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AN APPLICATION OF PARTICIPATORY LEARNING PROGRAM TO *AEDES AEGYPTI* LARVAE CONTROL AMONG SIXTH GRADE STUDENTS IN MUANG DISTRICT, NONTHABURI PROVINCE

JARUNEE CHAICHARNCHEEP

อภินันทนาการ
จาก
บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล

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Jarunee Chaicharncheep
.....
Mrs. Jarunee chaicharncheep
Candidate

Nirat Imamee
.....
Assoc.prof. Nirat Imamee,
M.P.H.,Ph..D.
Major - Advisor

Roongrote Poomriew
.....
Assoc.prof. Roongrote poomriew,
M.P.H., Ph.D.
Co-advisor

Pacheun
.....
Assoc.prof. Oranut Pacheun,
Dr.P.H.
Co-advisor

Thavaj Chayaniyayodhin
.....
Thavaj Chayaniyayothin,
D.P.H., D.T.M. & H. (London)
Co-advisor

.....
Prof. Liangchai Limlomwongse,
Ph.D.
Dean
Faculty of Graduate Studies

Vason Silpasuwan
.....
Assoc. Prof. Vason Silpasuwan, Dr.P.H.
Chairman
Master of Science (Public Health)
Major in Health Education and
Behavioral sciences,
Faculty of Public Health

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Thesis

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was submitted to the Faculty of Graduate Studies, Mahidol University

for the degree of Master of Science (Public Health)

On

April 18, 2001

Jarunee Chaicharncheep.
.....
Mrs. Jarunee chaicharncheep
Candidate

Nirat Imamee
.....
Assoc.Prof. Nirat Imamee,
M.P.H., Ph.D.
Chairman

Roongrote Poomriew
.....
Assoc.Prof. Roongrote poomriew,
M.P.H., Ph.D.
Member

O Pacheun
.....
Assoc.prof. Oranut Pacheun,
Dr.P.H.
Member

P. Dangsupa.
.....
Prayadh Dangsupa,
M.Sc.(Tropmed) , D.A.P.
Member

Thavaj Chayaniyayothin.
.....
Thavaj Chayaniyayothin,
D.P.H., D.T.M. & H. (London)
Member

Liangchai Limlomwongse
.....
Prof. Liangchai Limlomwongse,
Ph.D.
Dean
Faculty of Graduate Studies
Mahidol University

Kanda Vathanophas
.....
Assoc. Prof. Kanda Vathanophas,
M.D., M.Sc. in Hygiene
(P.H. Microbiology)
Dean
Faculty of Public Health
Mahidol University

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Jarunee Chaicharncheep

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4236364 PHPH/M : MAJOR : HEALTH EDUCATION AND BEHAVIORAL SCIENCES; M.Sc. (PUBLIC HEALTH)
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JARUNEE CHAICHARNCHEEP : AN APPLICATION OF PARTICIPATORY LEARNING PROGRAM TO *AEDES AEGYPTI* LARVAE CONTROL AMONG SIXTH GRADE STUDENTS IN MUANG DISTRICT, NONTHABURI PROVINCE. THESIS ADVISORS : NIRAT IMAMEE, M.P.H., Ph.D, ROONGROTE POOMRIEW, M.P.H., Ph.D., ORANUT PACHEUN, Dr.P.H., THAVAJ CHAYANIYAYOTHIN, D.P.H., D.T.M & H.(LONDON) M.A. 104 p., ISBN 974-665-679-1

Dengue Haemorrhagic Fever is presently a major public health problem. Primary school students were the highest risk group, due to improper preventive health practices, especially for *Aedes aegypti* larvae control. This study was a quasi-experimental research focusing on the effectiveness of the participatory learning program for *Aedes aegypti* larvae control among sixth grade students. The sample was 74 students in Nonthaburi province who were divided into two groups : 35 students in the experimental group and 39 students in the comparison group. The experimental group participated in a health education program for 8 weeks. The program included various activities such as : lectures with video, slides, posters, leaflets, chart, group discussion, brain storming, demonstrations and skill practice in controlling. Data was collected through questionnaires and survey forms both before and after the experiment. Statistical methods used for analysis included percentage, arithmetics mean, standard deviation, student's t-test and paired sample t-test.

The results of this study showed that after the program, the experimental group had higher knowledge of Dengue Haemorrhagic Fever and *Aedes aegypti* mosquitoes, more highly perceived severity, perceived susceptibility of Dengue Haemorrhagic Fever than before and than that of the comparison group. This difference was statistically significant at p-value < 0.05. The perceived benefit of larvae control was also higher than before experiment within the experimental group but not at statistically significant level. In adition, the percieved benefit of larvae control was higher in the experimental group than in the comparison group but not at a statistically significant level.There was a statistically significant difference (p-value <0.05) in the proportion of infested houses among the sample houses surveyed (H.I.) before and after the program. In conclusion, the health education program applying participatory learning for *Aedes aegypti* larvae control improved preventive behavior for *Aedes aegypti* control in experimental group. Thus this program should be applied to leading and learning activities. The social support by the parents, the teachers or health officers should be added in the program.

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4236364 PHPH/ M : สาขาวิชาเอก : สุขศึกษาและพฤติกรรมศาสตร์ ; วท.ม. (สาธารณสุขศาสตร์)

จารุณี ชัยชาญชีพ : การประยุกต์การเรียนรู้แบบมีส่วนร่วมในการควบคุมลูกน้ำยุงลายในชุมชน ของนักเรียนชั้นประถมศึกษาปีที่ 6 อำเภอเมือง จังหวัดนนทบุรี (AN APPLICATION OF THE PARTICIPATORY LEARNING PROGRAM TO *AEDES AEGYPTI* LARVAE CONTROL AMONG SIXTH GRADE STUDENTS IN MUANG DISTRICT, NONTHABURI PROVINCE). คณะกรรมการควบคุมวิทยานิพนธ์ : นิรัตน์ อิมามี, M.P.H., Ph.D., รุ่งโรจน์ พุ่มริ้ว, M.P.H., Ph.D., อรนุช ภาชื่น ,Dr.,P.H., ธวัช จายนียโยธิน D.P.H., D.T.M & H.(LONDON) 104 หน้า, ISBN 974-665-679-1

ไข้เลือดออกเป็นโรคติดเชื้อที่เป็นปัญหาสาธารณสุขที่สำคัญของประเทศไทย ซึ่งพบว่า เด็กวัยเรียนชั้นประถมศึกษาเป็นวัยที่อยู่ในกลุ่มเสี่ยงต่อการเกิดโรคไข้เลือดออกมากที่สุด เนื่องจากพฤติกรรมที่ไม่ถูกต้องของนักเรียน โดยเฉพาะอย่างยิ่งพฤติกรรมควบคุมลูกน้ำยุงลาย การวิจัยครั้งนี้เป็นการวิจัยกึ่งทดลอง มีวัตถุประสงค์เพื่อศึกษาประสิทธิผลของโปรแกรมสุขศึกษาการประยุกต์การเรียนรู้แบบมีส่วนร่วม ในการควบคุมลูกน้ำยุงลายมาเป็นแนวทางในการกำหนดกิจกรรม กลุ่มตัวอย่างเป็นนักเรียนชั้นประถมศึกษาปีที่ 6 ในจังหวัดนนทบุรี จำนวน 74 คน แบ่งเป็นกลุ่มทดลอง จำนวน 35 คน กลุ่มเปรียบเทียบจำนวน 39 คน โดยจัดกิจกรรมสุขศึกษาให้กับกลุ่มทดลองที่กำหนดไว้ 8 สัปดาห์ ประกอบด้วย การบรรยายประกอบสไลด์ เทปวีดิทัศน์ ภาพโปสเตอร์ แผ่นพับ แผนภูมิ การอภิปรายกลุ่ม การระดมสมอง การสาธิต การฝึกปฏิบัติ การควบคุมกำกับการฝึกปฏิบัติ รวบรวมข้อมูลโดยใช้แบบสอบถามและแบบสำรวจก่อนและหลังการทดลอง แล้วนำมาวิเคราะห์ด้วยสถิติ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน Student's t-test และ Paired sample t-test

ผลการวิจัย พบว่า ภายหลังการทดลอง กลุ่มทดลองมีความรู้เรื่องโรคไข้เลือดออกและยุงลาย การรับรู้ความรุนแรงและโอกาสเสี่ยงต่อการป่วยเป็นโรคไข้เลือดออกมากกว่าก่อนการทดลองและมากกว่ากลุ่มเปรียบเทียบอย่างมีนัยสำคัญทางสถิติ การรับรู้ประโยชน์ของการควบคุมลูกน้ำยุงลายมากกว่าก่อนการทดลองแต่ไม่มากกว่ากลุ่มเปรียบเทียบอย่างมีนัยสำคัญทางสถิติ ค่าดัชนีร้อยละของบ้านที่สำรวจพบลูกน้ำยุงลาย (H.I.) ลดลงกว่าก่อนการทดลองและลดลงมากกว่ากลุ่มเปรียบเทียบ แต่ไม่พบว่าแตกต่างกันอย่างมีนัยสำคัญทางสถิติ และเมื่อนำค่าส่วนต่างของสัดส่วนบ้านที่สำรวจพบลูกน้ำยุงลายกับบ้านที่สำรวจลูกน้ำยุงลายทั้งหมดทดสอบทางสถิติ พบว่า มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ จากผลการวิจัย แสดงว่าการจัดโปรแกรมสุขศึกษาโดยประยุกต์การเรียนรู้แบบมีส่วนร่วมในการควบคุมลูกน้ำยุงลาย มีประสิทธิภาพทำให้เกิดการเปลี่ยนแปลงพฤติกรรมในการควบคุมและกำจัดแหล่งเพาะพันธุ์ลูกน้ำยุงลายในกลุ่มทดลองได้ ซึ่งสามารถนำไปสอดแทรกในกิจกรรมการเรียนการสอนให้กับนักเรียน เพื่อให้เกิดพฤติกรรมการควบคุมและกำจัดแหล่งเพาะพันธุ์ลูกน้ำยุงลายและควรเพิ่มแรงสนับสนุนจากครูผู้ปกครองหรือเจ้าหน้าที่สาธารณสุขเข้าไปด้วย

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CHAPTER I

INTRODUCTION

Background and Significant of the Study

The evidence of Dengue Haemorrhagic Fever (DHF) has been occurred in Thailand more than forty years. The first epidemic outbreak was recorded in 1958 (Department of Communicable Diseases Control, 1998 : 1, Dangsupa, P.; 1999 : 1, Nimmanittaya, S.; 1997: 1). Up until now, the Dengue Haemorrhagic Fever has been considered as one of a major health problems of the country for over four decades. In 1998, which was the first year of the 5th decade, there were 120,000 reported cases with 400 deaths. The morbidity rate was increasing to 213.66 per 100,000 population (Pantana, S.; 2000 : 8). About 70 to 75 per cent of the morbidity rate occurred among the age group of 5-14 years. This rate was three to four times higher than the rate found in other age groups (Division of Epidemiology : 1997).

As mentioned above that the highest infected cases with dengue haemorrhagic fever cases was among the age 5-14 years. This resulted in a large number of illness and death among the school children each year (Division of General Communicable Diseases, 1998 : 6). Each episode of the disease will bring out suffering which in turn affect the physical and mental development as well as the learning outcome of the children. The children could not come to school while they

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are sick (Department of Communicable Diseases Control, 1996 : 4). Moreover, the disease will affect the children's family in terms of nervousness and the expenditures for medical care. The losses are invaluable especially in cases of deaths. They will have impact on social and the economic development of the nation in the future

Nonthaburi province, one of the outskirts of Bangkok, has been facing the continuous epidemic of Dengue Haemorrhagic Fever from 1992 to1999. The case fatality rate particularly in 1994, 1997, and 1998 were 0.32, 0.23, and 0.17 per cent respectively. In 1999, there were 584 infected cases, with the morbidity rate of 71.53 per 100,000 population, and the mortality rate of 171.23 per 100,000 population, this rate is higher than the maximum criteria of not more than 50 per 100,000 population, (Nonthaburi Provincial Health Office, 2000 : 3). Among districts of Nonthaburi, Muang district had the highest incidence of the Dengue Haemorrhagic Fever. From 1997 to 1999 the morbidity rate of the Dengue Haemorrhagic Fever in Muang were 273.22, 258.09, and 105.66 per 100,000 population respectively. In 1999, the case fatality rate was 0.30 per cent. In 2000, from January to June, the accumulating number of cases of the Dengue Haemorrhagic Fever in Nonthaburi Province was 55, which was equal to 6.61 per 100,000 population. The Muang district had the highest number of cases and the highest morbidity rate, 37 cases or 10.93 per 100,000 population (Nonthaburi Provincial Health Office, 2000 (Jul) : 1-2). Furthermore, the cases were among the age group of 5-14 years which was about 75 per cent of the total Dengue Haemorrhagic Fever cases (Nonthaburi Provincial Health Office, 2000 : 1-5).

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Tambon Bangsrimuang, the sub-district located in Muang District, reported the continuous Dengue Haemorrhagic Fever incidence especially in the past five years (1995-1999). Each year, there were 6, 4, 37, 13, and 8 cases of dengue haemorrhagic fever patients, with the morbidity rate of 30, 20, 185, 65, and 40 per 100,000 population. (Nonthaburi Provincial Health Office, 2000 , Bangsrimuang Health Center,2000) In the year 2000 (January - June), there were 3 cases of Dengue Haemorrhagic Fever patients with the morbidity rate of 15.02 per 100,000 population. The *Aedes aegypti* larvae survey conducted in schools in July 2000 found that the Breteau Index (BI) was 148, criteria of not more than 50, and the percentage of infested containers or Container Index (CI) was 36.03, criteria of not more than 10.

