The Effect of Using Know-Want-Learn Strategy on Students 'Achievement and Attitude in Learning Mathematics of 10th Grade Students

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ABSTRACT

The purposes of this research were to study the effects of using Know–Want–Learn Strategy on students' mathematics learning achievement and to assess students' attitude towards using Know–Want–Learn (KWL) Strategy in mathematics learning. The sample group consisted of 40 students studying in Grade 10 in the second semester, academic Year 2014 at Horwang School, Bangkok, Thailand. The researcher examined students' understanding of mathematical concepts and their ability to solve mathematical problems from writing solution in KWL chart. The researcher used the Know–Want–Learn Strategy as an instructional tool and as a model to solve mathematical problems. The research instruments were lesson plans, paper test and questionnaire. Statistical analysis was accomplished by percentage, mean and t-test for one sample. Based on the research findings, KWL Strategy was effective in developing the understanding of mathematical concepts, improving the students' abilities to solve mathematical problems and promoting students' mathematics achievement and positive attitudes for the students.

Keywords: Know-Want-Learn Strategy, students' achievement, students 'attitude

1. Introduction

In Thailand, The Basic Education Core Curriculum (Ministry of Education Thailand, 2008) stated "mathematics is highly important to develop human mind. It enables a person to think logically and systematically, to analyses various problems or situations, to anticipate, to plan, to make decisions, to solve problems and to apply mathematics to daily life" (Ministry of Education, 2008).

Two problems that lead learning difficulties in mathematics don't known aims to learn and unable to activate students' prior knowledge of some topics which may have from students' learning styles or teacher's instructions. So the students can't check progress in learning mathematics that affect to understanding mathematical concepts and solving mathematical problems. In mathematics learning will be more efficient by instruction that students should realize and use connections among prior knowledge, new knowledge how communication and presentation of mathematical concept to solve problems through diverse methods. In addition, students should create and select representations to determine issues and method of study, write questions, and systematize information to model and interpret mathematical problems. From studying literature of researcher found that solving the problems: students should be set their own purposes for learning, they are more motivated and active as learners, access a student's prior knowledge is the first step in integrating new concepts into their framework. "Know – Want – Learned (KWL) strategy helps activate background knowledge and provide an opportunity for students to set their own learning objectives" (NEA, 2012).

In semester 2 of academic year 2014, some students were not able to activate their prior knowledge of some topics, such as relation and function. The researcher did the action research to correct activating students' prior knowledge of this topic by using KWL Strategy to develop the understanding of students and model for solving mathematical problems.

The researcher studied about KWL strategy and instructions to help the learners to activate students' prior knowledge, establishing a purpose for learning and for summarizing what was learned. The researcher

studied about KWL Strategy and instructions help the students in learning mathematics. "The studied by Ogle (1986) suggested that the KWL Strategy can help students reflect and evaluate their learning experience, as well as serve as a useful assessment tool for teachers" (NEA, 2012).

Brozo and Simpson (1991) concluded KWL Strategy is a simple and yet powerful strategy that is helpful in almost all classrooms, in any subject area. This strategy has been designed to insure that the students establish purpose and activate prior knowledge from the learning process, organize the knowledge and summarize any contents. In the KWL Strategy (Blachowicz and Ogle 2008), teacher and students begin the process of learning by brainstorming together about what I know (the K in K-W-L) about a topic. With a variety of ideas being shared, the teacher can easily ask what the students want to know (the W in K-W-L). Finally, they write what they have learned, so they have additional opportunities to consolidate their learning (Cited in Tok, 2013). When carefully analyzed, accurately interpreted and applied from the students' KWL chart, could help both the teachers and the students in the teaching and learning process. Moreover, using KWL chart as instructional tool have effects toward positive attitudes in learning and solving problem in mathematics.

From above discussed and according previous researches, the researcher interested in the effects of using KWL Strategy on students' mathematics learning achievement and to assess students' attitude towards using KWL Strategy in mathematics learning. The researcher believed that KWL Strategy in mathematics could activate prior knowledge, establishing a purpose for learning and for summarizing what was learned. In Addition, the researcher also believed in that students' writing KWL chart can be develop and reflect their understanding of mathematical concepts, abilities to solve mathematical problems and positive attitudes for the students.

2. Research Objectives

2.1 To study the effects of using Know–Want–Learn Strategy on students' mathematics learning achievements; and
2.2 To assess students' attitude towards using Know–Want–Learn Strategy in mathematics learning.

3. Research Methodology

This research is an action research. The purposes are to study the effects of using Know–Want–Learn Strategy on students' mathematics learning achievement and to assess students' attitude towards by using KWL Strategy of students' mathematics learning through KWL Strategy in the following.

3.1 Participants
The participants of this study consisted of 40 students in Grade 10 studied mathematics; course M31102 in the second semester, academic Year 2014 at Horwang School, Bangkok, Thailand.

3.2 Research Instruments
1) Lesson Plans
The lesson plans were conducted to determine how the learning is presented in the following.
1.1) Mathematics Contents
The contents on each lesson plan are the learning area of mathematics; course M31102 in Grade 10 indicated The Basic Education Core Curriculum (2008) is following: function, graph of function, function from A to B, and kind of functions.

1.2) KWL Strategy
KWL Strategy as activity is an abbreviation of what students: Know - Want to know - Learned. To use this activity, place three columns labeled K, W and L (KWL Chart) on a sheet of paper. At the beginning of each lesson, the teacher distributes the paper and asks students to complete the first two columns. Through their responses, the teacher can determine the prior knowledge of the class and their interests. At the end of the lesson, the students are asked to complete third column to see the growth they have made (Andrews, 1997: 141 Cited in El-Rahman, 2011, p.1). Some lesson plans, the KWL Chart used to solve mathematical problems. Example KWL Chart was given in Appendix.

