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Study of the Influence of Pre-Organizers on Mathematic Achievement of Students

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ABSTRACT

Background: Improving students' problem-solving abilities is a major, if not the major, goal of middle grades mathematics. The Pre-organizer strategy is an instructional technique which involves deliberate introduction of certain concepts and sub-concepts called sub-summers in advance of the presentation of the actual learning material or task in order to enhance meaningful learning and retention of the learning materials perceived difficult to learners. **Objective:** The present research investigates the effect of learning by using advanced organization and traditional learning on the achievement in mathematics. Therefore we have chosen 3 classes by random sampling from among mechanics student Eyrie Islamic Azad university, one class (42 students) as experimental1 group, one class (44 students) as experimental2 group and other class (43 students) as control group. **Results:** Per-test on mathematics was administered to 3 groups. There was no statistical significant difference between the groups. Same subject were thought to 3 groups lasted one months. Experimental groups were thought by learning using advanced organization and control group were thought by traditional method. After one months and teaching of second chapter of the book, 3 groups took part in post-test. The results of comparisons revealed that: experimental groups were significantly better than control on mathematics learning. Also found that these who are instructed bussed on method using advance organization at the beginning of each chapter are highly benefited from educational development. **Conclusion:** One month after post-test, we gave the student mathematics exam .the exam show that this method has a positive effect on the educational development in mathematics

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INTRODUCTION

Improving students' problem-solving abilities is a major, if not *the* major, goal of middle grades mathematics. "Let me give you a math story problem." This sentence often strikes fear in many middle grades students as well as some teachers. As international comparisons, national commissions, and state assessment results confirm, students have difficulty solving mathematical applications problems. The Pre-organizer strategy is an instructional technique which involves deliberate introduction of certain concepts and sub-concepts called sub-summers in advance of the presentation of the actual learning material or task in order to enhance meaningful learning and retention of the learning materials perceived difficult to learners. The introductory materials are meant to provide prerequisite knowledge that would assist the learners to understand a specific topic/concept that is perceived difficult to comprehend. "Pre-Organizers", is a concept or a subject which is used in teaching a lesson by which the different parts and subjects of a major of science place in the student's mind. Ausubel's theory is concerned with how individuals learn large amounts of meaningful material from verbal/textual presentations in a school setting (in contrast to theories developed in the context of laboratory experiments). According to Ausubel, learning is based upon the kinds of superordinate, representational, and combinatorial processes that occur during the reception of information. A primary process in learning is subsumption in which new material is related to relevant ideas in the existing cognitive structure on a substantive, non-verbatim basis. Cognitive structures represent the residue of all learning experiences; forgetting occurs because certain details get integrated and lose their individual identity. The pictorial orientation allows students to record their ideas in whatever order they occur. If students first think of the unit for their final answer, then this is recorded in the fifth, bottom-right area. This idea (the unit), then, is not needed in the short-term memory because a reminder is recorded. If students first think of a possible procedure for their answer, this is recorded in the third, upper-right area. David Ausubel who is professional in educational psychology has offered the idea of using the pre-organizer in training in 1963. He had a special interest in a method that

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hierarchy of knowledge organizes and how the human's mind organizes the thoughts. Ausubel believed that the learner owns a "structure, consolidation and a clear view of knowledge in a particular subject" at each time and each stage. He named this structure a Cognitive Structure and believed that this structure will form the learner in facing with the new ideas.

A research which was accomplished by Gholamali Afrouz and the colleagues studied the influence of pre-organizers in learning the 2nd grade of high school boys' students in Shiraz in Geography. The results showed that the students' grade did not have a meaningful difference in pretest but the increased grades in posttest were reviewed in experimental group. Therefore, these groups (Experimental Group) who have received the pre-organizers have better learning in comparison with the Control Group.

Goals of the Research:

1. Study the Influence of training with pre-organizers expression on the mathematic achievement
2. Study the influence of the training with pre-organizers expressions on consolidation of Mathematic learning

Research Hypothesis:

First Hypothesis: the progress in mathematics of students who are trained by the pre-organizers expressions at the beginning of each Lesson is more than the one who trained by the traditional method.

