Journal for the Education of Gifted Young Scientists, 7(3), 389-407, September 2019
e-ISSN: 2149- 360X
http://jegys.org

Research Article

School Agricultural Learning Center for Sustainable Agricultural Learning

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Received: 27 June 2019 **Accepted:** 17 July 2019

Abstract

The purpose of this study was to compare the learning achievements and skills in agricultural practices between students who learned through the School Agricultural Learning Center (SALC) and those who learned in the normal classroom. Participants were 150 Thai high school students in grade 12 recruited by purposive sampling. The study included three steps: 1) Investigation of basic data for developing the SALC, 2) Establishment and development of the SALC, and 3) Use of the SALC for learning: Facebook and Line were employed as the channels for knowledge exchange, communication on learning activities holding and activities transfer. A posttest-only control group design was employed. The results revealed that the students who learned through the SALC exhibited significantly ($p<0.01$) higher learning achievements and skills in agricultural practices than those who learned in the normal classroom. Our findings suggest that the SALC is pivotal for improving the students' learning achievements and skills in agriculture and should be promoted to become a natural part of sustainable agriculture education.

Keywords:

Agricultural practice, agricultural skill, agricultural learning achievement, School Agricultural Learning Center (SALC), social network

To cite this article:

Saduak, W., Poungsuk, P., Phonpakdee, R. and Deeying, S. (2019). School Agricultural Learning Center for Sustainable Agricultural Learning. *Journal for the Education of Gifted Young Scientists, 7*(3), 389-407. *DOI: http://dx.doi.org/10.17478/jegys.582993*

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Introduction

Agriculture and agricultural yields are vital factors for human in making a living. Thus, agricultural yields must be sufficient to meet the needs of the world population. At present, however, the world resources are limited while the world population increases rapidly. Besides, the food resource areas are deteriorated and agricultural yields per hectare decreases. Apart from that, the world climate change, global warming, flood, drought and water shortage have an adverse effect on food production, especially the agricultural sector. Food security of human will collapse if there is no agricultural sector. The extension of knowledge and understanding of agricultural practices to the people affected is one of the promising guidelines for solving such problems. In addition, the guideline for extending the knowledge and understanding can also be used for the learning development of learners, which can be implemented by schools and concerned agencies, who are capable of operating and preparing the contents and activities to be consistent with the needs, interest and skills of learners. Importantly, the following aspects must be taken into consideration: individual differences, skill practice, thinking process, management, dealing with difficult situation, knowledge application for prevention and problem solving, experiential leaning or learning through the actual situations. All subjects must contain good values or code of conduct and instill desired behaviors of learners. Learning atmosphere/environment, media, and convenience facilities must be appropriate. In fact, teachers and learners may learn together at the same time with coordination of parents, guardians, and the community and learning facilitation can occur everywhere (Government Gazette: National Education Act, 2002).

Agricultural education based on active learning (learning by doing) is an essential part of the daily school life which may promote the acquisition of knowledge and skills related to the ecological and social dimensions of sustainability. For the agricultural teaching and learning facilitation, it is important for learners to learn and practice their skills in a variety of agricultural activities, including crop and vegetable growing, livestock domestication, technologies for increased agricultural yields and yield management, in the actual situations since Agriculture subject requires learners to have direct experience that can be applied to the daily life activities. In addition, learners have a chance to develop their responsibility, diligence and tolerance, as well as strategies to conserve energy and environment. Hence, teachers must facilitate diverse learning activities for lecture and practice sessions; even at home parents or guardians can take part in the learning activities of their children (Thanapanyaratchawong, 2002). Importantly, teachers must have sufficient knowledge and understanding related to teaching techniques, methods and approaches to design the learning activities or prepare the good learning management (Moonkham & Moonkham, 2002).

The advent of new technologies plays an important role in the daily life activities of the world population, particularly the youth of learning age, somehow making them have no interest in occupations related to agriculture. Considering the facilitation of agricultural teaching and learning, students still lack understanding of contents pertaining to agriculture as well as skills and agricultural practices, thereby leading to the low learning achievements and negative attitudes towards Agriculture subject. Besides, problems associated with the teaching and learning facilitation have been encountered, including the inappropriate area for learning activities and the lack of convenience facilities, materials and equipment, as well as inadequate budgets. One previous study has revealed the problems in the facilitation of career teaching and learning in the secondary school level that some schools lack materials and equipment for students to practice the skills; some do not have any workshop, so students are only given lectures; small schools have problems in obtaining budgets; and many students and their guardians have negative attitudes towards agricultural career teaching and learning (Poungsuk, 2013). Another study disclosed that many schools at the basic education level encounter problems associated with Agricultural class management since they seldom have classrooms for specific purposes and areas for agricultural practices are limited (Phonpakdee, 2013). Therefore, agricultural teaching and learning needs to be revised and adjusted to fit the conditions of schools, like growing plants in containers and rearing ornamental fish.

