

The Learning Center Development to Create Knowledge, Awareness and Appreciation Value of Medicinal Plants in Mahasarakham University Demonstration School (Secondary)

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Abstract

The establishment of a learning center at Mahasarakham University demonstration school (secondary) is to enhance knowledge, understanding, and volunteerism about the protection of medicinal plants. The establishment of a learning center for medicinal plants at the school involves organizing activities to cultivate species such as *Solanum trilobatum* L., *Solanum indicum* L., and *Cissus quadrangularis* L. A cohort of 40 students volunteered to engage in these activities, which were promoted through various initiatives, including training sessions on the cultivation of medicinal plants, lectures on their cultivation and applications, and study visits to the Pharmacy Faculty at Mahasarakham University to explore the production of herbal products, extraction of herbal compounds, and the manufacture of medicines and medical supplies derived from medicinal plants. The instruments employed for data collection included the knowledge assessment of medicinal plants test, the awareness and valuation of medicinal plants questionnaire, and the volunteer measurement test. The findings indicated that students exhibited the highest overall knowledge of the establishment of herbal plant learning centers in schools following their participation in the activity. The mean awareness score post-activity was significantly greater than pre-activity, with a statistical significance at the .05 level. The comparison study revealed that students' average knowledge scores post-activity significantly exceeded their pre-activity scores, with statistical significance at the .05 level. The comparative analysis of average volunteerism in organic agriculture and environmental conservation revealed that students exhibited a statistically significant increase in their volunteerism scores after participating in the activity, compared to their scores prior to participation, at the .05 level.

Keywords: medicinal plants, knowledge, awareness, volunteerism, medicinal plant conservation

1. Introduction

In recent years, the global population has continued to rise alongside the escalating challenges of global warming and climate change. These environmental changes have led to significant alterations, including mutations in microbes that cause diseases affecting both humans and animals. Novel disease outbreaks, such as COVID-19, have underscored the urgency for timely therapeutic solutions. The pandemic has prompted stakeholders to reevaluate community issues, particularly the importance of enhancing the economic resilience of rural communities to achieve self-sufficiency (Kenny, 2020).

One approach to fostering community resilience involves safeguarding health through the use of local medicinal plants. These folk remedies, which provide essential nourishment and bolster immunity, can mitigate the risk of various illnesses. According to the legal definition, herbs are medicinal substances derived from plants, animals, and minerals that undergo minimal processing, such as drying or soaking (Food and Drug Administration, 2020). These substances can include plant parts such as roots, stems, leaves, flowers, and fruits, which are often processed

into forms like powders or compressed cubes.

Although herbs are primarily associated with plant-based medical applications, minerals and animal-based remedies are also used, albeit for specific conditions. The utilization of medicinal plants dates back to the Neanderthal period (Department of the Development of Thai Traditional and Alternative Medicine, 2016), illustrating their historical significance. Therefore, the cultivation and transmission of knowledge about these plants should begin with enhancing awareness and education among students and younger generations. This approach ensures the continued recognition and valuation of medicinal plants for future applications (Kwankhao et al., 2020).

To address this need, the Mahasarakham University Demonstration School (Secondary Division) has established a Folk Botany Learning Center. In collaboration with the Medicinal Plants Project at Khok Nong Phai Forest, Mahasarakham University has identified various wild plants with distinct therapeutic properties. However, some medicinal plants with high therapeutic potential and market demand remain scarce or undiscovered.

Encouraging the cultivation of these medicinal plants in Khok Nong Phai Forest and at educational institutions such as Anchor Thai and Anchor Piphek is a viable solution. Prominent plants like tamarind (*Tripala*), horseradish, horseshoe, and diamond sangha can serve as focal points for education and awareness programs. These initiatives aim to integrate medicinal plant knowledge into the production chain, fostering a sustainable value chain and market. Establishing learning centers for economically valuable medicinal plants can promote the conservation, cultivation, and application of these resources.

The proposed Medicinal Plant Learning Center is a collaborative effort involving the Mahasarakham University Demonstration School (Secondary Division), the Faculty of Pharmacy, the Faculty of Education, the Walai Rukkhavej Research Institute, and the Faculty of Environment and Resource Sciences. This interdisciplinary approach synthesizes educational activities, creating a business model that supports the sustainable use of medicinal plants. Through these learning centers, communities can enhance their health resilience, conserve traditional knowledge, and achieve economic sustainability.

