EFFECT OF ARTIFICIAL INTELLIGENCE TECHNOLOGY AND USING KWDL TECHNIQUES ON LEARNING ACHIEVEMENT AND ABILITY TO SOLVE MATHEMATICAL PROBLEMS ON FUNCTIONS OF MATHAYOMSUKSA IV STUDENTS

Nutthasun Sinthuchaiyapakseree
Suan Sunandha Rajabhat University, 1-U-Thong Nok, Dusit, Bangkok,Thailand,
Email: nutthasun.si@ssru.ac.th

ABSTRACT

The purpose of this research was to improve learning achievements in Mathematics on functions of Mathayomsuksa 4 students after receiving learning activities using artificial intelligence technology combined with KWDL learning techniques. used in the research were Mathayomsuksa 4 students of Suan Sunandha Rajabhat University Demonstration School (Secondary Department) in the second semester of the academic year 2021, 1 room with 11 students acquired by co-operation. The tools used in this research were the learning management plan for artificial intelligence technology combined with KWDL learning techniques, a mathematics learning achievement test, and a mathematical problem-solving ability test. Statistical analysis of data using percentage, mean, and standard deviation. and the sampling t-test were independent of each other. The research results showed that (1) learning achievement in mathematics After receiving the learning management by using artificial intelligence technology together with KWDL technique learning was higher than 60 percent of the test score at a statistical significance at the .05 level and (2) the ability to solve math problems. mathematics After receiving the learning management using artificial intelligence technology together with the KWDL learning technique, higher than 60 percent of the test score was statistically significant at the .05 level, which was in line with the hypothesis of this research.

Keywords: artificial intelligence technology, KWDL technique, learning achievement, problem solving skills, mathematics

INTRODUCTION

Education in the 21st century Mathematics teaching and learning from the past to the present has not been as successful as it should be. Considering from the results of the basic national education test (O-NET) in the past 3 years, it was found that the overall mathematics subject was still in very low criteria. (National Institute for Educational Testing, 2021), especially problem solving It appears that most students solve the problem. Rarely a problem from the advancement of technology and communication today and education is the cornerstone of sustainable development (UNESCO, 2011 cited in Office of education council, 2014). Artificial Intelligence (AI) technology is therefore used to solve problems. This is in line with the Thai education management according to the 4.0 policy in response to the teaching

and learning taught by teachers so that students can integrate knowledge that exists everywhere in the world to integrate creatively (Wirat Pansiriroj, 2016).

Mathematics is a field that is important to students both in life in today's society and in higher education because mathematics is a tool that leads to progress in science. Science, economy, society and education as well as being an important basis for research. all types of research (Yupin Pipitkul, 1981: 11). In addition, mathematics is an important factor in human quality development Because mathematics helps develop the thinking of students to be able to think. systematically rationally and able to solve problems effectively Therefore, teachers should use technology in conjunction with the analytical thinking process in learning activities for students (Montri Wongsaphan 2013, 130) to enhance students' problem-solving abilities and academic achievement better math.

Enhancing students' ability to solve math problems requires teaching strategies that help them practice thinking in an organized way and using appropriate techniques. In solving mathematical problems using the KWDL technique (K: (What We Know) What does the problem say W: (What We Want to Know) Students find out what the problem wants to know D: (What We Do to Fine Out) Students must do How to get the answer to the desired problem and L: (What We Learned) was developed by Shaw et al. (1997) as an alternative to teaching strategies (Carr & Ogle, 1987) to solve. math problems It is a learning management technique that trains students to think and analyze problems in a detailed, step-by-step manner. Make students clearly understand the problem-solving process and come up with a variety of solutions. more accurate and systematic It also helps to develop the ability to communicate. analytical thinking and creatively conducive to students to solve problems can have a variety.

Reasons and importance mentioned above. The researcher is therefore interested in developing a learning management plan using artificial intelligence technology on learning achievement and ability to solve mathematical problems on functions by using the KWDL technique of Mathayomsuksa 4 students at Demonstration School of Suan Sunandha Rajabhat University to develop the learning process of learners to participate in more teaching and learning activities. foster the development of mathematical skills and processes in order to lead the learners to achieve their goals.

