The Effectiveness of Constructivist Learning Model in the Teaching of Mathematics

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Abstract— This paper demonstrates that the constructivist learning model in the teaching of mathematics has a great impact in the acquisition of concepts , constructivist theory of theories that are based on building knowledge of learners , cares structural model including the learners schemes conceptual , is also interested to apply the active and effective in new situations he cares what any after learning and transfer of knowledge and experience to take advantage of them in the construction of experiences associated with new positions .The study was applied to samples of students in the preparatory year at the University of Tabuk and the two divisions to choose at random to represent one of the experimental group and the other control group. The result was that there were statistically significant differences between the mean scores of students of experimental and control groups in the post application to test the statistical concepts for the benefit of students of the experimental group.

Index Terms — Constructivist, Learning Model, Teaching mathematics

I. INTRODUCTION

Technology, communications, and information are very greatly changing during twenty first century. They do represent extremely development revolution in these fields. Thus changes in different aspects of life economically, socially, and politically. Thus general liberal, necessities, future challenge, did require us to give great attention to fundamental knowledge such as theories and other needs for modern mathematics. Modern mathematics now a day is based on pillars of understandings and skills to finally form a strong building by itself. Thus learning of mathematics is the centerline to convey information by different means, to direct and make it easy to understand. Thus, also courses of study need frequent adjustments as well as strategic methods of study [1and 2].

Constructive learning model
This model has different names in studies is concerned with what available to the learners of conceptual schemes, is also interested to apply the active and effective in the new situations that he cares, what any after learning and transfer of knowledge and experience to take advantage of them to build expertise associated with new positions and the constructivist learning model has four [2-4] stages:

(1) Phase of the call: where are inviting students to learn through a variety of ways. Teacher to ask them some questions with thought-provoking questions to be borne in mind that at this stage their knowledge related to the previous
(2) The stage of exploration and innovation: challenging the capabilities of the students this stage in the search for answers to questions specific to their generated through observation, measurement and experimentation, and working groups, with each group and each specific tasks of their own.
(3) The stage of proposal explanations and solutions: in this stage all groups to provide their findings and interpretations of solutions and proposals and discussed, and where students are modified of misconceptions or bring scientific concepts by replace misconceptions.
(4) The decision point: where practical applications of the findings of the students of solutions and conclusions.

Advantages of constructivist learning model
(1) Makes the learner focus of the educational process by activating the role of learner discovers and looking and performs activities.
(2) Allows the learner the opportunity to debate and dialogue with fellow learners or with the teacher in order to assist the growth of the language of dialogue and make him active.
(3) Links between science and technology, which gives learners the opportunity to see the importance of science for society and the role of science in solving the problems of society.
(4) Makes learners think in a scientific way.
(5) Encourages constructivist learning model to develop a spirit of cooperation and work as a team[5-8].

Constructivist learning in mathematics
Mathematics has a unique feature in it subject only, which claims the majority of adult learners and proudly inability to where and vision constructivism in learning and teaching change the concept of the students to the nature of mathematical knowledge is the vision of building for learning and one of the elements important theory in the teaching and learning of mathematics. And the constructivist theory principles the following:
(1) Learning is based on the activities carried out by educated and plans by the teacher.
(2) Focus on concepts and general rules linking molecules associated with them.
(3) Requires a good understanding of teaching mental models formed by the learners to the world.
(4) The goal of learning is to have your learner's meaning, not to preserve the correct answers and adopts the meaning of others [9-14].

**Problem of Research**

The research problem is that there is clear a weakness when asked for the preparatory year at the University of Tabuk in their ability to absorb the statistical concepts and tries to find the answer to the following question:

What is the effectiveness of constructivist learning in the teaching of statistics and its impact on the development of statistical concepts at the preparatory year students at the University of Tabuk.

**Objectives of the research and its importance**

1. Knowledge of the impact of constructivist learning in the development of statistical concepts to the target sample
2. Formation of the probability unit, according to the philosophy of constructivist learning.
3. May contribute to the search results in the formation of the current scientific perception about the effectiveness of constructivist learning in the development of statistical concepts.
4. Drawing the attention of those in charge of teaching the importance of constructivist learning mathematics.

**Hypotheses of Research**

1. There were statistically significant differences between the mean scores of students of experimental and control groups in the post application to test the statistical concepts.
2. There is the effectiveness of teaching using constructivist learning in the development of statistical concepts.

**Research limits**

1. Time limits: the academic year 1434-1435 H, first semester.
2. The objective limits: subject in principles of probability for students of the preparatory year.
3. Place limits: two divisions of the preparatory year at the University of Tabuk (females student department).

**II. RESEARCH TOOLS**

(a) A list of statistical concepts that can be developed with the target sample.
(b) Worksheets for students (prepared by the researchers)
(c) Test the statistical concepts prepared by the researchers.