Second Hypothesis: the progress of mathematics of students who are trained by the pre-organizers expression during each topic is more than the ones who are trained by traditional method

Third Hypothesis: the learning consolidation of mathematics in students who are trained by the pre-organizers expression at the beginning of each Lesson is more than the ones who are trained by the traditional method.

Fourth Hypothesis: the learning consolidation of mathematics in students who are trained by the pre-organizers expression during each Lesson is more than the ones who are trained by the traditional method.

Fifth Hypothesis: the mathematic progress of students who are trained by the pre-organizers expression at the beginning of each Lesson is equal to the ones who are trained by the pre-organizers expression during each Lesson

Methodology:

Among the Mechanics classes which had taken Differential Equation at the second semester of 2011-2012, 3 classes were chosen randomly. Then one out of these three classes was chosen randomly as the Test Group 1 and a class as the Test Group 2 and a class as the Control Group. The populations were 368 boys. By choosing the Test Groups & Control Groups, at first the equation course was simultaneously run in three classes. The pre-test of the Equation Course includes 2 pars; part one was evaluating the students' learning's from chapter 1 and the second part was evaluating the students' knowledge from chapter 2 (The Studied chapter on this research). The results of T test of 3 groups indicate the lack of significant differences between the 3 groups and all three groups are equal. A week after the pre-test in the class test 1 of training with the expression of pre-organizers at the beginning of each Lesson and in the class test 2 of training with the expression of pre-organizers during each Lesson and in control group with the traditional method was accomplished. These methods were last 4 weeks and a post-test was taken from all three groups on the fifth week and the track test was taken a month after the post-test without notification. In order to evaluate the achievement in the Equation Course and study the learning consolidation of the students in both groups of test & control, the researcher test was used which the questions of this test have been collected and studied with accordance to the final questions of Boyce Diperima Differential Equation book along with the colleagues' point of view and some of the professors. This test was executed in form of "pre-test" "Post-test" and "Tracking test. The (T-Test) was used for both independent groups and study of the average discrepancy of these two groups

Table 1: The preliminary or final plan with the witness group and usage of random selection.

Group	Preliminary Test	Independent Factor	Final Test
Experimental	T1	X	T2
Witness	T1	-	T2

Table 2: Comparison between the averages for the first part of the Equation Course Pre-test in two groups of Control & Test 1.

	Number	Average	Standard Deviation	Lowin Test		T Statistics	Degree of Freedom	Significance Level	Significance Status
				F Statistics	P- Value				
Control Group	43	12.83	2.78	0/002	0/96	0/32	59	0/75	Insignificant
Test Group	42	12.67	2.71						

Results:**3.1. The T test among the two groups of Test 1 & Control in the first part of the pre-test in Equation Course**

Table 2 shows that the deviation between the average of Test Group 1 grades & Control group in the first part of the Equation Course pre-test in terms of statistics is not significant. Therefore the students' data of two groups of the book's first chapter is almost equal and the two groups are equal ($P > 0/75$)

3.2. The T test among the two groups of Test1 & Control in the second part of the Equation Course Pre-Test**Table 3:** Comparison between the averages for the second part of Equation Course Pre-test in two groups of Control and Test 1

	Number	Average	Standard Deviation	Lowin Test		T Statistics	Degree of Freedom	Significance Level	Significance Status
				F Statistics	P- Value				
Control Group	43	0/74	0/73	0/14	0/7	0/53	59	0/59	Insignificant
Test Group	42	0/83	0/79						

3.3. The T test among the two groups of Test2 & Control in the first part of the Equation Course Pre-Test**Table 4:** Comparison between the averages for the first part of Equation Course Pre-test in two groups of Control and Test 2.

	Number	Average	Standard Deviation	Lowin Test		T Statistics	Degree of Freedom	Significance Level	Significance Status
				F Statistics	P- Value				
Control Group	43	12/83	2/78	1/023	0/315	0/097	90	0/923	Insignificant
Test Group	44	12/89	2/76						

Table 4 shows that the difference is not significant statistically which indicates that the two groups are the same in terms of data which shows that the two groups are equal.

