Chapter

The Development Biology Authentic Learning of Mahasarakham University Demonstration School (Secondary). Thailand

Wutthisak Bunnaen

Abstract

The research study Development of Authentic Biology Learning Activities, Mahasarakham University Demonstration School (Secondary). The sample group consisted of 160 students in grade 10 students, Science-Mathematics major, 160 students, divided into experimental groups of 80 people and 80 control groups from purposive sampling. The instruments used in research is a set of authentic biology learning activities, the biology knowledge tests and attitude questionnaire. The research used experimental process (Quasi-experimental Design Research) Quasi-equivalent control group design. The results of comparative analysis of the average test results of biology knowledge Before and after learning of students in the experimental group It was found that before the students had an average score of 8.96 and the post-test results in the experimental group students had an average score increased to 12.98, with the average after learning scores increased significantly at the level of .05. The biology knowledge test before and after learning found that the students in the experimental group average score from the biology knowledge test after learning higher than students in the control group with statistical significance at the level of.05 and the results of attitudes towards the arrangement of authentic learning biology learning activities of grade 10 students in the experimental group found that in almost all questions, the average score of the score is greater than 4.51 Which is at the highest level and the overall average score is 4.74 which is at the highest level show that. The organizing of authentic learning activities in biology for grade 10 students, gives students a better understanding of the learning content with scores from higher knowledge tests therefore, is an effective way to organize learning activities for students that can be applied with other courses.

Keywords: Development Learning Activities, Authentic Learning, Biological knowledge, attitudes towards learning

1. Introduction

Basic Education Core Course Aims to develop all learners Which is a nation's strength to be a human being with a balance of physical, knowledge, morality,

consciousness of Thai citizenship and world citizenship Adhere to the democratic regime Have the knowledge and basic skills and attitudes necessary for further education. Career and lifelong study with a focus on learners on the basis of the belief that Everyone can learn and develop themselves to their full potential. Educational Institutions, Demonstration School Mahasarakham University (High School) is a course that provides all forms Has strengths that emphasize the development of learners according to their aptitude and potential Meet the needs of further study in higher education and future careers. Covering all target groups Can transfer grades and experience Create a positive attitude towards the use of innovative information system technology and promote the use of scientific processes. Able to draw potential of learners according to their interests and aptitudes Cultivate virtue Ethics and transfer cultural identity to international standards.A society that seeks knowledge of the truth cannot deny that research is a vital tool in finding answers. Seek a solution to the problem systematically Teaching is a phenomenon of human society on the basis of ideal society. Understanding human behavior through teaching and learning is necessary to apply research to improve the quality of teaching and to apply the research results obtained to solve problems and develop sustainable society. The concept of teaching and learning research is therefore emphasized. Teaching and learning improvement Bringing innovative teaching and learning to classrooms and schools (Prasart Nueng [1]) Many students in Thailand have still not attained the expected foundation skills in education, as evidenced by the results of national examinations and international assessments [2, 3]. Drop-out rates remain high at the secondary school level, which leaves too many young people exposed to the harsh realities of the labor market without the necessary skills to thrive [4–6]. Education is an important factor in developing people to have the qualifications society needs. Therefore, education must try to make the role consistent with complex and rapid social changes. A student-centered approach is one of the highest priority projects and one which aimed to elevate student achievement, to develop 21st century skills, as well as encourage students to be good Thai citizens with morals and ethics. Furthermore, area-based educational reform guidelines, such as educational institutes, educational service areas, local government and the provincial administration can be considered important targets in terms of operations and consistent with time restrictions and enabling determination of the quantity and quality scopes. In order to assess achievement, the Office of the Basic Education Commission, Thailand, which is responsible for promoting and managing basic education in the country, proposed new teaching and support methods including mentoring, coaching and peer coaching The active learning has received more attention in the past several years. In Thailand, it has been a popular concept over the last few decades. According to the vision of education policy in Thailand the objectives are to develop a learning society by focusing on increasing educational opportunities and promoting active learning behavior in students. The main shift of learning is changing the focus from the teacher and delivery active Learning and its Outcomes 36 of course content to the student and active engagement with the material. Students are therefore actively involved while listening to formal presentations in the classroom. Most important, to be actively involved, students must engage in such higher-order thinking tasks as analysis, synthesis, and evaluation [7, 8].

Learn Authentic Learning is another form of learning innovation. Is genuine learning, learning in real life It is a learning style that encourages students to create useful and tangible products to share with their world. Once educators provide the motivational challenge, they develop and provide the necessary criteria, planning, timing, resources, and support to support student success. Teachers will become guides with students or event manager The facilitator is not a dictator. Learning

process Will become a dominant force and the content is properly collected. Real learning helps students make meaningful and useful. They are real life or simulated jobs that give learners the opportunity to connect directly to the real world.