2. Literature Review

2.1 The Role of Medicinal Plants in Promoting Health Resilience

Medicinal plants have played a crucial role in healthcare systems across cultures and continue to offer essential therapeutic benefits in contemporary society. Traditional medicine, rooted in the use of medicinal plants, remains a primary healthcare source for over 80% of the global population, particularly in rural communities (World Health Organization, 2019). These plants contain bioactive compounds that can bolster immunity, improve bodily functions, and mitigate the risks of diseases, including infections and chronic illnesses (Nair et al., 2013). For instance, studies have shown that plants like *Tamarindus indica* (tamarind) and *Moringa oleifera* (horseradish) possess antioxidant, antimicrobial, and anti-inflammatory properties (Gupta et al., 2012; Singh et al., 2016).

The COVID-19 pandemic highlighted the significance of traditional knowledge and the need for natural alternatives to pharmaceutical treatments (Sasidharan et al., 2020). Local medicinal plants were often used to alleviate symptoms and boost immunity during the pandemic, prompting renewed interest in integrating traditional medicine into modern healthcare systems. Recognizing the therapeutic potential of these plants can enhance community resilience and empower rural populations to manage health challenges effectively (Kumar et al., 2021).

2.2 Education and Transmission of Medicinal Plant Knowledge

The preservation and transmission of traditional knowledge regarding medicinal plants are critical for ensuring their continued use and application. Research underscores the importance of incorporating ethnobotanical education into school curricula to foster awareness and appreciation of medicinal plants among younger generations (Rojas-Sandoval et al., 2016). By integrating learning activities centered on local flora, students can gain practical skills and knowledge about plant identification, cultivation, and therapeutic use (Zhang et al., 2018).

Programs such as folk botany learning centers serve as valuable platforms for experiential learning, where students engage directly with their natural environment and traditional practices. For example, studies in Thailand have shown that educational initiatives focusing on medicinal plants improve students' understanding of local biodiversity and promote the conservation of traditional knowledge (Chotchoungchatchai et al., 2012). These programs also enhance students' scientific literacy and critical thinking skills, which are essential for sustainable development (Lertkrai et al., 2013).

2.3 Economic and Environmental Sustainability Through Medicinal Plant Cultivation

The cultivation of medicinal plants offers significant economic and environmental benefits, particularly for rural

communities. The global market for herbal products is projected to grow substantially, driven by increasing consumer demand for natural remedies (Ekor, 2014). Encouraging the cultivation of high-demand medicinal plants, such as those found in Khok Nong Phai Forest, can create income-generating opportunities and support local economies (Sharma et al., 2015). Additionally, sustainable harvesting and cultivation practices contribute to biodiversity conservation and ecosystem health (Schippmann et al., 2002).

Community-based initiatives, such as the establishment of medicinal plant learning centers, can facilitate knowledge sharing, improve production techniques, and develop value chains for medicinal herbs (Bodeker & Ong, 2005). Collaboration between educational institutions, local communities, and governmental agencies enhances the effectiveness of these initiatives, ensuring that they align with market demands and conservation goals (Pathavi, 2018). Such programs not only promote self-sufficiency but also support cultural heritage and environmental stewardship.

3. Methodology

3.1 Population and Sample

- 1) The population were 1800 students of Mahasarakham University Demonstration School (Secondary)
- 2) The sample were volunteer 40 students of Mahasarakham University Demonstration School (Secondary) .

Instruments of Research

Relay Instruments

- 1) Promotional and Training Initiatives Propagation of therapeutic flora, application, and product innovation
- 2) Instructor in Medicinal Plant Cultivation and Utilization; Develop medicinal plant products.
- 3) Engaged in studies in the Farm Care program under the Faculty of Pharmacy at Mahasarakham University, focusing on the production of herbal goods. Extraction of compounds from herbs and the manufacture of pharmaceuticals and medical supplies derived from medicinal plants

Assessment and Evaluation Instruments

- 1) Assessment to evaluate information regarding medicinal flora and the protection of medicinal species
- 2) The questionnaire assessing awareness and appreciation of medicinal plants has a five-level rating scale: Most, Medium, Little, and Least.
- 3) Contribute to the establishment of the Medicinal Plant Learning Center. Within educational institutions

