The Effect of Using the (K-W-L) Strategy in Teaching Mathematics on Second Stage Basic Education Students' Achievement and Developing Their Deductive Thinking Skills

A Thesis

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Summary

This Summary takes the research problem, limits, aims, Importance, method, hypotheses, procedures, results, recommendations and suggestions in light of the attained results.

Introduction:

The subject of interest in thinking, the development of skills and patterns of different has become educators’ axis of polarization around the world. The transformation of this interest in the modern curriculum from just focusing on information access to the development of the human mind and to sharpen its various interest methods, that develop the high thinking skills, by which any effective change in our daily practical life can occur.

Among the most important goals we need from the teaching of mathematics is training students on the proper ways of thinking. This is because mathematics has features and characteristics in terms of content and method that makes it fertile ground to train learners on the proper ways of thinking.

The study of mathematics at all levels and stages of education relies on the basis of thinking in order to understand. Also, mathematics itself contribute to give learners the ingredients that will help them to practice the right thinking that enables them face the problems of study and life easily.

Mathematics, as a science, has the nature of evidentiary, so it plays an important role in the development of deductive thinking as one of the most important thinking patterns to solve the problems and realize relationships. Students acquisition of the ability to think deductively is one of the most important goals of teaching mathematics at all levels of education. Thus, the students’ development of deductive thinking makes them study the available data and understand the relationships between them. Moreover, this makes them use rules of logic in processes of getting results.
The problem of the research:

The problem of the research is represented in the low level of first year of second stage basic education students’ achievement, deductive thinking skills and weakness of usual methods of its development. To overcome this problem, the research attempted to find answers for the following question:

"What is the effect of using (K-W-L) strategy in teaching mathematics on second stage basic education students' achievement and developing their deductive thinking skills?"

From the above main question, the following sub – questions could be derived:
1) What are the appropriate deductive thinking skills for students in the first year of the second stage of basic education?
2) What is the image of the unit "Engineering and Measurement" by using the (K-W-L) Strategy on second stage basic education students' achievement and developing their deductive thinking?
2) What is the effect of using the (K-W-L) Strategy in teaching mathematics on second stage basic education students' achievement?
3) What is the effect of using the (K-W-L) Strategy in teaching mathematics on developing second stage basic education students' deductive thinking skills?
4) What is the relation between achievement and developing deductive thinking skills in mathematics through using the (K-W-L) Strategy?
The limitations of the research:

The study is limited to:
1) A sample of first year preparatory students of Kasr Rashwan Joint Preparatory School, which is in Tamiya Educational Administration, for the scholastic year (2012-2013).
2) Unit "Geometry and Measurement" assessed on first year preparatory students from the second stage of basic education, as this unit fits the (K-W-L) strategy and includes some of the deductive thinking skills.
3) Some deductive thinking skills, which will appear by the list of deductive thinking skills.

The aims of the research:

The research aims at:
1) Defining the effect of using the (K-W-L) Strategy in teaching mathematics for second stage basic education students' achievement.
2) Defining the effect of using the (K-W-L) Strategy in teaching mathematics on developing second stage basic education students' deductive thinking skills.
3) Defining the relation between achievement and developing deductive thinking skills in mathematics through using the (K-W-L) Strategy.
The importance of the research:

The research would help:
1) In response to the call by educators at the present time the need for the use of modern trends in teaching.
2) Mathematics curriculum planners and developers in considering deductive thinking patterns during the construction of the curriculum by including activities help develop deductive thinking skills as a key target for mathematics education.
3) Provide a standardized test to measure students’ achievement in mathematics which may benefit teachers and researchers.
4) Provide a standardized test to measure deductive thinking skills among students which may benefit teachers and researchers.
5) Help the teachers in teaching unit (Geometry and Measurement) using a teacher's guide prepared in the light of the steps and procedures of the (K-W-L) strategy for the development of achievement and deductive thinking skills.
6) Useful in the development of achievement and deductive thinking skills among first year preparatory students from the second stage basic education through the exercise of student activities brochure prepared in the light of the (K-W-L) strategy.

