

Effect of Self-Assessment on Academic Performance of Secondary School Students in Rivers State of Nigeria

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Abstract. *The study examined the effect of self-assessment on academic performance of students in English language, Mathematics and Integrated science. The study adopted a quasi-experimental design and four research questions and their corresponding hypotheses guided the study. Junior secondary III students from three senatorial districts were involved with the study. In each school, two arms of JSSIII classes were used. Students in one arm consisted the experimental group and the second arm consisted the control group. A sample of 359 students drawn from a population of 5400 took part in the study. A pretest was given to all the students, the students in the experimental group were taught the skills of self-assessment after which they assessed themselves while those in the control group did the traditional teacher assessment. All the students took a posttest and scores from the pre and posttests were subjected to descriptive statistics of mean and standard deviation to answer the research questions while ANCOVA was used to test the hypotheses at 0.05 level of significance. Results revealed the students in the experimental groups in English language and Mathematics outperformed those in the control group but not so for Integrated science.*

It was recommended among others that the students be encouraged to embrace self-assessment as it enhances their academic performance.

Key words: Self-assessment, Teacher assessment, self-regulation, academic performance.

I. Introduction

Assessment in education is a major part of teaching and learning and the method used to assess learning outcomes can if properly employed improve what students learn and help them build lifelong skills that can be applied in every aspect of life. There are three major types of assessment used by educators (1) Assessment of learning (summative), (2) Assessment for learning and (3) Assessment as learning which has various techniques, one of which is self-assessment. Sharm et al (2016) noted that it provides opportunity for students to collect information, be in control and reflect on how they are learning. This is a priceless tool for learning that prepares students for life beyond the school as any student who has mastered success criteria setting for self-assessment learns how to set standards and work towards them in every task presented to him. It provides the bases for teachers to shift part of the responsibility for learning to the students, thus makes the student a partner in decision making in his educational pursuit. Dyer (2015) Observed that educators need to allow learners and present them a leading role in their education and this is even more appropriate now that teaching is more learner centered, assessment should also be more learner centered. This however does not in any way eclipse the job of a teacher, as much mentoring and feedbacks are needed to help the student acquire the skills for self-assessment effectively and objectively. Rourke in Yan (2017) emphasizing the need to allow students to self-assess themselves observed that self-assessment is a set of abilities that inspire learners to effectively oversee the way they learn, present themselves with appropriate responses and improve on their self-learning thereby becoming active learners. Students have the opportunity to compare their works with the success criteria or standards and then see what they have learnt adequately, what needs to be re-learned and when to move to new areas. Self-assessment if done properly leads people to be informed to ascertain their unconfirmed self-concept and to employ it in the enhancement of their self-knowledge (Sedikides, 1993). It involves a variety of techniques through which learners describe and possibly evaluate their learning characteristics and take control of what they learn and how they learn (Ranadero, Brown & Strijbos, 2016).

Benefits of self-assessment abound and as ACADEM (2019) stated, some include.

- Providing important meta-cognitive skills for students to evaluate their own work.
- Allowing self-awareness by thoughtfully looking at skills that help the learner to be objective in assessing his own work.
- Providing students control of how they learn and assess themselves.

Self-assessment is anchored on Bandura's theory of self-regulation: This is being able to delay immediate gratification and focus on a better reward later. It results in internal motives for actions instead of being pushed by external forces or factors. People who can regulate themselves adequately are more likely to do well in whatever they are doing as they have the inner drive for accomplishment. Such people are constantly assessing themselves against set standards, discrepancies are identified and the person works towards self-improvement based on the standards. Bandura (2017) noted that self-regulation employs three major sub-functions.

- Observing how well an individual is doing when compared against set standards.
- Evaluating self against the set standards.
- If there are discrepancies, some measures are taking to remedy them.

To confirm this, Rourke (2017) opined that self-assessment being one of the new innovation can make learners uncomfortable but they help them in taking active part and focusing on the learning not just on scores.

