The Effect of Portfolio Strategy on Academic Performance in Mathematics among Secondary School Pupils.

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Abstract: *Teaching is a complex craft. Effective teachers use techniques that best serve the learning needs of their students. There are many things that students can learn themselves through discovery, with the teacher structuring the learning to suit. More teachers have recently begun using portfolios in all curricular areas. Portfolios provide a myriad of information about students' attitudes and motivation, level of development, and growth over time. Portfolios are useful as a support to the new instructional approaches that emphasizes the student's role in constructing understanding and the teacher's role in promoting understanding .This study is meant to find out the effect of Portfolio blended strategy in the learning of Mathematics at secondary level. The study concluded that teaching mathematics with portfolio strategy is effective in up scaling performance in Mathematics among the pupils at secondary level.*

Key Words*: Portfolio Blended Strategy, Academic Performance.*

1. INTRODUCTION:

Today education is the hope and dream of every person. Education has to prepare man to face the unknown, unpredictable and uncertain tomorrow. The rapid changes and increased complexity of today's world present new challenges and put new demands on our education system. There has been generally a growing awareness of the necessity to change and improve the preparation of students for productive functioning in the continually changing and highly demanding environment. In confronting this challenge it is necessary to consider the complexity of the education system itself and the multiple of problems that must be addressed.

Indeed, any strategy for change must contend with the diverse factors affecting the education system, the interactions of its parts and the intricate interdependencies within it and with its environment. As we consider these problems, we become increasingly cognizant of the various possibilities of using concepts and methods of the study of complex systems for providing direction and strategies to facilitate the introduction of viable and successful changes.

On one hand the goal of education is viewed as the transmission of knowledge by the teachers to the students. Nelson Mandela said I believe that "education is the most powerful weapon which you can use to change the world". On the other hand the goal of education is viewed as facilitating student's autonomous learning and self expression. The divergent teaching approach is flexible, student-centered, where the students are active participants in the learning process and learning achievements are assessed by a variety of evaluation tools such as student evaluation in parallel to teacher evaluation, documentation portfolios and special projects.

Portfolios are collection of student work representing a selection of performance. Portfolios in classrooms today are derives from the visual performing arts tradition in which they serve to showcase artists' accomplishments and personally favoured works. A portfolio may be a folder containing a student's evaluation of the strengths and weakness of the pieces.

According to Kingore,1993, portfolio as "systematic collections of students work selected to provide information about students attitudes and motivation, level of development and growth over time."

Recent changes in education policy, which emphasize greater teacher involvement in designing curriculum and assessing student, have been an impetus to increased portfolio use. Portfolios are valued as an assessment tool because, as representations of class-room based performance, they can be fully integrated in to the curriculum. Moreover, many teachers' educators and researchers believe that portfolio assessments are more effective than 'old-style' tests for measuring academic skills and informing instructional decisions.

2. NEED AND SIGNIFICANCE OF THE STUDY:

Teaching is a complex craft. Effective teachers use techniques that best serve the learning needs of their students. There are many things that students can learn themselves through discovery, with the teacher structuring the learning to suit. More teachers have recently begun using portfolios in all curricular areas. Portfolios are useful as a support to the new instructional approaches that emphasizes the student's role in constructing understanding and the teacher's role in promoting understanding.

Portfolio engages students in learning content. It helps students learn the skills of reflection and self evaluation. It helps students understand what quality work is and to document student learning in areas that do not lend themselves traditional assessment. Portfolio facilitate communicate with parenting adults.

Portfolios can be used to evaluate both products and process, and they allow integration of learning and assessment. Learning based on portfolio assessment can be more students directed, and since evaluation is not based on single scores, instruction based on learning styles is more easily evaluated. Portfolios also reduce the teacher's daily burden of grading papers. In sum, portfolios enable to assess global understanding and thinking skills with a multidimensional form of evaluation.

