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### **Guidelines for Developing Learning with the Crop Rotation System for food Security**

#### **A Case Study: Princess Ubolratana School Students, Chiang Dao Sub-district, Chiang Dao district, Chiang Mai, Thailand**

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##### **Abstract**

This is a research and development paper and its objective is to develop a learning approach to the crop rotation system for food security at Princess Ubolratana School, Chiang Dao Sub-district, Chiang Dao district, Chiang Mai, Thailand. This study employed secondary and primary data methods and a participatory action research method. The secondary data method and focus-group discussion were used to collect the data. The target group included 54 students from grades 6-9 of the school's agricultural club. Quantitative data were analyzed using percentage, mean value, and qualitative data analysis using content analysis. The results of the research revealed that 1) the need for the development of learning issues can be divided into 3 issues: production factors, learning media, and development of

practical skills and life skills; 2) the crop rotation system is the cultivation of at least two types of plants in the same area taking into account the types of plants, varieties and suitable cultivation time as well, and the planters were teachers and students at Princess Ubolratana School who used the tool as a plot and planting calendar to plant efficiently; and 3) the management model of Muang Phet Learning Center was assessed and improved so that it is consistent with the philosophy of sufficiency economy, and the assessment showed that the overall score was at a high level.

### **Keywords**

Crop Rotation System, Learning center

**JEL Classifications:** J11, F43

### **1. Introduction**

Food security and nutrition are essential to the survival of all human beings because they can contribute to physical and intellectual development, and having good health will help support humans to be able to participate in economic and social development to their maximum potential. Hence, food must be safe and contain necessary nutrition. In addition, the agricultural sector, an important food-producing sector, plays an important role in contributing to food security. Therefore, it should support the establishment of a sustainable agriculture system that takes into account the quality of life of farmers – especially small farmers – consumers' safety, increasing the productivity of the agricultural sector, ecological balance, the stability of the resource base, and biodiversity as well as preparing to cope with the impacts of climate change, disasters and fluctuations in agricultural prices (*Office of the National Economics and Social Development Council. 2021. SDGs, 2021*).

Furthermore, children and youth are not only considered an important force in the country's future development, but they can also be seen as a fragile group because they might not be able to manage their lives on their own. Therefore, government assistance is important as they can implement a policy to assist relevant agencies to solve problems and find ways to develop and achieve sustainability. This links to the 17 Sustainable Development Goals (SDGs), specifically Goal 2, which addresses hunger and provides assurance for all, especially the poor and vulnerable as well as infants so that they all can have access to safe, nutritious, sufficient food throughout the year by 2030. At Princess Ubolratana School, Chiang Dao Sub-district, Chiang Dao district, Chiang Mai, Thailand, staff aim to improve the quality of education of rural youths who lack educational opportunities, have poor status or divided families, are abandoned or sexually abused, have AIDS or HIV in the bloodstream, are likely to have occupational risks, or are in court proceedings. They are normally children of both hill tribes or lowland Thais in the North and elsewhere (*Princess Ubolratana School. 2012. School history. Retrieved May 25, 2022, , 2012*). In light of this, children

must be educated so that they are able to help themselves and develop themselves to be a good quality population who can bring knowledge back to develop their local areas. Apart from that, the school promotes agricultural plots according to the Royal Initiative and then uses the harvested produce for lunch.

Hence, the research team was eager to learn about the guidelines for the development of learning with the crop rotation system for food security at Princess Ubolratana School, Chiang Dao Sub-district, Chiang Dao district, Chiang Mai, Thailand. We aimed to find a common ground for all, and the results of this research would be valuable for schools and neighboring communities so that people can apply the development process and create a learning center for sustainable development in the future.

## **2. Objectives**

- 1) To study the need for the development of each point of learning
- 2) To develop a model for the management of the vegetable cultivation learning center with a crop rotation system for food security
- 3) To assess the management model of the crop rotation system learning center

## **3. Literature review**

### **3.1 The Concept of Knowledge Management**

Knowledge management is an important step in bringing theories into practice. It is a part of the Basic Education Core Curriculum, a curriculum that has learning standards where learners' competencies and desirable characteristics are deemed important for the development of children and youth; instructors must make an attempt to select the learning process, and manage learning to develop students to be equipped with the qualities according to the learning standards. All 8 learning subject groups include cultivating and enhancing appropriate characteristics, and developing various skills and important competencies that are required for learners.

- 1) Principles of learning management

The principles are to provide learners with knowledge and competence according to the learning standards, having essential competencies and desirable characteristics as defined in the Basic Education Core Curriculum based on the principles indicating that learners are the most important and that everyone has the ability to learn and develop themselves. The knowledge management process must encourage learners to develop naturally to their maximum potential taking into account individuals' differences and brain development and putting an emphasis not only on knowledge but also on virtue.