Given the aforementioned problems, social networks and technologies are the important learning sources to assist in the facilitation of agricultural teaching and learning in order that learners would be able to gain knowledge, experience and skills in agricultural practices. Previous literature has unraveled that the management of teaching and learning focusing on the use of a variety of media gives learners an opportunity to actively take part in teaching and learning activities as well as self-assessments for successful learning (Poungsuk, 2018 and Promwong, 2008). Moreover, it has been reported that the learning management using an agricultural garden area as a place for implementing integrated learning activities, under the concept of experiential learning or learning in the actual situations, is one of the promising strategies for the learning management (Srisuantaeng, 2013). Additionally, using agricultural technologies as well as social network for the coordination and connection in various forms in the production of plants and animals has been claimed to increase agricultural yields (Thiangtrong, 2014). Hence, the use of various learning sources for developing the facilitation of agricultural teaching and learning leading center to promote agricultural learning making learners to gain knowledge, understanding and skills and agricultural practices is of great interest.

This research focused on: 1) learning through the School Agricultural Learning Center results in sustainably agricultural learning. This emphasized on the establishment and development of the School Agricultural Learning Center. The use of this learning center could be integrated with the teaching/learning facilitation using 5 learning bases: (1) Plant Propagation, (2) Organic fertilizer Production, 3) Agricultural Technology, (4) Plant Growing, and (5) Technology for selling Agricultural Products. Also, there was the integration of the use of social network of Facebook and Line application, and 2) this study aimed to investigate learning achievement of the students using the School Agricultural Learning Center. This included their skills in agricultural practice after the learning center.

Problems of the Research

Nowadays, the facilitation of agricultural teaching/learning in the school has a limitation on decreased teaching/learning hours. Besides, there is a decrease in a number of students who are interested in agriculture. Based on the number of upper secondary school students in 35 schools under Srisaket Provincial Administratiive Organization, it decreased from 2,085 (year 2015) to 1,835 students (year 2016) or a decrease for 12 percent (Division of Education Religious and Culture, 2016). In the same year, there was a decrease in a number of students who were enrolled in Agriculture subject among grade 12 students at Praibuengwittayakom school (15.74 percent decrease) (Academic division, 2019). However, it is necessary to offer agricultural courses to students and interested persons for long term benefits to them and the country. As a matter of fact, many Thai people at present are aware of health care and organic products. In other words, they put the importance on safe food with good taste. Thus, concerned personnel about agriculture, Agriculture teachers, and farmers need to promote or do organic farming and extend this knowledge to interested persons which will be beneficial to them and their families. The establishment of the School Agricultural Learning Center is an important alternative to promote organic farming and smart farmers to the community around the school and interested persons. It also aims to make students, teachers, and people visiting the School Agricultural Learning Center to have good attitude towards organic agriculture and farming and they may decide to be engaged in the small or big farming in the future.

Method

This study employed true experimental design which posttest was only used with the control group (Campbell & Stanley, 1969). This comprised the following 3 steps:

1. Investigation of basic data for developing the School Agricultural Learning Center

2. Construction and development of the School Agricultural Learning Center

3. Try-out form of the School Agricultural Learning Center

Population and Sample Groups

1. The population in this study included 182 out of 216 grade-12 students at Praibuengwittayakom School, Srisaket province, who took Agriculture subject in academic year 2016 and they were obtained by purposive sampling.

2. The sampling group consisted of 182 grade-12 students (4 classes) obtained by simple random sampling (Lotto method). Thus, simple random sampling (Lotto method) was conducted again and 2 groups were obtained: experimental group (75 students) and control group (75 students) as shown below:

(1) Experimental group consisting of 75 students as follows:

- Grade-12 students from Class 6/1 (37 individuals)
- Grade-12 students from Class 6/2 (38 individuals)

(2) Control group consisting of 75 students as follows:

- Grade-12 students from Class 6/3 (37 individuals)
- Grade-12 students from Class 6/4 (38 individuals)

Instrument and Procedures

Step 1: Investigation of Basic Data for Developing the School Agricultural Learning Center

It consisted of two steps: (1) Documentary review or review of related literature, i.e., Concepts and principles of the facilitation of agriculture teaching and learning, Concepts and principles of teaching and learning facilitation by using learning sources, and Concepts and principles of the teaching and learning facilitation by using the School Agricultural Learning Center, and (2) Assessment of the needs for developing the School Agricultural Learning Center of students, guardians and Agriculture teachers. The research instruments were checked by 5 specialists in terms of validity and consistency of question items (IOC). Mean scores of the opinion level of each item must be at ≥ 0.50. If less than this, improvement must be done based on suggestions of the specialists. A 5-point Likert-scale questionnaires (Ivanov et al., 2018) were employed in this study. The assessment criteria were as follows: (Leekitwattana, 2012).

