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"The Effectiveness of the Dual Situated Learning Model in Correcting Fifth Grade Students Scientific Misconceptions and Increasing their Achievement Motivation"

A Dissertation Submitted in Partial Fulfillment of Ph.D. Degree
In Education, Curricula and Teaching Science

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The Summary in English

Introduction:

Teaching and learning science occupies a great importance for all generations. Scientific education is witnessing a large continuous care to face the challenges of the third millennium and the great amount of information in all scientific fields in general and in the field of natural sciences in particular due to the nature and structure of science.

The scientific concepts are considered the basic foundation of science as they are very important science products by which the scientific knowledge can be organized in a way that is meaningful and those are the organizing and controlling elements for any scientific knowledge that is presented in an academic term.

Broner emphasized the importance of possessing sound scientific concepts by the students that help them understand the subject and move them from haring an initial knowledge into a higher order knowledge.

Learning concepts is the core of learning science. Therefore scientific concepts are a must for autonomous learning and scientific education for life. They decrease the need for relearning when facing new situations. Moreover, acquiring scientific concepts leads to an increase in students' attention to scientific items, and their motivation to learn tem because they increase their abilities to explain, control and predict.

Children in the preschool stage have a basic understanding or awareness of a lot of scientific concepts. Students come to classrooms having alternative ideas and views or a misconception related to natural phenomena surrounding them. The difficulty in erasing these concepts is due to its resistance to change, solidity, stability and being built in the cognitive structure of the individual. It is also difficult to get rid of them using traditional teaching methods. Consequently, work should be done and effort should be exerted to change these views and correct them in students during learning science which is called conceptual change.

Many theories have attempted to study concepts and investigate the students misconceptions. One of these trials was the constructivism theory which took care

of the pre-cognitive knowledge of the individual which was represented in using ideas for forming new experiences and accessing new information. Learning happens when the ideas the learner has are modified or new information is added or existing ideas are reorganized so, the focus in constructivist thinking includes both the structure and the processes that happen inside the learner's brain.

In spite of this, there are many difficulties that stand in the way of conceptual change. As a result, (She) tried to put a model to facilitate the conceptual change process making use of previous theories and models in which learning depends on Dual- situated learning model in order to overcome the problems that result from concepts learning by traditional methods.

The problem of the research:

The problem of the research was represented in the existence of misconceptions of primary five pupils in science and their lack of motivation towards achievement. Therefore, the study aimed at identifying the effectiveness of the Dual- Situated learning model in correcting misconceptions included in "friction" unit and increasing achievement motivation of primary five pupils.

The problem of the research was represented in the following main question:

What is the effect of teaching using the Dual- Situated learning model in science in correcting misconceptions of primary five pupils and increasing their achievement motivation?

The main question is branched into the following sub questions:

1- What are the perspectives of primary five pupils about scientific concepts in the "friction" unit?
2- What is the effect of teaching using the Dual-Situated learning model in correcting misconceptions of primary five pupils?
3- What is the effect of teaching using the Dual-Situated learning model on increasing achievement motivation of primary five pupils?
4- What is the effect of teaching using the Dual-Situated learning model on the scores of the variables of the study which are the conceptual understanding and the motivation for achievement of primary five pupils?

The aims of the research:

The present research aimed at the following:

1- Identifying the misconceptions of primary five pupils about the scientific concepts included in the "Friction" unit.
2- Identifying the effect of the Dual-Situated learning model in correcting misconceptions and increasing achievement motivation of primary five pupils.

The significance of the research:

The significance of the research was represented in the following:

1- Presenting a diagnostic tool to figure out the misconceptions of primary five pupils in science.
2- Providing teachers with a list of misconceptions of primary five pupils included in "Friction" unit.
3- Presenting an operational model showing how to use the Dual-Situated learning model to correct misconceptions in science to help teacher.
4- Presenting two objective tools that help teachers measure the conceptual understanding in friction unit of primary five pupils and their motivation for achievement in science.

The delimitations of the research:

The research was delimited to the following:

1- A sample of primary five pupils from Gamal Abdel Nasser and Kohafa primary schools in fayoum Governorate.
2- The "Friction" unit assigned to primary five pupils for the following reasons:
   a. The unit includes scientific concepts related to pupils, lives which require correct understanding.
   b. The exploratory study for teachers and supervisors clarified that "Friction" unit is one of the most difficult units for the pupils and also includes a high misconceptions rate.

The approach of the research:

The research used the descriptive and quasi- experimental design:

1- **The descriptive approach**: That is used to survey previous studies and the theoretical framework related to the topic of the study.

2- **The quasi- experimental design**: That is used through choosing two groups:
   - **An experimental group** studying the friction unit by the Dual-Situated learning model.
   - **A control group** studying by the traditional method.

Tools of the research:

The tools of the research were represented in the following:

1- **Educational material:**
   - A student's activity book in which the content of the unit is organized according to the Dual-Situated learning model. (Prepared by the researcher)
   - A Teacher's guide related to the Dual-Situated learning model. (Prepared by the researcher)

2- **Measuring Tools:**
   - Conceptual understanding test. (Prepared by the researcher)
   - Achievement motivation test. (Prepared by the researcher)

Hypotheses of the research:

The research tried to verify the following hypotheses:

1- There are significant statistical differences between means of scores of students in the experimental and the control groups in the conceptual understanding test.
2- There are significant statistical differences between means of scores of the experimental group pupils in the pre- post application of the conceptual understanding test.
3- There are significant statistical differences between means of scores of the experimental group pupils and the control groups in the post application of the achievement motivation test as a total score and different measurements.
4- There are significant statistical differences between means of scores of the experimental group pupils in the pre -post application of the achievement motivation test as a total score and different measurements.