3.4. The T test among the two groups of Test2 & Control in the second part of the Equation Course Pre-Test**Table 5:** Comparison between the averages for the second part of Equation Course Pre-test in two groups of Control and Test 2.

	Number	Average	Standard Deviation	Lowin Test		T Statistics	Degree of Freedom	Significance Level	Significance Status
				F Statistics	P- Value				
Control Group	43	0/74	0/73	0/582	0/447	0/334	90	0/972	Insignificant
Test Group	44	0/72	0/76						

Table 5 shows that the difference between the grades of the two groups of Control & Test 2 in the second part of the Equation Course Pre-test is not statistically significant which indicates the equality of students' pre-data of two groups

3.5. Special Assumption1:

The Mathematic achievement of students who are trained by the expression of pre-organizers at the beginning of each Lesson is more than the students who are trained by the traditional method. The T test was taken for the independent groups. The grades were achieved from subtracting the pre-test grades from the post-test grades and the difference between these grades in both groups was studied.

Table 6: Comparison between the average grades among the Test 1 & Control Groups in post-test.

	Number	Average	Standard Deviation	Lowin Test		T Statistics	Degree of Freedom	Significance Level	Significance Status
				F Statistics	P- Value				
Control Group	43	0/22	0/93	4/46	0/039	-2/8	59	0/005	Significant
Test Group 1	42	0/78	0/54						

Table 6 shows that the difference between the grades average among the Test 1 group & Control group is statistically significant and by neutralizing the effect of pre-test the difference between the two groups will be statistically significant ($P < /005$). Therefore, while confirming the first hypothesis it can be said that training with the expression of pre-organizers at the beginning of each Lesson effects the students' mathematic achievement of Test Group 1 and this effect is significant.

3.6. Special Assumption 2:

The mathematic achievement of students who are trained by the pre-organizers expression during each Lesson is more than the students who are trained by traditional method. The T test was taken for independent groups, the grades here were achieved by subtracting the pre-test grades from post-test grades and the difference of this grade was studied among the two groups of Test & Control.

Table 7: Comparison between the average grades among the Test Group 2 & Control Group in post-test.

	Number	Average	Standard Deviation	Lowin Test		T Statistics	Degree of Freedom	Significance Level	Significance Status
				F Statistics	P-Value				
Control Group	43	0/22	0/93	3/218	0/076	2/551	90	0/01	Significant
Test Group 2	44	0/68	2/32						

Table 7 shows that the average grade of Test group's been greater than the Control Group and the results are statistically significant ($P < 0/047$). Therefore by confirming the second hypothesis it can be said that training with expression of pre-organizers during each Lesson influences the achievement of students' equation course of the Test Group and this influence is significant.

3.7. Special Assumption3:

Training consolidation of students mathematic learning which are trained by the pre-organizers expression at the beginning of each Lesson is more than the students who are trained by the traditional method. In testing this hypothesis, the average grade of the tracking test of the Equation course of Test Group 1 or the Control Group was compared with T-Test statistical test for the independent groups which the result is as follow with the accordance with the SPSS Software:

Table 8: Comparison between the average grades of Tracking Test of Equation Course in two groups of Test Group 1 & Control Group.

	Number	Average	Standard Deviation	Lowin Test		T Statistics	Degree of Freedom	Significance Level	Significance Status
				F Statistics	P-Value				
Control Group	43	9/96	3/4	0/314	0/557	3/009	59	0/004	Significant
Test Group	42	12/17	3/1						

Table 8 shows that the average of Test Group 1 in the Tracking Test of Equation Course is greater than the Control Group ($12/17 \pm 3/1$ for Test Group & $9/96 \pm 3/4$ for Control Group) and this deviation is statistically significant. ($P < 0/005$) therefore while confirming the third hypothesis it can be said that training with the pre-organizers expression at the beginning of each Lesson will influence the Mathematic learning consolidation of Test Group 1 students and this influence is significant.