- 2) Learning process

Knowledge management prioritizes learners as the most important, so learners must rely on the Year 6, issue 2, learning process, July - December 2018, that indicates how various tools are available to guide them towards the goals of the curriculum. The processes include integrated learning process, knowledge creation process, thought process, social process, simulation activity process – such as situations and solving problems – experience process, implementation process, hands-on process, management process, research process, learning from one's own learning process, and character development process.

#### **4. Research Method**

The area in this research study was Princess Ubolratana School Students, Chiang Dao Sub-district, Chiang Dao district, Chiang Mai, Thailand. The target subjects used in this study were 54 students from grades 6-9 of the school's agricultural club. This research was action research and was divided into 2 steps as follows:

**Step 1** Select target groups by coordinating with teachers or school staff interested in making a "crop rotation system" learning center.

**Step 2** Put into practice:

1) Prepare according to the crop rotation system's production plan by selecting the plan suitable for the area so that people can develop skills and knowledge regarding the matter in schools. The researchers created a planting plan and a planting calendar by considering the age of the vegetable, season suitability, and the needs of the vegetables. Then, the team proceeded to do agricultural plots with the crop rotation system in the school's agricultural garden area of 1 rai, divided into 20 large plots and made a number plate to mark each plot. The team and the 54 students helped each other make the plots and sow the seeds which were consistent with the planting plan that had been set, and the production results were recorded.

2) Follow up results. The research team advised on crop rotation production and exchanged knowledge among the target groups.

3) Assessment and improvement of the learning center management model.

#### **5. Research Tools**

This qualitative research made use of participatory action research as a research tool and employed a focus group discussion technique in planning the production of vegetables in the crop rotation system, and data on various issues were accumulated using questionnaires. Data were collected using document studies, observations, interviews and group recordings, and the proper learning center management model was chosen based on the analysis of the data.

#### **6. Data Analysis**

The research team put the proposed issues in the research conceptual framework. After that, the relevant literature review was searched and the issues

from the research conceptual framework were processed together using a triangulation approach to verify the completeness of the content, resources, and accuracy of the information. The qualitative data analysis was gained by using content analysis to conclude the data collection.

## **7. Result and Discussion**

### **7.1 The Need for The Development of Each Point of Learning**

From the qualitative data about the need for the development of each point of learning, it is divided into 3 different areas, and the details are as follows:

In terms of production factors, it was found that the target group had a demand for machinery, tools, and technologies used in the management of planting plots. The tools include walk-behind tillers, soil preparation machines, seed trays, peat moss, soil moisture meters, a drip irrigation system (pipes, drip heads), water pumps, small ponds, vegetable seeds, etc.

Regarding the learning media, it was found that the target group required tools and equipment for the learning center's training materials, such as a video presentation of the learning center, handbooks on the production in the crop rotation system, and Podcasts or a form of learning done through the recording of conversations on the topic of vegetable production in the crop rotation system of Princess Ubolratana School on the website or the newly created Princess Ubolratana School YouTube channel created by teachers and students who jointly designed content and formed presentation of information and had technology specialists provide knowledge regarding media production and give advice during media production.

As for the development of practical skills and life skills, it was found that there was a need to develop activities to promote the learning of practical skills and life skills. This could be done by bringing technology, agricultural innovations, or the "Smart Farms" as well as the knowledge of local medicinal plants that are transformed into herb gardens by processing them to add value and at the same time preserve them from extinction. Learners want to be the center of knowledge gathering that will lead to promoting the learning process for people in the community. In addition, there was an exchange of wisdom, experiences, values, culture, and community identity. Some activities corresponded with the way of life of the people in the community which are consistent with the changes in society, leading to self-reliance for sustainable community strength, the point of attraction for those aspiring to come to study and those interested.

### **7.2 Vegetable Production Plan with Crop Rotation System**

A crop rotation system is the cultivation of at least 2 types of plants in the same area, arranged in an orderly sequence and rotating. The plants that are planted must be suitable for the terrain climate, and so the crop rotation system

can increase productivity while conserving soil and water resources. In order to accomplish this, people have to consider the appropriate plant types, varieties, and cultivation time.

Planting operators: teachers and students at Princess Ubolratana School.

### 7.3 Operational Steps

- 1) Assessment of Areas' Characteristics
- 2) Plan with tools such as a planting calendar and planting plan (considering vegetable age and seasonal suitability)
- 3) Planting plan that has been performed from seed sowing, soil preparation, planting, maintenance, harvesting, harvesting, transportation, and soil improvement after farming.

