

INFLUENCE OF SELF ASASSESSMENT RUBRIC ON ACADEMIC ACHIEVEMENT IN MATHEMATICS OF UPPER PRIMARY PUPILS.

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Abstract

The self-assessment honors the crucial role of feedback in learning. Research has clearly shown that feedback promotes learning and achievement. This study explores the impact of rubrics on the academic achievement of upper primary pupils in Mathematics. The study involves a sample of 86 students, drawn from two intact class divisions of standard VII at S N D P Higher Secondary School, Aluva, Ernakulam District. The experimental group comprises 43 students, taught Mathematics using Rubric and the control group also consists of 43 students, taught through existing method. The results suggest that employing Self assessment rubrics for teaching Mathematics proves more effective than the traditional conventional approach.

Key words: Self Assessment, Rubrics.

Introduction

In today's landscape of standards-focused education, student self-assessment emerges as a key factor in enhancing student motivation, engagement, and learning outcomes. When executed effectively, student self-assessment fosters intrinsic motivation, self-driven effort, a focus on mastering skills, and deeper comprehension. Its significant influence on student achievement, evident in both classroom evaluations and broader standardized tests, empowers students to take ownership of their learning journey and grasp the benchmarks for measuring their progress.

Even though young students typically possess the ability to evaluate their own work, they may not always do so, often due to the absence of certain necessary conditions. For self-assessment to be effective, students require an understanding of its importance, access to transparent assessment criteria, a specific task or performance to evaluate, examples of self-

assessment, guidance and support in the process, ample practice opportunities, cues for appropriate timing, and chances to refine their work. While this might seem like a challenging set of requirements, student self-assessment is both achievable and happening in numerous educational settings worldwide. Many of the essential conditions mentioned, such as modeling, guidance, direct instruction, and practice, are already commonly integrated into classroom routines. Addressing the need for clear assessment criteria, for instance, can be facilitated by introducing a rubric.

A rubric typically consists of one or two pages detailing criteria and delineating different levels of performance, ranging from excellent to poor, for a particular assignment. While many educators utilize rubrics primarily for grading purposes, their optimal use extends beyond evaluation to encompass teaching as well. An effective rubric not only assesses but also instructs. It not only outlines common errors students might make but also highlights exemplary work. By providing students with clear insights into the task ahead and removing ambiguity about learning objectives or standards for high-quality work, a well-crafted rubric becomes an invaluable tool for enhancing understanding and performance.

Students are inclined to adopt rubric-based self-assessment for several reasons tied to their academic progress and drive. Research findings have shown that students view rubric-based self-assessment as beneficial, yet they also express the need for guidance and regular practice to fully harness its advantages.

Need and Significance of the Study.

Student performances encompass focused tasks that culminate in a product or an overarching learning achievement. These products may encompass various forms of student work aimed at specific skills. Rubrics serve as a tool for teachers to assess and evaluate student performance or competency in a given task, relative to the final product or learning objective. Consequently, rubrics offer valuable insights into the extent to which a student has accomplished a predefined learning outcome, based on explicit criteria that establish the evaluation framework.

Statement of the Problem.

Present investigation intends to test the influence of rubrics on academic achievement in Mathematics of upper primary pupils. The problem under present investigation has been

entitled as “INFLUENCE OF RUBRICS ON ACADEMIC ACHIEVEMENT IN MATHEMATICS OF UPPER PRIMARY PUPILS.”

Objectives Of The Study.

The present study has the following objectives:

1. To develop self assessment Rubric for the pupils at upper primary class for mathematics learning.
2. To develop a standardized achievement test in Mathematics for the pupils of class VII
3. To find out the extent of influence of self assessment on academic achievement in mathematics among upper primary pupils.

Hypotheses Of The Study

The hypotheses framed and tested for the present study is as follows:

1. There is no significant difference in the academic performance in mathematics between experimental group and control group of total sample.