**Terminology**

Constructivist learning model: [15] define it as: a method by which to help students build their knowledge (concepts, principles, laws) on the subject of new lesson by placing them in a position to contain the problem and then directed to conduct exploration activity to test the validity of their initial thoughts and then display their findings and interpretations and summarized in the form of background information for use in new situation. [16] defined it as: that the model is to help students build their knowledge of scientific concepts and according to four stages (advocacy, exploration, propose explanations and solutions, decision-making).

**Procedure definition for constructivist learning model**

Is a model for teaching statistical concepts ensures the interaction between the teacher and the learner, any learning-based understanding through the active role of students from the use of their information and knowledge in the construction of new knowledge that leads them to new situations and this is done in four successive stages are (invitation, exploration, propose explanations and solutions, decision-making).

**Research steps**

To answer the research question researchers have carried out:

1) Test for understanding is performed for the students of the preparatory year at the University of Tabuk first semester.
2) Preparation of required papers for the students of the experimental group, according to the style and philosophy of constructivist learning and teaching for the control group the manner currently used in teaching.
3) Application of the test of statistical concepts.
4) Recording results and treating it by statistically processed and interpreted.
5) Make recommendations and proposals.

**III. RESULTS AND DISCUSSION**

An examination was given to two classes consisting of 44 and 47 students respectively. In the first class (control group) the mean grade was 15.6 with a standard deviation of 4.4, while the second class (experimental group) the mean grade was 26.9 with a standard deviation of 2.4. We want to find is there a significant difference between the performance of two classes at a level of significance 0.05?

Suppose the two classes come from two populations having the respective means $\mu_1$ and $\mu_2$, then we have to decide between the hypotheses

$H_0$: $\mu_1 = \mu_2$ and the difference is merely due to chance
$H_1$: $\mu_1 \neq \mu_2$, and there is a significant difference between classes.

The mean and standard deviation of difference in mean are given by

$$\mu_{\bar{x}_1-\bar{x}_2} = 0, \quad \sigma_{\bar{x}_1-\bar{x}_2} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} = 0.75$$

Where we have used the sample standard deviations as estimates of $\sigma_1$ and $\sigma_2$.

Then

$$z = \frac{\bar{x}_1 - \bar{x}_2}{\sigma_{\bar{x}_1-\bar{x}_2}} = \frac{15.6 - 26.9}{0.75} = -15.07$$

For a two-tailed test the results are significant at a 0.05 level if $Z$ lies outside the range -1.96 to 1.96. Hence we conclude that there is a significant difference in performance of two classes and the second class is probably better [17].
IV. RECOMMENDATIONS

Recommendations for the development of statistical concepts
1) The urgent need for educational policy and a well-defined specific aims directly to the development of mathematical concepts as they help to creativity in various forms.
2) Concern for the development of statistical concepts to all levels of education through the choice of teaching methods and the dimension of modern methods of conservation and indoctrination that make the student recipients of the information without the slightest attempt to think.
3) Concern that classroom climate in which there is freedom, which helps to achieve the creativity and skill development.
4) interest in the practical application in the classroom, giving students the opportunity and the time to think about decaffeinated and urged them to be creative and conclusion and the exchange of views and access to the required themselves.
5) To encourage students to use the thinking skills, and effective methods in the independent self-learning and the use of all types of technology available to help them lifelong learning.

The recommendations of teachers
1) The need to implement training courses for teachers of mathematics to use the constructivist learning model in the teaching of mathematic, whether before or during the service.
2) Preparation of educational programs based teaching and learning of Mathematics aims to creativity in all the various stages of education
3) Continuing professional growth and academic teachers.
4) urged teachers to be creative in order to reach the personal creative where there are proper understanding of the methods of education and innovation, leading to the development of the creative abilities of students
5) Provide an opportunity for all groups of students to learn how to think and how to learn and how to enjoy whatever they are learning.
6) Urged the students to practice leadership skills, which help them to develop mathematical and statistical concepts they have.

Teach specific recommendations
1) The need for attention to the student during the process of teaching and to give him time to think and participation in activities in the classroom that allows him to be creative.
2) The use of modern teaching methods to help the development of statistical concepts and away from the traditional methods those focus on conservation and indoctrination.
3) The use of teaching methods are working on the development of habits of mind in the teaching and learning processes for the different grades.
4) Interest in mathematics curriculum and content and presented in a modern style works to stimulate the creative abilities of the students.
5) The continued development of the curriculum in order to learn to think, and the possibility of combining thinking strategies, and interact with many life situations, through the restructuring of the educational curriculum in the form of new help to train students to use thinking skills.
6) The use of innovative methods in teaching and learning process for all stages n starting from kindergarten to graduate students, to focus on learning the skills for the future.

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