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Effect of Utilizing Geometer's Sketchpad Software on Students' Academic Achievement in Mathematics' Training at High Schools

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----------ABSTRACT----------
The study is carried out in order to measure the effectiveness of "Geometer's Sketchpad software" inside the classroom environment and analyzed how this training is helping high school students while solving mathematics problems. In order to measure the effectiveness, regression and co-relation analysis has been done and finally the mean responses have been analyzed to evaluate the method effectiveness correctly on SPSS computer statistic program.

Keywords: *Geometer's Sketchpad software, Mathematics.*

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I. INTRODUCTION

Using sketchpad software improves students` understandings and mathematical conceptions, vocabulary, get visual feedback, deepen understanding and promotes mathematical habits which will increase students` test results. Using Sketchpad activities with your students facilitates a variety of proven learning strategies. Many of these strategies are drawn from Classroom Instruction.

There are several advantages of Sketchpad program in order to improve students' Math skills, especially for observing differences and similarities between mathematical shapes and representations. As students reshape a Sketchpad construction by dragging a point or changing a parameter, they can observe the differences and the similarities between two constructions.

Explaining reasons for differences and similarities provides students deeper understanding and insights into mathematical terms in Sketchpad. Students responses about these changes helps teacher to get better evaluation about students comprehension.

Sketchpad provides effective and faster learning, better comprehension by active symbolization. Students modification on shapes and parameters, observing and analyzing changes by using this program makes students motivated and give them chance to study more than one example. Because our brains are tend to observe and analyze actions, active usage of Sketchpad is very motivating and helpful for learning.

Sketchpad's tools help to understand abstract notion of mathematical objects and makes them more concrete. As students make mathematical shapes directly using Sketchpad objects, seeing their structures like scripts, describing and explaining their work with captions and other annotations, they are being able to study with multiple representations of their mathematical concepts —tangible and abstract as well as symbolic, visual, and verbal.

Students get instant visual correction, which enables them to check and assess their own work without their teachers help. Does it work as they expected? Does "drag test" result fit together by dragging different points? Receiving immediate feedback from their work , completing a Mathematical construction , discovering principle by try solving different problems causes complete satisfaction and can be very motivational for students.

Sketchpad improves students' mathematical vocabulary and helps them using it accurately. Deliberate usage of Sketchpad's text for menus (rather than icons) is very crucial because learning Mathematical terms such as Construct Perpendicular Line, Plot New Function, and Measure Circumference are key factors for using Sketchpad's program and when used ; outcomes of the program enables students see the concrete result of their thoughts. Sharing results with each other and with the whole class, describing them to each other creates positive and interactive learning atmosphere in the classroom.

Students are encouraged to produce and test hypotheses by try building constructions, describing the differences they observe and answering questions. What causes differences in their constructions? What is the students explanation about the changes. How they justify their modifications and manipulations? These questions make students face with creative part of mathematics, which is very important part of mathematics.

II. RESEARCH MODEL

This study determined whether using Geometer's Sketchpad as a teaching tool improved student attitudes toward mathematics and their improved achievement. This chapter includes the data analysis of the surveys, interviews, and journal, as well the interpretation of the results. Analyzing of 11th grade students` attitudes towards the mathematics lesson. A modified attitude survey was given to experimental groups` students. There are 54 students in the experimental group totally. 51 of 54 students participated in this survey.

III. REGRESSION ANALYSIS

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.576[a]	.331	.273	2.19474	1.923
a. Predictors: (Constant), Cognition, Perception, Affection, Learning Effectivness					
b. Dependent Variable: Atmosphere					

Here, value of R square is 0.331 which means that all independent variables have a significant impact upon the dependent variable with a total value of 0.331 and remaining effect is due to other factors. Value of R square lies between 0 to 100. Here, this value of R shows that model is fit and explains effect of independent variables upon dependent one. Usually, value of Durban Watson is less than two. It measures the auto correlation between the variables. Here, its value is less than two, which shows that model is significant and auto correlation among all independent and dependent variables exists significantly.

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	109.756	4	27.439	5.696	.001[b]
	Residual	221.578	46	4.817		
	Total	331.333	50			
a. Dependent Variable: Atmosphere						
b. Predictors: (Constant), Cognition, Perception, Affection, Learning Effectiveness						

Value of F shows the significance of the overall regression model, here value of F is 5.696 which is greater than its minimum value of 4. higher the value of F, greater will be the significance of the overall regression model. It means that our theoretical model was correctly built.

IV. CORRELATION ANALYSIS

Relation between effectiveness and classroom environment

Correlations			
		Learning Effectivness	Atmosphere
Learning Effectivness	Pearson Correlation	1	.526**
	Sig. (2-tailed)		.000
	N		51
Atmosphere	Pearson Correlation		1
	Sig. (2-tailed)		
	N		51
**. Correlation is significant at the 0.01 level (2-tailed).			

Here, shows that there is a significant relationship between two variables, and learning effectiveness has a positive relation with classroom atmosphere. It means that higher the students will found the method helpful and easy to understand, more healthy atmosphere will exist inside the classroom that would be more conductive towards learning.

Relation between perception of students towards method and classroom environment

Correlations			
		Atmosphere	Perception
Atmosphere	Pearson Correlation	1	.335*
	Sig. (2-tailed)		.016
	N	51	51
Perception	Pearson Correlation	.335*	1
	Sig. (2-tailed)	.016	
	N	51	51
*. Correlation is significant at the 0.05 level (2-tailed).			

A significant positive relation exists between students perception and classroom atmosphere, it suggests that general attitude of students towards the new method affects the classroom learning with a significant value of 0.335.

Relation between affection and classroom atmosphere

Correlations			
		Atmosphere	Affection
Atmosphere	Pearson Correlation	1	.158
	Sig. (2-tailed)		.270
	N	51	51
Affection	Pearson Correlation	.158	1
	Sig. (2-tailed)	.270	
	N	51	51

Here, the effect of affection upon the classroom atmosphere is not significant enough. It shows that students personal liking about the topic do not significantly affect the overall classroom environment.

Relation between cognition and classroom environment

Correlations			
		Atmosphere	Cognition
Atmosphere	Pearson Correlation	1	-.190
	Sig. (2-tailed)		.183
	N	51	51
Cognition	Pearson Correlation	-.190	1
	Sig. (2-tailed)	.183	
	N	51	51

Again the relation between two variables is insignificant and there is no direct impact of cognition process upon the classroom environment.

V. CONCLUSION

Overall, the study results have shown that general perception of student towards the method is positive , but some students hesitate using method as showed disagreement towards the statements that favored the use of methods in the class. It suggests that there is a strong need to encourage the students towards usage of this method as this method is found highly effective in building the basic concepts of students about the subject. Students reported that the method is helping them clearing the concepts and they easily get visualize while using this method. It has suggested to teachers that there should be a proper training give to students in order to build the awareness regarding the use of method inside classroom. It also suggests that there is a need to find an easy way that can help and encourage some students while using the method. We can analyze the mean scores of all responses to asked questions. Teachers who really want to make their student learn about new things have to build first, the confidence of their students. One way to encourage the students is by promoting a healthy inside class environment, where students can help each other. Teacher may make the teams of students and assign the group assignments instead of individual ones. Tasks should be interesting enough to grab the attention and a teacher may have to spend extra time while coaching its students in the initial stage.

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