Therefore, in the development of teaching and learning focus on the students' learning potential As a learner and youth of learning in the 21st century, it is essential that the Demonstration School of Mahasarakham University (Secondary) is responsible for teaching and learning at the basic educational level to develop a learning management model give learners the potential and skills they need In living and self-development at a particular higher level. The organizing learning activities that emphasize connection with life applying knowledge in daily life to keep pace with economic changes society and technology. That is always advanced from the above point the researcher is interested. In designing learning activities which focuses on learning Authentic Learning to develop learners See the importance of learning with real life can link knowledge with daily life and life skill development for living in the future.

2. Objective

1. For the development of learning activities in science under Authentic Learning in Biology with Mathayomsuksa 4 students at Demonstration School, Mahasarakham University (High School).

2. To compare scores of knowledge in biology among students who manage authentic learning with students who manage to learn in normal activities.

3. To study the students' Authentic Learning attitude before and after using the learning activity package.

3. Research hypothesis

1. The students who conducted the Authentic Learning method had the score of knowledge in biology after study higher before studying.

2. The students who conducted the Authentic Learning method had higher scores on biology knowledge. Students who organize learning in activities as usual.

3. Attitude towards Authentic Learning among experimental students group after Learning activities is on the higher level.

4. Research methodology

4.1 Population and sample

4.1.1 Population

The population used for research, study, research, development of biological learning activities. Authentic Learning Demonstration School, Mahasarakham University (Secondary Division), including 280 students in Mathayomsuksa 4 level of the academic year 2018 in Science - Mathematics.

4.1.2 Sample group

The samples used were 160 students, Grade 10 in academic 2018 based on the sample size framework according to the table of Krejcie and Morgan ([1]: 124), namely the, divided The experimental group of 80 subjects and a control group of 80 were obtained by purposive sampling. The researcher has conducted experimental research. (Quasi-experimental Design Research) Quasi-equivalent control group design model (Prasart Nueng [1]: 124).

(O_1-X-O_2)
(O_1-C-O_2)
When O_1 is pre-test (Pretest)
X is the use of innovation (Treatment)
C is a Control group.

O_2 is a post test and qualitative research based on descriptions, observations and interviews with teachers and effective learning activities.

4.2 Research tools

1. Authentic Learning Biology Activity Kit.

2. Biology Knowledge Test.

3. Authentic Learning Attitude Questionnaire.

4.3 Construction and qualification of research tools

The construction and quality of research tools can be separated into steps as follows.

4.3.1 Building and finding quality authentic learning activity kits

1. Design and a set of authentic learning biology activities in the course.

   Biology for Science students in Mathayom 4.

2. Find the validity of the learning activity package by checking for the consistency of the content from.

   Specialist (IOC) with the following criteria for scoring: Grade level.

   +1 when sure it's appropriate.

   0 when unsure

   −1 when sure it is not suitable

   Analyze the content-consistency index of the learning activity series. The subjects were selected with an IOC value of 0.50 or higher, which results from an expert content validation examination showed an average of 0.96, indicating that the content-content-based learning set was applicable.

3. Assess the suitability of the activity package by an expert. The questionnaire was based on a 5-level estimation scale questionnaire that was the most appropriate, very appropriate, moderate questionnaire. Less suitable and least appropriate.

Suitability rating scale
5 Most suitable
4 very appropriate
3 Moderate
2 less suitable
1 least appropriate
The experts' suitability assessment average score is used as the following points: ([9]: 100)
4.51–5.0 means most suitable.
3.51–4.50 means very suitable.
2.51–3.50 means moderately appropriate.
1.51–2.50 means less appropriate.
1.00–1.50 means least appropriate.

By setting the criteria for the mean of suitability, ie if the expert opinion mean was 3.51 or more, the learning activity set was appropriate. Can be used for evaluation results The suitability of experts found The mean of 4.91 was the most appropriate.

4.3.2 Building and searching for quality authentic learning attitude questionnaire

1. Create an attitude test Per authentic learning activities Learning in the Science.

   Biology course for science students in Mathayomsuksa 4.

2. Find straightness in the attitude measurement model by Verify for content validity from experts (IOC values), with the following criteria for scoring:

   Grade level

   +1 when sure it's appropriate.