Objective

1. Compare functional mathematics scores After learning management with AI technology and KWDL technology

2. Compare the ability to solve mathematical problems After learning management with AI technology and KWDL technology

Research Hypothesis

1. Math achievement After receiving the learning management using artificial intelligence technology together with the KWDL technique learning was higher than the criteria of 60 percent of the test score at a statistical significance at the .05 level.

2. Ability to solve math problems After receiving the learning management using artificial intelligence technology together with the KWDL technique learning was higher than the criteria of 60 percent of the test score at a statistical significance at the .05 level.

Expected Benefits

1.To know the learning achievement and problem-solving ability of Mathayomsuksa 4 students from learning management using artificial intelligence technology together with KWDL learning techniques.

2. As a guide for organizing activities for teachers of mathematics and science. To improve teaching and learning that contributes to the development of academic achievement and problem-solving abilities for students in other grades.

METHODS

This research was a quasi-experimental study to study mathematics problem solving skills and mathematics learning achievement. with a single-group study trial According to the one group posttest design, the research methods are as follows:

Population and Sample 1) The population used in this research is Mathayomsuksa 4 students, second semester of the academic year 2021, Mathayomsuksa 4 students at Suan Sunandha Rajabhat University Demonstration School. 2) The sample used in this research are students. Mathayomsuksa 4 level, semester 2, academic year 2021, Suan Sunandha Rajabhat University Demonstration School with test scores on the addition function and the reduction function Below the criteria of 60 percent of the test scores of 11 people by recruiting on a voluntary basis. The lesson contents used in this research are in accordance with the Basic Education Core Curriculum, B.E. 2551, revised B.E. 2560, 5 plans on functions, consisting of 1) Addition and Subtraction Functions 2) Addition, Subtraction, Multiplication, and Division Functions 3) Functions Consists of 4) the inverse function and 5) graphing the function.

Study variables It consisted of independent variables, namely instructional management with artificial intelligence technology combined with KWDL learning techniques, and dependent variables, namely learning achievement in mathematics on adding and decreasing functions. and the ability to solve mathematical problems on adding and decreasing functions.

The experimental tools consisted of 1) a learning management plan with artificial intelligence technology combined with KWDL learning techniques on adding and decreasing functions, 2) a mathematics learning achievement test on KWDL. and 3) a test to measure mathematical problem-solving skills on increase function and decrease function.

Data collection tools for data collection were:

1) Learning management plan using artificial intelligence technology (Wolfram Alpha) combined with KWDL learning technique on adding and decreasing functions. Bring the completed learning activities plan to present to 3 experts to examine the accuracy, suitability, feasibility and application of the learning activities. The researcher used to determine the content validity (IOC) by 3 experts with an average of 0.50 to 1.00. The results showed that the test statements met all criteria. The mean value was 0.91 and the internal consistency was analyzed by the Kuder-Richardson method (KR20) with a reliability level of 0.85 to determine the quality and reliability of the entire test.

