RESEARCH ARTICLE

IMPROVING STUDENTS' ACHIEVEMENT AND RETENTION OF LEARNING IN ENVIRONMENTAL SCIENCE USING 7ES INSTRUCTIONAL MODEL

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Manuscript Info	Abstract
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This study was undertaken to determine the effects of 7Es Instructional Model in the achievement of students in Environmental Science. It is anchored in the belief that between the two, the Traditional Approach and the use of 7Es Instructional Model in teaching Environmental Science, the latter leads to a positive effect on science achievement and retention of previously gained concepts in the Environmental Science Strand in K to 12 Science Curriculum. This study used the Quasi-Experimental Design, particularly Two – Factor Mixed Design. The experimental group was subjected to the use of 7Es Learning Model for teaching environmental science while the control group was taught with the Traditional Approach.The participants of the study were 38, 7th graders from each group. The experimental and the control groups of participants were given pre-test, underwent different treatments and were given the post-test. Three weeks, later the same post – test was re-administered to assess the retention level of the participants. The instrument used in the study were the Lesson plan, and Teacher-made Achievement Test. The instruments were validated by the pool of experts and were rated very good.Resultsshows that there is no significant difference between the posttest scores of the experimental and control groups. It also revealed that there is a significant difference between the posttest and pretest mean scores of the experimental and control groups while retention of previously gained concept in science was significant in the lag test scores of the experimental group. Analysis of Test Items and Lesson plans (7Es Instructional Model) shows that the category Explore, Explain, Elaborate and Extends promote high scores in the Science Achievement Test. Thus, teachers may use the 7Es' instructional Model in making Daily Lesson Plan in teaching science subjects to improve the achievement and enhance retention of previously gained concepts of students.

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Introduction:-

Science education aims to develop scientific literacy among learners that will prepare them to be informed and participative citizens who are able to make judgments and decisions regarding applications of scientific knowledge that may have social, health, or environmental impacts.(K to 12 Science Curriculum Guide August 2016).A science education that can mold a learner who is ready to compete globally, equipped with the twenty first (21st) century

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skills, and understand the phenomena present in their physical environments.And behind the success of this goal are the factors that contributes to the learning process of the students. Primarily, one of these is the process of teaching and learning process in the school which can cause a great impact to the learners. As a teacher, the improvement in the quality of education largely depends on the quality of instruction imparted in the classroom. Thus, the study utilized the 7E's Intrustional model in teaching. The 7E's Instructional model was use by the researcher in making the lesson plan for grade 8 students. The lesson plan is consisting of seven phases representing the 7 E's instructional model; Elicit phase, whereas teacher tried to identify prior understanding and misconception about the topics in environmental science. At this stage, the student used their prior knowledge in answering some questions about the topic. Their answers revealed some misunderstanding about the topic. During Engage phase, the teacher tried to get the attentions of their students into the subject matter. During the Explore phase, teacher act as a facilitator and assist students on their task and encourage students to connect with previous knowledge and experiences to create new solution as well as challenge their assumptions and by asking questions. At the Explain phase, the teacher provides the information, ideas and concepts that they learn from their activities.   During the Elaborate phase, the teacher provides opportunity for the students to apply the acquire new knowledge about the topics. For the Evaluation phase, the teacher allowed the students to check and see their own paper and reflect on to their own answers. In this way they can evaluate their own understanding about the topic. At the last Extend phase, the goal of the teacher was to transfer of students' learning to new concepts.Hence, the main focus of this study is to improve student's achievement and retention of learning in Environmental Science using 7E instructional model. In present study, the researcher utilized the 7E learning model as the platform for developing a lesson plan to discuss topics under the strand of environmental science and identify the achievement and concept retention of Grade 7 students for School Year 2017-2018.

Research Questions:
The main purpose of current experimental study is, therefore to improve student's achievement and retention of learning in Environmental Science using 7E instructional model. Specifically, this study will;
1.   To prepare and validate lesson transcripts based on 7E Instructional model.
2.   To compare the effectiveness of instructions based on 7-E instructional model and traditional instructional model on student's achievement and retention of learning.

Methods:-
This study utilizes quasi-experimental design through a non-equivalent control group to investigate the effect of 7Es Instructional Model in the achievement and attitudes of the students, whereby two intact group of Grade 7 students is the sample population in the experiment. One section is the control group that use the regular classroom discussion and activities, while the other section is the experimental group that use the 7E Learning model during the experimentation. The two treatment groups were pre-tested, administered a treatment, and afterward post-tested.

Descriptive Statistics such as arithmetic mean, and standard deviation were used to validate lesson transcripts based on 7E's Instructional Model.

Inferential Statistics - Data collected were analyzed using F –test emphasizing one – way analysis of variance (ANOVA). The use of ANOVA enabled the researcher to partial out the initial differences from the two groups. Initially, students in both the experimental and control groups were pre-tested on the Science Achievement Test and statistical analyses showed no significant difference in pre-test scores of the subjects. One – way Analysis of Variance (ANOVA) was used because it satisfies all the three principles of designs of experiments namely; replication, randomization and local control. Significant difference between the means of the pre-test and the post-test of the sRubjects for both the control and experimental groups were analyzed using this statistical model because this study investigated changes in mean scores over three time points (pretest, posttest and Lag test) and the subjects were used more than once on the same dependent variable.