5-Rating scale	Assessment criteria
5 = Highest	4.51 – 5.00 = Highest
4 = High	3.51 – 4.50 = High
3 = Moderate	2.51 – 3.50 = Moderate
2 = Low	1.51 – 2.50 = Low
1 = Lowest	1.00 – 1.50 = Lowest

The questionnaires were administered with 3 groups of people concerning with agricultural teaching/learning activities as follows:

- Grade-12 students at Praibuengwittayakom School, Srisaket province, who took Agriculture subject in the academic year 2014 (413 individuals)

- Guardians of the students (413 individuals)
- Agriculture teachers in the secondary school level in Srisaket province (25 individuals)

The obtained data were calculated for the mean scores and standard deviations prior to synthesizing the contents.

Step 2: Construction and Development of the School Agricultural Learning Center

The construction and development procedures of the School Agricultural Learning Center are shown in the diagram below:

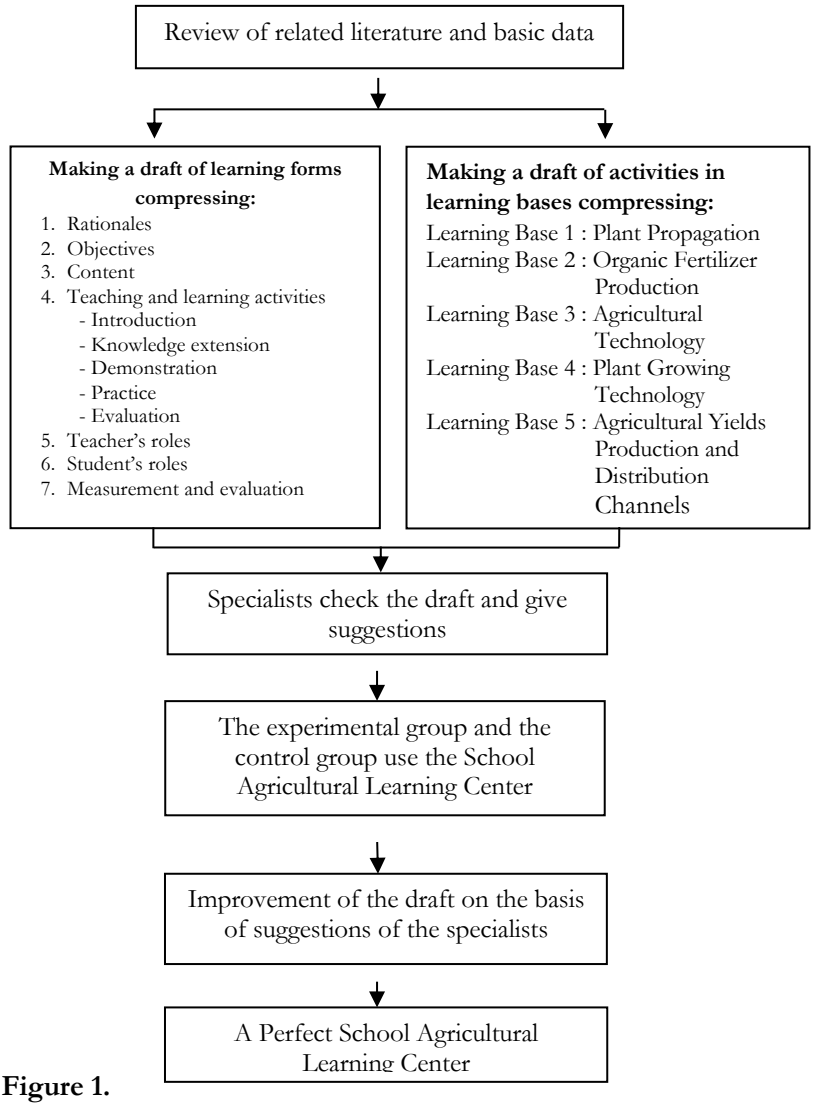

Figure 1.

The Construction and Development Procedures of the School Agricultural Learning Center

According to the diagram, it included the following.