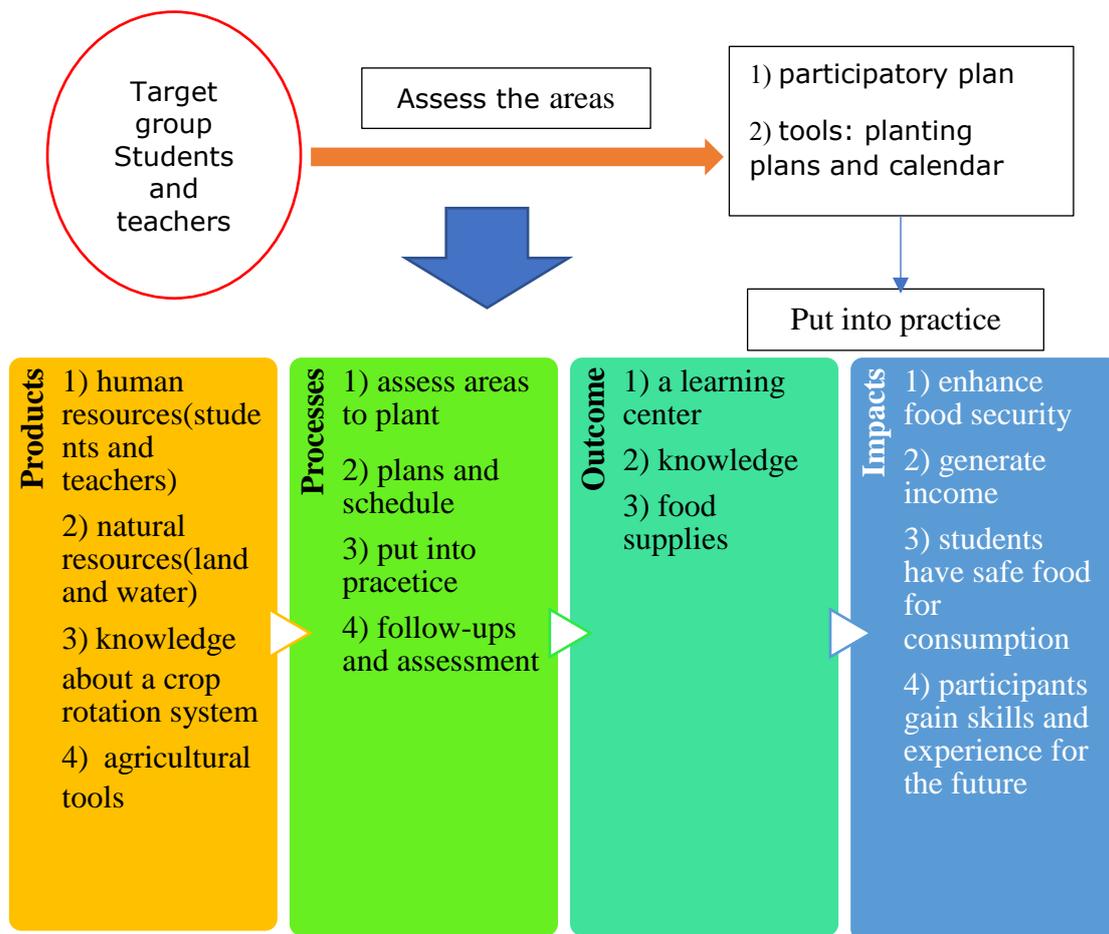


Figure 1. Operational Framework for The Crop Rotation System

### 8. Evaluation and improvement of the learning center management model

The assessment of the people's satisfaction in the community towards the learning center management model with the crop rotation system for food security

revealed that, after surveying the satisfaction of the target group of 54 people, the overall satisfaction of the trainees for the development of the learning center management model was at a high level (total average 3.66), and can be described as follows:

1) Benefits people could gain from making demonstration plots were at a high level (total mean 3.55), and when considering each aspect, it was found that the aspect with the highest average was that this demonstration plot could solve the issues directly. Secondly, after attending the workshop, learners were able to think and solve problems. Subsequently, they gained fruitful knowledge from the lecture and the practice of how to generate income from agricultural products.

2) The aspect of creating incentives for the center development was at a high level (total average of 3.65), and, when considering each aspect, the study showed that the aspect with the highest mean was within the learning center. The second highest went to a systematic learning process, followed by the exchange of learning and helping each other, the knowledge management within the center and member encouragement, allowing them to develop themselves continuously.

3) The atmosphere during the process of making demonstration plots was found to be at a high level (total average of 3.70), and when considering each aspect, it was found that the aspect with the highest average was that this workshop motivated the learners to learn all the time. The second highest score was the encouragement to keep learners up with the content. In addition, this training was actually put into practice, and the learners could help and cooperate with one another, leading to this workshop being less time-consuming to learn. Besides, this workshop can be self-taught.