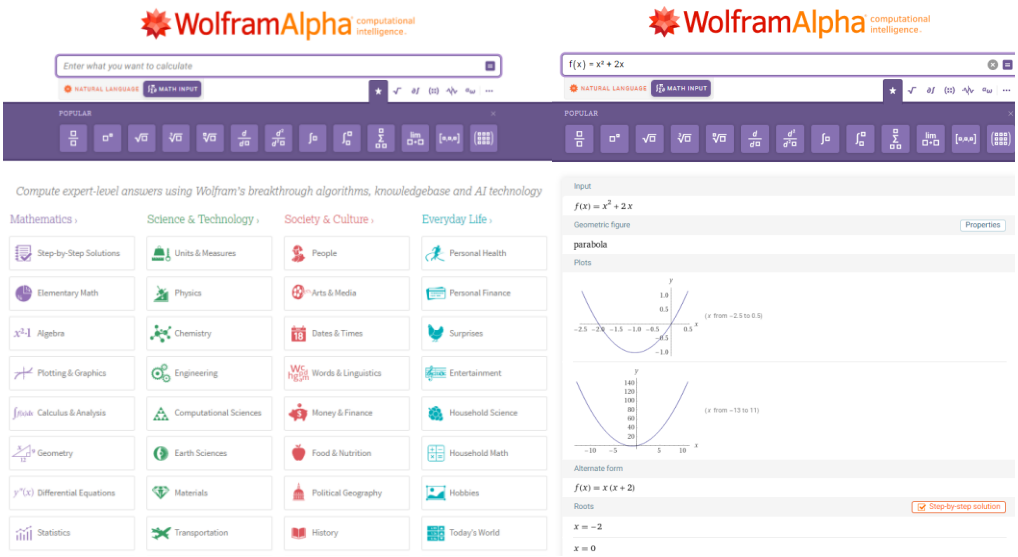

Figure 2 Using artificial intelligence technology to solve mathematical problems with programs (Wolfram Alpha)

2) Mathematics Learning Achievement Test on Addition and Decrease Functions Analyze the relationship between the content. Learning Objectives, A multiple-choice test was created, 1 set, 5 options, 15 items, and from the evaluation and revision of the learning achievement test by 3 experts, respectively, it was found that the index of consistency (IOC) was between 0.50 - 1.00. Leads to Difficulty and Discrimination powers. The learning achievement test was used to test (Try - Out) Sombat Thai Rue Kham (2008: 101 – 102). learn the content increase function and decrease function the scores obtained from the analytical experiment with measures of difficulty (p) and discrimination power (r) ranged from 0.25–0.80 and 0.20–0. 75, respectively, and the internal consistency was analyzed by the Kuder-Richardson method (KR20). (Reliability) at the 0.85 level to determine the quality and reliability of the entire test.

3) A test to measure mathematical problem-solving skills about adding and decreasing functions. The researcher created a subjective model, subjective model, 1 set, 5 items, 15 points. From the assessment and revision of the learning achievement test by 3 experts, respectively, it was found that the index of consistency (IOC) was between 0.50 - 1.00. Difficulty ranged from 0.56 – 0.64, discrimination power ranged from 0.62 – 0.75, and confidence was 0.83 using the Kuder-Richardson method (KR20).

By the tools used in learning management Use problem-based learning management for all 6 steps (Office of the Education Council, 2007: 8) as shown in Figure 1.

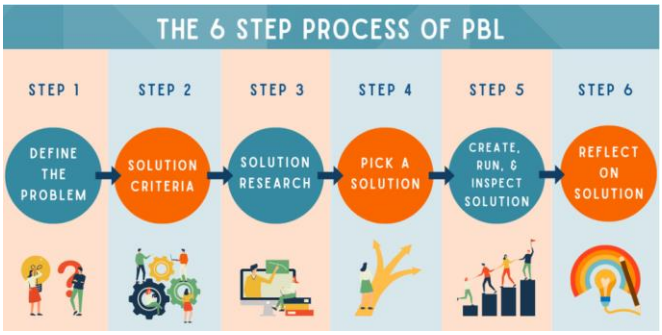

Figure 1 Problem-based learning management (Office of the Education Council, 2007: 8)

Data Collection Method The researcher proceeded as follows: 1) Voluntarily began to recruit a sample group. 2) Conducted learning management with artificial intelligence technology in conjunction with learning KWDL techniques outside of normal classes, totaling 16 periods of 40 minutes each. 3) Bringing the model. a test to measure problem-solving skills and a test to measure learning achievement in mathematics on addition and subtraction functions came to test the sample group, 1 period, lasting 40 minutes, respectively, after being managed to learn by using artificial intelligence technology together with learning KWDL techniques on adding and decreasing functions, and 4) taking scores from the skill test. Problem solving and mathematics achievement test on the subject of addition and subtraction functions. before and after experimenting with learning management with artificial intelligence technology combined with KWDL learning techniques to be used for statistical analysis to further verify the hypothesis.

Statistics for data analysis were as follows: Basic statistics were 1) Percentage, 2) Mean, 3) Standard Deviation, and 4) T-test for one sample.