Schools are educational institutions which students from each household of the community are educated by prescribed teaching-learning system or by the same schooling system. At present, the reformation of the educational system is emphasized on student-center learning. The participatory learning from student's experiences will be emphasized. (Ra-nguptook,W.1999:7)Thus, the integration of preventing dengue haemorrhagic fever and controlling of mosquito larvae into the teaching-learning process will enhance the students to be aware of the Dengue Haemorrhagic Fever problems and to improve their Dengue Haemorrhagic Fever prevention and control behaviors. Hopefully such behaviors should be transferred to their homes. Households are the most important community units in controlling the *Aedes aegypti* larvae. There for the researcher was interested in doing the study on the application of the participatory learning program for A*edes aegypti* larvae control by the students.

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In order to design proper health education intervention for this study, primary data were collected from 7 grade five students of Wat Puttiprangpramote school through focus group interview. school administrators and school health teachers were also interviewed. School health environmental was observed. Three key elements of PRECEDE Framework proposed by Lawrence W. Green were used to construct the interviewing questionnaire (Green, et al 1980:68 – 76).

The primary data revealed as follows: for **predisposing factors,** about 43 percent of the students indicated that they were not susceptible to the Dengue Haemorrhagic Fever because none of their family members, neighbors and school friends was infected with Dengue Haemorrhagic Fever. About 57 per cent of them knew that Dengue Haemorrhagic Fever could be re-infected. Seventy one per cent thought that dengue mosquito usually bites only during the day time. About 86 per cent thought that the *Aedes aegypti* larvae could be found, in the mosquito breeding places, only in rainy season. All sample students mentioned that, they could not do the A*edes aegypti* larvae survey, unless their teachers or the public health officers brought the larvae survey form for them to do so. Most of the students used to pouring out the water from the containers, in case the *Aedes aegypti* larvae were found.

Regarding the **enabling factors,** it was found that the kindergarten bedroom was installed with mosquito net but the bedroom doors were occasionally and frequently opened according to the children running in and out. There was water in school building drainage. There were growing-grasses in some areas. The rainwater

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could be taped in these areas especially in the hole ground. There were piles of discarded used woods and wrecked chairs. Water storage cement in the bathroom had no draining hole and there was not enough sun light. The study area is a municipal area with semi urban and semi-agricultural. Many rented houses or townhouses used jars to store water. The control of mosquito larvae could not be done in some of these houses because they were closed. There were trashes with water on surrounding areas of the houses. Such conditions observed were good breeding places for the *Aedes aegypti* mosquitoes.

For the **reinforcing factor**, most of the students received the Dengue Haemorrhagic Fever information from their teachers, and from public health officers as well as from Dengue Haemorrhagic Fever leaflets. In the past, there was Dengue Haemorrhagic Fever campaign and exhibition. The students were trained to survey the mosquito larvae at home and were though to use abate sand to control the larva. A larva survey recorded form was used for this training.

From the above data, it could be summarized that most of the students could be able to recall essential knowledge about the Dengue Haemorrhagic Fever. They had unfavorable perception on the Dengue Haemorrhagic Fever prevention and control. They though that the infection of the Dengue Haemorrhagic Fever was quite far away from them. They had never seen any real infected case before. Therefore, their perception should be reoriented, otherwise they still have high risk of Dengue Haemorrhagic Fever infection. Moreover the B.I. and the C.I. was higher than the acceptable standard. The level of such B.I. and C.I. reflected the risk of the Dengue

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Haemorrhagic Fever endemic in that area. Hence, it is essential to control and destroy the mosquito breeding places before the Dengue Haemorrhagic Fever endemic be developed to the Dengue Haemorrhagic Fever outbreak. So it was justified to develop a health education program, for grade 6 students of Wat Puttiprangpramote, to control and destroy *Aedes aegypti* mosquito breeding places. The 6th grade level is the highest level of this primary school. The students at this level could be trained to be student health volunteer. Their physical and mental ability are quite developed. They are also actively involved in various kinds of school activities. They can understand rules and regulations along with can think reasonably in problem solving. They can learn to cooperate in teaching learning process because they can better comprehend on content in the lesson plan. They also have more conceptual thinking about their environment and can explain such concepts. (Kowtrakul, S.; 1994 : 63-65). Thus, if learning and teaching lessons about the Dengue Haemorrhagic Fever are planned and developed for students to have knowledge, perceptions and skills to control and destroying *Aedes aegypti* mosquito breeding places, hopefully they can be leaders in controlling of the breeding places in the community. (Department of Communicable Diseases Control,1996:6-7)

Participatory learning is an effective training method. It helps trainees for continuous development on health knowledge, attitudes and skills (Department of Mental Health, 2000:8-9, Ministry of Public Health, 2000:6). The participatory learning program emphasizes on active teaching–learning activities. More involvement from the learners is desired. Therefore the main teaching-learning activities which frequently be used are group dialogue in sharing of the learners'

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knowledge and opinion. The learner's problems will be used to analyze the causes of the problem. Then alternative solutions will be considered before the appropriate strategies or methods can be developed to solve the problems (Ra-nguptook,W.1999:42)As mention earlier that, if the students have enough essential knowledge about the Dengue Haemorrhagic Fever, favorable perceptions and skill in controlling *Aedes aegypti* larvae, hopefully it will have impact on the implementation of the Dengue Haemorrhagic Fever prevention and control program in the student's house. Thus the participatory learning approach was applied to design program activities as well as the conceptual framework of the study. The program aimed mainly at the student's improvement of *Aedes* mosquito larvae control practices. The students then can transfer their direct experiences, how to control *Aedes aegypti* mosquito larva, back home. This approach will decrease the density of *Aedes* mosquito, which in turn will decrease the incidence of the Dengue Haemorrhagic Fever.

Research Problem

Whether the participatory learning programs approach will enable the sample students to improve either their practices in controlling or destroying of the *Aedes aegypti* mosquito breeding places as well as the mosquito larvae or not?

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Objectives of the Study

General Objective

To assess the effectiveness of health education program based on the participatory learning concepts, on behavioral change of grade 6 students in Muang district, Nonthaburi regarding the *Aedes aegypti* larvae control

Specific Objectives

1. To study behavioral change of the students, after participated in the participatory learning program activities, in the following aspects: -
    1.1 Knowledge of Dengue Haemorrhagic Fever and *Aedes aegypti* larvae control.
    1.2 Perceived susceptibility of Dengue Haemorrhagic Fever.
    1.3 Perceived severity of Dengue Haemorrhagic Fever infection.
    1.4 Perceived benefit in controlling or destroying of the *Aedes aegypti* mosquito breeding places and the *Aedes aegypti* larvae
2. To assess the House Index of the students' households (houses which the *Aedes aegypti* mosquito larvae are found).

Research Hypothesis

1. After the participation of the study program, the students will gain more positive behaviors on the following: -

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1.1 Knowledge of Dengue Haemorrhagic Fever and *Aedes aegypti* larvae control.

1.2 Perceived susceptibility of Dengue Haemorrhagic Fever.

1.3 Perceived severity of Dengue Haemorrhagic Fever infection.

1.4 Perceived benefit in controlling or destroying of the *Aedes aegypti* mosquito breeding places and the *Aedes Aegypti* larvae

2. After program implementation, the House Index of the experimental group will be decreased.

Study Variables

1. **Independent variable or the study intervention** was the program activities based on participatory learning concepts. The program basically consisted of teaching-learning activities related to the essential knowledge, the perception on susceptibility and severity about Dengue Haemorrhagic Fever. Basic skills for surveying *Aedes aegypti* larvae from various breeding places were practiced. Major health education methods namely lecture case study, demonstration and practices, brainstorming and sharing experience through group discussion were used. Health education materials about the Dengue Haemorrhagic Fever, life –cycle of *Aedes aegypti* mosquito, how to control *Aedes aegypti* larvae and to destroy mosquito breeding places were used They were slides, posters, exhibition kid, hand book,chart and brochure.

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2. Dependent variables

2.1 Knowledge of Dengue Haemorrhagic Fever and *Aedes aegypti* larvae control.

2.2 Perceived susceptibility of Dengue Haemorrhagic Fever

2.3 Perceived severity of Dengue Haemorrhagic Fever infection.

2.4 Perceived benefit in controlling or destroying of the *Aedes aegypti* mosquito breeding places and the *Aedes aegypti* larvae.

2.5 House Index of the students's houses

Scope of the study

The sample of this study was the selected 6 grade students who attending two primary schools in Maung District Educational Office, Nonthaburi province .They were assigned into two groups, the experimental group was Watputtiprangpramote school. The comparison group was Choomchonwatsmorakote school. The period of study was covered from September to December 2000

Assumption of the study

Beside the study intervention, health information and routine activities about the Dengue Haemorrhagic Fever and the *Aedes aegypti* larvae control could not be controlled. The behavioral changes on *Aedes aegypti* larvae control was reflected and measured by the House Index.

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Definition of Term

1. Participatory learning program refers to the training program that emphasizes the trainees as the center in designing training activities. In this study, the trainees are grade 6 students. The program is designed according to two basic learning principles, the experiential-learning and learning through group process. The experiential-learning comprises of 4 components, the experience, the reflection and discussion, the understanding and conceptualization and the experimentation or the application. The learning through group process will enhance maximum learning, participation and performance of the students. The maximum performance, in this case, is the effectiveness of changing behavior regarding knowledge about the Dengue Haemorrhagic Fever and *Aedes aegypti* larvae control. The perception on susceptibility to the Dengue Haemorrhagic Fever, severity from infection of the Dengue Haemorrhagic Fever and benefit of *Aedes aegypti* larvae control or destroying of *Aedes aegypti* breeding places

2. The effectiveness of participatory learning program refers to changing occurs after the grade 6 students of the experimental group go through the learning program activities. Such changes include knowledge about the Dengue Haemorrhagic Fever and *Aedes aegypti* larvae control; the perception on susceptibility to the Dengue Haemorrhagic Fever; severity from infection of the Dengue Haemorrhagic Fever; benefit of *Aedes aegypti* larvae control or destroying of *Aedes aegypti* breeding places

3. The knowledge of the Dengue Haemorrhagic Fever and the *Aedes aegypti* larvae control refers to the ability of grade 6 students to explain about the

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causes, mode of transmission, symptoms, treatment and prevention of the Dengue Haemorrhagic Fever. The knowledge will be measured by structured questionnaire developed by the researcher

4. Perceived susceptibility refers to the perception of grade 6 students that themselves, their family and community members are susceptible to the infection of the Dengue Haemorrhagic Fever. The perception will be measured by Likert scale type questionnaire, with five response scales, strongly agree, agree, not sure, disagree and strongly disagree

5. Perceived severity refers to the awareness, of grade 6 students, on the seriousness of the infection of the Dengue Haemorrhagic Fever. The severity will include the evaluation of the infection consequences to the human body such as mortality and family economy. The perceived severity also will be measured by Likert scale type questionnaire, with five response scales, strongly agree, agree, not sure, disagree and strongly disagree.

6. Perceived benefit of A*edes aegypti* larvae control refers to the belief of grade 6 students that controlling of A*edes aegypti* larvae and the A*edes aegypti* mosquito breeding places will be resulted in the prevention of themselves, their families and their villagers from the Dengue Haemorrhagic Fever infection. The perceived benefit will be measured by Likert scale type questionnaire, with five response scales, strongly agree, agree, not sure, disagree and strongly disagree

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7. House Index refers to the percentage of houses or premises being surveyed and found one or more habitats positive for A*edes aegypti* or related species. It is calculated as follow.

$$HI. = \frac{\text{Infested houses}}{\text{Number of sample houses survey}} \times 100$$

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CHAPTER II

LITERATURE REVIEW

The main objective of this study was to assess the effectiveness of a health education program, based on the participatory learning concepts, on behavioral change among grade 6 students regarding *Aedes aegypti* larvae control in Muang District, Nonthaburi Province. The following concepts, theories and related research were applied as a guideline to design the health education program activities in this research study.

Part 1 : The knowledge of Dengue Haemorrhagic Fever and *Aedes aegypti* larvae control

1.1 Dengue Haemorrhagic Fever

1.2 *Aedes aegypti* larvae control

Part 2 : Concepts and Theories which were mainly applied for this research

: Participatory Learning

Part 3 : Dengue Haemorrhagic Fever Curriculum in The Elementary School Level

Part 4 : Related Research Results

4.1 Dengue haemorrhagic Fever

4.2 The Participatory Learning

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Part 1 : The knowledge of Dengue Haemorrhagic Fever

1.1. Dengue Haemorrhagic Fever (WHO, 1996:6-7)

The first epidemic outbreak occurred in 1958 with 2,706 case and 296 deaths resulting in a morbidity rate of 10.6 per 100,000. The DHF has persisted since 1958 with the first cases outside of Bangkok being reported for the first time in 1964 . Subsequently, it spread gradually throughout the country by 1978 and now occurs in cities, small towns as well as rural areas too.

In 1987, a major epidemic occurred with the highest incidence of 174, 285 cases and 1,008 deaths. The year 1990 was another serious year with 111,116 cases and 397 deaths reported. In 1993, there were 67,017 cases and 222 death , and 51,688 cases with 140 deaths were reported in 1994.

Beginning of February each year, there is gradual increase in the DHF cases in Thailand which, peaks in July and August with the monthly number of cases declining thereafter. All four serotypes of dengue viruses are circulating in Thailand, though the proportion of each serotype is varied.