Empirical review of literature shows studies on self-assessment in western and eastern parts of the world and not much in Nigeria to the knowledge of the researcher, necessitating this study. Das, Mpotu, Dunn and Loaphear in 1998 looked for a relationship in self and tutor evaluation in problem based learning tutorials. The study involved 64 students who came into the faculty of Medical and Health Sciences of the Arab Emirates problem-based learning institute in 1994 and 1995. Result showed similarities in self and tutor assessment with male students assessing themselves higher than the females. In 2007, Papinezak, Young, Grove and Haynes did an analysis of peer, self and tutor assessment in problem based learning tutorials. The work investigated self, peer and tutor assessment and performance in tutorials among medical students in level 100. A sample of 125 students participated in the study, which involved the skills in the tutorial setting. These skills included: leadership, politeness, communication and appraisal through demonstration of case synopsis. The three forms of assessment, self, peer and tutor went on simultaneously and results indicated that students were more liberal in assessing their peers than themselves. Average correlation were seen when self and peer assessment scores were correlated with tutor assessment. They deduced that learners self-rating of themselves was not as precise as that of their peers. This kind of situation confirms that proper training on assessment skills and setting of success criteria is important to get the best from self and peer assessment. If measures are not taking to counter subjectivity in these assessments the aim of producing learners who can effectively learn on their own in and outside the classroom will not be achieved. Supporting this further, David, Chip & Jerry observed that, though there are lot of merits, the consequences of wrongly applied self-assessment can be grave. This idea emanates from the notion that generally people tend to overrate and exaggerate the skills and abilities they possess. This as they observed can be seen across all field of life. In the health sector people most often overrate their health status and underrate their health risks which can turn out to be detrimental. In the world of work, employees are also seen to exaggerate their abilities and skills they claim to have to the disappointment of the employers who also overrate their sense of judgement. In education, studies have found students self-assessing their performances higher than the rating of teachers and their peers. It has been found that peer assessment is more highly correlated to teacher assessment than self-assessment. All these point to the fact that students should be adequately trained to self-assess correctly and objectively. Assuming that students can do this without adequate training would be disastrous. This becomes very important depending on why an individual is self-assessing, for as Wrider (2017) noted, self-assessment is more about students and their learning skills and not necessary about students awarding marks to themselves, making it primarily a technique for acquisition of knowledge. In a study by Karnilowicz (2012) which compared self and tutor assessment, a sample of 64 psychology university students participated and it was found that student self-appraised themselves correctly. In another study by Sharma et al (2016) on impact of self-assessment by students, the study was done to analyze the effect of self-assessment by medical students on their academic performance. It involved two theory tests comprising of essay and short answer questions given to 89 1st year students. They carried out self-assessment three days after taking their first test, which was followed by faculty, and feedback was given. An equivalent test was given to them afterwards by faculty after seven days, which was scored by the teacher. The students perception and the intervention was gotten, it was concluded that self-assessment could help raise both interest and motivational level of students resulting in better academic performance. However in a study of relationship between academic performance and students' self-assessment in clinical performance of students in Podiatric Medicine and Surgery. The study was conducted by students filling a self-assessment of how they performed in five broad medical learning outcomes during the third year clinicals. Pre and post assessment scores were collected and results show the mean self-assessment mark for pre and post ratings and compared them to the students year three cumulative grade average. Result showed no significant correlation between cumulative grade point and the pre and post clinical self-assessments scores. They concluded that students' academic performance does not correlate with their clinical self-assessment performance. This could mean that the method of carrying out self-assessment should be researched into to get the best practices that will enhance academic performance. If self-assessment is to be practiced effectively by students, teachers should be able to teach the skills before the

students are asked to assess themselves or their peers accurately. The result of a study by Thawabieh (2017) on a comparison between students' self-assessment and teachers' assessment on 71 students at Tafila technical University studying Introduction to psychology for the stressed training for students on the relevant skills for self-assessment materials. Findings indicates students can precisely appraise themselves and this can happen objectively if they are trained on how to self-assess.