Methodology

The influence of rubrics on academic achievement in Mathematics of upper primary pupil is experimented in this study. In the present study the experimental design used is pretest- posttest non equivalent group design. The experimental group is taught Mathematics using Rubrics and the control group is taught through existing method. Sample, tools and statistical techniques used for the present study are briefly given here:

Sample

For this research, 86 students were chosen from two intact class divisions of standard VII at S N D P Higher Secondary School in Aluva, located in the Ernakulam District. The experimental group comprises 43 students, while the control group also consists of 43 students.

Tools used

In this study, the researcher utilized the following instruments:

1. Rubrics
2. A standardized achievement test in Mathematics for standard VII
3. Lesson transcripts based on teaching using rubrics.
4. Lesson transcripts based on existing method.

Statistical Techniques

The statistical techniques to be employed for the analysis of data in the present study are the following.

1. Descriptive statistics like mean, median, mode, standard deviation, skewness and kurtosis.
2. Test of significance of difference between means.
3. Single factor analysis of covariance (ANCOVA).

Analysis and Interpretation

Table1: Descriptive statistics calculated for the pre-test scores of achievement of the experimental and control groups

Measures Calculated	Experimental Group	Control Group
Sample size (N)	43	43
Mean	5.62	5.45
Median	6	6
Mode	5	4
Standard deviation	2.52	1.81
Skewness	0.2460	0.8011
Kurtosis	-0.5953	-0.825

The mean score obtained in the experimental and control groups are 5.62 and 5.45 respectively. The median and mode for the experimental group is 6 and 5. Median and mode for the control group is 6 and 4 respectively. This shows that the students in both groups did not achieve high scores in pre-test. This indicates that the two groups had only limited knowledge on the topic selected for the study.

The standard deviation for both the group is 2.52 for experimental group and 1.81 for control group respectively. The standard deviation for both experimental and control groups are not high. The skewness values of experimental group and control group are 0.2460 and 0.8011 and kurtosis values are -0.5953 and -0.8259

Table 2: Descriptive statistics calculated for the post-test scores of achievement in Mathematics of the experimental and control groups

Measures Calculated	Experimental Group	Control Group
Sample size (N)	43	43
Mean	21.41	17.57
Median	20	18
Mode	19	16
Standard deviation	6.23	5.66
Skewness	0.3868	0.2774
Kurtosis	-1.244	-1.375

The mean of post-test score for the experimental group is 21.41, while for the control group, it is 17.57. In control group; the mean value is lower than that of experimental group. The values of median are 20 and 18 and mode are 19 and 16 respectively for the experimental and control groups. This indicates that the pupils in the experimental group attained scores when they learnt using Self assessment rubrics than the pupils who learnt by prevailing method of teaching. When the results were analyzed, it is clear that the distribution is approximately normal as the measures of central tendencies are more or less same.

The standard deviation of post-test scores for the experimental group is 6.23 and the control group is 5.66. These values are not high showing that the scores obtained by pupils in both the groups are not very much scattered.

The values of skewness obtained for the post-test scores for the experimental group and control group is 0.3868 and 0.2774 respectively. This indicated that the distribution is slightly positively skewed. The value of kurtosis is -1.2443 and -1.3755 respectively for experimental group and control group.

Table 3: Data and result of the t-test for the mean scores of post-test in achievement between experimental and control groups for the total sample

Group	No. of pupils	Mean	S.D	t- value	Level of significance
Experimental Group	43	21.41	6.23	2.7727	Significant
Control group	43	17.57	5.66		

The table above indicates that the obtained t-value of 2.7727 for the post-test is statistically significant at both the 0.05 and 0.01 levels of significance. The results suggest that there is a significant difference in the mean performance between the experimental group and the control group on their post-test scores. The experimental group's higher mean score indicates its superiority over the control group in terms of post-test scores.

Table 4: Summary of Analysis of Variance (ANOVA) of pre test and post test scores in the experimental group and control group.

Source of variation	df	SSx	SSy	MSx	Fx	MSy	Fy
Means-among	1	0.49	272.5	0.49	0.10	272.49	7.89
Groups-within means	84	347.89	2552.0	4.83		35.44	

At the 0.05 level of significance, the table value of F is 3.96, and at the 0.01 level, it is 6.95. The calculated value of Fx was 0.10, which is not significant at either level. Therefore, it's evident that the two groups do not differ significantly in their pre-test scores. Conversely, the calculated value of Fy was 7.89, which is significant at both the 0.05 and 0.01 levels. This indicates a significant difference between the two groups in the post-test scores.