Statistics to determine the quality of research tools were: 1) the content validity of the pre-experimental and post-experimental achievement test (IOC: Index of Item Objective Congruence), a formula of Lovinelli and Hambelton. (Rowinelli & Hambleton, 1977) 2) Determination of confidence (Reliability) using Cronbach's alpha (α- Coefficient) method, which is an improvement from the KR.20 formula. using Brennan's method (Bernan 1974) and 5) determining the difficulty and determining the power of subjective exam classification. using the method of CA Drake (CADrake)

The data were analyzed as follows: 1) comparing mathematics learning achievements before and after learning by using matched pairs t-test; of Mathayomsuksa 4 students before and after learning management using artificial intelligence technology combined with KWDL learning technique using a t-test (t - test for one sample) and 3) analyzing learning achievement. subject mathematics increase function and decrease function of Mathayomsuksa 4 students before and after learning management using artificial intelligence technology combined with KWDL learning technique using a t test (t test for one sample

RESULTS

1. The results of developing mathematical problem-solving skills increase function and decrease function of Mathayomsuksa 4 students after receiving a learning management using artificial intelligence technology combined with KWDL learning techniques. The results are shown in Table 1.

Table 1 Mean and T-test statistics of mathematical problem-solving skills on add and subtract functions. Before and after learning management using artificial intelligence technology combined with KWDL learning techniques

Samples.	n	df	Full score	$\bar{X}$	S.D.	t	p
Preschool	10	9	15	10.7	2.49	4.7434*	.000
After class	10	9	15	12.7	2.11		

*p<0.05

From Table 1, it was found that the mathematical problem-solving skills on adding and decreasing functions of Mathayomsuksa 4 students after receiving the learning management using artificial intelligence technology combined with KWDL technique were higher than the percentage criteria. 60 of the test score, statistically significant at the .05 level, which is in accordance with the research hypothesis 1.

2. Mathematics Achievement Development on Addition and Decrease Functions of Mathayomsuksa 4 students after receiving a learning management using artificial intelligence technology combined with KWDL learning techniques. The results are shown in Table 2.

Table 2 Means and T-tests of Mathematics Learning Achievement on Addition and Decrease Functions Before and after learning management using artificial intelligence technology combined with KWDL learning techniques

Samples.	n	df	Full score	$\bar{X}$	S.D.	t	p
Preschool	10	9	15	10.8	2.29	4.5209*	.000
After class	10	9	15	13.5	1.08		

*p<0.05

From Table 2, it was found that the learning achievements on increase function and decrease function of Mathayomsuksa 4 students after receiving a learning management using artificial intelligence technology combined with KWDL learning technique was higher than the criteria of 60 percent of the test scores at a statistical significance at the .05 level, which was in accordance with research hypothesis 2.

CONCLUSION AND FUTURE WORK

According to the research on the effect of learning management using artificial intelligence technology combined with KWDL learning technique on learning achievement and ability to solve mathematical problems on functions of Mathayomsuksa 4 students at Suan Sunandha Rajabhat University Demonstration School. Because students can understand the use of the Wolfram Alpha program. able to review knowledge Change the variables in the study subject. Until the knowledge of the content is obtained This is because learning management plan created by the researcher, there are teaching and learning activities that focus on students working together Help each other as a group according to KWDL collaborative techniques. Students who have studied artificial intelligence technology. Able to research conclusions and various knowledge, resulting in achievement of learners' mathematical problem-solving skills higher than before. and likely as a result of the following reasons the research results can be discussed as follows.

1. Mathematics problem solving skills on adding and decreasing functions of Mathayomsuksa 4 students after receiving the learning management using artificial intelligence technology combined with KWDL learning technique was higher than the criteria of 60 percent of the test scores at a statistical significance at the .05 level, which was in accordance with assumptions shows that Learning management with the KWDL technique will help the learner to level up in the process of systematic thinking. This will help to be a reinforcement that allows learners to convey concepts systematically. Able to find ways to solve problems on their own which corresponds to the Institute for the Promotion of Teaching Science and Technology (2012, page 78) states that in order to begin developing students to have skills in problem-solving processes Teachers must build a foundation for students to become familiar with the problem-solving process, which has 4 steps as follows: Step 1: Understanding the problem or analyzing the problem, Step 2: Planning for solving the problem, Step 3: Implementing the problem, and Step 4 Check solutions or look back. And it is in line with the research results of Arporn Santiworakul (2020). The ability to solve mathematical problems of the group students who received the activity. Learning related to real life using the KWDL technique was higher than that of the group receiving normal learning activities. with statistical significance at the .05 level.

