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The Development of Integrated Instruction for Natural Resources Conservation Using Forest in Khok Phu Taka as The Learning Resource for Schools in Phu Wieng Areas

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Abstract

The aim of this research was to construct and use integrated instruction plans on the conservation of natural resources using Khok Phutaka Forest as the learning resources. The ideas of student-centered learning and cross-curriculum teaching were integrated into the construction of the desired teaching plan while the doctrine of action research (Kemmis & McTaggart, 1992) was also adopted. The research instruments include integrated instruction plans, questionnaires, focus group record forms, a tape recorder and a camera. Qualitative information was analyzed by content analysis and then reported in narrative form while quantitative data was analyzed using mean and standard deviation. The findings of the research can be summarized by the following points, 1) the basic information on Phutaka area reveals that Khok Phutaka Forest, which was once a thriving habitat for many valuable plants and animals, while continuing to the community's major food source, has suffered from extensive damages. 2) The construction of the integrated instruction plans produced (2.1) 4 study guides (small books) and one study guide which combines the trees in 4 zones into one big book; (2.2) a schematic chart of cross-curriculum teaching of 8 strands in normal curriculum using the trees in Khok Phutaka Forest as a core of integration; (2.3) The integration instruction plans of 8 strands; and (2.4) the results of field experiment of Science and Art education strands showed that the students saw the learning activity as a whole to be of good level ($\bar{X}$ = 4.42, SD = 0.70) while the teachers similarly rated the whole experience as being of good level ($\bar{X}$ = 4.49, SD = 0.54). The students also liked and enjoyed the activity.

Keywords: Integrated instruction, Learning resource, Natural resources conservation

Introduction

Khok Phutaka area, which is located at Baan Khok Sung, Phuwieng District, Khon Kaen Province, was once abundant in varieties of fauna and flora. Her Royal Highness Princess Sirindthorn, after being presented with the area by the people, was of the view that the area should be used as a site for Plant Genetics Conservation Project. Thus far, this area has not been utilized for the learning of students in nearby areas, nor has there been any development of plan to assist the teachers in using that area as a learning resource for their students. Therefore, to enable the teachers in the area to effectively raise students' awareness of the importance of the Plant Genetics Conservation Project, the researcher has developed a plan for integrated learning activities on natural resources conservation which entails placing the forest in the area of the Project at the heart of the learning activities. It was anticipated that such a plan would make the students and other participants appreciate and value the diversity of plant genetics in the area, which could in turn lead to further efforts to conserve plant genetics at a local and national level.

The planning of learning activities aimed at fostering desired characteristics of the learners requires the teachers to act as a leading figure. Accordingly, the researcher has developed the plan for integrated learning activities, which is based on using forests in Khok Phutaka area as learning resource, so that they can conduct their teaching more effectively.

Research Objectives and Methods

This research aimed to 1) develop, and implement a plan for integrated learning activities which uses Khok Phutaka forests as learning resource, and 2) study the outcome of such a plan. It adopted an 'action research' approach (Kemmis & Mctaggart, 1992) which gave particular attention to student-centered learning and cross-curriculum teaching.

Research Target Groups: there were two target groups as follows

1. Group 1: those targeted for basic data collection included

1.1 Students: 30 students from Baan Nong Bua School, Baan Muang Kao School and Baan Hin Rong School, Phuweing District, Khon Kaen Province, who participated in essay writing activities. The essay title was 'Phutaka that I know'.

1.2 Focus Group: 10 youth representatives, 7 teachers and 10 villagers from around Khok Phutaka area as well as 2 officers working for the Plant Genetics Conservation Project.

2. Group 2: those participated in field activities include

2.1 Local residents: 17 elementary school students (Prathom Suksa 5 and 6) and 6 teachers from Bann Nong Bua School, Baan Muang Kao School and Baan Hin Rong School, Phuweing District, Khon Kaen Province, 1 villager with knowledge of local plants and herbs, and 2 officers working for the Plant Genetics Conservation Project.