   1 when in doubt

   −1 when sure it is not suitable

   Analyze the content-validity index of the attitude measurement form. The subjects were selected with an IOC value of 0.50 or higher. The results of an expert content validation examination showed an average of 0.96, indicating that the attitudes were content-based and could be used.

3. Assess the suitability of the activity package by an expert. The questionnaire was based on a 5-level estimation scale questionnaire that was the most appropriate, very appropriate, moderate questionnaire. Less suitable and least appropriate

Suitability rating scale
5 Most suitable
4 very appropriate
3 Moderate
2 less suitable
1 least appropriate
The experts' suitability assessment average score is used as the following points: ([9]: 100)
4.51–5.0 means most suitable.
3.51–4.50 means very suitable.
2.51–3.50 means moderately appropriate.
1.51–2.50 means less appropriate.

1.00–1.50 means least appropriate.

The mean of suitability was determined, ie, if the expert opinion average was 3.51 or higher, the attitude scale was considered appropriate. Can be used Which evaluation results The suitability of experts found The mean of 4.80 is the most appropriate.

4.3.3 Construction and quality of biology literacy test the steps are as follows

1. Create a knowledge quiz. Biology 40 questions, considering coverage.

   Content to spread measurements to cover Bloom Revise's theoretical cognition.

2. Find the validity of the test by examining the content validity by an expert (IOC value) with the following criteria for scoring Analyze the content-consistency index of the form.

5. Data analysis

1. Analyze the results of the evaluation of the quality of tools from experts.

2. Analyze the results of the knowledge test Before and after learning from the use of a knowledge test in an Authentic Learning activity in the group.

   Experiments and normal learning management in the control group. Using mean, percentage and standard deviation.

3. Analyze and compare the average results of the knowledge test before and after study of experimental group students who organized Authentic Learning using t-test.

4. Analyze and compare the average results of the knowledge test before and after study. Of the control group students organizing normal learning using t-test.

5. Analyze and compare the mean results of the test to measure knowledge after learning during Experimental group students conducting authentic learning with control group students conducting normal learning using t-test.

6. Analyze the results of attitude measurement towards the Authentic Learning learning management model of experimental group students. Using mean, percentage and standard deviation.

7. Analyze and describe data from observation and interviews with students and subject teachers. Resulting from learning activities.

5.1 Statistics used in data analysis

1. Basic statistics are.

   a. Statistics of frequency and percentage.

   b. Statistics Mean.

   c. Standard Deviation Statistics.

2. Statistics test the performance of the tool, including.

    a. Find the conformity index.

    b. Finding the power to classify each item of Questionnaire using Item-total correlation.

    c. Finding Confidence, Request a Questionnaire According to the formula for the alpha coefficient (α –Cronbach)

3. Statistics test results and hypotheses, t-test (independent)

6. Results

Development of an Authentic Learning Biology Learning Activity Kit for Mathayomsuksa 4 Students at Demonstration School, Mahasarakham University (Secondary Division), the researcher designed the learning activities. Which emphasizes on doing actual operations in the environment around the students or the real learning area in nature near the school The learning activity set was sent to 5 experts to assess consistency and assess suitability. It was found that the Authentic Learning biology learning activity set had an average of 0.96, which was higher than the specified criteria at level 0.50. Learn is relevant, content is applicable. And evaluation results of experts found that The mean of 4.91 was the most appropriate (**Table 1**).

Table 2, the results show that of comparative analysis of the mean results of biological knowledge test Before and after class of experimental group students It was found that the mean score before class was 8.96 and the post-study test results in the experimental group increased to 12.98, with the average score after class increased statistically significant at the .05 level.

Table 3, the results show that of comparative analysis of the mean results of the biological knowledge test Before and after class of the control group students

Students	Sample (n)	Total score (N)	Pretest			Posttest		
			Total	$\bar{x}$	S.D.	Total	$\bar{x}$	S.D.
Experimental group	80	40	717	8.96	1.73	1039	12.98	2.31
Control group	80	40	598	7.47	1.93	603	7.53	1.88

Table 1.
Result of biology knowledge test analysis before and after learning from the use of a knowledge test in the authentic learning biology learning activities in the experimental group and the normal learning management in the control group.

Item	Pretest (N = 40)		Posttest (N = 40)		*t*	P
	$\bar{x}$	S.D.	$\bar{x}$	S.D.		
Knowledge (n = 80)	8.96	1.73	12.98	2.31	−12.51	.000*

**Significant.05.*

Table 2.
The results of comparative analysis of the mean results of the biological knowledge test before and after class of experimental group students who organized authentic learning using paired t*-test.*

Item	Pretest (N = 40)		Posttest (N = 40)		*t*	P
	$\bar{x}$	S.D.	$\bar{x}$	S.D.		
Knowledge (n = 80)	7.47	1.93	7.53	1.88	−.236	.814

*Significant.05.