Portfolios offer the teacher and student an in-depth knowledge of the student as a learner. This means that the teacher can individualize instruction for the student. Weak areas can be strengthened and areas of mastery built upon. This study provides more information about student progress and encourages students to be responsible of their own learning and also help students develop skills necessary for life-long learning.

3. STATEMENT OF THE PROBLEM:

The present study was intended to study the effect of portfolio strategyin Mathematics learning at secondary level. Hence the study is entitled as **"THE EFFECT OF PORTFOLIO STRATEGY ON ACADEMIC PERFORMANCE IN MATHEMATICS AMONG SECONDARY SCHOOL PUPILS".**

4. VARIABLES OF THE STUDY:

Independent variable

1) Method of mathematics teaching with portfolio strategy
2) Prevailing method of mathematics teaching

Dependent variable

1) Academic Performance in mathematics

The intervening variable in this study is Gender.

5. OPERATIONAL DEFINITION OF KEY TERMS:

PORTFOLIO STRATEGY:

Portfolio: are purposeful, chronological collection of student work, designed to reflect student development over time and student outcomes at one or more designed points in time.

Showcase portfolio: This type of portfolio focuses on the student's best and most representative work. This type of portfolio is similar to an artist's portfolio where a variety of work is selected to reflect breadth of talent.

Teacher- student portfolio: This type of portfolio is often called the working portfolio or a working folder. This is an interactive teacher-student portfolio that aids in communication between teacher and student.

Portfolio assessment: Portfolio assessment enables students to reflect their real performance, to show their weak and strong domain and to observe students progress during the learning process and encourages students to take responsibilities for their own learning.

In this study **Portfolio strategy** entails portfolio as an instrument of learning and assessment. For the purpose the investigator made use of showcase portfolio, teacher-student portfolio and portfolio assessment.

6. STUDY OBJECTIVES:

To find out the effect of portfolio strategy on academic performance in mathematics among secondary school pupils.

HYPOTHESES

1. There is no significance difference in the academic performance in mathematics between experimental group and control group of pupils at secondary level with respect to
   a) Total sample
   b) Gender wise sub sample

7. METHODOLOGY:

Experimental method is used for the present study. This method is used to determine and evaluate effect of portfolio strategy on academic performance in mathematics of STD VIII pupils.

SAMPLE

For the present study 60 students from two intact class divisions at STD VIII who follows English as medium of instruction is selected. Experimental group consists of 30 students and control group consists of 30 students.

TOOLS USED FOR THE STUDY

1. Lesson transcripts based on portfolio strategy method.

2. Lesson transcripts based on prevailing instruction method.
3. A standardized achievement test in mathematics.

8. ANALYSIS OF DATA AND INTERPRETATIONS:

The performance of students in the gain scores of experimental and control group are represented in the following Figure