2.2 Those from outside the area: 10 Science Studies students and 2 researchers from Faculty of Education, Khon Kaen University.

Data Collection

In this research, both qualitative and quantitative data were collected; the qualitative data was analysed by content analysis and then reported in descriptive form, while the qualitative data was analysed through calculation of mean and standard deviation. As for research instruments, questionnaires, focus group record forms, a tape recorder and a digital camera were used. To increase the credibility of the collected data, the researcher employed the 'Triangulation' data verifying techniques of Elliot's (Elliot, 1991) to periodically collect data from co-researchers and from other participants.

Operation Plan: the research was conducted according to the following steps:

1. Study documents related to the area and the survey of the area in order to understand the nature of the forests and the condition of the schools and the nearby villages. A study on the level of knowledge and understanding of the teachers and students in the area on the Plant Genetics Conservation Project was also conducted. Information obtained from these preliminary studies was used to construct a plan for integrated learning activities.
2. Study the forest trekking routes as well as the plant varieties found on the way within the area of the Plant Genetics Conservation Project in order to designate appropriate areas for learning activities. The data obtained was then incorporated into the construction of the plan for integrated learning activities.
3. Develop 4 small guide books for the study of plant varieties in the different 4 designated areas of Khok Phutaka forest, and also a big guide book that combined all the 4 small booklets into one. These booklets only contained information of the plants which are found in the 4 designated areas.
4. Develop a schematic chart of cross-curriculum teaching of 8 normal school subjects using the trees in Khok Phutaka forest as a core of integration, and also a plan for integrated learning activities for the 8 subjects.
5. Conduct field learning activities according to the plan that has been developed in order to test its appropriateness, and take note of the opinions of the participants about the implementation of the plan in order to find limitations of the plan and room for improvement.
6. Use the opinions, observations and conclusions regarding the implementation of the plan to improve and refine the learning activities plan, so that the plan is more complete.

Research Outcomes and Discussions

Part I: Background Information on Khok Phutaka area

Information obtained during focus group discussion among the villagers, teachers, students and officers at the Khok Phutaka Operation Centre:

- **History of Khok Phutaka**

After Khok Phutaka was designated as a protected area for the conservation of plant genetics, a number of local villagers were unaware of it. This explains why some villagers still went in to cut down trees, such as ไม้เต็ง (maiteng) (Shorea obtusa Wall,

Dipterocarpaceae) ไม้รัง (mairung) (Shorea siamensis Miq., Dipterocarpaceae) ไม้แดง (maidaeng) (Xylia xylocarpa Taub., Leguminosae) and ไม้พลวง (maipluang) (Dipterocarpus tuberculatus Roxb., Dipterocarpaceae), for building purposes. In the past, valuable trees such as ไม้แดง (maidaeng) (Xylia xylocarpa Taub., Leguminosae) ไม้ประดู่ (maipradoo) (Pterocarpus, Leguminosae) ไม้เต็ง (maiteng) (Shorea obtusa Wall, Dipterocarpaceae) ไม้รัง (mairung) (Shorea siamensis Miq., Dipterocarpaceae) ไม้พลวง (maipluang) (Dipterocarpus tuberculatus Roxb.,Dipterocarpaceae) and ไม้มะค่า (maimakaa) (Afzelia xylocarpa Craib, Leguminosae) were cut down and sent to a sawmill, but the sawmill had been closed since there were just small trees left in the forests.

The villagers do not only rely on the forest as a source for wood, but also as a main source for food. The trees in the forest used to be very dense with little sunlight reaching the ground; everywhere was green and there were bird singing all around the forest. In rainy seasons, there would be various mushrooms and bamboo shoots, while, in summer, there would be vegetables in vast quantity ready to be collected by the villagers. By contrast, at present there are very few plants and animals in the area, some of which has already disappeared. The villagers spoke in once voice that they wanted to see their forests return to their rich and plentiful state like in the past again.