Table 5: Summary of Analysis of covariance (ANCOVA) of pre test and post test scores in the experimental group and control group.

Source of variation	df	SSx	SSy	SSxy	SSyx	MSyx or Vyx	SDyx	Fyx
Means-								
among	1	0.49	272.5	11.51	227.86	227.86		
Groups-within							4.02	14.10
means	84	347.89	2552.0	699.03	1147.43	16.16		

The computed Fyx ratio was 14.10. At the 0.05 significance level, the table value of F is 3.96, and at the 0.01 level, it is 6.95. This indicates a significant difference between the two final means, influenced by the experimental and control variables, after the application of treatments, at both the 0.05 and 0.01 levels. This difference persists even after adjusting for initial disparities. Consequently, the null hypothesis is rejected at both levels.

Major Findings

The effectiveness of teaching Mathematics using self-assessment rubrics surpasses that of the current conventional teaching method. This assertion is substantiated by the subsequent findings.

- i. A statistically significant difference was observed when comparing the post-test scores of students in the experimental and control groups. The obtained t-value of 2.7727 is significant at both the 0.05 and 0.01 levels of significance. The mean score for the experimental group was 21.41, whereas for the control group, it was 17.57.
- ii. Analysis of covariance on the pre-test and post-test scores of students in both the experimental and control groups revealed a significant disparity between the two groups. The computed Fxy value, with degrees of freedom 1/84, was 14.10, significant at both the 0.05 and 0.01 levels of significance. The adjusted mean score for the experimental group was 21.24, compared to 17.73 for the control group. These results indicate that the experimental group outperformed the control group in terms of achievement.

Suggestions for further research

The researcher proposes the following promising avenues for future investigation. It is anticipated that this study will pave the way for exploring new areas of research.

- Similar studies can be conducted at other levels of education such as high school, higher secondary and other levels too entitled as
 - “A study on effectiveness of self assessment rubrics on achievement in Mathematics of pupils at high school level”,
 - “A study on effectiveness of self assessment rubrics on achievement in Mathematics of pupils at higher secondary level”.
- The study can be extended to other subjects like physics, chemistry, language, arts etc and can be entitled as
 - “A study on effectiveness of self assessment rubrics on achievement in Physics of pupils at upper primary level”,
 - “A study on effectiveness of self assessment rubrics on achievement in Chemistry of pupils at upper primary level”,
 - “A study on effectiveness of self assessment rubrics on achievement in English of pupils at upper primary level”,
 - “A study on effectiveness of self assessment rubrics on achievement in Social science of pupils at upper primary level”,
- Replication of the study with different experimental designs can be done.
- The study can be extended to different medium of instruction and can be entitled as
 - “A study on effectiveness of self assessment rubrics on achievement in Mathematics of pupils at Malayalam medium upper primary level”
- The study can be extended to one academic year.
- In this study only achievement is treated as dependent variable. Effectiveness of this new method on other variables can also be taken. Such as,
 - “A study on effectiveness of self assessment rubrics on intelligence and achievement in Mathematics of pupils at upper primary level”
- It can be applied for other educational research purposes.
- A study on attitude of teachers and students towards self assessment can be conducted.

The researcher would be pleased if the outcomes of this study contribute to a deeper comprehension of the teaching-learning process and inspire further investigations in this field.

Conclusion

The current study aimed to explore the impact of self-assessment rubrics on both self-esteem and academic performance in Mathematics among upper primary students. Drawing from the study's findings, the following conclusions have been reached:

The research uncovered that employing self-assessment rubrics in teaching Mathematics proves more effective than the conventional approach. Additionally, utilizing self-assessment with these rubrics enhances the self-esteem of upper primary students. Furthermore, the study revealed no correlation between self-esteem and academic performance in Mathematics among upper primary pupils.

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