The Methods of the research:

The research relied on The quasi-experimental method to identify the effect of using the (K-W-L) strategy in teaching mathematics on second stage basic education students' achievement and developing their deductive thinking skills. This is through choosing two groups randomly, one experimental and the other controlled that have pre and post test grades and test deductive thinking skills in mathematics and teaching for students in the experimental group according to the (K-W-L) strategy while the teaching of the controlled group in the usual ways to test significant difference between the mean scores of the experimental and controlled groups using the "T" test.
The Research Hypotheses:

The study tested the following hypotheses:
1) There is a statistically significant difference between the mean scores of students of experimental and control groups in the post application of the achievement test in mathematics in favor of the students in the experimental group.
2) There is a statistically significant difference between the mean scores of the experimental group in the pre application and post application of math achievement test in favor of the post application.
3) There is a statistically significant difference between the mean scores of students of experimental and control groups in the post application to test deductive thinking skills in math in favor of students in the experimental group.
4) There is a statistically significant difference between the mean scores of the experimental group in the application pre and post application to test deductive thinking skills in mathematics in favor of the post one.
5) There is a statistically significant correlation between the scores of the experimental group in academic achievement and deductive thinking in mathematics.

The tools of the Research:

The research relied on the following tools:
1) Achievement test in mathematics. (Prepared by the researcher)
2) Deductive thinking skills test in mathematics. (Prepared by the researcher)
The Procedures of the Research :-

The researcher followed the following steps:

To answer the first question of the study is "What are the appropriate deductive thinking skills for students in the first year of the second stage of basic education?".
The researcher follows:
1) Review some of the studies and previous educational literature and tests that dealt with deductive thinking in general and mathematics in particular.
2) Prepare a list of deductive thinking skills necessary development for the first year preparatory students from the second stage basic education and displayed on a group of arbitrators to determine their suitability for use and modification in the light of their suggestions.

To answer the second question of the study is "What is the image of the unit "Geometry and Measurement" by using the (K-W-L) Strategy on second stage basic education students' achievement and developing their deductive thinking?"
The researcher follows:

1) Defining the learning objectives of the unit "Geometry and Measurement"
2) Re-drafting unit of "Geometry and Measurement" in the light of the steps and procedures of the (K-W-L) strategy.
2) Analyzing the content of the unit "Geometry and Measurement" assessed on the first year preparatory students from the second stage basic education.
3) Defining the learning activities in the light of the goals of the unit "Geometry and Measurement".
4) Defining the methods of evaluation.
To answer the third question of the study is "What is the effect of using the (K-W-L) Strategy in teaching mathematics on second stage basic education students' achievement?"
The researcher follows:
5) Preparation of achievement test in the unit entitled "Geometry and Measurement" and make sure of his sincerity and firmness, and determine the time of the test.
6) Choose the sample of the study and divide it randomly into two groups, one experimental and the other controlled.
7) The application of the achievement test previously on experimental and control groups.
8) Teaching Unit "Geometry and Measurement" according to the (KWL) strategy for the experimental group and teaching the usual methods for the control group.
9) The application of the achievement post test on experimental and control groups.
10) Monitoring, statistically processing and interpreting the results.

To answer the fourth question of the study is "What is the effect of using the (K-W-L) Strategy in teaching mathematics on developing second stage basic education students' deductive thinking skills?"
The researcher follows:
1) Test preparation deductive thinking skills in mathematics and to make sure of validity and reliability and determine the time of the test.
2) The application of deductive thinking skills test on tribal experimental and control groups.
3) Teaching Unit "Geometry and Measurement" as the (K-W-L) strategy for the experimental group and teaching the usual methods for the control group.
4) The application of deductive thinking skills post test on experimental and control groups.
5) Monitoring results, and processed statistically, and interpreted.
To answer the fifth question of the study is "What is the relation between achievement and developing deductive thinking skills in mathematics through using the (K-W-L) Strategy?"

The researcher follows:
1) Calculate the correlation coefficient between the scores of the experimental group in the achievement test and test deductive thinking skills in mathematics at the post for two tests.
2) Present the recommendations and suggestions in the light of the results of the study.