- **Opinions of relevant stakeholders**

Baan Khok Muang Village Headman mentioned that local leaders were informed that Khok Phutaka was designated as a Plant Genetics Conservation area, but the majority of villagers were unaware of it. He said that the villagers wanted the forests to be rich and plentiful again, and that they wanted the area to be developed into a tourist destination, which would be good for the economy of the community.

A youth representative of the local residents spoke that she used to be able to go mushroom picking 3 times a day (morning, noon and late afternoon) when she was younger, but now she could only go twice a day in the morning and the late afternoon. She wanted the forests to be like it used to be in the past, and wanted there to be a development of Khok Phutaka area into an important tourist attraction of the village; she wanted to be a guide who can show her friends and tourists around the area to see the plants and the orchids, and be able to tell them what the forest has to offer and to tell the tourist how different things from the forest can be used.

A representative of the teachers in the area stated that she wanted the students to learn about Khok Phutaka forest by organizing learning activities aimed at raising awareness among the students of the importance of the forest. She wanted there to be support and encouragement for the students to have more knowledge, understanding, interest and devotion regarding the conservation of their local natural resources. She suggested that what must be done urgently was to make people see how they could benefit from the forest; the community must find its identity and uniqueness, especially Khon Phutaka forest, perhaps by making Khok Phutaka stand out as a showcase of the community. We must also help foster a sense of responsibility we owe towards the environment in the people's mind, with an emphasis on showing the people how to sustainably and optimally use their local resources.

Students' Knowledge of Khok Phutaka

In order to find out about the basic knowledge of the elementary school students in the areas on Khok Phutaka forests, the research team organized an essay writing competition between 15-30 December B.E. 2548 (2005). The essay title was 'Khok Phutaka that I know' and there were 30 submissions from Prathom Suksa 5 - 6 students of Baan Nong Bua School, Bann Muang Kao School and Bann Hin Rong School, Phuwieng District, Khon Kaen provice.

An overall analysis and assessment of the student's creativity shows that there was a divergence of account of the history of Khok Phutaka, especially with regards to the origin of the name 'Khok Phutaka'. The students gathered information by asking their fathers, mothers, grandmothers and grandfathers, and it was clear that people living around Khok Phutaka area has different believes of the history of the name 'Khok Phutaka'. The students' essays also revealed that they knew very little about the different types of trees in the area. Nevertheless, many students wanted to see Khok Phutaka forest become a rich and plentiful forest in the future; they want to use the forest as a main source of food for the community, as well as to develop the area into a tourist destination of the community.