The trend of the incidence of the disease has continued to increase in a cyclic pattern. The disease mainly affects the younger age groups of less than 15 years with the highest proportion of cases occurring in the age group of 5-9 years, followed by the age group 10-14 years. As can be expected, DHF is the main cause of pediatric hospitalization in Thailand. Despite the increased number of cases, the case fatality rate has declined as the physicians have gained experience in the treatment of young patients. The case fatality rate had been declined from above 10 per cent between 1958 and 1960 to 0.27 per cent in 1994.

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Virus Transmission (Department of Communicable Control, 1997:52)

A vector mosquito may become infected when it feeds on a viraemia human host. In the case of DF or DHF, viraemia in the human may mostly occurs 1-2 days before the onset of fever and lasts for about five days after the onset of fever. After an intrinsic incubation period of 10-12 days, the virus grows through the mid gut to infect other tissues in the mosquito, including the salivary glands If it bites other susceptible persons, after the salivary glands become infected, then the dengue virus be transmited to those persons by means of injecting the salivary fluid.

Clinical signs (WHO, 1995:3)

The following clinical manifestations have selected as indicating a clinical diagnosis of DHF. The use of these criteria may prevent over diagnosis of the disease.

1. Fever: acute onset, high, continuous and lasting two to seven days.
2. Haemorrhagic manifestations, including at least a positive tourniquet test. Any of the following may be present: petechiae, purpura, ecchymosis (red spots small surface hemorrhages), epistaxis (nose bleed), gum bleeding. Haematemesis (vomitting blood) and/or melaena (bloody stools)
3. Enlargement of liver: however, this is not always a constant feature in children with DHF.
4. Shock-manifested by rapid and weak pulse with lowering of blood pressure ($\leq$ 20 mmHg) or hypotention and pulse pressure less than 20 mmHg, with the presence of cold, clammy skin and restlessness.

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Treatment (WHO, 1995:2)

There is no specific treatment for dengue fever. However, careful clinical management by experienced physicians and nurses frequently save the lives of DHF patients.

1.2. *Aedes aegypti* larvae control

The most important vector of dengue virus is mosquito *Aedes aegypti*, which should be the main target of surveillance and control activities. Other species should be considered for vector control only where is reliable evidence that they play an epidemiological significant role in the transmission of dengue infections.

1.2.1. Ecology and bionomics (WHO, 1998:50)

Eggs

Eggs are deposited singly on damp surfaces just above the water line. Most female *Ae. Aegypti* will lay eggs in several oviposition sites during a single gonotrophic cycle. Embryonic development is usually completed in 48 hours in warm and humid environment. Once embryonation development is complete, the eggs can withstand long periods of desiccation (more than a year). Eggs hatch once the containers are flooded, but not all eggs hatch at the same time. The capacity of eggs to withstand desiccation facilitates the survival of the species during adverse climatic conditions.

Larvae and pupae (WHO,1998:51)

The larvae pass through four developmental stages. The duration of larval development depends on temperature, availability of food, and larval density in the receptacle. Under optimal conditions, the time taken from

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hatching to adult emergence can be as short as seven days, including two days in the pupa stage. At low temperatures, however, it may take several weeks for adults to emerge.

Adults (WHO,1998:51) (WHO,1995:11)

Soon after emergence, the adult mosquitoes mate and the inseminated female may take a blood meal within 24-36 hours. Blood is the source of protein essential for the maturation of eggs.

The adult female *Aedes* mates and takes its first blood meal about 48 hours after emergence, and can take multiple blood meals between different gonotropic / generation cycles. Engorgement to ovipositor takes two to five days. Generally, a single female lays about 60-100 eggs in initial ovipositor.

After feeding on a person whose blood contains dengue viruses, the female *Aedes* mosquitoes normally require an incubation period of 8 to 10 days, when the viruses multiply in the mosquito salivary gland. Thereafter, the mosquitoes become infected and will transmit the dengue virus to the next human host when feeding occurs again. In man, the incubation period is from five to seven days. The female *Aedes* mosquitoes can also transmit the virus immediately from an infected person to another individual by a change of host when its blood meal is interrupted. Thus the "mechanical transmission" term is used.

Ae.aegypti are commonly found indoors than outdoors, unlike *Ae.albopictus*. Generally, *Ae.aegypti* prefer to rest indoors in shaded places, whereas *Ae.albopictus* prefer to rest outdoors in shrubs and trees.

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For oviposition, *Ae.aegypti* lays eggs in practically all types of man-made (artificial) containers, and in some natural containers, and *Ae.albopictus* ovipositors in both natural and artificial containers.

The main indoor breeding sites are : earthen jars used for water storage ;ant traps for protection of cabinets in kitchens; concrete water storage tanks for bathrooms; uncovered water storage tanks flower vases; saucers for ornamental potted plants; soft drink bottles; water trays of refrigerators with automatic deffrosting and air conditioner trays; metal drums for water storage; plastic containers; and any others which can store water.

Main outdoor breeding sites are : tree-holes; bamboo stumps; leaf axis of various plant species (palm, banana, yam, etc.); earthen jars for water storage; bamboo pots and stumps; discarded tires; metal drums for water storage; rain barrels for collecting rainwater; deficient and clogged up roof gutters; coconut shells and husks; latex collection cups in rubber plantation; cocoa husks and pods; canoes and small fishing boats; and all artificial containers which mosquitoes can breed.

1.2.2 Larvae Survey (WHO, 1993:129-130)

Due to the nature of the larval habitats and the ease with which larvae can be collected, larval surveys are commonly used for *Aedes* species, and involve the collection of larvae or pupae. The immature stage are collected from water-holding containers found both inside and outside houses. Information concerning the locality, date of survey, precise location and classification of the container or source is carefully recorded. Receptacles which are negative for immature stages on examination are also recorded. The exact format of such records will vary from place to place depending on the type of breeding site and the purpose

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of the survey. Larval surveys may be categorized into three types: those concerned with all larvae, or a number of larvae, from all positive containers; those concerned with a single larvae from each positive container, and visualization.

In order to carry out the above surveys, which results in a saving of time for field workers, detailed information about the composition of the *Aedes* species breeding in containers should be available. Visual larval surveys, and the one larva per container survey are only accurate when one species, e. g. *A. aegpyti*, is found, as is the case in some urban areas. In the urban areas of Bangkok, Thailand, one larva per container surveys were found most suitable for comparison of *A. aegypti* populations between localities and seasons.

The method involving all larvae has been used in Singapore, where both *A. aegypti* and *A. albopictus* are common. Both methods have advantages and disadvantages and their use depends on the objectives of the survey.

Larvae indices

The commonly used larvae indices are as follows:

House or premises index (HI) is the percentage of houses or premises with one or more habitats positive for *A. aegypti* or related species. It is calculated as follow :

$$\text{House or Premises Index} = \frac{\text{No. of infested house}}{\text{No. of surveyed house}} \times 100$$

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Container Index is the percentage of infested containers with *A. aegypti* or related species. It is calculated as follow :

$$\text{Containers Index} = \frac{\text{No. of infested containers} \times 100}{\text{No. of surveyed containers}}$$

In examining the containers, only those which having are counted.

- **Breteau Index (BI)** Originally this index was used in connection with *A. aegypti.*

$$\text{BI} = \frac{\text{No. of infested containers} \times 100}{\text{No. of surveyed houses}}$$

The Breteau Index is generally considered the best of the commonly used indices, such as the House or premises Index and the Container Index, since it combines dwellings and containers and is more qualitative and of more eepidemiological significance.

The House Index is the most frequently used and understood. It also involves less labor because, when the first positive container is located in a house, there is no need to proceed further. This index does not take into account the number of positive containers in an infested house. The House Index gives an idea of the percentage of houses positive for vector breeding and hence the percentage of the

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population at risk. If the index is high, transmission occurs easily to neighboring houses, and if the index is low transmission occurs less rapidly.

The Container Index, although not so useful from the epidemiological point of view, is a useful comparative figure especially when evaluation of control measures is being carried out.

Epidemiological Interpretation of Surveillance Data

It is not possible to give a precise density figure for *A. aegypti* or *A. albopictus* at which no transmission will occur. However, the usefulness and significance of an estimated threshold density cannot be over-emphasized.

Entomologists and health officers should try to work out, in their own localities, possible threshold vector densities required for transmission of dengue haemorrhagic fever. Constant monitoring of this index through routine surveillance enables epidemiologists to predict the trend of disease and vector control efforts when the suspected critical level is reached. In actual practice there are, unfortunately, many situations where low vector indices are not maintains and the disease remains endemic on a year round basis.

Since there is no specific indices for *A. aegypti* larvae at the present time, general guideline for Yellow fever might be applied.

- Breteau index more than 50 : high risk of transmission
- Breteau index less than 5 : low risk of transmission
- House index more than 10 : high risk of transmission
- House index less than 1 : low risk of transmission

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1.2.3 Vector control for containment of Epidemic (WHO, 1997:12-15)

Dengue/dengue haemorrhagic fever outbreaks, whenever they occur, build up in a short time; thus early action are required to immediately exterminate the infected mosquitoes to interrupt transmission and to reduce or eliminate new breeding ground of *Aedes aegypti.* Mobilization of government resources to meet such emergencies are always slow and before they come into operation much damage is already done. In countries where no *Aedes aegypti* control program exists, the things are still worse. This was exemplified by the dengue outbreak in some cities of Member Countries in 1996 as the local authorities were caught unawares and it took a couple of weeks before a full-scale effective vector control campaign could be put into action. Therefore, to meet such emergencies it is essential that everybody at all level, viz. individual, family, community and government, can contribute to arrest the spread of the epidemic. In the following paragraphs an attempt is made to highlight the actions which everybody can take as and when the first case of DEN/DHF is detected.

1.2.4 Larvae Control (WHO, 1995:23-29)

Aedes larvae are container-breeders which thrive in both clean and organically rich water in both natural and artificial containers. Hence, container management to reduce the sources of breeding habitats is one of the best approaches for controlling *Ae.aegypti* and *Ae.albopictus.*

Container Management

Container management should take into consideration the householder's use of the containers. If the population considers the containers to be

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useful or essential (such as earthen jars, rainwater drums, ornamental plant containers), the strategy employed will be the prevention of *Aedes* breeding in containers rather than destruction or removal of the containers.

If the containers are to be useless or non-essential (such as discarded tyres, abandoned domestic containers), removal and destruction is desirable. Natural habitats that accumulate water (such as tree holes, plant axils, bamboo stumps) can also be either eliminated or appropriately modified to prevent the breeding of *Aedes.*

Elimination or alteration of breeding sites

Destruction or elimination of unwanted natural and artificial containers in and around human living premises definitely contribute to an overall reduction of the *Aedes* population. Examples of such source reduction are as follows:

Rubbish which includes artificial and natural containers should be cleaned up, packed in disposable plastic bags and away through the local rubbish collection system. Municipal sanitation department collaboration should be obtained. If a local rubbish collection system is not available, the discarded containers should be buried

Discarded tires should be disposed of in such a way that they are kept away from occupied premises and not exposed to rain. In tire collection and storage areas for the districts, they should be properly arranged, placed under shelters and covered to prevent breeding of *Aedes.* Tires also can be shredded and placed in a landfill away from populated areas.

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Tree holes around housing compounds should be filled with sand or concrete to prevent breeding.

Structurally deficient roof gutters should be repaired. All roof gutters should be cleared of debris regularly.

Household and garden utensils(buckets, bowls and watering devices) kept outdoors should be turned upside down when not in use to prevent accumulation of rainwater and breeding of *Aedes.*

Leaf axis of various plant species within the house compound (palm, banana, etc.) often contain rainwater which should be removed or treated with proper larvicides to prevent *Aedes* breeding.

Canoes and small fishing boats should be emptied of water and turned upside down when not in use.

Agricultural crop remains (coconut shell, cocoa husks) should be disposed of properly. For the extraction of cocoa seed, the fruit should be opened with three cuts, one at the middle and two at both ends to prevent accumulation of water.

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Part 2 : The Approach to Concept and Theory in Research

Participatory Learning(David A. Kolb; 1984, David A.Kolb, et al.,1979,1995)

Participatory Learning used the 'student-centered' method, which consists of learning through experience and learning efficiently.

Learning through experience emphasized that the learner searches for knowledge by himself from his past experiences, it comprises of 5 principles :

1. Learning through the students'
2. Challenges for learning new things continuously, called "Active Learning "
3. Interaction among students , and between teachers and students
4. Interaction that expands the network of knowledge
5. Communication through speaking or writing is the instrument for knowledge exchange, information analysis, and knowledge development.

The Principle of participatory learning by Nicole et al. Developed an integrating with student centered learning cocepts; Experiential Learning, Active Learning and Group Process Learning. (Nicole et al., 1994).

Components of Learning through Experience; There are 4 components of learning through experience:

Experience: The teacher helps his students in using their past experiences to develop new knowledge.

1. Reflection and Discussion : The teacher helps his students in expressing their ideas in order that students exchange opinions and learn from each other.

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3. Understand and Conceptualization : The students understand and will lead them to the conceptualization. This may happen in two ways-the student initiates the idea which would then be fulfilled by the teacher, or the teacher initiates and fulfil to conceptualization by the students.
4. Experiment or Application : The students applies new knowledge in different life situations.