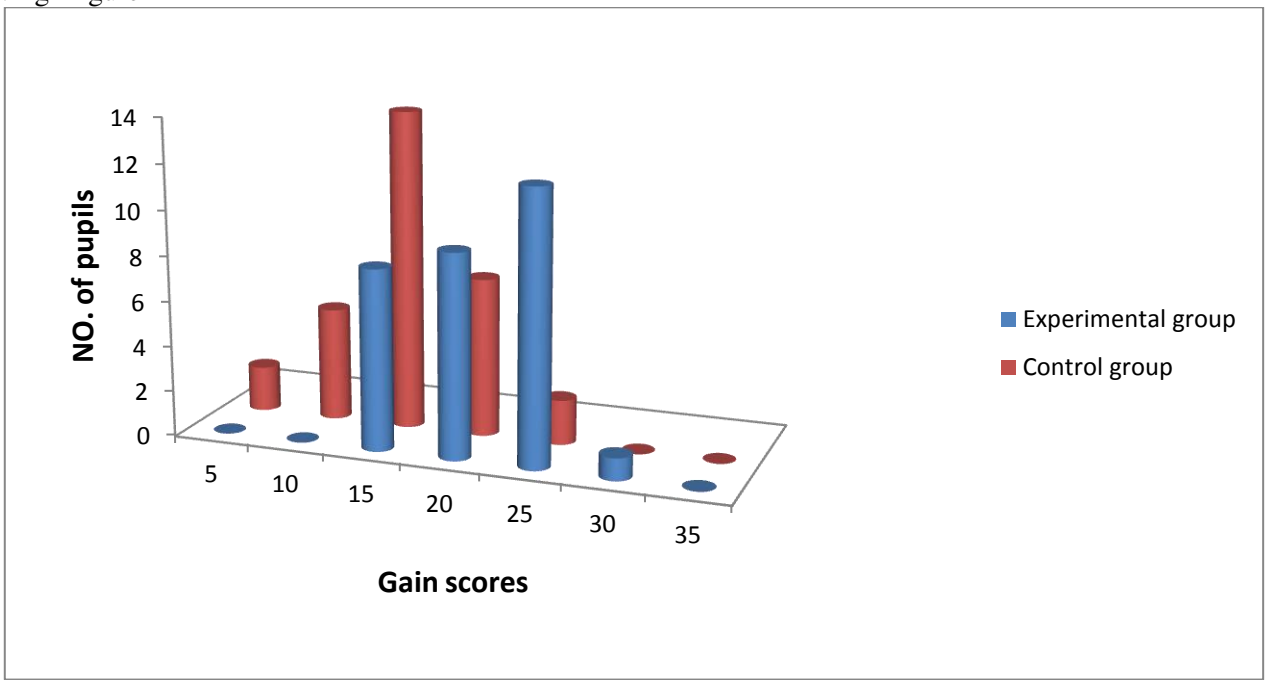

FIGURE 1:Graphical Representation of the Performance of Students in the Gain Scores of Experimental and Control groups

Summary of the Mean Comparison

The summary of mean comparison is given in Table below

TABLE 1

The result of the t-test conducted for the comparison of mean pre test (total), post test (total) and gain scores (total) for experimental and control groups.

VARIABLES		TOTAL SAMPLE, t – VALUE	LEVEL OF SIGNIFICANCE
Pre test	Total	0.9743	Not Significant
	Male	0.53	
	Female	0.60	
Post test	Total	6.021419	Significant
	Male	5.13	
	Female	4.18	
Gain Scores		5.36261	Significant

From Table1 , summary of t-values suggest that the t-values obtained for pre test is found not significant 0.01 level and 0.05 level of significance. So performance of the experimental and control groups for total sample is similar in case of their pre-experimental status of achievement measured in terms of a pre test. The value obtained for post test for total sample is found significant. It can be seen from the results that performance of the experimental group is high compared to the control group. The obtained t-values for the gain score for the total sample are found significant. There is a significant difference in the performance of the experimental group and control group on the gain scores.

Comparison of Effectiveness of Portfolio based class over Existing Method

For finding the effectiveness of Portfolio based class in teaching Mathematics, the investigator uses ANCOVA for statistically remove the heterogeneity of the two select groups. The details of ANOVA as well as ANCOVA are given below.

TABLE 2

Summary of Analysis of Variance (ANOVA) of Pre test and Post test scores in the experimental group and control group

SOURCE OF VARIATION	df	SS_X	SS_Y	$MS_{X(VX)}$	F_X	$MS_{Y(VY)}$	F_Y
Means - Among	1	2.82	582.8	2.82	0.92	582.82	34.35
Groups - Within	58	178.03	984.0	3.07		16.97	

The table value of F at 0.05 level of significance is 4.08 and 7.31 at 0.01 level of significance. The calculated value of F_X was 0.92 which is not significant at both levels. So it is clear that the two groups do not differ in their pre test. The calculated value of F_Y was 34.35 which is significant at 0.05 level and 0.01 level. This means that the two groups differ significantly in the post test.