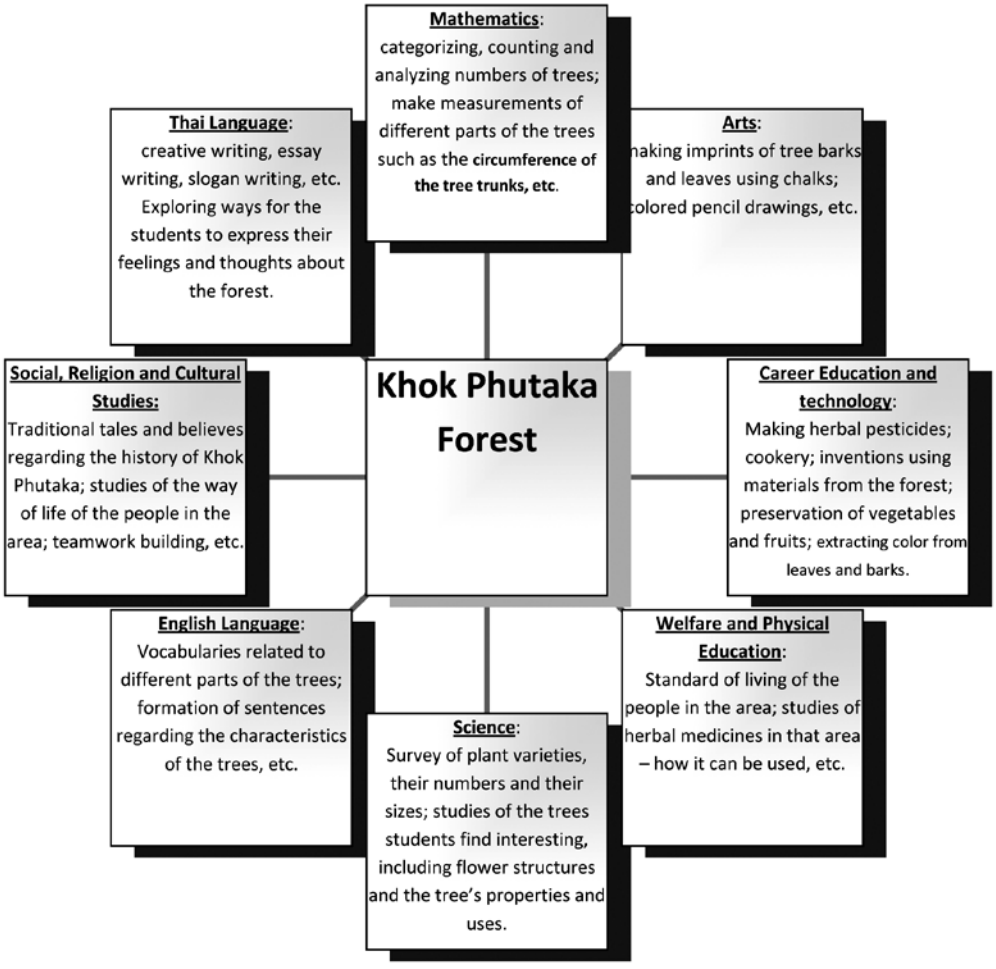
Part 2: Developing guide books for the study of plant varieties, a schematic chart of cross-curriculum teaching and a plan for integrated learning activities

2.1 ***Guide books for the study of plant varieties***

In order to make guide books for the study of plant varieties, the researcher team first did a survey of the area together with a local expert in herbal medicines, after which there was a designation of 4 different learning spots along the trekking routes in Khok Phutaka forest. Subsequently, the researcher and his team worked on compiling names, pictures and information on the characteristics and properties of the plants found in those four learning spots into one big guide book. To make the information more accessible to students participating in the learning activities, 4 smaller guide books has been created, with each containing information of the plant varieties found in the 4 corresponding learning spots. During the field learning activities, each student would only be given the small guide book that is tailored to that particular learning spot, while the big guide book was readily available for those who were interested in learning more about the plants in other area.

2.2 *A schematic chart of cross-curriculum teaching and a plan for integrated learning activities*

The following diagramme has been developed and used in this research; it shows 8 normal school subjects (Science, Mathematics, Thai Language, English Language, Social Studies, Arts, Welfare Studies and Career Education) being formulated in such a way that uses Khok Phutaka as key learning resource.



Part 3: Outcome of test-implementation of the plan for integrated learning activities

Assessment of the outcome of the test-implementation of the plan was done in two ways – 1) through questionnaires that allow students and teachers who participated in the learning activities to express their opinions and 2) through group discussion at the end of the field learning activities. Once the field implementation was completed, the research team convened a meeting among themselves to reflect on the outcome of all activities, which can be summarized as follows:

- **Students' Opinions**

All students were in the second tier of elementary education (Prathom Susan 4 - 6), 13 of which were female and 4 were male. They came from 3 schools which are Baan Nong Bua School, Baan Muang Kao School and Baan Hin Rong School, Wieng Kao Sub-District, Phuweing District, Khon Kaen Province. Overall, the students were of the view that the integrated learning activites are at a 'Good' level ($\bar{X}$ = 4.24). More specifically, the students' was at a 'Very Good' level in 6 areas, which are 1) "chosen places for the learning activities were suitable" ($\bar{X}$ = 4.82), 2) "speakers clearly delivered information"

($\bar{X}$ = 4.76), 3) "students have better knowledge of plant varieties in Khok Phutaka" ($\bar{X}$ = 4.64), 4) "the learning activities had clear objectives" ($\bar{X}$ = 4.64), 5) "students had fully participated in the learning activities" ($\bar{X}$ = 4.64) and 6) "students enjoyed the learning activities" ($\bar{X}$ = 4.64).