It is not just enough to ask students to self-appraise themselves for it is a great responsibility, it is important to guide them to do so without subjectivity. Some authors of like minds have carried out studies to see how to properly train the teachers to guide students for self-assessment. Fernandes and Fontana in Dyer (2015) carried out a study with 25 elementary school teachers in self-assessment procedures for about eight months after which the teachers taught their skills in their classroom. Students taught by these teachers were compared to these taught by other teachers that were not in the program. Result showed that the students taught by the trained teachers assessed themselves better and more readily imputed their learning and success to self-accomplishment rather than luck or external forces. They found that students taught by the trained teachers felt self-empowered and felt responsible for their accomplishments. One of such studies was conducted by Panayiotu et al (2017). They studied using the Dynamic Approach to Teacher Professional Development for Promoting Students Self-Assessment for Formative Purposes. The paper prescribed employing Dynamic Approach to enhance self-assessment in learners for developmental reasons. Dynamic Approach believes that professional growth should be altered to equip the teachers to adequately guide the students in self-assessment. The study involved 45 teachers randomly placed into two groups. The experimental group received an INST Course based on dynamic approach while the control group did not. Assessment skills were measured using pre and post after the intervention and result showed that teachers in the experimental group showed improved skills and their students achieved more in mathematics.

Yan and Brain (2017) did a study as A Cyclical Self-Assessment Process Towards a model of how students engage in self-assessment. The study was on a sample of 17 university lectures from a teacher-training institute. The study tried to identify skills students usually employ during self-assessment. Result showed three major skills of (a) Setting Success Criteria, (b) Seeking for feedback and (c) Self-reflection. These skills apply in everyday life thus making students who have acquired them to be more confident and more goal oriented. Some authorities have also looked at influence of some variables on students' self-assessment. A study by Yan (2008) studied "Student Self-Assessment Practices: The role of gender, school level and goal orientation. The study involved 8843 students in Hong Kong ranging from elementary four to secondary six self-assessment skills included inward directed feedback and self-reflection. Findings revealed that female students displayed more effective self-assessment than the males, school level significantly influenced students effectiveness in self-assessment which self-orientation has a significant negative influence.

On benefits of students' self-assessment, ACADEM (2019) noted among others that:

- It helps students in the development of cognitive process that equip effective learning.
- It increases self-awareness thereby making the student look inwards and take control of his learning.
- Students develop critical thinking skills that help the m to be more objective in assessment.

This study is undertaken therefore to either confirm or reject the notion that self-assessment can enhance students performance.

- Is there any mean difference in the pre and post tests scores of students in the experimental (self-assessment) and control (teacher assessment) groups in English language?
- To what extent do the mean scores in pre and post tests of students in the experimental and control groups differ in Mathematics?
- Is there any mean difference in the pre and post tests of the experimental and control groups in Integrated science.

The following null hypotheses were formulated to guide the study.

- There is no significant difference in the posttests mean scores of students in the experimental and control groups in English language.
- There is no significant difference in the posttests mean scores of students in the experimental and control groups in Mathematics.
- There is no significant difference in the posttests mean scores of students in the experimental and control groups in Integrated Science.

II. Methods

The study adopted a Quasi- experimental research design specifically the non-randomized control group- pretest- posttest design. This according to Nwankwo (2013) is devoid of randomization as students in

their normal classrooms constituted both the control and experimental groups. The population for the study comprised 5400 JSS 3 students in 2018/2019 academic session. A school was chosen from each senatorial district and two arms of JSS 3 where picked as the experimental and control groups given three experimental and three control groups. A 100 students (experimental 50, control 50) where assessed for English Language, 200 students in the second school (experimental 100, control 100) where assessed for Mathematics while 59 students in the third school (experimental 30, control 29) where assessed for Integrated Science. All the students totaling 359 where given a pretest then the students in the experimental classes in each school where coached by the researcher on how to set success criteria and use same for self-assessment, the students in the control groups where assessed by their teachers. The study took about two months after which all the students were given a posttest. Three compulsory subjects: English Language, Mathematics and Integrated Science were chosen to confirm or reject the effectiveness of self-assessment in enhancing academic performance as this allowed comparison across the different subjects. Mean scores and standard deviation were used to answer the research questions while ANCOVA was used to analyze the hypotheses at 0.05 level of significance.