Results:-
Problem 1. To prepare and validate lesson transcripts based on 7E Instructional model.
Five (5) Learning plans were developed for the duration of the study which are as follows: Dynamic Atmosphere; Climate, Weather and Biosphere; People and Severe Weather; Human Impact on the Atmosphere; and Severe Climate Condition. The Learning plans made were reviewed by three (3) experts in the field of science and in lesson

planning using an Evaluation Form for Learning Plans. The prepared Learning Plans were evaluated using four domains namely; Objectives, Materials, Procedure/ Lesson Development and Evaluation.

Domains	Mean	SD	Remark*
I. Objectives	3.00	0.000	Very Good
II. Materials	2.67	0.000	Very Good
III. Procedures	3.00	0.000	Very Good
IV. Evaluations	2.83	0.397	Very Good
Overall	2.97	0.171	Very good

The obtained mean for the objectives is 3.00 with an SD of 0.000 which is "very good". This showed that the objectives of the lessons are specific, measurable and attainable; it provided various learning domains (cognitive, affective and psychomotor) and reflect the kind of evaluation method/ procedure to be used. In terms of materials the 7Es' learning plans obtained a mean score of 2.67 which is "very good". This implied that the experts believed that the instructional materials stated in the plans are suited to the levels of the students, match the contents and aims of the lesson and show variety and creativity. The mean score of 3.00 and an SD of 0.000 for procedure/ lesson development was obtained. The rating showed that the evaluators were convinced that the procedures in the plans utilized the 7Es' learning model; elicit, engage, explore, explain, elaborate, evaluate, and extend. Finally, for the domain evaluation which obtained a mean score of 2.83 and an SD of 0.397 was rated "very good" by the three experts which means that they were convinced that appropriated activities are provided to check whether or not the objectives of the lessons are met and different methods and procedure for evaluation are included in the plans. The evaluators found out that the 7Es' Learning Plans as "very good" in all domains namely; Objectives (3.00); Materials (2.67); Procedure/Lesson Development (3.00); and Evaluation (2.83) with an over-all mean score of 2.97 (very good).

Problem 2. To compare the effectiveness of instructions based on 7-E instructional model and traditional instructional model on student's achievement and retention of learning.

After analyzing the data gathered for this study, the results revealed the following:
1. There is no significant difference between the post-test mean scores of the experimental and control groups.The analysis of variance (ANOVA) obtained an F-value of 0.077, p = 0.782. Since the p-value (.782) is greater than the alpha (.05), the research hypothesis is rejected.
2. There is a significant difference between the post-test mean score and pretest mean score of both the control and the experimental group. The ANOVA results of posttest and pretest of the experimental group shows the results with extremely significant at F = 101.496; p = 0.0001. While, the results of the post-test and pretest mean scores of the control group also suggest extremely significant difference between the two test in this group at F = 122.2235 at p=0.0001.
3. There is a significant difference between the lag test mean scores of the experimental and control groups. The results shows the F – value = 52.148, p – level = 0.00001 is extremely significant.
4. There is a significant difference between the lag test mean score and the post-test mean score of the experimental group.Analysis of variance (ANOVA) revealed that the lag test and post-test means scores is significant with the observed F= 10.02 and p = 0.003 value.
5. There is a significant difference between the lag test mean score and the post-test mean score of the control group.The study reveals that the Lag test scores are significantly different to the posttest scores of the control group after three weeks at an observed F = 119.25, p = 0.00001.
6. Based on the analysis of test items and Daily Lesson Plan using 7Es' Instructional model, Test items that were discussed in the category of Explore, Explain, Elaborate and Extends promote high scores in the Science Achievement Test.

Recommendations:-
The study revealed that 7Es instructional model improve student's achievement and retention of learning in Environmental Science.
Consequently, the following are the recommendations of this study:
1. Teachers may use 7E instructional model in teaching the lessons not only environmental science but also in other science lessons such as in Biology, Chemistry and Physics which are also covered under the K to 12 science

curriculum. Furthermore, they may also apply the said approach in teaching lessons in other subject areas such as English, Mathematics and Social Sciences.

2. Teachers may change the design of implementing the Daily Lesson Plan (DLP) approach by allocating longer duration so that students will have adequate time to enjoy and learn more concepts in science education and develop the skills of the 21st century learners.

3. For future researchers in science education, it is recommended to replicate this study covering larger scope in environmental science, in other sciences such as Biology, Chemistry, Physics and Earth Science or other subject areas. In relation to assessing students', researcher may employ another method like the use of reflective journal of students to assess their perception. Furthermore, researcher may also investigate on the effects of 7Es instructional model on students' problem solving skills. This would benefit not only the students but also the science teachers who are teaching the subject.

4. The school administrators may consider the conduct of training for science teachers and other subject areas in the implementation of the use of 7Es' Instructional model in teaching their respective subjects. This would benefit them as the primary entity who will manage the learning process inside the classroom.

5. For curriculum developers, they may identify and recommend topics that will utilized 7Es instructional model materials in environmental science which can help lessons and promotes achievement, concept retention and enjoyment in learning science concepts.

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