• **Teachers' opinions**

All 6 teachers who participated were female and they taught classes of Prathom Suksa 4 – 6. In general, teachers were of the view that the learning activities were at a 'Good' level, with 8 specific areas being rated 'Very Good' – 1) "students had fully participated in the learning activities" ($\bar{X}$ = 5.00), 2) "Students enjoyed the learning activities" ($\bar{X}$ = 5.00), 3) "the contents of the activities were suitable for the students" ($\bar{X}$ = 4.80), 4) "the equipments used in the activities were suitable" ($\bar{X}$ = 4.80), 5) "Documents at the survey sites were suitable" ($\bar{X}$ = 4.60), 6) "chosen places for the learning activities were suitable" ($\bar{X}$ = 4.60), 7) "students have better knowledge of plant varieties in Khok Phutaka" ($\bar{X}$ = 4.60), and 8) "speakers clearly delivered information" ($\bar{X}$ = 4.60).

• **Post-implementation group discussion**

Students' opinion: most students were excited to participate in the learning activities in Khok Phutaka, especially during the survey of plant varieties within the designated areas. They said that the activities had raised their awareness of the names, the characteristics and the uses of the plants in the areas. Many said that the weather was very hot during the activities and some plants did not have enough leaves which made it very difficult for them to observe and distinguish different varieties of plants. This meant that some students could not finish the survey of the area in time. However, despite the short amount of time left for drawing of trees in the afternoon, every student said that they liked the drawing session because they could sit down and relax and they got to choose their own plant to draw. They also liked the drawing session because they could carefully and thoroughly examine the plants. They enjoyed presenting their drawing as well as seeing their friends' work when the students' drawings were put up in an exhibition. The students expressed their feeling that they wanted the teachers to organize learning activities like the one they just participated.

Teachers' opinion: the teachers were of the view that the learning activities were good because changing the learning environment from inside classroom to the actual forest made the students very interested and willing to learn. However, they thought that there could be more activities related to more school subjects given that this was a whole-day event, rather than just Science and Arts. The teachers were unsure if they can build on the plan by themselves in the future; they were uncertain how the results from these learning activities could be used and adapted for the teaching of other school subjects.

Opinion of the research team: the team found that, despite the hot weather, during the survey of plant varieties the students were very excited and interested in the activities. It was found that

1) some group of students still lacked basic skills needed for the measurement of the circumference of the tree trunks, which meant that the support team had to intervene to give them necessary advices and help, causing delays,

2) Most students could not distinguish between different varieties of plants in the designated area, because the guide books contain primarily information and picture of the leaves of the plants and, at the time the activities were organized, the plants did not have many leaves, or had only very young leaves. As a result, the students were not able to name or count the number of the different varieties of plants in the areas, which means that the information obtained by the students was not as complete as it should be.

3) With regards to the colored pencil drawing session, most students did very well. Since they could choose their own drawing subject, the students could fully express their creativity and imagination. It was observed that some students took a long time to decide on what they want to draw, while most students took relatively quickly to choose. It was interesting to see that those who took a long time to choose their drawing object produced better art work than those who chose their drawing object quickly.