5- There is effect of teaching by the Dual-Situated learning model on the scores of the variables of the study which are the conceptual understanding and the motivation for achievement of primary five pupils.

The procedure of the research:

The research went through the following steps:

1- Surveying previous literature and studies related to misconceptions, Dual-Situated learning model and achievement motivation to write the theoretical framework.
2- Analyzing the content of "Friction" unit assigned to primary five pupils to determine the scientific concepts it includes in it to design the diagnostic test.
3- Designing a diagnostic test to figure out the misconceptions in its initial form.
4- Showing the diagnostic test to a group of jury members in order to determine its appropriateness for application.
5- Writing the test in its final form according to opinions of jury members.
6- Applying the test to the sample of the study.
7- Writing the results of the test and treating them statistically in order to identify the misconceptions included in the "Friction" unit of primary five pupils of the scientific concepts included in the "friction" unit.
8- Designing the tools of the study in its initial form.
9- Showing the tools of the study to a group of jury members to control them scientifically.
10- Writing the tools in their final form according to opinions of jury members.
11- Choosing the sample of the study from primary five pupils.
12- Applying the two pre- tests to the sample of the study and writing the results.
13- Teaching the two groups.
14- Applying the post tests to the sample of the study.
15- Writing the results, treating them statistically, explaining and discussing them.
16- Presenting recommendations and suggestions according to the results of the study.

Terms of the research:

The Dual- Situated Learning Model:

It is operationally defined as a learning model based on the nature of scientific concepts in the "Friction" unit assigned to primary five pupils and the beliefs of these pupils about the concepts which require designing educational events that cause unbalance and a gap in the previous knowledge of the pupils that lead the pupils to get rid of the misconceptions and accept the correct scientific concept then the occurrence of the conceptual change takes place.

Misconceptions:

It is operationally defined as what is formed to primary five pupils including ideas, knowledge and beliefs related to some concepts of "Friction" unit and contradicts sound scientific views and hinders pupils' understanding and correct explanations and resists adaptation and change.

Achievement motivation:

It is operationally defined as the motive that directs the scientific activity of the pupils to exert more effort, persistence, concentration and attention in learning science, enjoying it and overcoming the challenges that may face them during learning, in order to achieve the best result regardless of the reward. It is measured by the score that the pupil gets in the exam.

Conceptual change:

Place understand fifth grade elementary error of scientific concepts Implied "friction" unit "under study" the correct scientific understanding.

Conceptual understanding:

The ability of the primary five pupils on:

- **Explanation**: which is to provide an accurate description of scientific concepts related to friction unit and the ideas associated with it, and to express them briefly and clarity
- **Interpretatio**n: Some of the positions related to scientific concepts by identifying the causes that led to certain results and to identify the evidence and the evidence for the occurrence of specific phenomenon

- **Application**: to use knowledge effectively in new situations and different contexts, any use of abstractions (facts - concepts) that was previously learned in new situations and different contexts.

Indicate the degree to which the student obtained in the test on the error correction understanding of scientific concepts IMPLIED unit friction "under study".

The results of the research:

The research has achieved the following results:

1- There are significant statistical differences between means of scores of experimental group pupils and control group pupils in the post application of the conceptual understanding test as a total score and different levels, in favor of the experimental group.

2- There are significant statistical differences between means of scores of experimental group pupils in the pre- post application in the conceptual understanding test as a total score and different levels, in favor of the post application.

3- There are significant statistical differences between means of scores of pupils of the experimental and control groups in the post application of the achievement motivation test as a total score and different measurements, Persistence factor, in favor of the experimental group.

4- There are significant statistical differences between means of scores of the experimental group pupils in the pre -post application of the achievement motivation test as a total score and different measurements, in favor of the post application.

5- There is an effect of teaching by the dual- situated learning model in the scores of the variables of the study which are the conceptual understanding and achievement motivation.

Recommendations of the research:

Through the results of the study, the researcher recommends the following:

1- Giving attention to preparing diagnostic tests to figure out misconceptions in different educational stage.
2- Teachers of science should pay attention to diagnose misconceptions by measuring initial beliefs that have been established in the pupils' minds by the end of each lesson and diagnostic tools can be used like sheets and tests.
3- According to these diagnostic tests of initial beliefs, the teacher can build dual- situations for other units.
4- Traing teachers on planning by using the dual- situated learning model.
5- Providing curriculum planners with the studies results that proved the effectiveness of dual- situated learning model to help them achieve curriculum development using this model.
6- Providing primary five science textbooks with the dual- situations to achieve efficiency in learning concepts.

Suggestions of the research:

Through the results of the research, the researcher suggests the following:

1- Specifying misconceptions of teachers on scientific concepts included in primary stage science textbooks.
2- Analyzing primary stage science textbooks to identify the alternative images included in these books.
3- The effectiveness of the dual- situated learning model in teaching science in misconceptions correction of a mixed males and females sample.
4- The effectiveness of the dual- situated learning model in teaching science on misconceptions correction of preparatory stage pupils.