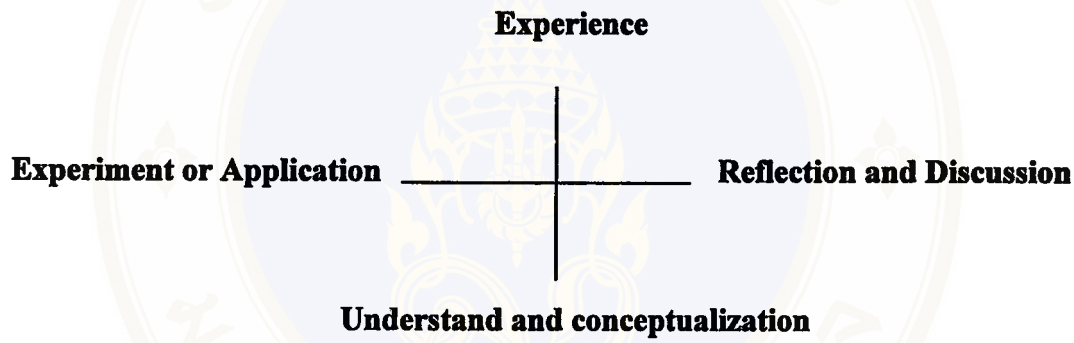

Figure 1 : Four components of Learning through Experience in participatory learning

The interaction among these four components is dynamic. Teaching can start at any point. The important thing is the basic for teaching knowledge domain rich focuses on building creative and critical thinking. In addition, it also is the basic for other life skill teaching, i.e., attitude and skill domain.

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Efficient Learning

In arranging the activities for participatory learning, another significant principle is the 'maximum learning' principle. The student should have maximum participation in every component. This includes sharing experiences, reflecting ideas and discussion, Understanding conceptualization, and having experiment or application of the knowledge. There should be the maximum learning in component or we can say that:

Maximum Learning equals to Maximum Participation plus Maximum Performance in the four components of the participatory learning

$$L_{max} = (Par_{max} + Per_{max}) \times 4$$

Maximum Participation

Maximum participation resulted from appropriate grouping in each learning component. Each group has different advantages and disadvantages, for example, a specific group may contribute a lot to the public but might lack variety of ideas. This kind of group then is suitable for the situation in which the teacher needs the expression and exchange of ideas from experiences without any conclusion. The details of different types of group and the limitations are in the following table:

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Type of group	Description	Instruction	Constraints
Pair Group	Students group in pair to complete the assigned activities	Every students should be involved in all expression of ideas and action	Lack of variety of notion and experience
Traid Group	Students group in 3 Role represents clearly and can be exchanged within group	Each student has an opportunity to play every role and learn new role	Lack of variety of and confused role play
Buzz Group	Temporary group of 3-4 students to express ideas	Every students has a chance to participate in a short period of time without any conclusion or gain only rough conclusion	Lack details and clear explanation
Small Group	5-6 student a group to accomplish activity assigned	Exchange of opinions and deep discussion to conclusion	Time consumption
Large Group	15-30 students or the whole class	Need more discussion and full idea expression or gather opinion from Buzz Group to get conclusion	Some students may not be participating or very little involvement. Also time consumption

Table 1: Different types of group

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Type of group	Description	Instruction	Constraints
Cross-over Group	2-step grouping. Small group for same activity to achieve expertise and all small groups gather to only one group for further development	Need each student to use full capacity in construction knowledge. Each student has involvement and gain intense knowledge.	Most time consumption, and some information /knowledge might be overlooked
Subgroup	2-step grouping. From 8-12 student group will be split into subgroup of 3-4 persons to work on different assignment	(the same with cross-over group)	(the same with cross-over group)
Pyramid Group	Collection of idea, starting from 2-4 persons a group, increasing in numbers of group members until the whole class has been included	Build awareness and empathy for each group	Lack of summarization and complete details

Table 1 : Different types of group (continue)

Appropriate grouping by the teacher in each teaching period facilitates the maximum participation and the dynamic interactive learning which will continuously inspire the students' interests.

Maximum Performance

Although designating various grouping will strengthen the participatory learning, the learning may not always be efficient. The essential core of

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maximum performance is the assignment to the group. There are 3 essential components of activity assignment:

1. Clearly indicate the activity, objective, type of grouping, time constrain, and preparing for presentation to other students within the specified time period.

2. Clearly assign group or individual role. In buzz group, the role and assignment should be different. When the small groups gather the knowledge will then be various and interesting. Role assignment also include each member' s role in a group, for example, role play, observer's role or leader's role in presentation, etc.

3. Clear structure should be giving the indicated for the activity details and roles. This can be done by giving the students the work description and schedule or giving work instruction slip to the group. The later is suitable for buzz group that works for the large group. The details as below:

Work instruction slip is the instruction / description of assignment. The teacher may type or write in a piece of paper and distribute to the students or the groups. Often use in reflection of ideas and discussion and application activities.

Clarification slip is explanation of less-detailed work in the large group . Before starting the activities, the teacher may writes on the board or transparency and let the students read out loud in the class or in the large group. Often use in Experience learning activity or application.

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Teaching Principles for Participatory Learning (David A.Kolb,1984, Norman Evans, 1994, Department of Mental Health, 1999:17-32)

Knowledge teaching that uses the principles of participatory learning assists in construct all other basic skills and is the co-component in all other life skill copponents. These components are creative thinking, critical thinking.

The characteristics of knowledge teach which uses principle of participatory learning are shown in table as below:

Component of PL	Characteristics of PL Knowledge Teaching
Experience	Raise questions to gather students experiences
Reflection of Ideas and Discussion	Exchange of knowledge to work on assignment
Conceptualization	Lecture (by teacher or communication media), group report, or presentation of buss group to the large group
Application	Applying new knowledge, e.g., writing slogan, report, composition, etc.

Table 2 : Component of Participatory Learning and Characteristics of Knowledge Teaching.

There is, in fact, no specific rules or procedures in setting the activities in teaching in order to allow students to gain more understanding.

The important point is to set the activity that could cover all components of the participatory learning.

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Teaching Principles for Attitude Participatory Learning

Attitude teaching has 2 components : Building related feeling to a specific attitude, and Belief and thinking system arrangement.

When relating these 2 components with the general principles of participatory learning which consists of 4 components, the attitude teaching then possesses the below characteristics in the table :

components of learning	Characteristic of Attitude
Experience	Emphasize the feeling experiences of the students
Ideas Reflection and Discussion	Full expression and objections of ideas
Conceptualization	Students conclude by themselves with the stimulant from teacher
Experiment and Application	Students has an opportunity to do the activities both in and outside the study period

Table 3 : Components of Participatory Learning and Characteristics of the Attitude Teaching

Since the attitude teaching is the thinking or belief the has 'feeling' as a component, the teaching then must have both components which are the feeling perspective and belief perspective as follows:

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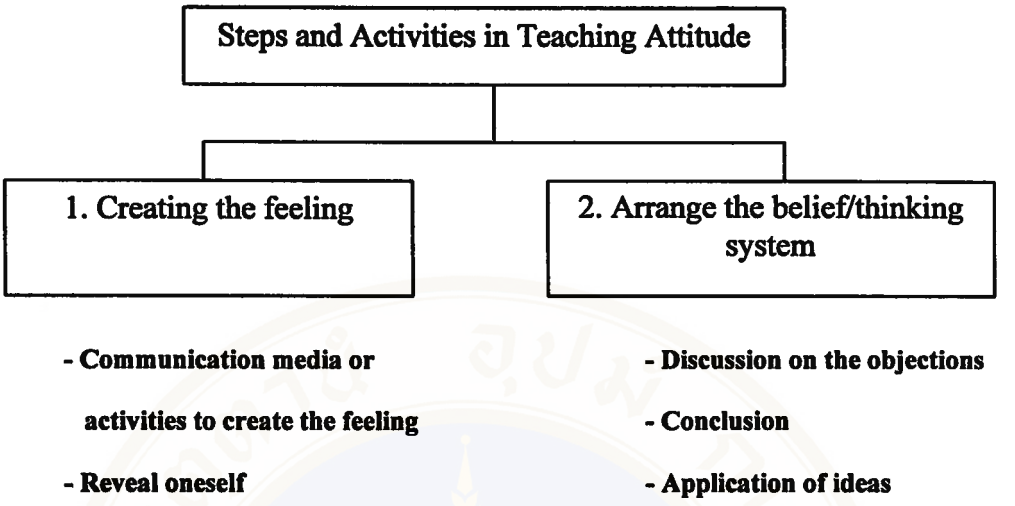

In the step of creating the feeling, communication media or activities will be used. This will take about 5-20 minutes of the teaching period. The rest of time will be for arrangement of the belief / thinking system.

Therefore, it is necessary that the teacher must have the skill to any the belief / thinking system arrangement efficiently.

The teacher must allow the students to express their ideas, expression any objection on others' ideas until they come to their own conclusion. Then, they details of the activities can be summarized as follow ;

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Steps	Components of PL	Activities
1. Creating the Feeling	Experience	Media or activities to construct the feeling is the media or activities used to make the students the feel involvement in any specific topic Media as follow: - Reading script e.g., letter, education script, memorandum, script for interview, etc. - Audio / video media Activities as follow: - Activities to directly create the feeling e.g., marionette - Activities to build relationship among different groups with related topics - Other activities e.g., activities that use imaginary to create or connect a telling story and Activities that stimulate interests e.g., debate Self revealing is to tell students' past experiences. Usually done in pair group or buzz group e.g., frankly express the feeling, role play in story, exchange ideas / experiences in writing
2. Belief / thinking system arrangement	Reflection of Ideas and discussion	Discussion on the Objection is the raise question for discussion in a group to find out and manage the belief / thinking of members in group
	Conceptualization	Conclusion is to let the groups present their conclusion reports and conclude the notion together in the large group
	Application	Application is the activity that allows the student to apply the existing attitudes. The activities should be held in class and should be emphasized by setting up an additional activities

Table 4: Summery of Steps and Activities in Attitude Teaching

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There are 2 levels of attitude teaching; Building attitude before behaving (e.g., hatred in visiting the brothel before having visits the place), and Changing the attitude (e.g., lessen or quit visiting the brothel after having visited the place).

The significant difference between the two is that building the attitude will emphasize in constructing the feeling that relates with a specified attitude, but changing the attitude will emphasize the use of communication media and activities that deviates the feeling of the former attitude.

In addition, in the step of belief/thinking system arrangement, the topic for discussion in changing attitude should be more interesting and clearer.

The problem in attitude teaching that may exist is that the students may conclude the discussion in a different way which is not objective-related (e.g., the students think that having sexual relationship before marriage is not wrong and is like experiment). In this case, the teacher then must find the way out by using the 4 following guidelines:

1. The teacher should be open-minded by accepting that the appropriate attitude might not be attitude expected by the teacher.

2. The teacher should trust the students. He should believe that if the attitude teaching is good foe the students, he then should allow students to have an opportunity in challenging or testing and support by their own reason in the discussion. However, the reasons should be accepted by other members in the group. As a consequence, the rational reasons will be automatically supported by the members, regardless of whomever the reasons/opinions belong to.

3. The teacher may assist the students in expanding the network of knowledge by raising the questions for students to think or the teacher and students

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may exchange their experiences because this is two-way communication rather than forcing them to accept opinions.

4. learning is the procedure to construct the knowledge that the students have a change to participate. However, if any ideas considered good in the teacher's opinion but disagreed by the students, though how hard the teacher tries to convince the students, this is not called learning. To solve this problem, the teacher should try to keep his idea with him without having to express it out, the students then might have a better feeling towards him and would accept him.

Activities used in attitude teaching

A. Activities in the step of creating the feeling is the activities that focus in inspiring, convincing, or motivating the students to have the required feeling in order to lead to the arranging of belief/thinking system. It is to build the required attitude or change the attitude. The activities in this step are as follows:

Media or activities to create the feeling

1) Media is the story improvised to the requirement of the target group e.g., education script, article, daily memorandum, letters, etc. This can be done by writing script, audio, and video

Script – is easy to use but needs the teacher's capacity in reading, using his reading intonation, and rhythm to inspire the students; feelings.

Audio – is also easy to use. Using the music, or famous professional speaker or signers to convey better feelings to the students.

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Video – this can inspire a lot of feeling if the video was created very well. Nevertheless, the instrumental problems, technical problems of screen and sound, and the sizing of screen problem may as exist.

2) Activities to construct the feeling can be divides into 3 groups as follows

Activities that directly construct feeling –is to apply media as an activity to allow the students to participate, for example,

The stage play is a short play. The script is giving to the students in advance for preparation. The students will usually act well in this kind of play in which they have practiced in advance. Their classmates will also be interested in the script and emotional expression in the play which, relates directly to the objective. There should not be too many scenes in a play. In addition, the play should not be too long in order to facilitate the acting and inspire more interests than the long-hour play.

Using the partition can easily carry out the Radio Play, and students read the prepared script emotionally without having to physically act as in the stage play.

Marionette can be used with the primary or secondary students. This will be more difficult if the same story of marionette becomes the stage or radio play. The script can be improvised in a more complicated way than the play since there will be a separate speech for the marionette in which the students do not have to speak by their own.

Value/Attitude Classification aims to great awareness or unexpectation of the students in acknowledge the different opinions among groups

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e.g., the infectious-noninfectious people, male-female, etc. The methodology as follows:

Opinion Survey – is the activity that will be used by the teacher to allow the student to perceive the thinking of the other party, which will directly deviate their own thinking. Then the discussion will be held to heavily emphasize the new thinking of the students.

Questionnaire – a good designed questionnaire will lead to the unexpected feeling that one thinks differently from the other persons or the other groups.