3.2 Construct and Instruments Quality

- 1) Develop a medicinal plant knowledge assessment of 30 questions, evaluate content validity, and determine the Index of Item-Objective Congruence (IOC) by expert review. The test was administered to 30 non-sample students to assess its difficulty and discriminatory potential. Subsequently, a quality test of 20 items was selected, and its reliability was assessed using the KR-20 formula, revealing a confidence level of 0.95.
- 2) Develop a questionnaire to assess awareness and value of medicinal plants. The accuracy of The questionnaire was evaluated for content validity and Index of Item-Objective Congruence (IOC) by experts, selecting items having an IOC score of 0.50 or more. The item-total correlation strength of the questionnaire was assessed using the alpha coefficient (α – Cronbach's Alpha), requiring a confidence value of .80 or above for valid utilization. The questionnaire demonstrated a confidence value of 0.89.
- 3) Develop a volunteer assessment exam. The accuracy of the volunteer measure test was assessed for content validity and the Index of Item-Objective Congruence (IOC) by experts, selecting items with an IOC value of 0.50 or more. The item-total correlation strength of the questionnaire was assessed using the alpha coefficient method (α – Cronbach Coefficient), requiring a confidence value of .80 or above for valid utilization. The volunteer measure test has a confidence score of 0.84.

3.3 Data Collection

The data was gathered in three steps as outlined below.

Phase 1

- 1) The researcher acquires information from papers, textbooks, and theories. Theoretical frameworks and empirical findings
- 2) Coordinate a focus group meeting with co-researchers and a panel of speakers to strategize the event. Facilitating training and coordinating initiatives to encourage the growth of medicinal flora. Exploitation and innovation of

medicinal flora to generate value

3) Prepare instruments for data collection and assess the quality of research tools by conducting evaluations. Provided by academic members in the discipline of Environmental Studies The Faculty of Environment and Resource Sciences, the Faculty of Education at Mahasarakham University, and specialists from the Walai Rukkhavej Research Institute at Mahasarakham University are qualified to assess and evaluate the quality of research instruments.

Phase 2

1) Enrolling students at the Mahasarakham University Demonstration School (Department of Secondary Schools) to advance and instruct in the cultivation, usage, and development of medicinal plant products.

2) Prepare the site and cultivate the plot for the planting of medicinal plants in the agricultural area of the University Demonstration Plot at Mahasarakham University Sufficiency Economy Learning Center, Khok Nong Phai Forest Area, and school vicinity.

3) Inquire about the understanding and enjoyment of medicinal plants with questionnaires and quizzes designed to assess knowledge on the subject, and implement voluntary measures before to engaging students in the activity.

Phase 3

1) Facilitate training sessions and activities focused on the cultivation of medicinal plants. Astragalus, Astragalus, and Petchsangha are the three primary types of medicinal plants designated for the formulation of medicinal goods for students involved in the project.

2) Assign activities to pupils. Planting three primary categories of medicinal plants: Angiosperms, Angiosperms, and Petch Sangha. and examine the variety of different vegetable species and medicinal flora, along with the maintenance of the ecology inside the medicinal plant plots

3) Coordinating events, conducting training, and facilitating promotion. Consciousness regarding the preservation and application of therapeutic flora Commercialization of medicinal plant products for students involved in the initiative. Study excursion at Farm Care, Faculty of Pharmacy, Mahasarakham University Research and acquire knowledge on the production of herbal items. Extraction of compounds from herbs and the manufacture of pharmaceuticals and medical supplies derived from medicinal plants

4) Assess volunteering with the volunteer measuring paradigm for the advancement of the Medicinal Plant Learning Center. Within educational institutions Inquiring about the understanding and enjoyment of medicinal plants using questionnaires and employing assessments to evaluate knowledge on medicinal plants. Subsequent to engaging in the activity

5) The researcher executed data collecting. Oversight of the growth and prospective evaluation Establishment of educational centers focused on medicinal plants inside educational institutions

3.4 Data Analysis

The researcher examined the research data in accordance with the method. as detailed below

1) The caliber of the instruments employed to assess performance

2) Examine the outcomes of medicinal plant growing and the efficacy of such cultivation practices.

3) Comparative Examination Assessment of students' understanding and enjoyment of medicinal plants before and after participation in the project, utilizing the Paired t-test.

4) Comparative Examination Assessment of knowledge on medicinal plants among students included in the project, conducted before and after participation in the activity utilizing the Paired t-test.

5) Comparative Examination Volunteering to establish a learning center for medicinal plants in schools for kids involved in the project, assessing their progress before and after participation using the Paired t-test.

6) Examine the findings of the assessment of the feasibility of establishing a learning center for medicinal plants inside the educational institution.

4. Results

The analytical results indicated that students were aware of the creation of the Medicinal Plant Learning Center in schools prior to engaging in the activity. The majority of the things are of a significantly elevated standard. Ten inquiries at the highest tier. The general awareness before to engaging in the activity was at its peak level.