2. Students who use artificial intelligence and KWDL technology to learn Fourth grade students' academic performance and ability to solve mathematical problems. The mathematics score after study is significantly higher than that before school, reaching 0.05 level, which conforms to the established hypothesis. By organizing learning activities, we can promote rapid communication, without limiting time and place, including individuals. Meet the needs of learners and teachers who have no time to prepare. Learners who have no confidence are afraid to answer questions and ask questions. You should have more courage to set up learning questions in class, because you don't have to show up in front of teachers and classmates. KWDL Technology Learning Fourth grade students' academic performance and ability to solve mathematical problems. According to Wilaiporn's research, students can practice and learn by themselves to better understand what they have learned. Nakwankij (2016, 48 hours) found the math scores of students in Grade 12 The learning activity group related to real life uses KWDL

technology, which is higher than the general learning activity group. 0.05 and consistent with Lapasada Parasiriskul (2020) Facts have proved that learning performance and mathematical reasoning ability can be improved through KWDL learning activities. Combined with electronic media, "univariate linear inequality of third graders" is used. The students' academic performance and mathematical reasoning ability are higher than those of normal learning activities. Significantly reach 0.05 levelLaphasrada Parasirisakul (2020) that the development of learning achievement and mathematical reasoning ability with KWDL learning activities in conjunction with the use of electronic media on one variable linear inequality of Mathayomsuksa 3 students had academic achievement and reasoning ability in mathematics higher than students studying with normal learning activities Significantly at the .05 level. 05and consistent with Laphasarada Parasirisakul (2020) that the development of academic achievement and mathematical reasoning abilities with KWDL learning activities in conjunction with the use of electronic media on one variable linear inequality of Mathayomsuksa 3 students had academic achievement and reasoning ability in mathematics higher than students studying with normal learning activities Significantly at the .05 level. 05and consistent with Laphasarada Parasirisakul (2020) that the development of academic achievement and mathematical reasoning abilities with KWDL learning activities in conjunction with the use of electronic media on one variable linear inequality of Mathayomsuksa 3 students had academic achievement and reasoning ability in mathematics higher than students studying with normal learning activities Significantly at the .05 level.

The application of artificial intelligence technology principles AI in this research for the benefit of teaching and learning, including the preparation of teaching plans. problem solving in the classroom teaching system and further development of a group of students with knowledge and abilities So that teachers can arrange teaching and learning to match their knowledge and abilities. and needs of most learners Because students can understand the use of the Wolfram Alpha program. being used as a problem-solving tool and develop analytical thinking used to create strategies to solve complex problems and develop a deep understanding A new form of education was born. arouse interest in students Make the learners have a better understanding of the lesson. not monotonous This is because the learning plan created by the researcher has teaching and learning activities that focus on students being able to explore conclusions and various knowledge by themselves.

Recommendations

1. Suggestions for implementation

1.1. KWDL learning management in combination with electronic media students must exchange ideas with each other and present work in front of the class Teachers should encourage students to be brave. Express with reinforcements such as awards, compliments, applause, and use open-ended questions to encourage. reasoning ability.

1.2. Teachers should supervise and encourage group members to be responsible. There is unity in the group. Known to be a good leader and follower.

2. Suggestions for further research

2.1. There should be an improvement and development of a learning management plan in the garden where the situation should be a situation that is close to the students' daily lives. for students to realize and be able to

2.2. The results of learning activities using the KWDL technique should be studied in normal groups of students. compared to the weak group of students that can develop problem-solving skills or other mathematical skills and processes that are not different.

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