1. Construction and development of the School Agricultural Learning Center for learning development and the tools reflecting the outcomes of learning development

(1) Construction and development of the School Agricultural Learning Center : The obtained data from Step 1 were used for designing the form of the School Agricultural Learning Center, which comprised the following 5 learning bases:

- Learning Base 1 : Plant Propagation
- Learning Base 2 : Organic Fertilizer Production
- Learning Base 3 : Agricultural Technology
- Learning Base 4 : Plant Growing Technology
- Learning Base 5 : Agricultural Yields Production and Distribution Channels

The learning activities consisted of the following 5 steps:

- Step 1 : Introduction
- Step 2 : Knowledge
- Step 3 : Demonstration
- Step 4 : Practice
- Step 5 : Evaluation

Assessment of the appropriateness of the learning bases was implemented using the assessment forms constructed by 10 Agriculture teachers at the upper secondary school level. The assessment forms were 5-point Likert-scale questionnaires (Ivanov et al., 2018) while knowledge assessment was performed based on the assessment criteria of Leekitwattana (2012). It was found that the learning bases developed had the highest score of appropriateness of 4.77 (S.D. = 0.06).

(2) Construction and development of the learning management plans : The learning management plans were constructed and developed based on the principle of leaning by actual practice and the application of technology for agriculture, which comprised 5 plans: Introduction, Knowledge, Demonstration, Practice and Evaluation. The learning facilitation plans were assessed using the assessment forms constructed by the team of researchers and checked by 5 specialists. The assessment forms were 5-point Likert-scale questionnaires (Ivanov et al., 2018), which were used to evaluate the consistency, appropriateness and validity of the learning facilitation plans, including important contents, learning objectivities, learning processes, learning media and learning assessments according to the evaluation criteria of Leekitwattana (2012). It was found that the learning facilitation plans had the highest score of efficiency of 4.72 (S.D. = 1.86).

(3) Construction and development of the tools reflecting the outcomes of learning development

- Test Papers to Measure the Learning Achievements

The test papers used to measure the learning achievements consisted of 4 multiple choices (50 items) and were checked by 5 specialists for improvement in terms of the appropriateness of contents, learning objectives, correctness of language use, and validity (IOC ≥ 0.80). The improved test papers were tried out with 28 Grade-12 students from Class 6/5 at Praibuengwittayakom School in the first semester of the academic year 2015. The obtained scores were analyzed to find the discrimination (B-index or Brennan index, B ≥ 0.23 and p (difficulty value = 0.25 – 0.79), KR20 = 0.96).

• Assessment Forms to Evaluate the Skills in Agricultural Practices

The assessment forms employed to evaluate the skills in agricultural practices were based on 5 aspects, with the principles of Educational Testing Center (2016) used to determine the assessment lists and scores as follows:

• Operation Planning = 3 marks
• Operation = 3 marks
• Finishing Operation (On-time) = 3 marks
• Outcomes = 3 marks
• Tool Using and Keeping = 3 marks

Developing the form of the School Agricultural Learning Center: This step involved the implementation of the experiments to evaluate the impact of learning styles on the learning achievements of the students that were not included in the sample groups: 35 Grade-12 students from Class 6/5 who took Agriculture subject in first semester of the academic year 2015.

Step 3: Trying-out of the School Agricultural Learning Center

The experiments were conducted with two sample groups: experimental group (75 individuals) and control group (75 individuals) by using the following steps:

(1) Asking permission from the school director to prepare the learning activities in accordance with the learning from the School Agricultural Learning Center.

(2) Informing the objectives of the teaching/leaning activities to the sample groups. The experimental group was named "Agriculture children network" in Facebook social network and LINE employed as the channels for knowledge exchange, communication on learning activities holding and activities transfer through social network (Lytras et al., 2018).

(3) Holding teaching/learning activities, where the experimental group learned and conducted activities at the School Agricultural Learning Center while the control group learned and performed activities in the normal classroom.

(4) Using assessment forms (5 items, 3 scores each) to score the students' skills in agricultural practices while they were learning and performing activities. The obtained data were then calculated for the mean scores and standard deviations. Differences between the experimental and control groups were determined using t-test (dependent).

(5) Learning achievement scores were collected by using learning achievement forms (40 items) prepared by the team of researchers after the students had finished the learning bases. The obtained data were calculated for the mean scores and standard deviations. Differences between the experimental and control groups were determined using t-test (independent sample).

(6) Substantially improving the learning activities of the School Agricultural Learning Center in order that the center could be suitably used as a place for holding the teaching/learning activities for sustainable agricultural learning.

Data Analysis

1. Investigation of basic data for developing the School Agricultural Learning Center based on relevant documents analysis and an assessment of the needs for developing the School Agricultural Learning Center of students, guardians and Agriculture teachers using questionnaires. It was checked and improved by 5 specialists using the Index of Item-objective Congruence (IOC).