Discussion of the Research Outcome

The integrated learning activities developed under this research attach great importance to the students. The results of the activities have shown that the students were very happy with learning and could learn about the varieties of plants in Khok Phutaka forests well. Overall, the opinions of the students and the teachers were at a 'Good' level, which demonstrates the benefits and advantages of student-centered learning activities. This conclusion corresponds with what many researchers have found that an integrated, student-centered teaching approach is conducive to student's happiness and enjoyment in the learning, thereby raising their learning capacity.(Ra-ngubtuke,1999; Chulasuksakoon, 2002; Dankaew, 2002; Chaiyawongwat, 2003; Somabutr, 2003; Karin, 2003; Saereekatakoon, 2004; Tangprasert, 2004; Phichaikam, 2005; Hully, 1999).

- **Study of the results of post-implementation group discussion**

As mentioned earlier, many students said that the hot weather greatly affected the learning activities. This shows that any outdoor activities, whereby students had to go do survey in the forests, should not be organized in summer. Therefore, if possible, the teacher should pick a better time or season to carry out the activities.

The research team found out that some students lacked necessary measurement and observation skills, which hindered their ability to collect and analyse relevant information. For this reason, before participating in the field activities, the students should be tested for their basic skills first, and, where necessary, provide basic skills trainings for the students.

During the activities, it was evident that some groups of students could not distinguish one type of plants from another. This was because the time when the learning activities were organized was the same period when the trees shed their leaves, and also because the guide books for the study of plant varieties did not contain sufficient information on the characteristics of the tree trucks. To solve this problem, the researcher believes that information on the characteristics of the stems and trucks of the plants should be added to the guide book to assist the students in distinguishing one plant from another. Although there were scientific name plates fixed to some tree trucks, they were not enough because those plates did not tell the students how to distinguish one tree from another.

Therefore, in order to avoid unnecessary delays in the activities, in addition to fixing one scientific name plate for each important tree in the designated areas, there should also be name tags (just the name) attached to all the trees within the designated learning areas (the area is 10 x 10 metres).

There was a suggestion by some teachers that there should be more activities under more school subjects within a day of learning activities. Unfortunately, that might not be viable in practice because of the time constraints and limitations of being outdoors. This is particularly true when one considers that students must be at the centre of integrated learning activities; attention must be given to the capabilities of the students; the activities must be enjoyable and must not push the students into doing too many activities. It should be noted, however, that the teachers can apply what they learn from the implementation of the plan for integrated learning activities in this research to the teaching of other school subjects. Indeed, the researcher has already developed plans for integrated learning activities for all subjects.

The researcher is fully aware that the guide books for the study of plant varieties that were developed in this research are far from complete. The researcher is not an expert in plant varieties and there was not enough time to wait for the publication of the comprehensive book on plants in Khok Phutaka which was then being made by a group of experts. For this reason, the researcher and his team had to create guide books from scratch using information obtained from the visits to Khok Phutaka forest with local experts, from books, related documents, and from the internet on plant varieties in Thailand.

Recommendations

Field survey of plant varieties in the forest should be conducted during a period of relatively cool weather, and should correspond with the period when the trees have fully grown leaves, preferably with flowers and fruits, so that the students can identify different types of plants more easily.

Prior to the field activities, the teachers must make sure that the students have necessary skills and knowledge for the completion of the activities; appropriate training should be provided if necessary.

For optimal results, these integrated learning activities should be adapted and applied to all strands of school subjects, not just in Science and Arts, to enable the students to understand the 'big picture' more clearly.

The guide books for the study of plant varieties used in the learning activities should contain more detailed information on the plants. The comprehensive book on plants in Khok Phutaka compiled by a group of experts has already been published, the information in which should be used to improve and update the guide books developed in this research.
What we get from this research

A developed plan for student-centered, integrated learning activities which use local forests as a learning resource. This plan can be used as guidance for the development of teaching plans in other types of learning resources.

Teachers, students and villagers have better understanding and appreciation of the importance of the forest in the area of Plant Genetics Conservation Project. This

understanding and appreciation can lead to more willingness of local people in the community to cooperate in conserving natural resources in other areas of their community.

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