The total sum of squares and adjusted mean square variance for post test scores were computed. F-ratio was calculated. The final (Y) scores were corrected for difference in initial (X) scores. For that SS_Y have been adjusted for any variability in Y, contributed by X. The adjusted sum of squares for Y (SS_X) was computed and the F-ratio (F_{YX}) was calculated.

The means of post test scores of achievement is adjusted with pre test mean and ANCOVA is applied to the adjusted mean to determine whether the adjusted means differ significantly. The summary of ANCOVA of pre test and post test scores of students in experimental group and control group are given in Table below

TABLE 3

Summary of Analysis of Covariance (ANCOVA) of pre test and post test scores in the Experimental and Control groups

SOURCE OF VARIATION	df	SS_X	SS_Y	SS_{XY}	SS_{YX}	MS_{YX} OR V_{YX}	SD_{YX}	F_{YX}
Among-group Means	1	2.82	582.8	40.52	549.52	549.52	4.12	32.38

The calculated value of F_{YX} ratio was 32.38. The table value of F is 4.08 at 0.05 level and 7.31 at 0.01 level. From this it was clear that the two final means, which depends upon the experimental and control variables differ significantly, after giving treatments, at 0.05 level and 0.01 level. This difference happens after they have been adjusted for initial differences. Thus null hypothesis is rejected at both levels.

The adjusted means of post test scores (Y mean) of students in the experimental and control groups were computed. The difference between Y means was tested for significance. The data for adjusted mean for post test scores in experimental group and control group are given in Table below.

TABLE 4

Adjusted Means of Post test scores in the Experimental and Control group

GROUP	N	M_X	M_Y	M_{XY}	S_{ED}	t
Experimental	30	6.17	24.2	24.10	1.06	5.74
Control	30	5.73	17.9	18.00		

The investigator used 't' test for determining the significance of differences among adjusted means. It helped to conclude about the differences generated through varying treatment after partialling out the initial differences.

The table value of t-value at 0.05 and 0.01 level of significance is 1.96 and 2.58 respectively. Since the calculated t-value 5.74 is greater than 2.58 at 0.05 level and 1.96at 0.01 level of significance, the difference between performances of the two groups differ significantly. The significantly great adjusted Y means of the experimental group than the control group indicates that experimental group is superior to control group.

From the analysis of the total scores of pupils in experimental and control groups by using the statistical technique of Analysis of Covariance (ANCOVA), it is evident that teaching through Portfolio based class is more effective than the Existing method-Activity method of teaching.

9. MAJOR FINDINGS:

1. Effect of portfolio strategy on academic performance in Mathematics

Teaching Mathematics blended with Portfolio strategy is more effective than the prevailing method of teaching Mathematics. This conclusion is supported by the following findings.

i. When the post test scores of pupils in the experimental and control groups were compared, the difference between their means was found to be statistically significant. The obtained t value was 6.0214 which is significant at 0.05 and 0.01 level of significance. Mean for experimental group is 37.03 and mean for control group is 30.36

ii. When the post test scores of males in the experimental group and control group were compared, the difference between their means was found to be statistically significant. The t value obtained was 4.18 which is significant at 0.05 and 0.01 level significance. The experimental group was found to be superior to the control group. Mean for the experimental group was 20.57 and mean for the control group was 17.2.

iii. When the post test scores of females in the experimental group and control group were compared, the difference between their means was found to be statistically significant. The t value obtained was 5.13 which is significant at 0.05 and 0.01 level significance. The experimental group was found to be superior to the control group. Mean for the experimental group was 18.07 and mean for the control group was 14.1.

iv. When the gain scores of pupils in the experimental group and control group were compared, the difference between their means was found to be statistically significant. The t value obtained was 5.3256 which is significant at 0.05 and 0.01 level significance. The experimental group was found to be superior to the control group. Mean for the experimental group was 18 and mean for the control group was 12.2 .

v. The analysis of covariance in pre test scores and post test scores of the experimental group and control group showed significant difference between the two groups. The obtained Fxy is 32.38 which is significant at 0.05 and 0.01 level significance. The difference between adjusted mean of post test scores of the experimental and control group were tested for significance and t-value (5.74) obtained was significant. The experimental group was found better than the control group in performance.