2. Construction and development of the School Agricultural Learning Center:

2.1 Five learning bases and learning management plans using assessment forms 5-point Likert-scale questionnaires was checked and improved by 5 specialists using mean score and standard deviation.

2.3 Testing papers to measure the learning achievements was checked and improved by 5 specialists using the Index of Item-objective Congruence (IOC) and improved through tried out technic was inspected based on the KR20 formula.

3. The testing of differences in an average mean score of learning achievement was using t-test (independent sample).

Results

Investigation of Basic Data for Developing the School Agricultural Learning Center

1. Analyzed and Synthesized Concepts and Principles Related to the Facilitations of Agricultural/Learning Using the School Agricultural Learning Center. It was found that agricultural education must cling on learning by doing or learning in the actual situation, in which the place and environment helped learners to learn actively from diverse agricultural activities. The following related concepts and principles were investigated:

1) Concepts and Principles of Agricultural Teaching/Learning

The facilitation of agricultural teaching/learning is the learning that learners learn from actual practices together with the application of concepts and principles related to the agricultural education management of academics and educators based on Dewey's theory of "learning by doing" (Dewey, 1958). It is one of most important educational ideas, which can be regarded as the product of empiricism,

behaviorism and progress theory. In other words, creating sufficient conditions for learners to "experience" is the key to education (Chang et al., 2018). Previous studies of Thanapanyaratchawong (1988); Poungsuk (2013) and Siriwan, (2014) also suggested that agricultural education must be based on the principle of learning by doing. Practical implementation of agricultural learning is at the heart of theoretical knowledge. Students would be able to memorize and be confident in the knowledge. Schools and agricultural education schools are the sources of agricultural knowledge for local people who take part in educational facilitations. Agricultural education is continuing education and agricultural knowledge must always be up-to-date or modern. The facilitation of agricultural career teaching/learning also aims to make learners have a positive change in cognitive domain or intellect. It is the behavior showing knowledge, understanding, adoption, analysis and synthesis on psychomotor domain or skills in practice. Also, it aims to develop affective domain or attitude of learners.

2) Concepts and Principles Used for the Construction of the School Agricultural Learning Center

The facilitation of teaching/learning using the School Agricultural Learning Center adopted the concepts and principles of many academics and educators for the construction of the center (Office of the Education Council, 2010; Laonet and Laonet, 2011; DCIDME, 2012; Siradej, 2002; Poungsuk, 2017; and Udomsin, 1999). Various places and environments help learners to have the occurrence of learning while teachers can make a learning plan, making learners have an opportunity to touch, observe, interview, practice, etc., or they can study by themselves to gain direct experience through case study with a group of friends. An earlier study of Srisuantaeng, (2013) stated that learning facilitation by using an agricultural garden was the use of the agricultural garden area for holding integrated learning activities, in which an agricultural garden area was employed as a tool for teaching under the concept of the experiential learning facilitation and was designed to be a living laboratory with various integrated activities. Another study claimed that the adoption of agricultural technology for plant and animal adoption as well as using social network for the coordination and dissemination of teaching/learning activities were very useful (Thiangtrong, 2014).

2. Data Obtained from a Survey on the Needs for Developing the School Agricultural Learning Center for Students, Guardians, and Agriculture Teachers

1) Needs for Developing the School Agricultural Learning Center for Students. As presented in Table 1, the overall needs for developing the School Agricultural Learning Center for the students was seen at the high score of 4.24 (S.D. = 0.44), with the highest score of 4.34 (S.D. = 0.66) observed for contents included in teaching/learning activities, followed by form of the School Agricultural Learning

Center (score = 4.33, S.D. = 0.74). By contrast, the management and administration had the lowest score of 4.02 (S.D. = 0.66).

2) Needs for Developing the School Agricultural Learning Center for Guardians had high scores in all aspects, with the highest score of 4.28 (S.D. = 0.53) achieved for contents included in teaching/learning activities, followed by form of the School Agricultural Learning Center (score = 4.23, S.D. = 0.61) as shown in Table 2.

3) Needs for Developing the School Agricultural Learning Center of Agriculture teachers was showed in Table 3. The overall needs for developing the School Agricultural Learning Center for the teachers was observed at high levels (score = 4.06, S.D. = 0.62), with the overall highest score noted for item 2. By contrast, the form of the School Agricultural Learning Center had the lowest score of 3.78 (S.D. = 0.83).

Construction and Development of the School Agricultural Learning Center

1. Construction of the form of the School Agricultural Learning Center

Regarding the construction of the form of the School Agricultural Learning Center, it was found that the center should have the following important components: concept of the teaching/learning facilitations, principles and objectives, for successful operation. The outcomes of the learning facilitations are shown in Figure 2.