The Results of the Research:

In light of the procedures followed by the researcher to solve the problem of this research, it concluded:
1) There is a statistically significant difference between the mean scores of students of experimental and control groups in the post administration of the achievement test in mathematics in favor of the students in the experimental group.
2) There is a statistically significant difference between the mean scores of the experimental group in the pre application and post application of math achievement test in favor of the post application.
3) There is a statistically significant difference between the mean scores of students of experimental and control groups in the post application to test deductive thinking skills in math in favor of students in the experimental group.
4) There is a statistically significant difference between the mean scores of the experimental group in the application pre and post application to test deductive thinking skills in mathematics in favor of the post.
5) There is a statistically significant correlation between the scores of the experimental group in academic achievement and deductive thinking in mathematics.
The Recommendations of the Research:

In the light of the results, the researcher recommends the following:

1. The need to get away from the traditional methods of teaching, which depend on the conservation and indoctrination, and show interest in the use of modern teaching methods that help to improve the educational process, such as the Role Playing - Reciprocal Teaching - modeling - Cooperative learning ..... etc., which make the learner an active element in the educational process.

2. Encourage teachers to use the (K-W-L) strategy inside the classroom, train them on how to use this strategy in teaching mathematics, introduce them to its benefits, and how to prepare lessons.

3. Drawing the attention of specialists in the field of curriculum and teaching methods to the need of taking advantage of the (K-W-L) strategy in the field of mathematics teaching and learning.

4. The inclusion of the (K-W-L) strategy within the content material of mathematics teaching methods in colleges of education in universities and train teacher students on using the strategy in teaching, which give them skills to use this strategy in real teaching situations.

5. Emphasis in teaching mathematics on the use of methods and means of modern teaching, learning meaningful based on a sound understanding of active participation by students and avoiding conservation in learning mathematics. This is through connecting new data with convenient information found in the learner's cognitive structure, through the use of the (K-W-L) strategy.

6. Preparation of a math teacher guide that deals with math lessons using the (K-W-L) strategy and to be based on the development of thinking in general and deductive thinking in particular.

7. Providing specialists in the practical education by an indicative guide which explains the philosophy of the (K-W-L) strategy, its steps and stages, how to use them in teaching and how to build and train students.
8. Giving attention to the development of deductive thinking among students through the use of methods and means of the development of deductive thinking in the processes of teaching and learning of mathematics at an early age as a key target in the educational process. This is because of its great importance in the proper personal growth and the progress of society as a whole.

9. The need to exercise the learner to the activities of scientific thought-provoking him to practice higher-order thinking skills as conclusion, interpretation and forecasting, making him/her knowledge productive.

10. Flexibility in the teaching and learning process, through the educational environment of freedom and thrill during the course of the learning process in addition to achieving deductive thinking and development.

11. Reconsider the mathematics curriculum, content and presented in an interesting manner and couched in ways that flare and active thinking abilities and deductive thinking they have, based on the initiative and research and experimentation and move away from a focus on conservation and memorization.

12. The need for diversity in means of assessment to maintain continuity from the beginning of the lesson to an end, which helps to develop deductive thinking.

The Suggestions of the Research: -

In the light of the study results, the researcher recommends conducting the following studies:

1 - Preparation of studies on the effect of the use of the (K-W-L) strategy in other fields of study in various stages of education.

2 - Conducting studies on the use of the (K-W-L) strategy in the teaching of mathematics to develop other aspects of learning such as: different patterns of thinking (creative thinking - reflective thinking - visual thinking .... etc.)

3 - Conducting a study on the effect of the use of teaching models other than the use of the (K-W-L) strategy in the teaching of mathematics on the development of thinking and deductive thinking.

4 - Conducting a study on the combination between the use of the (K-W-L) strategy and another teaching model can contribute to
the development of collection and deductive thinking among the second stage basic education students' and various educational stages through the teaching of mathematics.

5 - Conduct a study involving the preparation of a training program for the development of deductive thinking skills in mathematics for math teacher in the preparatory stage.

6 - Conduct evaluative studies of mathematics curricula for the various stages of education in the light of its ability to develop the skills of deductive thinking and thinking in general.

7 - Conduct a study on the evaluation of teaching performance to a mathematics teacher in various stages in the light of deductive thinking skills.