Ranking of Importance – make the students encounter the conflict feeling and have to decide which one is more important.

These 3 activities must employ the strategy that influence the feeling e.g., make the students find out 5 characteristics of their lovers, then let them find the lovers that only have 4 required characteristics by crossing one out. Do the same way until only characteristics left. The students will then discuss and realize which characteristics are most valuable to them as human beings.

Group activities that related directly with the desired attitude will build awareness, which will be connected to the good management of belief/thinking system.

Other activities, for example, debate, story joining, role-play by imagination, etc. If the activity was set in relation with the objective that stimulate the feeling and suitable for the students, this will assist the creating or changing of the students's attitudes.

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Self Revealing

The students reveal their thoughts from their past experiences by participating in various sub activities, usually consisting of 2 or 3 people or buzz group of 3-4 persons so that the students will have an opportunity in fully expressing their ideas. Directly relate the feeling to exchange the part experiences Role play to create experience of empathy and understanding as if he were that person in the play

Write and exchange suits for the groups of students who are not able to or hesitate themselves in public by speaking or brainstorming. This method could be divided into two types; Reading his own experience or letting his classmates read his experience. The latter is suitable for the issue which is sensitive in disclosure or which could embarrass the students e.g., sexual issue or conflicting opinions.

B. Activities in the steps of belief/thinking system management use the grouping procedure to achieve maximum participation. There are three kinds of activities in a continuous steps as follows:

Discussion by dividing the students into group, using small group of 5-6 persons or buzz group of 3-4 persons because the students can better present themselves. Small grouping first to discuss then conclude in a larger group. The discussion though allow the students to fully present themselves, it has to be limited in some occasion. The presenter has to respect the right of the listeners in a certain way. If there are few conflicts in the discussion, it may not make the changed attitude lasts. The teacher then should inspire by questioning to the conflict among groups so the students can fully express their conflicting opinions and clear discussion with the others.

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The discussion is to build the conceptualization together. There, the teacher should allow the students to conclude the opinions from the activities by themselves. If some points have been overlooked, the teacher can add for completion. During the conclusion process, the teacher should support the conflicting opinion discussion in the large group to facilitate the clear arrangement of belief/thinking system.

Application of Ideas – The teacher uses the time at the end of the period for the students to apply their opinions by allowing the students to join a small activity e.g., writing slogan, summarizing the reading passage or answering the test question. This will also considered as teaching evaluation. The group will be of 2 or 3 persons. This also can be done as an additional activity e.g., writing a letter, board decoration, talks with parents, etc.

Participatory Skill Teaching

As already known, each teaching will have every components mixes in knowledge domain, attitude domain. But in skill teaching e.g., communication skill is the teaching that emphasize on the skill teaching which has to be clearly represent in easy procedure for the students and give the students a chance to practice in surrounding situations. From the 4 general components of participatory learning, the skill teaching possesses the characteristic shown in the below table:

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Components of learning	Characteristic of skill teaching
Experience	Use the real life situations in learning the skill
Ideas Reflection and Discussion	Students exchange analysis of problem. Find out the principles or analyze each step in skill learning
Conceptualization	Conceptualization gain from listening the lecture, observing, demonstrating, evaluation within group and class evaluation
Experiment or Idea Application	Students have an opportunity to practice repeatedly by role play in a set-up situations

Table 5 : Component of Learning and Characteristics of Skill Teaching

Skill is the ability that we never had before but learned and practiced to achieve expertise. Skill teaching, therefore, consists of 2 steps :

1). Understanding Steps is the step that aims to make the students acknowledge that those skills are important and how to practice them, and

2) Acting Step is the step that allows the students to have a chance to practice according to what they have learned from the first step.

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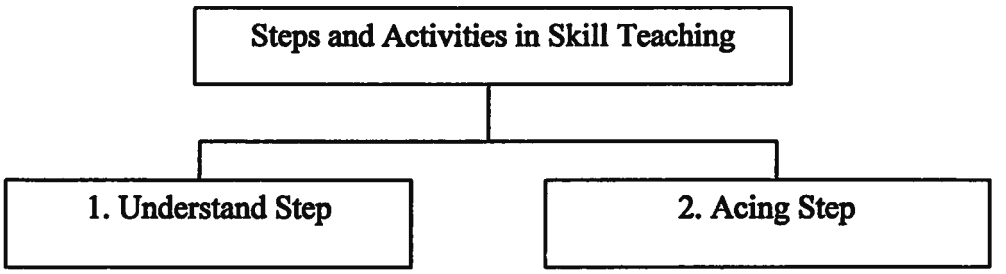

- **Leading lecture**
- **Case study, Set-up situations, demonstration**
- **Analyzing the set-up situations and evaluation**
- **Practicing**
- **Practice Evaluation**

The 3 components of participatory learning have been used in the understanding step which are conceptualization, experience, and reflection of ideas and discussion. The conceptualization happened by the preceding lecture, example illustrations, and discussion by the student about the importance and methodology to practice a specific skill. The experience component has been implemented by the teacher setting up the situations that allows the students to practice the skill or demonstrate which will make the students participate as well. The demonstration will assist the clear understanding of the students step by step. In the component of reflection of ideas and discussion, the teacher make the students in to different grouping or buzz grouping in order to find principles. The activities of these 3 components can be arranged in any deemed appropriate by the teacher.

In the step of acting, we will use another component of participatory learning-experiment and application-by using the role play or rehearsal play as the main activities. The Activities then have to be repeated to allow every student to play every role. So in this kind of training, the teacher must also have the skill in setting up situation and demonstration in to make the student see and understands and situations. At the same time, the teacher must also have the skill of role play or

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rehearsal play and evaluate the practice. The details of the activities can be summarized in the following table:

Steps	Components of PL	Activities
1. Understanding Step	Conceptualization Experience Reflection of Ideas and Discussion	Preceding lecture to provide necessary information or knowledge in a short period of time. Case study, set-up situation, or demonstration - Case study: question is set for the students to think, find out the answers, and express opinions. - Set-up situation: is a set-up of eventual question and role play - Demonstration: is the demonstrate the steps of the correct implementation. This can be clearly demonstrated by comparing with the incorrect implementation. Analysis: case study, set-up situations or demonstration.
2. Acting Step	Application of Ideas Conceptualization	Practicing: Practice the skill step-by-step or until the components of specified skill have been completed by role play or rehearsal play to achieve expertise. Evaluation of the practice: Allow the group members to evaluate among themselves and the teacher will evaluate in the large group.

Table 6 : Summarization of Steps and Activities in Skill Teaching

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In Teaching the communication skill, especially the denying skill or other skills, the problems may exist in the way that the students in fact do not want to deny (e.g., friend persuading to drink alcoholic beverage). This makes the practice become unreal and the acting is not natural. There are two guidelines for this kind of problem:

1. When one wants to deny in sometime, it means he has his own attitude and that is his decision. The problem is that he should be able to say it nicely in order not to break the good relation ship among friends, for example. So in the teaching projects, re will have to initially teach the attitude, the relate decision, and the denial skill before physically declining the unwanted invitation.

2. Before starting each class or lecture, the teacher should review the learning in the previous teaching period to ensure that the student have equal understanding in what are the things that deserve refusal.

Activities Used in Skill Teaching

Understanding Step – The activities in the teaching period are as follows:

1. Preceding Lecture – is to inspire the student's interests before leading into the lessons, and to provide necessary information or knowledge to the students. The preceding lecture should short and should make the students involved in that short period of time, e.g., questioning or giving easy examples, and letting the students express their opinions.

2. Skill Using Experience can be divided into 3 types:

Case study: The teacher gives the set-up case to the students to obtain the answers and opinions from the students.

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Set-up Situation: The teacher set-up a situation, act with the students, or give the opportunity for the students to group and act according to the set-up situation to find out the answers or opinions. The significant point of learning is in the discussion and the teaching along with the set-up situation.

Demonstration : by role play. Inspiring the involvement from the students by letting them act to the dialog. Then the teacher will put the dialog on the transparency and use the overhead projector for discussion or teaching according to that dialog.

3. Discussion in small groups to give the students a chance to analyze from the set-up situations or from the demonstration in order to gain more understanding on the steps and the method utilized in each step.

Acting Step – The activities can be divided into 2 parts as follow

1. Practicing by role play and rehearsal play

Role playing is the efficient method for skill practicing. This can be done by setting up characters and situations, and let the students act according to each character in the question. The assignment then has to be set very clearly – the situations, the characters, and the observers' roles.

Rehearsal play is to allow the student to act as himself in the set-up situation in which might actually happen one day in their lives in order to let the students (player) and their friends observe what skill have been taken in use in the play.

2. Evaluation on the Practice as a feedback of the result on the play. To evaluate whether the students have been acting suitable and in relation with what

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they have learned. The evaluation can be held among the students themselves within groups, between the teacher and students, or both ways.

In the case that the students evaluate among themselves, the teacher should clearly set the evaluation standards for them,

In the case that teacher helps in evaluation, the teacher randomly picks up a group from the class to act the role-play. He then helps in the evaluation process and ask for the other students' opinions. The other way is that the teacher interviews the students or let the group members relate their past experiences, then ask for the teacher's suggestion.

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Part 3 : Dengue Haemorrhagic Fever Curriculum in The Elementary School;Level (Department of communicable Diseases Control ,1996:6-9)

Dengue Haemorrhagic Fever is a serious problem for school children, the Ministry of Education and the Ministry of Public Health collaborated to conduct a project in which every school had to operate extra-curricula activities about Dengue Haemorrhagic Fever and methods to control larva, including trying to prevent e *Aedes aegypti* from breeding and to destroy or removal of breeding places in schools and extending the results to communities : the aim of the project was to reduce the incidence of Dengue Haemorrhagic Fever and to support teachers and students to be aware of and to understand the danger of Dengue Haemorrhagic Fever. Furthermore, they should know how to prevent and control the disease. This project started in 1992 and has operated continuously up until the present.

Whangrungsup, Y. (1996 : 247-258) evaluated the attitudes of public health officers and educational officers towards the prevention and control of Dengue Haemorrhagic Fever project in schools from September to November, 1994. Data were collected through interviewing 371 public health and educational officers. It was found that 90-95 percent agreed that Dengue Haemorrhagic Fever was a serious public health problem for elementary students. Most of them intended to participate in this project, and they would also persuade others to do so. They also agreed that the elementary students could play an important role in the prevention and control of the disease. Moreover, it was important that the incidence of Dengue Haemorrhagic Fever should be reduced quickly and continuously.

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Curriculum on Dengue Haemorrhagic Fever

The curriculum promotes teaching and learning activities to help students acquire knowledge and understanding about Dengue Haemorrhagic Fever and be aware of the danger. They can also protect themselves from infected. Teachers can either arrange the activities directly in health subject or integrated into other subjects 'Supplementary Life Experiences' and 'Supplementary Characteristics' which are laid out in the handbook in order to prevent Dengue Haemorrhagic Fever in schools as shown in figure I. Only some examples for elementary grade 5-6 students from the guideline of teaching and learning management will be presented.

Unit 3 : Things around us

Sub Unit : The Impact of the Natural Environment on the Society

For the example : - Ecological System

- Environmental Planning
- Surveyng Larva and Breeding Places
- Eliminating Larva and Breeding Places

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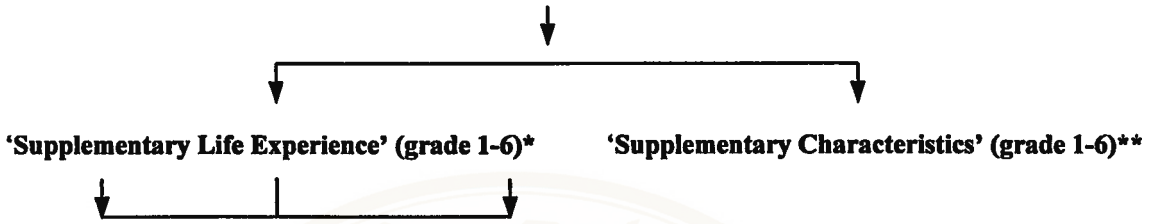
The Elementary Curriculum on Dengue Haemorrhagic Fever



Direct Teaching	Additional Teaching	Additional Teaching
Unit 1 : Living Things - About ourselves - Having good habits - Health Promotion - Disease Prevention - Using Household Medicine and Others - The Principal of Behaving Oneself	Unit : things Around Us - Human Beings & Natural Environment - The Impact on the quality Of Life of Communities From the changing of the Natural Environment Unit : Events, News and National Holidays	Activities : - Boy scouts, Girl Guides and Junior Red Cross - Other activities - Free Activities

* Dengue Haemorrhagic Fever can be added to 'Supplementary Life Experience' every dary.

** Dengue Haemorrhagic Fever can be added to 'Supplementary Characteristics' where suitable

Figure 2 : Shows the Elementary Curriculum on Dengue Haemorrhagic Fever

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Part 4 : Related Researches

4.1 Dengue Haemorrhagic Fever

Saeunk, P. (1992 : 82-89) studied the effectiveness of a Health Education Program with a modification of the Health Belief Model and Social Support through teachers and fathers or mothers for preventive behavior of Dengue Haemorrhagic Fever among grade 6 students in Muang District., Nonthaburi Province. The result showed that, after the experiment, the experimental sample gained significantly more perceptions regarding susceptibility, severity and benefit as well as in preventing Dengue Haemorrhagic Fever than prior to participating the program. The statistically achieved a lower proportion of containers with larva of *Aedes aegypti*, was found. The Breteau Index (BI) in the experimental group decreased from 1,418 to 816. There was a relationship between social support from teachers and fathers or mothers and practice in preventing Dengue Haemorrhagic Fever.