1.3) Work Sheets

Every lesson plans includes work sheets to enhance learning process and to prepare students' learning, and KWL chart. The worksheets were composed of contents and questions on function. There is individual or group task. In addition, for each subtopic, there are written conclusion about content for activating prior knowledge linked new knowledge.

2) A paper test

A paper test as achievement test which is measured students' understanding of mathematical concepts and their ability to solve mathematical problems on achievement. It is consisted of 16 items which are multiple choice and essay from using KWL Strategy.

3) A questionnaire

A questionnaire which is measured attitude by 5-point Likert scale. It is consisted of 15 items which are cognitive component, affective component and action tendency component from using KWL Strategy.

3.3 Data Collection

This research was conducted and data was collected in the second semester, academic Year 2014 following these steps:
1) The researcher taught in the lesson about function, which is following KWL Strategy. There are exercises on worksheets and writing KWL Chart as activity at the end of the lesson altogether 12 periods.

2) The researcher collected data from exercises, homework, and KWL chart and analyzed for understanding and ability to solve problem in mathematics learning for individual students after they had learned each subtopic. The short comings of students on each side have reflected result to students that improve their learning.

3) At the end of topic, there was a paper test and questionnaire that measure studied students' achievement and attitude in learning mathematics by using KWL Strategy.

3.4 Data Analysis

(A) Qualitative Analysis:

Data analyzed form students' writing KWL charts and worksheets of students at the end of the lesson presented for activating students' prior knowledge showed understanding and ability to solve problem in mathematics learning.

(B) Quantitative Analysis:

Data analyzed comprised score on a paper test presented by t-test for one sample to test the mean of score for paper test which is statistically higher than the 60 percent criterion at the .01 level of significance. Response to questionnaire presented by percentage and mean on attitude in learning mathematics.

4. Research Results

(A) Qualitative Analysis of Results:

Analyzing data of the first subtopic writing KWL chart and doing worksheets revealed the perfofmance that some students can activate their prior knowledge and doing worksheet which are correct by using KWL Strategy. Writing KWL chart for all lesson, the researcher found that most students can activate their prior knowledge which show understanding of mathematical concepts and solve mathematical problems.

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(B) Quantitative Analysis of Results:

1) Achievement in mathematics

The paper test score was analyzed after using KWL Strategy in learning mathematics. The results of analysis are displayed in Table 1.

Table 1

Students' achievement in learning mathematics.

	n	Mean	S.D.	t	df	$t_{0.99,39}$
Score	40	14.4	7.49	10.128	39	2.4258

According to the table 1, found that $t = 10.128 > 2.4258$ show the students' achievement after learning mathematics by using KWL Strategy was statistically higher than the 60 percent.

2) Students' attitude in learning mathematics

The questionnaire was analyzed after using KWL Strategy in learning mathematics. The results of analysis are displayed in Table 2.

No.	Statements	Levels of satisfaction shown as percentages					$\sqrt{x}$
		5	4	3	2	1	
Cognitive component							
1	I believe that using the KWL Strategy organization technique creates a better understanding of mathematics.	22.5	55	22.5	-	-	4.03
2	I believe that learning using the KWL Strategy is systematic, organized, and do not have complicated steps.	37.5	35	25	2.5	-	4.08
3	I believe that learning using the KWL Strategy helps connect past experiences with new experiences in a substantial manner.	27.5	45	27.5	-	-	4.08
4	I believe that the KWL Strategy as organization technique helps stimulate the want to learn with interesting topics in mathematics.	22.5	50	27.5	-	-	3.95
5	I believe that using the KWL Strategy better helps me correct mathematic problems assessments.	15	60	22.5	2.5	-	4
Affective component							
6	I feel excited to learn math through the utilization of the KWL Strategy organization technique.	17.5	35	40	7.5	-	3.63

Table 2
Students' attitude in learning mathematics.

No.	Statements	Levels of satisfaction shown as percentages					$\sqrt{x}$
		5	4	3	2	1	
Affective component							
7	I do feel awkward or afraid when the instructor has me perform activities in the front of the classroom.	45	40	15	-	-	4.3
8	I enjoy to solving math problems and exercises using the KWL Strategy.	40	35	20	5	-	4.1
9	I have fun tending to math problems and exercises while using the KWL Strategy.	22.5	62.5	12.5	2.5	-	4.05
10	I feel more careful and cautious while working problems and exercises using the KWL Strategy.	30	47.5	22.5	30	-	4.08
Action tendency component							
11	Students may implement this method in their everyday lives.	30	45	25	-	-	4.33
12	I feel stimulated to question and seek the answers that I wish to know.	27.5	45	25	2.5	-	3.98
13	I have thought and reviewed the material that I have learned, making me understand the subject matter on a better sense	25	45	30	-	-	4.28
14	I can better develop activities such as summary writing.	20	50	27.5	2.5	-	3.88
15	I can find a solution to the problems in my life.	15	57.5	25	2.5	-	4.23

*5 (Strongly Agree), 4 (Agree), 3 (Undecided), 2 (Disagree), and 1 (Strongly Disagree)

According to the table 2, most students had agreed (4) level of cognitive, affective and action tendency component on attitude by using KWL Strategy in learning function.

5. Conclusion

The results of the study show that using KWL strategy as instructional tool and a model to solve mathematical problem for activating students' prior knowledge and to explore students' achievement and attitude in learning mathematics. The research findings show that students developed the understanding of mathematical concepts and improved the students' abilities to solve mathematical problems that are effective in promoting students' mathematics achievement and positive attitudes for the students.

Acknowledgement

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