III. Results

Research Question I: Is there any mean difference into pre and post test scores of students in the experimental (SA) and control (TA) groups in English Language?

Table I: Mean and Standard Deviation of Pre and Post Test Scores of Experiment (SA) and Control (TA) Groups in English Language.

English Language	Mean	N	Std. Deviation	Mean Difference
English Experimental Pretest	20.6200	50	4.62862	12.18
English Experimental Posttest	32.8000	50	3.55711	
English Control Pretest	21.1800	50	4.69776	9.86
English Control Posttest	30.4600	50	5.10786	

The result as shown above revealed that the English Language academic performance of students in the experimental group who self-assessed, had a pretest score of 20.62 (SD = 4.62), while they also had a posttest score of 32.80 (SD = 3.55). This result yielded an academic performance mean difference of 12.18 for the self-assessed students in the experimental group. For students in the control group who were assessed by their tutors, it was revealed that at the pretest phase, they reported a mean English Language academic performance of 21.80 (SD = 4.69), while at the posttest phases they had a mean value of 30.46 (SD = 5.10), resulting in a mean difference of 9.86. Based on the mean difference of 12.18 obtained for self-assessed students in the experimental group, and 9.86 reported for tutor-assessed students in the control group, it can be observed that self-assessed students scored higher in English Language than tutor-assessed students. This observed difference was further subjected to an ANCOVA analysis to test for significance.

H₀ I: There is no significant difference in the post test scores of students in the experimental (SA) and control (TA) groups in English language.

Table II: Analysis of Covariance (ANCOVA) of Post Test Scores of Experimental (SA) and Control (TA) Groups in English Language.

Dependent Variable: English Posttest						
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	137.496 ^a	2	68.748	3.514	.034	.068
Intercept	4758.378	1	4758.378	243.208	.000	.715
Eng_Exp_Pre	.606	1	.606	.031	.861	.000
Group_English	135.290	1	135.290	6.915	.010	.067
Error	1897.814	97	19.565			
Total	102081.000	100				
Corrected Total	2035.310	99				

a: R squared = 0.068 (Adjusted R Squared = 0.44).

The result of the ANCOVA analysis showed that when the effect of self-assessment and tutor assessment were computed on the English Language academic performance of students, the F-value was 6.915, $p = 0.010 < 0.05$. This result therefore indicated that self-assessment has a significantly greater effect in the academic performance of students in English language of self-assessed students than the tutor-assessed. Thus, the null hypothesis was rejected. However, the partial eta squared value showed that there was a small effect size of 0.067.

Research Question II: To what extent do the mean scores in pre and posttests of students in Experimental (SA) and control (TA) groups in Mathematics.

Table III: Mean and Standard Deviation of Pre and Post Test Scores of Experimental (SA) and Control (TA) Groups in Mathematics.

Mathematics	Mean	N	Std. Deviation	Mean Difference
Maths Experimental Pretest	1.9800	100	1.74066	13.94
Maths Experimental Posttest	15.9200	100	2.60023	
Maths Control Pretest	2.2100	100	1.78826	9.54
Maths Control Posttest	11.7500	100	2.49191	

The result as shown above revealed that the Mathematics academic performance of students in the experimental group who were self-assessed had a pretest score of 1.98 (SD = 1.98), while they also reported a posttest score of 15.92 (SD = 2.60). This result yielded an academic performance mean difference of 13.94 for the self-assessed students in the experimental group. For students in the control group who were assessed by their tutors, it was revealed that at the pretest phase, they had a mean Mathematics academic performance of 2.21 (SD = 1.78), while at the posttest phases they had a mean value of 11.75 (SD = 2.49), resulting in a mean difference of 9.86. Based on the mean difference of 13.94 obtained for self-assessed students in the experimental group, and 9.54 reported for tutor-assessed students in the control group, it can be observed that self-assessment had a greater effect in students' academic performance in Mathematics than tutor-assessment. An ANCOVA analysis was further computed to ascertain if the difference in the group was significant.