Koonawoot, S. (1997 : 91-94) studied on the effectiveness of health education program, using the Protection Motivation Theory and group process to improve preventive Dengue Haemorrhagic Fever behaviors among primary school students in Sawangha District, Ang Thong Province. Results of the study showed that, after the experiment, the experimental group gained significantly more perceived susceptibility and severity, self-efficacy, response efficacy and preventive behavior than prior to experiment and than comparison group. It was found that perceived severity and susceptibility, self-efficacy, response efficacy correlated significantly

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with preventive behaviors. In addition, the Breteau Index and Container Index decreased after the experiment.

Thiarawiboon, S. (1999 : 128-130) studied the effectiveness of a health education program to develop preventive behavior for Dengue Haemorrhagic Fever by applying the Protection Motivation Theory with Social Support, group discussion, campaign, temporary exhibition and prompting by letter and mobile public announcement vehicle among the housewife group who had children under 14 years of age in Muang District, Pathumthani Province. Results from the study showed that the experimental group had higher perceived severity, perceived susceptibility, self-efficacy, response efficacy, intention to act and preventive behavior for Dengue Haemorrhagic Fever after the intervention period than before, and also better than that of the comparison group. This difference was statistically significant at p-value<0.05. It was also found that perceived severity, self-efficacy and response efficacy were significantly correlated with preventive behavior, but age, education and family income were not correlated with preventive behavior.

Taluengpet, M. (2000 : 107-114) studied on the effectiveness of health education program, using the Protection Motivation Theory and Social Support to improve preventive Dengue Haemorrhagic Fever behaviors among primary school students in Nakronsrithammarat Province. Results of the study showed that, after experiment, the experimental group gained significantly higher perceived severity, perceived vulnerability, Self efficacy, response efficacy for Dengue Haemorrhagic Fever than before and also higher than that of the comparison group. This group also exhibited better prevention behavior at home and at school. These differences were

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statistically significant. Also, the Breteau Index, Container Index at home and at school and House Index of *Aedes aegypti* larva decreased after the experiment.

Deokul, V. (1999 : 86-90) studied on the effectiveness of health education program to develop the preventive behavior for Dengue Haemorrhagic Fever by applying Health Belief Model among housewife's group at Amphur Banleam, Petchaburi Province. Results of the study showed that after experiment the experimental group gained more perceptions regarding susceptibility, severity, benefits, barriers and practice in preventing Dengue Haemorrhagic Fever than prior to participatory in this program and more than the control group at the level 0.01 significantly.

Jamjitta, N. (1999 : 85-90) studied on the effectiveness of Health Education Program, prevention and control behavior of Dengue Haemorrhagic Fever of grade sixth students. The result showed that after the experiment an experimental group gained significantly more knowledge and practice of prevention and control behavior of Dengue Haemorrhagic Fever than prior to experiment and than comparison group. But there was no significantly difference in attitude of prevention and control behavior of Dnegue Haemorrhagic Fever.

Duangkumsawats, S. (1998 : 175-176) studied on the effectiveness of applying group process and social support on promoting health behavior among housewives in the prevention of Dengue Haemorrhagic Fever in Mae Tha District Lampang Province. The results of the study showed that, the experiment group gained significantly more knowledge, perceived severity and susceptibility of D.H.F., and benefits of practicing preventive behavior than the controlled group.

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4.2 The participatory Learning

From general viewing the document of Participatory Learning, there was no research study which, apply the concepts of participatory learning for DHF prevention, controlling of *Ae. aegypti* larvae and the eliminating of mosquito breeding places. However there were many programs which, applied the Participatory Learning approach for developing and designing teaching learning activities under life skill development for the students which were summarized as follows :

Tusakunnee, C. (1999:146-147) applied life skill with social support to prevented amphetamine abused of the students in technical college, education border 6, Khornkaen Province. The Experiential Learning Theory by Kolb and Social Cognitive by Bandura were applied. The program was emphasized the participation of students, it was found that the students were increased in knowledge of amphetamine, critical thinking, concerning in hazardous of amphetamine and refusal skill, self control, self regulation, and decision making

Reongsukapipattana, S.et.al.(1999:85-86) studied on developing of teaching learning based on Participatory Learning in Sukanaree school, under zzoffice of the Primary Education, Muang Distric ,Nakornrajsrima Province. It was found that the learning outcomes of each subjects was increased. The students were progress in self-motivated to learn, enable to apply knowledge, attitude and skill to their daily life happily. They had more skill in communicating and expressing their feelings.

Prommin, S.(1999:69-71) studied on developing of teaching learning based on Participatory Learning in Sukanaree school, under office of the Primary Education, Muang Distric ,Nakornrajsrima Province. It was found that the learning outcomes of each subjects was increased. The students were progress in self-

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motivated to learn, enable to apply knowledge, attitude and skill to their daily life happily. They had more skill in communicating and expressing their feelings

According to the related research studies, the concepts and the theories being reviewed, it can be concluded that the participatory learning emphasized on 'student – centered' plus learning through experience can be used to enhance the development of student's health knowledge. The interaction among students and between students and their teachers can help students to expand, to analyze, to synthesize and to apply health knowledge in real situation. As mentioned in the introductory part that the sixth grade students, a high-risk group, are more susceptible to Dengue Haemorrhagic Fever. They themselves also though that they can be infected with the DHF. Thus if the students gain enough essential knowledge, about Dengue Haemorrhagic Fever. Having favorable perception about susceptibility and severity of being infected by the DHF along with the benefits of mosquito larva control. Then they will be more aware of the prevention of *Aedes* breeding and the destruction or the removal of the *Aedes* breeding places. The health education program activities which were developed according to the participatory learning concepts were summarized in the conceptual frame work of the study.

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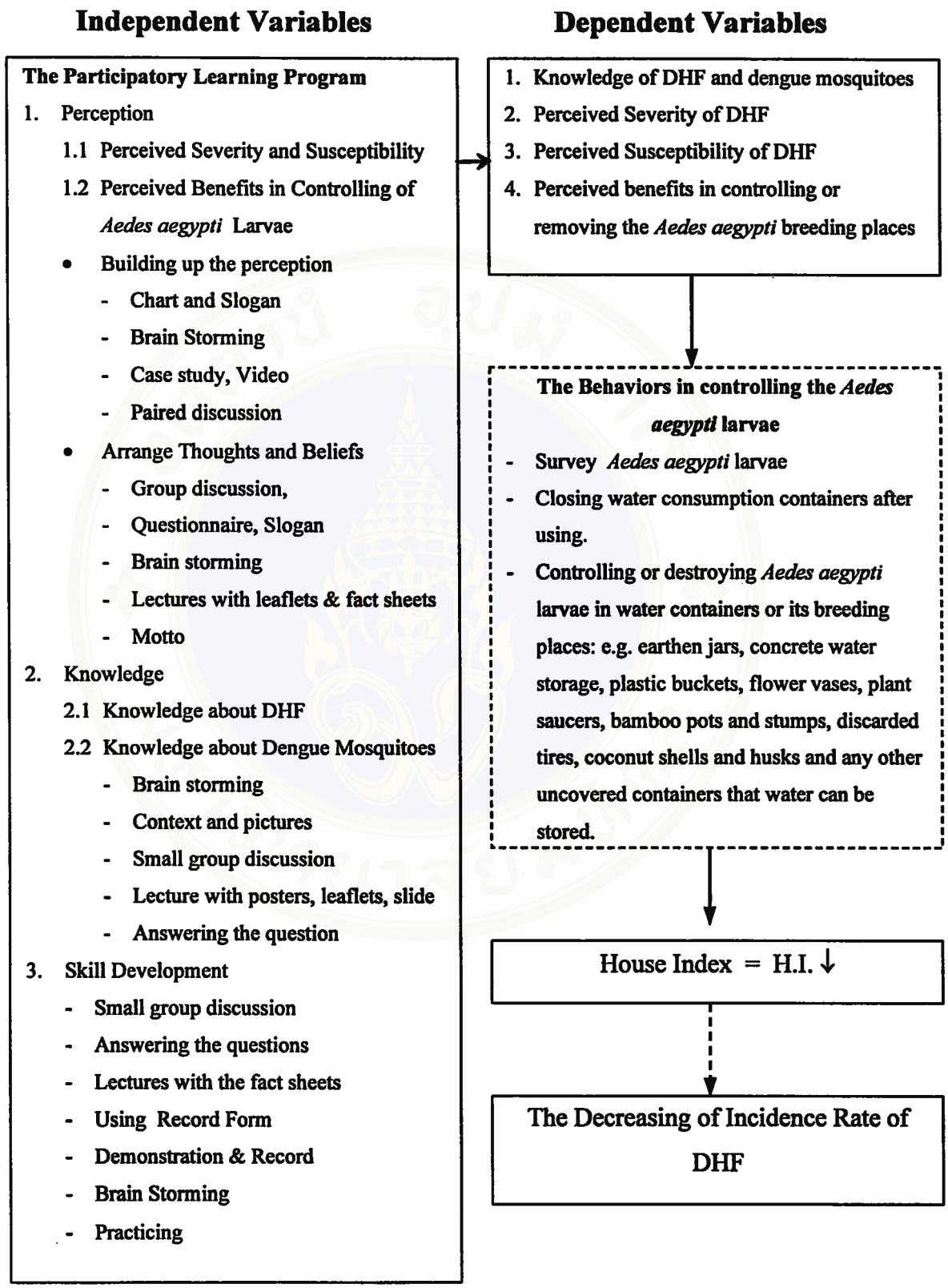

Figure 3 : Conceptual Framework of the Study

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CHAPTER III

MATERIALS AND METHODS

This research study was a quasi experimental research aiming to assess the effectiveness of health education program based on the participatory learning concepts, on behavioral change of grade 6 students in Muang district, Nonthaburi regarding the *Aedes aegypti* larvae control. These concepts were mainly applied from concept of through student center of the Department of Mental Health (1999), the Department of Health (2000) and the Ministry of Education. The concepts have an important basis of experiential learning and effective learning. When they were integrated with the group process, it will yield maximum participation (Department of Mental Health, 1999 : 6 - 7) . The research design and research procedures were as follows:

1. Research Design
2. Population and Sampling
3. Research Instruments
4. Research Implementation
5. Data Analysis

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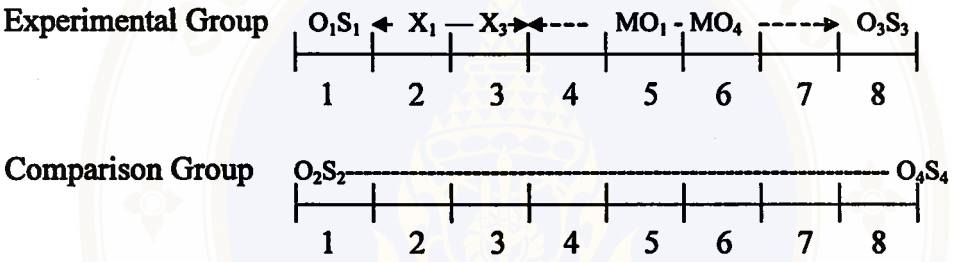
1. Research Design

This research design was quasi-experimental research design. The study samples were randomly selected, based on specified criteria, and were randomly assigned into experiment and comparison group. Data were collected through structured questionnaire from both groups, before and after program implementation as shown in the experimental chart below:



O_1O_2 Refer to data collection from the experiment and comparison group before the experiment.

O_3O_4 Refer to data collection from the experiment and comparison group after the experiment.

S_1S_2 Refer to household dengue larvae survey from the experiment and comparison group before the experiment.

S_3S_4 Refer to household dengue larvae survey from the experiment and comparison group after the experiment.

X_1-X_3 Refer to the implementation of 3 sessions of health education activities in the experiment group to increase the samples's knowledge and perception on susceptibility, severity and cost benefit about Dengue Haemorrhagic Fever and controlling of the *Aedes Aegypti* breeding

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places. Skills for household dengue larvae survey and the controlling or destroying of the *Aedes aegypti b*reeding places were also developed.

$MO_1 - MO_4$ Refer to recording of dengue larvae survey and the controlling of the *Aedes aegypti b*reeding places both at the student's house and at the school.

2. Population and Sampling Selection

2.1 Population Characteristics

Populations for this study were the 6th grade students in 2000 academic year, under the Office of Primary Education, Muang District, Nonthaburi province. The following criteria were used to define the sampling population:

2.1.1 Students who were studying in schools which located in the endemic area of DHF in the last year.

2.1.2 Students resided in the sub-districts area where the schools were located

2.1.3 Students did not change school during the implementation of this study.

2.1.4 There were sufficient number of students in the same school which the research study can be implemented.

2.1.5 Schools were willing to participate in the research study.

From such criteria being used, two sample schools were selected and one class from each school then was randomly selected.

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2.2 Sampling Selection Procedures

2.2.1 Selection of the sample districts.

Among 6 high endemic districts of Dengue Haemorrhagic Fever in 1999, Muang District which had the highest incidence of the Dengue Haemorrhagic Fever was selected.

2.2.2 Selection of the sample schools.

Two schools were selected according to the preset criteria. Theses two schools needed to be located in the same sub-district, of Muang District, Nonthaburi Province, under the District Office of the Primary Education. The selected sample schools were:

2.2.2.1 Wat Puttiprangpramote school, Bangsrimuang sub-district, Nonthaburi province and

2.2.2.2 ChoomchonWat Samorakote school, Bangkrasor sub-district, Nonthaburi province

2.2.3 The two sample schools were then randomly assigned in to the study groups. The simple random sampling technique was used. By doing so, the Wat Puttiprangpramote school was randomly selected and assigned into the experiment group while the Choomchon Wat Samorakote school was assigned into the comparison group.