Table 3.
The results of comparative analysis of the mean results of the biological knowledge test before and after study of the control group students organizing normal learning using paired t*-test.*

Item	Pretest (N = 40)		Posttest (N = 40)		*t*	P
	$\bar{x}$	S.D.	$\bar{x}$	S.D.		
Knowledge (n = 80)	12.98	2.31	7.53	1.88	−16.31	.000*

*Significant.05.

Table 4.
The results of comparative analysis of the mean results of the biological knowledge test after class during experimental group students conducting authentic learning with control group students conducting normal learning using independent t-test.

managing normal learning found that the mean score before and after study of the control group students organizing normal learning non difference.

Table 4, the results show that of comparative analysis were the mean results of the biological knowledge test. After class during The experimental group of students conducting authentic learning with the control group students conducting normal learning found that the experimental group had a mean score from the post-study biology knowledge test. Higher than the control group students With statistical significance at the .05 level. The results of the measurement of attitudes towards Authentic Learning Biology activities of Grade 10 students were found that in most questions, the average score was greater than 4.51, which was the highest and the overall average score was 4.74, which was the highest. Showed that The experimental group students had a positive attitude at the highest level. Continue to organize Authentic Learning Biology activities.

7. Results

Biology knowledge test analysis results before and after learning from the use of a knowledge test in the Authentic Learning Biology learning activities in the experimental group and the normal learning management in the control group. Found that the test results of knowledge of biology before studying in the experimental group the average score was 8.96, the control group had a mean score of 7.47, and the post-test results in the experimental group had a mean score of 12.98, while the control group had a slightly increased mean score to 7.53.

The results of comparative analysis of the mean results of the biological knowledge test. Before and after class of experimental group students It was found that the mean score before class was 8.96 and the post-test results in the experimental group increased to 12.98, with the average score after class increased statistically at the .05 level.

The results of comparative analysis of the mean results of the biological knowledge test. Before and after class of the control group students managing normal learning found that the mean score before and after study of the control group

students organizing normal learning No difference With a slight increase in the average grade after school.

The results of comparative analysis of the mean results of the biological knowledge test. After class during The experimental group of students conducting authentic learning with the control group students conducting normal learning found that the experimental group had a mean score from the post-study biology knowledge test. Higher than the control group students Statistically significant at the .05 level and the results of the attitude measurement towards the Authentic Learning Biology learning activities of the experimental group of grade 10 students found that in almost all questions, the average score was greater than 4.51. Which is at the highest level and the overall average score was 4.74, which was the highest. Showed that the experimental group students had a positive attitude at the highest level. Continue to organize Authentic Learning Biology activities.

8. Discussion

Authentic learning is another form of learning innovation. Is genuine learning, learning in real life teachers will become guides with students or event manager The facilitator is not a dictator Learning process Will become a dominant force and the content is properly collected. Real learning allows students to make meaningful and useful in real life or simulated work. That gives learners the opportunity to connect directly to the real world from the development of the Authentic Learning in Biology activity at Mahasarakham University Demonstration School (Secondary School) and the expert assessment, it was found that the Authentic Learning biology activity set had an average consistency value of 0.96, which was higher than the specified criteria at level 0.50. Shows that the learning activity set is relevant to the content can be used And evaluation results Of experts found that The mean of 4.91 was the most appropriate. This is in line with (Puntarika [10]), the development of the 21st century learning assessment model. 21 for science grade 10 students to study the condition of assessment, create a model, study the results of using and evaluate the model. Using research and development methods evaluation model developed It aims to assess the knowledge of the subject content along with the assessment of 21st century skills and to inspire learners in learning. Balance assessments, both development assessments and assessments for conclusions, students assessed using the format have a higher score on all aspects. Have academic achievement Inspiration for 21st century learning and skills is far higher than normal assessed groups. With statistical significance at the .05 level.

Designing a Biology Laboratory that is suitable for the learner and using the real situation in nature. It creates learning by participating in and working on real-world problems. Engage learners with opportunities to solve complex real-world problems. And finding solutions Learners practice skills and knowledge that are relevant and realistic in the workplace and learn at the same time. Including practice exercises Role play, problem-based activities, case studies, and involvement in the virtual community of practice. Learning environment in nature [11].