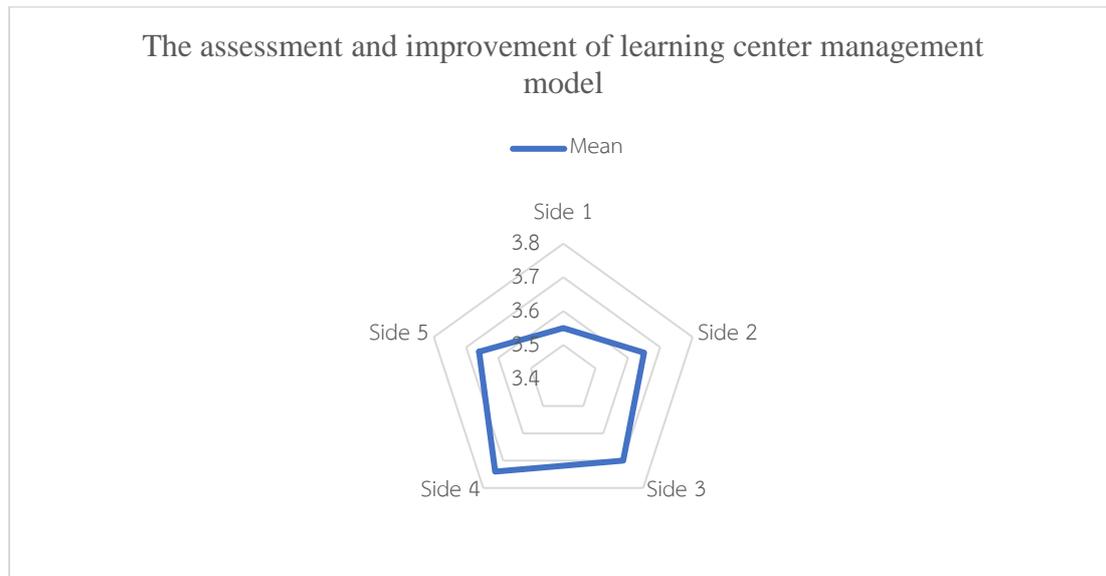
4) Activities from the demonstration plots were at a high level (total mean of 3.74), and when considering each item, it was found that in the item with the highest mean participants were satisfied that they took part in the workshop. The learning center's activities truly meet the needs of people in the community, and this training creates understanding and can be practiced on their own.

5) Resolving problems and major obstacles in the activities were shown at a high level (total average of 3.66). From the study, it was found that the physical problem was soil nutrient deficiencies and water resources were not in the vicinity. Other factors were solved, including biological factors, such as disease and insect outbreaks, and social factors, such as a lack of response to visitors, no help from any agency, and not receiving equal attention from the relevant agencies.

## **9. Conclusion**

From action research on Guidelines for Developing Learning with the Crop Rotation System for food security, a Case Study: Princess Ubolratana School, Chiang Dao Sub-district, Chiang Dao district, Chiang Mai, Thailand, it can be concluded that the need for the development of learning issues can be divided into

3 issues, namely, factors of production, learning media, and the development of practical skills and life skills.



Graph 1. Results of the Assessment and Improvement of The Learning Center Management Model

For the vegetable production plan for the crop rotation system, it is the cultivation of at least two types of plants in the same area, and the plants must be suitable for the terrain climate, so the crop rotation system can increase productivity while conserving soil and water resources. In order to accomplish this, learners have to consider appropriate plant types, varieties, and cultivation time as well as the planters or the teachers and students at Princess Ubolratana School. Consistent with (Sayan, 2004), blending crops such as cash crops (field crops) with other cash crops (forage crops) is a simple practice and increases soil fertility.

The assessment and improvement of the learning center management model was found to be at a good level, total mean of 3.66 with a total of 5 aspects, arranged in order of the greatest to the least mean, namely, activities from demonstration plots, at a high level (total mean 3.74); atmospheric in the demonstration plot, at a high level (total average 3.70); solving problem and major obstacles in the activities, at a high level (total average 3.66); the motivation for center development, at a high level (total mean 3.65); and the benefit from the demonstration plot, at a high level (total average 3.55). This is in line with Thitapat et al. (2017), saying that practical skills training activities encourage students to have knowledge. the ability to adapt to their own social conditions and lifestyle and is consistent with the (Dusdee, 2000) implementation starting from the planning of the project. Then what should be followed is the evaluation. as a guarantee of the performance of that project

## 10. Acknowledgment

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