Outcomes of Awareness Assessment Regarding the Establishment of Medicinal Plant Educational Centers in

Educational Institutions Upon engaging in the exercise, it was determined that the pupils have knowledge of the Nearly all things are at the highest level, with the exception of item 8, where students recognize the significance of cultivating medicinal plants and establishing a learning center for them in educational institutions. Upon engaging in the activity at the utmost level.

Table 1. Comparison of Average Awareness on the Establishment of Medicinal Plant Learning Centers in Schools before and after Participation in the Activity, Utilizing the Paired t-test

awareness	Before engaging in the event		After engaging in the event		df	t	P
	$\bar{X}$	S.D.	$\bar{X}$	S.D.			
Acceptance (n=40)	4.41	0.09	4.61	0.07	4	-3.375	0.02*
Perception (n=40)	4.46	0.11	4.54	0.11	4	-2.471	0.06
Appreciation (n=40)	4.40	0.11	4.61	0.07	4	-3.460	0.02*
combine	4.42	0.10	4.59	0.08	14	-5.124	0.01*

Note. * Statistically significant at the 0.05 level.

Table 1 shows that students who participated in the activity demonstrated increased awareness of the creation of the Medicinal Plant Learning Center at the school. In every aspect, the average score after participation exceeded the score before participation. This improvement in scores was statistically significant at the .05 level.

The comparative analysis of knowledge averages from the learning center development initiatives indicates that students' recognition and appreciation of medicinal plants at Mahasarakham University Demonstration School (Secondary Division) significantly improved after engaging in the activity.

Table 2. Comparison of Mean Knowledge Scores Prior to and after Participation in the Activity

Knowledge	Before participating in the event		Knowledge Level	After participating in the activity		Knowledge Level
	$\bar{X}$	S.D.		$\bar{X}$	S.D.	
Sample (40)	14.03	2.36	moderate	16.63	1.74	the majority

Table 2 presents a comparison of the average knowledge scores derived from the developmental activities associated with the establishment of a Learning Center to promote awareness of medicinal plants. The analysis focuses on the recognition and appreciation of medicinal plants at Mahasarakham University Demonstration School (Secondary Division) before and after student participation in these activities. The pre-participation average knowledge score was 14.03, indicating a modest level of understanding. After participating in the event, the average score increased to 16.63, representing the highest level achieved.

Table 3 shows the results of the comparative analysis of average knowledge scores related to the developmental activities designed to foster awareness and appreciation of medicinal plants. Using the Paired t-test, the analysis demonstrates a statistically significant improvement in students' awareness and understanding of medicinal plants at Mahasarakham University Demonstration School (Secondary Division).

Table 3. The results of the comparative analysis of average knowledge scores related to the developmental activities designed to foster awareness and appreciation of medicinal plants

Knowledge	Before participating in the project		After participating in the project		df	t	P
	$\bar{X}$	S.D.	$\bar{X}$	S.D.			
Sample (40)	14.03	2.36	16.63	1.74	39	-4.955	0.001*

Note. * Statistically significant at the 0.05 level.

Table 3 indicates that students who participated in the learning center creation activity demonstrated increased awareness, recognition, and appreciation of medicinal flora at Mahasarakham University Demonstration School (Secondary Division). The average knowledge scores improved significantly after engaging in activities related to medicinal plants, including the production chain, sustainable marketing, and the establishment of a medicinal plant learning center within educational institutions. The post-participation scores were statistically significantly higher compared to the pre-participation scores at the .05 level.

The analysis also compared the average levels of student volunteering in organic farming and environmental

conservation using a Paired t-test, showing a statistically significant increase in engagement and awareness after participation in the activities.

Table 4. Comparative Analysis Results of Volunteerism in Organic Agriculture and Environmental Conservation Utilizing Paired t-test

Volunteer	Before participating in the event		After participating in the activity		df	t	P
	$\bar{x}$	S.D.	$\bar{x}$	S.D.			
Sample (40)	4.22	1.90	6.00	1.33	39	-4.716	0.01*

Note. * Statistically significant at the 0.05 level.

Table 4 shows that students who participated in the learning center creation activity demonstrated increased awareness and appreciation of medicinal plants at Mahasarakham University Demonstration School (Secondary Division). The average scores for students involved in activities related to organic agriculture and environmental preservation significantly improved after participation. The post-participation results were statistically significantly higher compared to pre-participation scores, with a significance level of .05.