The results of comparative analysis of the mean results of the biological knowledge test. Before and after class of experimental group students It was found that the mean score before class was 8.96 and the post-study test results in the experimental group increased to 12.98 with the average score after class increased statistically at the .05 level. The Biology knowledge test after class during The experimental group students who conducted the authentic learning activities with the control group students conducting normal learning found that the experimental group students had a mean score from the post-study biology knowledge test.

Higher than the control group students Statistically significant at the .05 level showed that arrangement of Authentic Learning Activities in Biology Courses for grade 10 students of Mahasarakham University Demonstration School (Secondary Division) gives students a higher level of knowledge and understanding of the learning content. Have a higher score from the knowledge test It is an effective way to organize learning activities for students that can be adapted and applied with other courses the results of the measurement of attitudes towards authentic learning activities of the students. The recent studies on active learning classrooms (ACLs) have demonstrated their positive influence on student learning. However, most of the research evidence is derived from a few subject-specific courses or limited student enrolment. Empirical studies on this topic involving large student populations are rare. The present work involved a large-scale two-year study that examined the effects of ACL on student perceptions of their learning experience and the relationship with academic performance in a General Education programme. An institutional survey was used to gather more than 35,000 units of student perception data from all 306 courses in the programme. Our empirical findings show that students thought courses that adopted an ACL as the key learning environment were significantly better designed and more encouraging of student creativity and innovation than courses which used regular classrooms; thus, student perceptions were improved. We are also the first to report that this positive effect on creativity and innovation is statistically unaffected by academic performance, with high, middle and low achievers all benefiting from the use of the facility. The results suggest that ACLs are better environments for nurturing innovation for all students, regardless of their academic ability [12].

Author details

Wutthisak Bunnaen
Academic and Research, Mahasarakham University Demonstration School (Secondary), Mahasarakham University, Kantarawichai, Maha Sarakham, Thailand

*Address all correspondence to: wutthisakcomplete@gmail.com

References

[1] Prasat Nueng Chalerm. (2017). **Teaching and Learning Research**. Chulalongkorn University Press. Bangkok. Thailand.

[2] Science and Technology (2014). Academic achievement. Scientific attitudes and problem solving skills from learning management as well Scenario lesson programs with experimental learning management. Matters of everyday life Grade 6. Thesis. Master of Education in Technology and Communication. Faculty of Education Mahasarakham University. Maha Sarakham. Thailand.

[3] The Organizationfor Economic Co-operation and Development [OECD]. (2016). Reviews of National Policies for Education : Education in Thailand. Paris : OECD Publishing.

[4] Boon chom sri-san. (2003). Research for Teachers. Suveeriyasan, Bangkok. Thailand.

[5] Clif Mims. (2003). Authentic learning : A practical introduction and guide for implementation. The University of Memphis. https://www.researchgate.net/ publication/228395999. Authentic learning a practical introduction and guide for implementation. Article (PDF available) • December 2003. Online. [accessed Jan 02. 2019].

[6] Delaney, H. (2019). **Education for the 21st Century: Placing Skills Development at the Heart of Education**, Unicef. Retrieved from. www.unicef.org/thailand/stories/education-21-century.

[7] Hyun, J.,Ediger, R., &Lee, D. (2017). **Students' satisfactionon their learning process in active learning and traditional classrooms.** International journal of teaching and learning in higher education,29(1),108-118.

[8] Amaraporn Surakarn, Thasuk Junprasert, Napattararat Chaiakkarakkan, Narisara Peungposop, and Rojana Boonlop. (2020). **Active Learning and its Outcomes: A Case Study from the Education Reform Project in Thailand.** The Journal of Behavioral Science Behavioral Science Research Institute. 2020, Vol. 15, Issue 1, pp.34-51

[9] Boon chom sri-san. (1992). **Preliminary Research**. 2nd edition, Suveiriyasan. Bangkok.

[10] Puntarika Noi-nont. (2016). Development of the 21st Century Learning Assessment Model for the **Science Subject Secondary Education Year 4**. Thesis. Doctor of Philosophy. Department of Research and Educational Evaluation Faculty of Education Mahasarakham University. Maha Sarakham. Thailand.

[11] Lam Bick Har. (2005-2013). **What is Authentic Learning?. The Hong Kong Institute of Education**. https://www.eduhk.hk/aclass/Theories/AuthenticLearning_28June.pdf. .online. [accessed Dec. 20. 2018].

[12] Pit Ho Patrio & Shuk Han Cheng. (2016). Effects of active learning classrooms on student learning: **a two-year empirical investigation on student perceptions and academic performance.** Higher Education Research & Development. Volume 36, 2017 - Issue 2