3.8. Special Assumption4:

Mathematic learning consolidation in students which are trained by the pre-organizers expression during each Lesson is more than the students who trained by the traditional method. In testing this hypothesis, the average grade of the tracking test of Equation course of Test Group 2 with the Control group was compared with the T-test statistical test for the independent groups which the results are shown by the SPSS Software as following:

Table 9: Comparison between the average grades of the Equation Course Tracking Test of Two groups of Test 2 & Control.

	Number	Average	Standard Deviation	Lowin Test		T Statistics	Degree of Freedom	Significance Level	Significance Status
				F Statistics	P-Value				
Control Group	43	9/38	2/934	0/363	0/548	2/101	90	0/03	Significant
Test Group	44	10/61	2/671						

Table 9 shows that the average of Test Group 2 of the Equation Course is greater than Control Group ($61/671 \pm 10/2$ for Test Group and $38/934 \pm 9/2$ for Control Group) and this deviation is statistically significant ($P < 0/05$). Therefore, while confirming the fourth hypothesis it can be said that training by pre-organizers expression during each Lesson influences the Equation Course learning consolidation and this influence is significant.

3.9. Special Assumption5:

The mathematic achievement in students who are trained by the pre-organizer expression at the beginning of each lesson is equal to the students who are trained by the Q & A Method with the pre-organizers expression during each lesson.

Table 10: Comparison between the average grades among the Test Group 1 & 2 in Post-Test.

	Number	Average	Standard Deviation	Lowin Test		T Statistics	Degree of Freedom	Significance Level	Significance Status
				F Statistics	P- Value				
Test Group 1	42	0/90	0/57	0/640	0/426	2/271	84	0/026	Significant
Test Group 2	44	0/62	0/55						

The T Test was taken for independent groups the grades here was achieved by subtracting the pre-test grades from the post-test grades and the deviation of this grade was studied in both groups of Test & Control. Table 10 shows that the deviation of Average grades among the Test Group 1 & Test Group 2 is statistically significant and by neutralizing the pre-test effect, the deviation of Test Group 1 & 2 is statistically significant ($P < 0/5$). Therefore, by rejecting the fifth assumption it can be said that training by pre-organizers expression at the beginning of each lesson has more influenced on the students' mathematic achievement

Discussion:

Ausubel believes that if the learners could relate the new learning to the leanings which had already learned or start the training with a right background and the content would be organized, the learning would be significant. But if he memorizes the new learning by repeating and practicing and without find any relationship between the learning which had already learned, his learning would be perfunctory. The principles of this theory are: 1. The most general ideas of a subject should be presented first and then progressively differentiated in terms of detail and specificity. 2. Instructional materials should attempt to integrate new material with previously presented information through comparisons and cross-referencing of new and old ideas. In view of the observed significant differences in performance between the group exposed to treatment and the group that was exposed to the conventional method in favor of the treatment group, it is necessary for teachers of mathematics and other subject areas to adopt the use- of advance organizers or pre-organizer strategy in dealing with topics considered' difficult. For effective application of the pre-organizer strategy, the teachers of mathematics should be exposed to various methods of identifying the concepts and sub-concepts subsumed in a specific mathematics topic through workshops and seminars. These subsuming concepts and sub-concepts constitute the advance organizer package. The content of the advance organizer package should be relevant to what the learners already know and the new knowledge to be imparted. This is because; the purpose of advance organizer is to bridge the gap between what the learner already knows and what he needs to know. Lastly, teacher should encourage female students to engage in active participation at lesson presentation. They should also be assigned responsibilities that would involve them in solving word based quadratic problems. Such assignments include calling them to respond to questions during the lesson, asking them to identify the key words in a word based quadratic expression, giving technical meanings to the identified key words and engaging them to solve as many word quadratic problems as possible.

Conclusion:

The results represents that learning by pre-organizers expression as one of the key elements of cognitive skills learning makes the learners to use the thoughts, feedbacks and previous learning in seeking mastery of concepts.

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