H₀ II: There is no significant difference in the posttest scores of students in the experimental (SA) and control (TA) groups in Mathematics.

Table IV: Analysis of Covariance (ANCOVA) of Post Test Scores of Experimental (SA) and Control (TA) Groups in Mathematics.

Dependent Variable: Maths Posttest						
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	876.317 ^a	2	438.158	67.581	.000	.407
Intercept	15293.435	1	15293.435	2358.844	.000	.923
Maths_Exp_Pre	6.872	1	6.872	1.060	.305	.005
Group_Maths	875.842	1	875.842	135.089	.000	.407
Error	1277.238	197	6.483			
Total	40435.000	200				
Corrected Total	2153.555	199				

a. R Squared = .407 (Adjusted R Squared = .401)

From the ANCOVA analysis in the table above, it can be seen that an F-value of 135.089 was obtained for the difference in the Mathematics achievement of students who were self- and tutored assessed. This result yielded a corresponding p-value of $0.000 < 0.05$. It therefore indicates that there was a significant difference between the Mathematics academic performance of students in the self-assessed and tutored-assessed groups. The null hypothesis was therefore rejected. From the partial eta squared value obtained (0.407), it indicates that the effect size was moderate.

Research Question III: Is there any mean difference in pre and post tests of students in Experimental (SA) and Control (TA) groups in Integrated Science.

Table V: Mean and Standard Deviation of Pre and Post Test Scores of Experimental (SA) and Control (TA) Groups in Integrated Science.

Integrated Science	Mean	N	SD	Mean Difference
Integrated Science Experimental Group Pretest	16.6667	30	2.07337	1.37
Integrated Science Experimental Group Posttest	18.0333	30	1.71169	
Integrated Science Control Group Pretest	13.8621	29	2.87507	1.41
Integrated Science Control Group Posttest	15.2759	29	2.88959	

The result revealed that self-assessed students had a pretest mean academic performance of 16.67 (SD = 2.07) in Integrated Science at the pretest stage, while at the posttest phase the result obtained was 18.03 (SD = 1.71), yielding a mean difference of 1.37. For the tutor-assessed students in the control group, the mean academic performance obtained in Basic Science at the pretest level was 13.86 (SD = 2.87), while at the posttest phase, it was 15.27 (SD = 2.88), resulting in a mean difference of 1.41. Based on this result, it is shown that students in the tutor-assessed group scored higher than those in the self-assessed group in Basic Science. An ANCOVA analysis was further computed to ascertain if the difference in students' performance in Basic Science was significantly different based on assessment type.

H₀ III: There is no significant difference in the posttest scores of students in the experimental (SA) and control (TA) groups in Integrated Science.

Table VI: Analysis of Covariance (ANCOVA) of Post Test Scores of Experimental (SA) and Control (TA) Groups in Integrated Science.

Dependent Variable: Integrated Science Posttest						
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	254.833 ^a	2	127.417	40.531	.000	.591
Intercept	72.823	1	72.823	23.165	.000	.293
Bas_Exp_Pre	142.712	1	142.712	45.396	.000	.448
Group_Basic_Sci	10.727	1	10.727	3.412	.070	.057
Error	176.048	56	3.144			
Total	16842.000	59				
Corrected Total	430.881	58				

a. R Squared = .591 (Adjusted R Squared = .577)

The ANCOVA analysis showed that when the effect of self-assessment and tutor assessment were computed on the Basic Science academic performance of students, an F-value of 3.144, $p = 0.070 > 0.05$. This result therefore indicated that there is no significant difference between the academic performances of self-assessed and tutored assessed students in Integrated Science. Thus, the null hypothesis was retained. Furthermore, the partial eta squared value (0.57) showed a small effect based on Cohen criteria.

