.

ZHI-Feng, C. K. S., & Yi Lee, K. A. (2013). *An Observation of Classroom Assessment Practices among Lecturers in Selected Malaysian Higher Learning Institutions. Malaysian Journal of Learning and Instruction, 14*(1), 23–61