5. Discussions

The results of the study could be discussed in the following issues.

5.1 Initiatives for Medicinal Plant Education and Utilization

Mahasarakham University Demonstration School (Secondary Division) has undertaken an initiative to promote awareness and appreciation of medicinal plants through educational programs and community service projects. This initiative combines academic services with creative learning models to foster sustainable development in local communities. Students are introduced to the cultivation, identification, and application of medicinal plants such as *Solanum trilobatum* L., *Solanum indicum* L., and *Cissus quadrangularis* L..

Field excursions to the Faculty of Pharmacy's Farm Care facility at Mahasarakham University provide hands-on learning experiences where students engage in the extraction of compounds from herbs and the manufacture of pharmaceutical and medical products. These activities also cover marketing strategies for herbal products, thus bridging the gap between traditional knowledge and commercial enterprise. The research team has developed an online database of medicinal plants found in the Khok Hin Lat Forest and Nong Phai Khok Forest to facilitate easy information retrieval and enhance students' learning experiences. This plant biodiversity database serves as a valuable educational resource for managing biodiversity, distribution, and the status of medicinal plants via geospatial information systems.

5.2 Research and Awareness on Medicinal Plant Diversity

Research efforts have documented the diversity of plant species in Khok Nong Phai Forest. Studies identified 429 plant species across 96 families, with Leguminosae-Papilionoideae being the most prevalent, comprising 50 species. The dominant species with the highest Important Value Index (IVI) were Teng, Rang, Heung, Dang, and Gung. The Shannon-Wiener Index (H') for species diversity was 3.8377, the species diversity (D) was 46.42, and the Evenness Index (J) was 0.7390.

Students participating in these research activities freely engage in examining medicinal plant samples and learning about their botanical attributes, traditional uses, and potential applications. This is accordant with Buranarak (2008) who highlights the traditional knowledge of medicinal plants categorized into nine groups based on their therapeutic uses, such as pain management, detoxification, and diabetes management. This research not only enriches student knowledge but also fosters a deeper respect for medicinal plants and their conservation.

5.3 Impact of Learning Centers on Student Knowledge and Community Engagement

The establishment of medicinal plant learning centers has demonstrable impacts on student knowledge and community involvement. Comparative analyses using the Paired t-test have shown statistically significant improvements in students' awareness and understanding of medicinal plants after participating in educational activities. For example, students' average knowledge scores increased from 14.03 to 16.63 post-participation, with results significant at the .05 level.

Moreover, initiatives to promote volunteer engagement in plant conservation highlight the critical role of community participation. As noted by Hassan (2020), herbal plants, including commonly overlooked weeds, contain valuable phytochemicals like alkaloids, flavonoids, and phenols that are effective in treating various health

conditions. Research supports the increasing global demand for natural, cost-effective, and accessible herbal treatments, which can reduce reliance on synthetic pharmaceuticals.

Community-driven conservation efforts are essential for the long-term preservation of plant species. Public involvement, through volunteerism and educational outreach, contributes significantly to the protection of medicinal plants. According to the IUCN Species Survival Commission, over 20% of global plant species are at risk of extinction, emphasizing the need for collective action. Programs that engage the public in conservation activities have proven effective in reducing the likelihood of extinction for rare plant species and promoting sustainable environmental practices.

6. Conclusion

The establishment of learning centers at Mahasarakham University Demonstration School (Secondary Division) has effectively enhanced students' awareness, recognition, and appreciation of medicinal plants. The project activities, including theoretical instruction, practical cultivation, field excursions, and pharmaceutical production visits, resulted in significant improvements in students' knowledge. Pre- and post-participation analyses using the Paired t-test demonstrated statistically significant increases in average knowledge scores. Furthermore, students showed higher levels of engagement in organic agriculture and environmental conservation, with high satisfaction rates recorded for project implementation and outcomes. These findings highlight the success of integrating medicinal plant education into the school curriculum and community activities.

The success of this initiative suggests that incorporating medicinal plant education into school programs can contribute significantly to environmental conservation, sustainable development, and public health. By fostering early awareness and appreciation of medicinal flora, students gain valuable knowledge and skills that can be applied to real-world contexts, including sustainable agriculture, herbal medicine production, and biodiversity conservation. Additionally, this model can be replicated in other educational institutions to create a network of learning centers that promote community engagement, cultural heritage preservation, and self-sufficiency. Collaborative efforts between educational institutions, research bodies, and local communities are essential to maximize the long-term benefits of such initiatives.

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