IV. Discussion of findings

Result on Table I on mean differences between the pre and posttest scores in experimental and control groups in English Language shows the pretest mean of the experimental group to be 20.62 with a standard deviation of 4.62 and the posttest mean to be 32.80 with a standard deviation of 3.55 recording a mean difference of 12.18. The pretest mean of the control (TA) group is 21.80 with a standard deviation of 4.69 while the posttest score is 30.46 with a mean difference of 9.86. On the posttest mean scores the experimental (SA) group recorded a mean score of 32.80 with standard deviation of 3.56 while the control group mean is 30.46, with a standard deviation of 5.11. Based on the mean differences, it is observed that the students in the experimental group who carried out self-assessment performed better with a mean difference of 12.18 as against 9.86 for the control group assessed by the teacher. On the post mean scores, it is also seen that the experimental posttest mean score of 32.80 is slightly higher than 30.46 for the control group indicating that the self-assessed students in the experimental group performed better than the control group considering there wasn't much difference between the pretest scores of both groups. The ANCOVA table of the posttest scores shows a pvalue

of 0.010, which is less than 0.05 indicating a significant difference in performance of those in the experimental group who assessed themselves and the control group assessed by the teacher. This result is in agreement with the findings of Sharma et al (2016) and Papatymou and Darra (2018) who also found self-assessment to enhance academic performance of students. However, Yoho, Vardaxis and Millonig (2016) found no significant effect of self-assessment as cumulative GPA of medical students. This result is probably because when a student has been trained to self-assess, he learns to work towards the set standards, which will definitely enhance success in learning. This implies that teachers have to be trained in self - assessment skills to be able to guide students

In Table III, for Mathematics the pre and posttests mean scores for the experimented group show a mean difference of 13.94 while the control mean difference is 9.54. This result shows that students in the experimental group that practiced self-assessment performed better. This is also confirmed by the posttest mean score of 15.92 for the experimental group being higher than 11.75 for the control group that practical teacher assessment. When subjected to Analysis of Covariance (ANCOVA), Table IV shows a p value of .000 which is less than 0.05 indicating there was a significant difference between the Mathematics performance of students in the experimental (self-assessment) and control (teacher assessment) groups. This result also agrees with the findings of Sharma et al (2016) and Papatymou and Daira (2018) who found self-assessed students to outperform teacher assessed students in their various studies, contrary to the findings of Yoho, Vardaxis and Millong (2016) who did not find any significant difference in performances of students who self-assessment and those assessed by the teachers. This could be because self-assessment gives the students control of his own learning and make him responsible and self-motivated to perform better. On comparison of mean scores of pre and posttests scores of students in the experimental and control groups

Table V shows mean difference of 1.37 for the experimental (SA) group and 1.41 for control (TA) group. Based on this result, students in the control group (TA) performed better in Integrated Science. Table VI showing the ANCOVA analysis of the post test scores showed the p value of 0.07 to be greater than 0.05 hence the null hypothesis is accepted indicating no significant difference in the performance of students in the control group assessed by the teachers and those in the experimental group who assessed themselves. The result is this time in agreement with the findings of Yoho, Vardaxis and Millong (2016) who found no significant difference in the performance of students assessed by the teachers and those who assessed themselves but is in variance with the findings of Sharma et al (2016) and Papatymou and Daira (2018) who found students that assessed themselves to outperform those who were assessed by their teachers. This could be because the students in the experimental group seen not to adequately acquire the skills for self-assessment as Fernandes and Fontana in Dyer (2015) and Yan and Bron (2017) opined that the students need to acquire the appropriate skills for self-assessment.

V. Recommendation

Based on the findings the following were recommended.

- Since the self-assessment has been seen to enhance academic performance of students, students should be encouraged to embrace it.
- The effectiveness of self-assessment depends on students acquiring the appropriate skills for objectively assessing themselves accurately. This requires students being trained on self-assessment.
- If the students are to be trained, the teachers first should be trained to acquire these skills so they can train the students properly.

VI. Conclusion

The paper concludes that when students are trained to assess themselves accurately, it helps them to be in control of their learning and makes them learn better.

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