2. Developing the form of the School Agricultural Learning Center

The experiments were conducted with the none-sample groups (35 Grade-12 students from class 6/5 in the first semester of the academic year 2015). It was found that the students' learning achievement was 32.29 out of the total score of 40 (S.D. = 2.07) and their skills in agricultural practice were 64.57 out of the total score of 75.

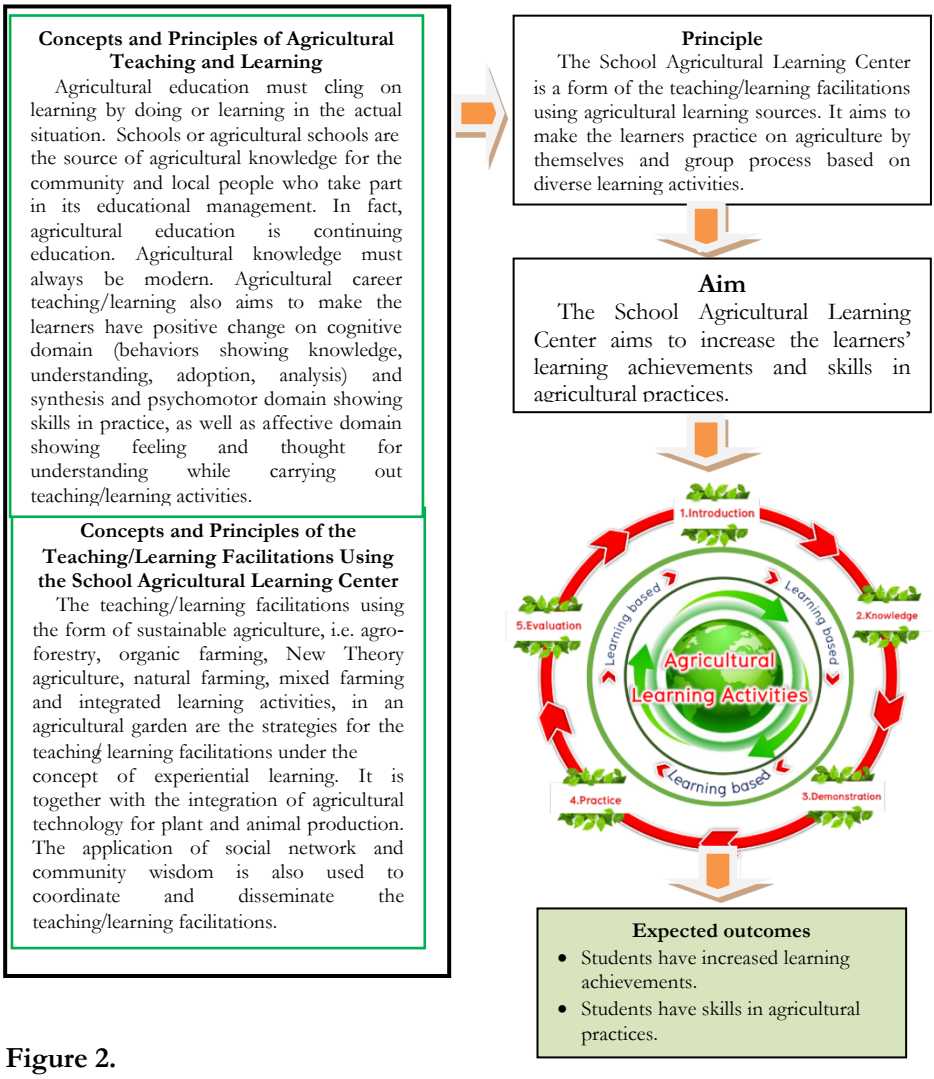

Figure 2.
Form of the School Agricultural Learning Center for Encouraging Agricultural Learning

Table 1.
Needs for developing the School Agricultural Learning Center of Students

Items	Level of Needs		
	Mean	S.D.	Description
1. Nature of the School Agricultural Learning Center	4.23	0.46	High
2. Form of the School Agricultural Learning Center	4.33	0.74	High
3. Contents included in teaching/learning activities	4.34	0.66	High
4. Management and administration	4.02	0.66	High
5. Media, materials and equipment	4.26	0.73	High
Overall	**4.24**	**0.44**	**High**

According to Table 1, all items were found to have a high level of need. However, contents included in teaching/learning activities was found to have the highest level of needs (score=4.34) and followed by form of the School Agricultural Learning Center (score=4.33). This might be because the learning content must be clear and of interest of student. Also, the School Agricultural Learning Center should have diverse forms of learning and teaching activities.