2.2.4 Selection of the sample classrooms.

2.2.4.1 One experimental classroom was randomly selected from two 6^{th} grade level classes of Wat Puttiprangpramote school by writing down 2 numbers that represented the two classes in separate sheets, then drew the sheet, the

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1st draw was selected as the experimental group. By doing so, the class number 6/1 with 35 students was selected.

2.2.4.2 One comparison classroom was randomly selected from two 6th grade level classes of Choomchon Wat Smorakote school by writing down 2 numbers that represented the two classes in separate sheets, then drew the sheet, the 1st draw was selected as the comparison group. By doing so, the class number 6/1 with 39 students was selected.

The sampling selection procedure can be summarized as in the following page.

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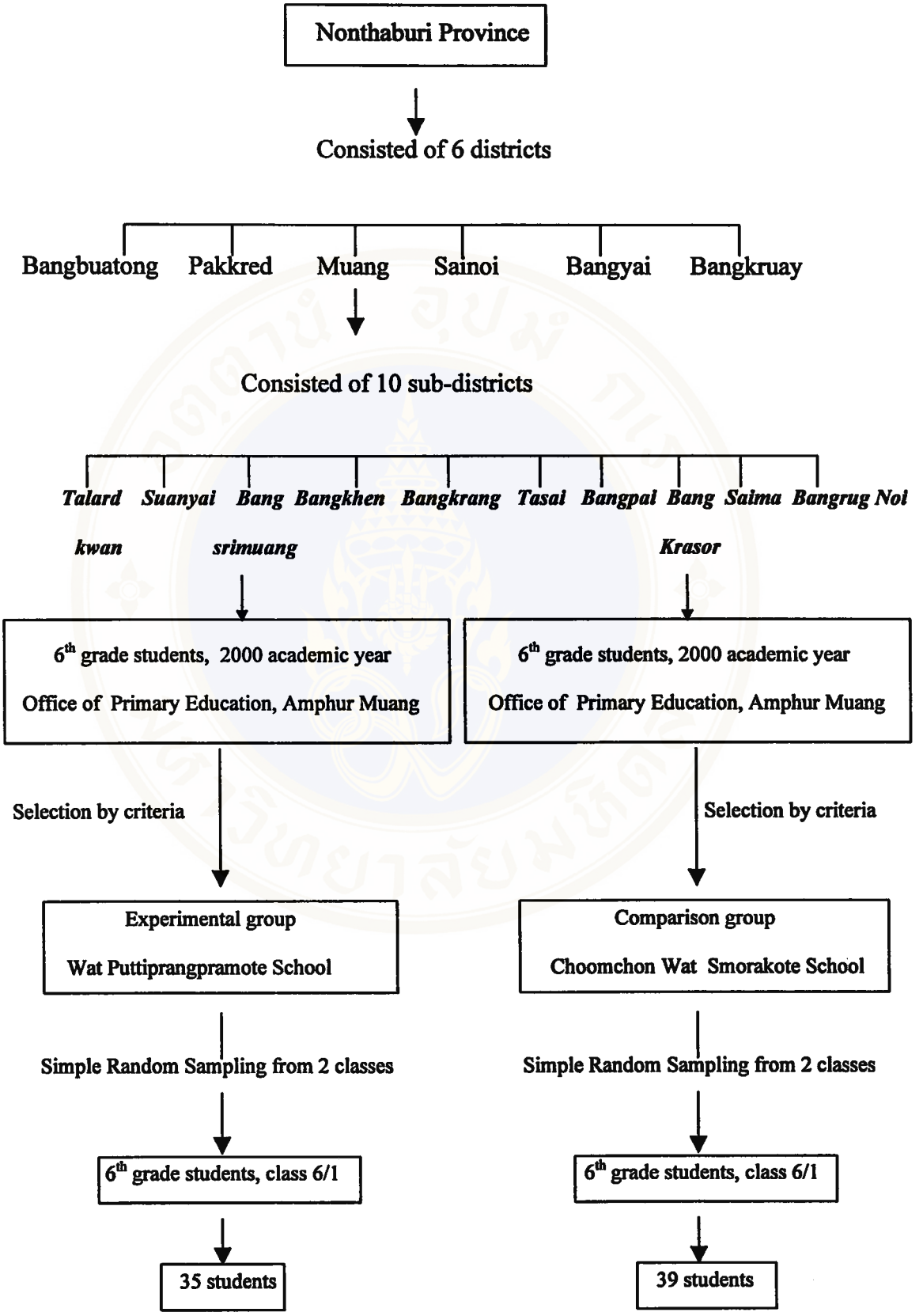

Figure 4 : Showing selection of the sample group

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3. Research Instruments

This research study utilized 2 types of instruments: data collection instrument and implementation instrument.

3.1 Data collection instruments

3.1.1 Self Instruction questionnaire comprised of 5 parts:

Part 1 Demographic Characteristics.

This part of the questionnaire comprised of questions regarding sex, parent's occupation, area of residency, experience in surveying of dengue larvae.

Part 2 Knowledge on Dengue Haemorrhagic Fever and Aedes mosquitoes. There were 16 multiple choice questions. Data was analysis by frequency, mean and standard deviation. The standard in measuring was evaluated of knowledge by all of them.

Part 3 Perceived severity of Dengue Haemorrhagic Fever. This part consisted of 9 rating scale questions (with 5 choices) applied from Likert Rating Scale.(Suwan,P.;1994:229,Sinlapasuwan,P.et.al.;1997;147-149,Taweerat,P.;1997:114)

Part 4 Perceived susceptibility of Dengue Haemorrhagic Fever. This part consisted of 11 rating scale questions (with 5 choices) applied from Likert Rating Scale as in part 3.

Part 5 Questions on perceived of benefit in controlling *Aedes aegypti* larvae, composed of 11 rating scale questions (5 choices) as in part 3.

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3.1.2 ***Aedes aegypti* Mosquito breeding Places Survey Record Form.** This form was designed for the sample students to conduct *Aedes aegypti* larvae survey both at home and at school. The students' activities in controlling or destroying the *Aedes aegypti* breeding places were recorded. .

3.1.3 ***Aedes aegypti* Larvae Survey Record Form.** This record was used for each household survey. Each breeding place, which any mosquito larva was found, was recorded. This data were used to compute House Index and Larvae Index

3.2 Implementation Instruments

3.2.1 **Teaching Aids**: Slides, VDO tapes, Leaflets, Case studies, Chart about Dengue Haemorrhagic Fever incidence, Demonstration Kids, Posters and Games.

3.2.2 **Lesson plan** for participatory learning.

Lesson plan I : Title "Closed Dangerous"

Lesson Plan II : Title "Knowing the DHF Disease"

Lesson Plan III: Title "Dangerous Mosquitoes, Aedes Mosquitoes"

Lesson Plan IV : Title "No *Aedes aegypti* Larvae, No Dengue Haemorrhagic Fever"

Lesson Plan V : Title "Sure, We Can Make It 100%"

3.3 Questionnaire Construction

3.3.1 Reviewing literatures related to concepts and theories of this study. Identified variables were used to develop question frame which were corresponded to the objectives, hypothesis and the conceptual framework of the study.

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3.3.2 Developed questions and criteria for assigning proper scores for each answer.

3.3.3 Thesis advisory committees assessed content and construct validity of the questionnaire. .

3.3.4 After the questionnaire was corrected according to the committee suggestions, then it was tried out with the samples who were similar to the study group. After that the reliability of the questionnaire, the Conbrach alpha coefficient, was computed.(Sax Gilbert,1980:259-268,Thaweerat,P.;1997:132-139) Results of the reliability computation were used to the final adjustment of the questionnaire before it was using for collect data. Reliability coefficient of each part of the questionnaire was as follows.

Reliability of the knowledge part was 0.70

Reliability of the perceived susceptibility part was 0.70

Reliability of the perceived severity part was 0.68

Reliability of the perceived of cost benefit part was 0.67

3.3.5 Improve question statements and choices in case they were not clearly understand.

3.3.6 The final instruments then were final reviewed and assessed before they were actually used. .

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4. Research Implementation

4.1 Pre-implementation Phase

4.1.1 Sending official letter to the Faculty of Graduate Studies, Mahidol University, requesting for an introducing letter to school administrators of both experimental and comparison schools, to inform them the objectives and details of the research project as well as research methods.

4.1.2 Coordinating the sample schools for permission in implementing research activities. Conducting orientation meeting for the experiment group in order to explain health education activities which, were planned to implement in details. Asking permission from classroom teachers and the teachers who were responsible for the "enhancing life experience" subject to carried out data collection and conducting health educational activities.

4.1.3 Selecting the study sample groups and preparing experimental tools

4.2 Implementation Phase

Week 1

1) Collecting data from experiment and comparison group before experimentation using self administered questionnaire
2) Conducting the *Aedes aegypti* larvae survey of sample student houses of the experiment and the control group. The survey was conducted only in two communities where the majority of the students of each studied group were living.

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3) For the experimental group, official letters from school were sent to students' parents to inform that their children were involving in the participatory learning activities in *Aedes aegypti* larvae control, and requesting parents to sign in the participatory learning activities form.

Week 2 Lesson Plan number I to IV were implemented.

Lesson Plan I : "Closed Dangerous" This lesson aimed at creating perception on susceptibility to and severity of the Dengue Haemorrhagic Fever (55 minutes length). Two main steps in this session were:

Creating the Feeling Step

Experiencing. The sample students were paired and discussed about the susceptibility of Dengue Haemorrhagic Fever. The life cycle chart of Dengue Haemorrhagic Fever was used for discussion.

: The paired students then further discussed about the Dengue Haemorrhagic Fever after listening to the case study on "The Dark Moon Night". The representative of the student summarized the discussion outcomes and presented to the whole group on the plenary session

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The Organizing Though and Belief Step.

Reflection Ideas and Discussion : Discussion in small group and response to a questionnaire

Conceptualization Representative of the student presented concepts regarding the *Aedes aegypti* larvae control and the Dengue Haemorrhagic Fever to the large group.

Brainstorming of the large group in plenary session. Researcher summarized the outcomes of the plenary group.

Application of the Concepts. Small group discussion on "How to prevent yourself from Dengue Haemorrhagic Fever".

Researchers leaded the discussion followed by large group brainstorming.

Lesson Plan II : "Knowing the Dengue Haemorrhagic Fever".

This lesson aimed to build up the knowledge on Dengue Haemorrhagic Fever (55 minutes length)

Experiencing Large group brainstorming on "Dengue Haemorrrhagic Fever"

Conceptualization Lecture with slide presentation on "Dengue Haemorrhagic Fever"

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Ideas reflection	Small group discussion on "Dengue Haemorrhagic Fever"
Concept Application:	Large group brainstorming Lecture with poster presentation, Distribution of leaflets on Dengue Haemorrhagic Fever
Idea application	Small group discussion and answering questions on "How to prevent yourself from Dengue Haemorrhagic Fever " large group brainstorming adding up, answering questions and conclusion

Lesson Plan III : "Dangerous Mosquitoes, *Aedes* Mosquitoes"

This lesson aimed to build up knowledge on dengue mosquitoes (50 minutes length)

Experiencing	Large group discussion on "*Aedes* mosquitoes' Pairing discussion, group activities on "Live cycle of Aedes Mosquitoes"
Conceptualization	Large group brainstorming to find the answers Lecture (added) with slides and posters.

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Ideas application Small group discussion using assigned situation Large group discussion. Lecture (added), answering questions and conclusion

Lesson Plan IV "No *Aedes* Mosquitoes, No Dengue Fever". This lesson aimed to create perception of the cost benefit on the controlling of *Aedes Aegypti* breeding places and *Aedes aegypti* larvae (55 minutes length)

Feeling Reflection

Experience : Large group discussion "How to make our community free from *Aedes Aegypti* larvae. "

: Pairing discussion and express the ideas from watching VDO tape, followed by large group presentation

Organizing Though and Belief

Ideas refection and discussion : Small group discussion on the issue "Why the effective prevention of Dengue Haemorrhagic Fever must be emphasized on *Aedes aegypti* breeding places control than controlling of *Aedes aegypti* mosquito since the *Aedes aegypti* mosquito carries the Dengue Haemorrhagic Fever.

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Conceptualization : Large group discussion

Concept application: Setting up slogan by small group and patching it in the class

Week 3

Lesson Plan V : Sure, we can make it 100%" aiming to develop skills in *Aedes aegypti* larvae survey and controlling of *Aedes aegypti* breeding places (1 hour and 40 minutes length)

Conceptualization

Experience : Group discussion on "*Aedes aegypti* breeding places

: Sample students were divided into 2 small groups for discussion about *Aedes aegypti* breeding places at home and at school, followed by large group presentation

Conceptualization : Researcher explained step by step how to either control or destroy *Aedes aegypti* breeding places and how to conduct *Aedes aegypti* larvae survey.

: Described the record forms for *Aedes aegypti* breeding places control and *Aedes aegypti* larvae survey.

: Demonstrate how to conduct the *Aedes aegypti* larvae survey

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Ideas Reflection : Students exercised the *Aedes aegypti* breeding places survey and controlling or destroying them from displayed model of houses and school in the community setting.

Action step

Concept application :Skills practices by small group in *Aedes aegypti* breeding places and controlling or destroying them.