From the above findings it can be concluded that teaching mathematics with portfolio strategy is effective in up scaling performance in Mathematics among the pupils at secondary level.

10. EDUCATIONAL IMPLICATIONS:

The analysis of data has proved that Portfolio strategy method in teaching Mathematics is more effective than the Existing method (Activity Oriented method) in the academic performance in Mathematics. On the basis of these, the following suggestions are made.

- It was found that while teaching using strategy based on Portfolio, the interest of pupils was also increased. So the students should be handled with this method of instruction. The application of Portfolio strategy will make the class interesting and lively.
- Portfolios capitalize on students' natural tendency to save work and become an effective way to get them to take a second look and think about how they could improve future work. As any teacher or student can confirm, this method is a clear departure from the old write, hand in, and forget mentality, where first drafts were considered final products.
- Students benefit from an awareness of the processes and strategies involved in writing, solving a problem, researching a topic, analyzing information, or describing their own observations. Without instruction focused on the processes and strategies that underlie effective performance of these types of work, most students will not learn them or will learn them only minimally. And without curriculum-specific experience in using these processes and strategies, even fewer students will carry them forward into new and appropriate contexts. Portfolios can serve as a vehicle for enhancing student awareness of these strategies for thinking about and producing work--both inside and beyond the classroom.
- Students at all levels see assessment as something that is done to them on their class work by someone else. Beyond "percent correct," assigned letter grades, and grammatical or arithmetic errors, many students have little knowledge of what is involved in evaluating their class work. Portfolios can provide structure for involving students in developing and understanding criteria for good efforts, in coming to see the criteria as their own, and in applying the criteria to their own and other students' work.
- Portfolios place additional demands on teachers and students as well as on school resources. Teachers need not only a thorough understanding of their subject area and instructional skills, but also additional time for planning, conferring with other teachers, developing strategies and materials, meeting with individual students and small groups, and reviewing and commenting on student work.

REFERENCES:

1. Anderson, R.S, DeMeulle, L. (1998). Portfolio use in twenty-four teacher education programs. Teacher Education Quarterly, 25(1), 25–32.
2. Cook-Benjamin, L. (2001). Portfolio assessment: Benefits, issues of implementation, and reflections on its use
3. Fernsten, L.,&Fernsten, J. (2005). Portfolio assessment and reflection: Enhancing learning through effective practice. Reflective Practice, 6(2), 303–309.
4. Wolf, K. (1994). Teaching portfolios: Capturing the complexity of teaching. In L. Ingvarson & R. Chadbourne (Eds.), Valuing teachers work: New directions in teacher appraisal. Victoria: The Australian Council for Educational Research.
5. Fritz, C.A. (2001). The level of teacher involvement in the Vermont mathematics portfolio assessment. University of New Hampshire. Unpublished doctoral dissertation.
6. Barton, J.,&Collins, A. (1993). Portfolios in teacher education. Journal of Teacher Education, 44(3), 200–210.
7. Ellsworth, J. Z. (2002). Using student portfolios to increase reflective practice among elementary teachers. Journal of Teacher Education, 53(4), 342–355.
8. Kingore(1993) Portfolios:Enriching and Assessing all students,identifying the gifted grades k-6.Professional associate publishing
9. Koretz, Daniel (1994). "The evolution of a portfolio program: The impact and quality of the Vermont Portfolio Program in its second year (1992-1993)." (ERIC Document Reproduction Service No. ED 379 301)