Table 2.
Needs for Developing the School Agricultural Learning Center of Guardians

Items	Level of Needs		
	Mean	**S.D.**	**Description**
1. Nature of the School Agricultural Learning Center	4.19	0.70	High
2. Form of the School Agricultural Learning Center	4.23	0.61	High
3. Contents included in teaching/learning activities	4.28	0.53	High
4. Management and administration	4.09	0.56	High
5. Media, materials and equipment	4.21	0.84	High
Overall	**4.20**	**0.49**	**High**

According to Table 2, likewise, all items were found to have a high level of need. However, contents included in teaching/learning activities was found to have the highest level of needs (score=4.28) and followed by form of the School Agricultural Learning Center (score=4.23). This might be because the learning content must be clear and of interest of student. Also, the School Agricultural Learning Center should have diverse forms of learning and teaching activities.

Table 3.
Needs for developing the School Agricultural Learning Center of Agriculture Teachers

Items	Level of Needs		
	Mean	**S.D.**	**Description**
1. Nature of the School Agricultural Learning Center	4.00	0.63	High
2. Form of the School Agricultural Learning Center	3.78	0.83	High
3. Contents included in teaching/learning activities	4.34	0.62	Highest
4. Management and administration	4.23	0.69	Highest
5. Media, materials and equipment	3.96	0.95	High
Overall	**4.06**	**0.67**	**High**

According to Table 3, it was found that contents included in teaching/learning activities (score=4.34) and Management and administration (score=4.23) were as a highest of needs. The rest were found at a high level. As a whole, the level of needs was at a high level on average.

Experiments on the Use of the School Agricultural Learning Center for Encouraging Agricultural Learning

Table 4.
A Comparison of the Students' Learning Achievement Scores between the Experimental and the Control Groups

The sample groups	n	Total score	Mean	S.D.	t	Sig.
Experimental group	75	40	32.69	2.07	20.78	0.00**
Control group	75	40	25.32	2.26		

** A statistical significance level at 0.01.

As shown in Table 4, it was found that the learning achievement of the experimental group (learning through the School Agricultural Learning Center) was higher than that of the control group (learning through normal classroom) with the statistical significance level at 0.01.

Table 5.
A Comparison on the Students' Skills in Agricultural Practices between the Experimental and Control Groups

The sample groups	n	Total score	Mean	S.D.	t	Sig.
Experimental group	75	75	64.84	3.14	20.11	0.00**
Control group	75	75	55.26	2.66		

** A statistical significance level at 0.01.

As shown in Table 5, likewise, the skills in agricultural practice of the experimental group were higher than those of the control group with the statistical significance level at 0.01.

Conclusion and Discussion

Basic Data for Developing the School Agricultural Learning Center

There was a high level of needs for developing the School Agricultural Learning Center for the students, the guardians, and the Agriculture teachers. This might be because they were involved in the educational facilitation and perceived the importance of agriculture and technology. In addition, they wished to develop the activities in agricultural learning using the School Agricultural Learning Center. Regarding an analysis and synthesis of concepts and principles related to the facilitation of agricultural teaching/learning using the School Agriculture Learning Center, it was found that agricultural education must emphasize the importance of learning by doing or learning in the actual situation with diverse learning activities. It is a guideline for the facilitation of agricultural teaching/learning to make the

learner have knowledge, understanding, and skills in agricultural practice as well as good attitude towards agricultural occupations. In accordance with Al–Zoubi & Bani Abdel Rahman (2016) found that the Najran Centers for Gifted should strive to improve their enrichment activities, teaching methods, and environment by providing better access to facilities the enrichment activities, teaching methods, student relationships, and facilities and equipment.

Using the School Agricultural Learning Center for Encouraging Agricultural Learning

Regarding a comparison of learning achievement before and after attending the Agriculture class by using the School Agricultural Learning Center, it was found that the students learning through the School Agricultural Learning Center had a higher learning achievement than before with a statistical significance level at 0.01. This implied that the School Agricultural Learning Center developed could truly improve knowledge and understanding of the students. This might be because the facilitation of agricultural teaching/learning using the School Agricultural Learning Center had diverse learning activities in the form of learning bases, which was well supported by an earlier study which elucidated that school facilities were the most potent determinant of high academic achievement of students (Owoeye & Yara, 2011). Meanwhile, the application of social network and community wisdom to coordinate and disseminate the teaching/learning facilitation in the program was also important. In one previous study of Sewilam *et al.*, (2015), it was observed that the main achievements of EduCamp were the development of Environment, Development and Sustainability (ESD) resource kits that included activities related to biodiversity, agriculture, energy, and water for schools to provide activities for teachers and students which linked the existing school curriculum to the local community. In addition, there were clear learning sequences, i.e. step 1-introduction, step 2-knowledge, step 3-demonstration, step 4-practice, and step 5-measurement. Consequently, the students gained knowledge/understanding and were able to practice correctly. Moreover, using technology and social network for teaching/learning activities helped them to truly understand what they had learned. This conformed to an earlier study of Chatiyanon, Punsawai, & Jermtaisong (2018) which stated that the students' achievement in studying medicinal plants before and after the project–based learning management was higher than the achievement before the project–based learning management at the significant level of 0.05, with a high level of satisfaction. Lytras, et al. (2018) had conducted a study and found that the collaboration and participation in social networks can widen learning opportunities such as new knowledge sharing and transfer. This is vital in the online learning process of all learners. Actually, academics stakeholders, policy makers, and concerned personnel should understand key components order to

create values through social networking in smart education. The key components include: offered content, policy making, an integration level, content, collaboration, social interaction, development, assessment, leadership, and innovation. In an earlier study of Saduak, Poungsuk, & Pourpan (2017), a model for development of agricultural skills under Occupation and Technology Subject (Agriculture) of third-year lower secondary school students using the School Agricultural Learning Center and it was found that the students' learning achievement after learning was higher than before with a statistical significance level at 0.05, which might be due to the fact that the model could help the students to gain knowledge and understanding, and be able to work effectively. In addition, there were learning documents prepared by the researchers for the students to study more while practicing or having available time. Interestingly, there were diverse learning activities and knowledge transfer was in the form of from abstract to concrete. One previous study of Roy (2005) also showed that schools could promote the attitudes of learning of students through doing, where the students enrolled in the school were encouraged to get involved in areas of study common to all vocational agriculture education. These areas included career awareness, investigations of aquaculture and marine trades, enhancement of leadership techniques and the practical application of problem-solving strategies through application of learned skills in the field. Moreover, two forms of teaching control, in which students were controllers by program, were evaluated for their effects on the learning achievements of 274 grade-9 and grade-10 students of high and low capacity, using selection and time spending for learning arithmetic and it was observed that the students who kept on controlling themselves had a higher score after learning than those who were controlled by the program and spent more time for program-learning and preferred the learning style. In addition, the students of high capacity had more behavioral adaptations on study by additional practices than those who had lower capacity with a statistical significance level at 0.01 (Hannafin & Howord, 1995).

As with the impact of the School Agricultural Learning Center on the skills in agricultural practice, it was noted that the students who passed skills in agricultural practice development through the School Agricultural Learning Center had a high level of agricultural practice with an average mean score of 8.19, which was due to the fact that the School Agricultural Learning Center was developed by prioritizing the importance of learning by doing or learning in the actual situation, possessing a systematic process. The School Agricultural Learning Center was suggested and assisted by specialists, consultants, school administrators, guardians and teachers, and possessed adequate tools and equipment for use by the students. This conformed to an earlier study of Moonkham & Moonkham (2002) which revealed that the most important learning of learners was learning in the actual situation,

which helped them to apply knowledge and experience to their daily life activities. Using learning sources in the process of learning facilitation is a practice guideline for the facilitation of teaching/learning activities in the age of learning reform. Providing an opportunity for learners to learn new things and discover knowledge by themselves under the designed situation promotes learning by doing. It also promotes learning in accordance with a concept of educational reform on measurement and evaluation called "evaluation based on actual condition". For instance, a teaching and learning model was developed using the concept of learning by doing for secondary school students and it was found that learning sources was essential for teaching and learning activities, as indicated by the fact that the students effectively gain knowledge, experience and skills as a result of the readiness of media, tools, equipment and appropriate learning sources (Muangma, 2011).

This study was based on Dewey's theory of "learning by doing" to encourage the use of the School Agricultural Learning Center for improving the students' learning achievements and skills in agriculture. The results revealed that the teaching/learning facilitation was successful using the School Agricultural Learning Center. Hence, it is important to establish an Agricultural Learning Center for people who have an interest in learning and practicing skills in agriculture, with social network applied to teaching/learning activities. Additionally, there should be the integration of the School Agricultural Learning Center with the teaching/learning activities of other subjects. Although the philosophy of agricultural education in Thailand has not fully been developed, yet basic principles of agricultural education have not change. The basic principles include the follow: providing up-to-date technical skills and knowledge in agriculture; conducting experiential learning activities in the real world or agricultural careers; and involving students in leadership and personal development activities at the local and national levels.

Acknowledgments

The authors are grateful to the students, the teachers and the academic staffs for their willingness to participate in the project. The authors are also grateful to the journal editor and anonymous reviewers for their time and helpful comments to improve the paper. Funding; this research was funded by the Graduate School of King Mongkut's Institute of Technology Ladkrabang (KMITL).

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