Conceptualization : Presentation of survey result, Researcher reviewed the record forms

: Large group brainstorming

: Answering questions and conclusion by researchers, followed by distribution of leaflets

Week 4 – 7

During this period, students in the experiment group was assigned to implement the *Aedes aegypti* breeding places survey and control or destroy them once a week in 4 consecutive weeks. The detail activities were follows:

1) Distribution of *Aedes aegypti* breeding places survey record form to each student. The student was told to do the survey and recorded the survey results

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on the assigned dated and returned the record form, on the next day, with the signature of his or her parents and of the classroom teacher to the researcher.

2) Divide the students into 5 small groups, assign them to carry out the *Aedes aegypti* breeding places survey in the school along with the controlling or destroying of the mosquito breeding places and record what they had done in the record form.

Week 5, 7

Conducted *Aedes aegypti* larvae survey at the student's house of the experimental group, Moo 1 Bangsrimuang sub-district. The total of 13 households And Moo 8 Bang Krasor Sub-district.The toral of 13 households of the experimental group. was surveyed and records and the House Index was then computed. .

Week 8

Conducted *Aedes aegypti* larvae post survey at the student's house of the experimental and the comparison group, Moo 1 Bangsrimuang sub-district and Moo 8, Bangkrasor sub-district. The total of 13 households of the experiment group and 10 households of the comparison group were surveyed and records and the House Index was then computed. .

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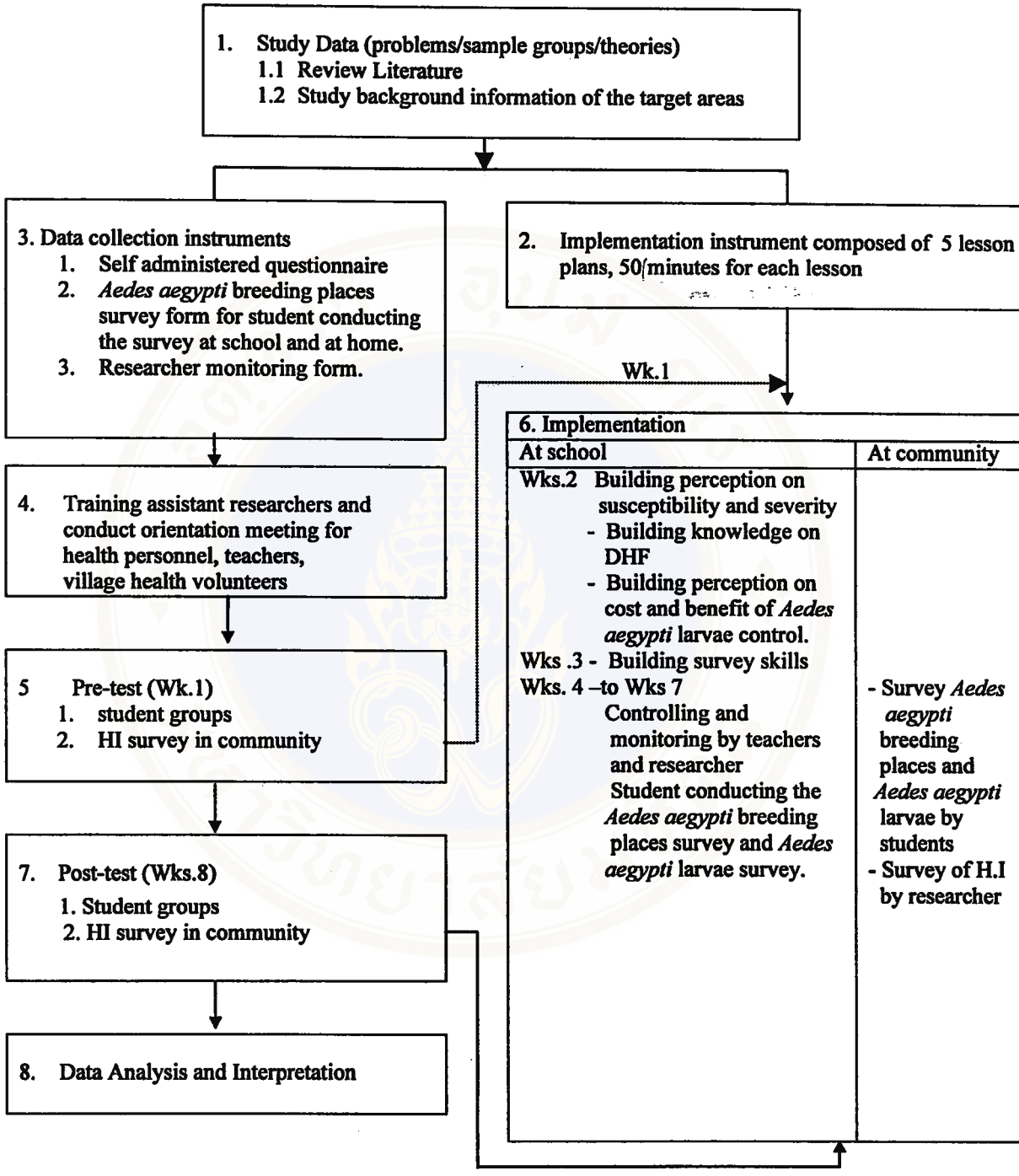

Figure 5 : Showing the steps of implementation

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5. Data Analysis

One of statistical package program for data analysis was used to analyzed data with 95 per cent level of confidence (p = 0.05) as criteria for acceptance or reject the research hypothesis.(Sinlpasuwan,P.et.al.,1995;142-145,Thaweerat,P.;1997:163)

1. Percentage distribution, mean and standard deviation were used to analyze general information. (Sinlpasuwan, P.et.al., 1995; 142-145, Thaweerat, P.; 1997 : 172)

2. Student's t-test was applied to test the significant difference between mean scores of the experiment and of the comparison group after experimentation regarding knowledge on Dengue Haemorrhagic Fever, perceived susceptibility and severity of getting Dengue Haemorrhagic Fever, and the perception of cost-benefit in controllingof the *Aedes aegypti* larvae.(Sinlpasuwan, P.et.al., 1995; 176, Thaweerat, P.; 1997 : 174 - 176)

3. Paired Samples t-test was applied to test the significant difference between pre and post mean scores of the experiment and of the comparison group regarding knowledge on Dengue Haemorrhagic Fever, perceived susceptibility and severity of getting Dengue Haemorrhagic Fever, and the perception of cost-benefit in controlling of the *Aedes aegypti* larvae. (Sinlpasuwan, P.et.al.,1995; 176, Thaweerat, P.; 1997 : 180 - 181)

4. Z-test was used to test significant different between House Index value of before, during and after experiment. Thaweerat, P.; 1997 : 174 - 176)

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CHAPTER IV

RESULTS

Application of participatory learning program for *Aedes aegypti* larvae control in the community by six grade students, Muang district, Nonthaburi Province was carried out through health education activities by researcher. Data were collected, analyzed, and presented in 3 parts:

Part 1: Demographic characteristics of the sample group comprised of gender, father's and mother's occupation, location of residential area, experience in *Aedes aegypti* larvae control were presented in part one.

Part 2: Comparison of mean scores on knowledge of dengue haemorrhagic fever, the perception of susceptibility in getting the dengue haemorrhagic fever, the perception of severity from the dengue haemorrhagic fever infection and the perception of cost-benefit regarding *Aedes aegypti* larvae control of the study groups

Part 3 : Comparison of House Index (H.I.) between experimental and comparison groups.

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Part 1 : Demographic characteristics of the samples

Table 7 Number and percentage of the study samples classified by demographic characteristics.

Demographic Characteristics	Experimental group (n = 35)		Comparison group (n = 39)	
	Number	Percent	Number	Percent
Sex				
Female	19	54.3	20	51.3
Male	16	45.7	19	48.7
Total	35	100.0	39	100.0
Father's Occupation				
Unskilled Labor	15	42.9	27	69.2
Government officer	8	22.9	2	5.1
Small local business	7	20.0	6	15.4
Others	5	14.3	4	10.3
Total	35	100.0	39	100.0
Mother's Occupation				
Unskilled Labor	14	40.0	19	48.7
Small local business	11	31.4	13	33.3
Others	8	22.8	6	15.4
Government officer	2	5.7	0	0.0
Total	35	100.0	39	100.0
Residential area				
Semi-urban	28	80.0	35	89.7
Township	7	20.0	4	10.3
Total	35	100.0	39	100.0
Experience in *Aedes aegypti* **larvae control**				
Never	13	37.1	9	23.1
Ever	22	62.9	30	76.9
1 time	15	42.9	21	53.8
2 times	4	11.4	5	12.8
3 times	2	5.7	4	10.3
6 times	1	2.9	0	0.0
Total	35	100.0	39	100.0

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From table 7, it was found that majority of the respondents in the experiment and the comparison group was females, 54.3 and 51.3 per cent respectively.

Fathers of the sample students in both groups were employees which, were unskilled labors, 42.9 in the experiment and 69.2 per cent of the comparison group. When the occupation of the students' mothers was considered, 40.0 and 48.7 per cent of the mothers in the experiment and the comparison group was unskilled labors respectively.

Most of the students, 80.0 and 89.7 per cent of the experiment and the comparison group, were living in the semi urban areas.

Regarding the student's experience in controlling *Aedes aegypti* larvae, it was found that more than half of the students in both groups had experience, at least once, in either controlling or destroying *Aedes aegypti* larvae or *Aedes aegypti* mosquito breeding places. About 63 percent in the experiment and 77 percent in the comparison group.

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Part 2 Comparison of means score on knowledge, perception of susceptibility, severity and cost-benefit regarding *Aedes aegypti* larvae control

Table 8 Comparison of means score on knowledge of Dengue Haemorrhagic Fever and *Aedes aegypti* mosquitoes between and within the study groups before and after experimentation.

	n	$\bar{X}$	S.D.	t	df	p-value
Pre-experiment						
Experimental group	35	7.31	1.81	0.124	72	0.902
Comparison group	39	7.26	2.16			
Post-experiment						
Experimental group	35	11.17	2.70	5.937	72	<0.001*
Comparison group	39	8.0	1.86			
Experimental group	35					
Pre-experiment		7.31	1.81	-8.620	34	<0.001*
Post-experiment		11.71	2.70			
Comparison group	39					
Pre-experiment		7.26	2.16	-2.058	38	0.046
Post-experiment		8.00	1.8			

*** significant difference (p-value <0.001)**

2.1 The results of data analysis in table 8 indicated that before the experiment, there was no significant difference (p-value = 0.902) of the knowledge means score between the experiment and the comparison group. However, after the

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experiment, the knowledge mean score of the experiment group was significantly higher (p-value <0.001) than of the comparison group.

When the knowledge means score before and after experimentation of the two study groups was compared, it was found that, after experimentation the knowledge mean score of the two groups was significantly higher than before experimentation. But the experiment group had higher level of significant than the comparison group.

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Table 9 Comparison of perception means score on severity from dengue haemorrhagic fever infection between and within the study groups before and after experimentation.

	n	$\bar{X}$	S.D.	t	df	p-value
Pre-experiment						
Experimental group	35	29.43	3.82	-0.551	72	0.583
Comparison group	39	29.92	3.88			
Post-experiment						
Experimental group	35	32.14	3.66	2.257	72	0.027*
Comparison group	39	30.23	3.62			
Experimental group	35					
Pre-experiment		29.43	3.82	-2.861	34	0.007*
Post-experiment		32.14	3.66			
Comparison group	39					
Pre-experiment		29.92	3.88	-0.398	39	0.693
Post-experiment		30.23	3.62			

*** significant difference (p-value <0.05)**

2.2 As shown in table 9, before the experiment, no significant difference (p-value = 0.583) of perception means score between the experiment and the comparison group was found. However, after the program implementation, the perception means score become significantly higher (p-value = 0.027) in the experimental group, and than that of the comparison group.

When the perception means score before and after experimentation of the study group was compared, it was found that, the posttest perception means score was significantly higher than the pretest perception means score (p-value = 0.007) This significantly different was not found in the comparison group (p-value = 0.693).

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Table 10 Comparison of perception means score on susceptibility to the dengue haemorrhagic fever between and within the study groups before and after experimentation

	n	$\bar{X}$	S.D.	t	df	p-value
Pre-experiment						
Experimental group	35	40.94	4.05	0.277	72	0.783
Comparison group	39	40.64	5.18			
Post-experiment						
Experimental group	35	44.49	4.17	3.712	72	<0.001*
Comparison group	39	40.56	4.84			
Experimental group	35					
Pre-experiment		40.94	4.05	-4.491	34	<0.001*
Post-experiment		44.09	4.17			
Comparison group	39					
Pre-experiment		40.64	5.10	0.086	38	0.932
Post-experiment		40.56	4.84			

***significant difference (p-value <0.001)**

2.3 The t-test analysis was made to determine the significant different between perception means score on susceptibility to Dengue Haemorrhagic Fever between the experiment and the comparison groups as well as within the group. As shown in table 10, before the experiment, no significant difference (p-value = 0.783) of perception means score between the experiment and the comparison group was found. However, after the program implementation, the perception means score

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significantly higher (p-value < 0.001) in the experimental group, and than that of the comparison group.

When the perception means score before and after experimentation of the experiment group was compared, it was found that, the posttest perception means score was significantly higher than the pretest perception means score (p-value < 0.001) This significantly different was not found in the comparison group (p-value = 0.932).

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Table 11 Comparison of perception means score on cost benefit in controlling the *Aedes aegypti* larvae between and within the study groups before and after experimentation.

	n	$\bar{X}$	S.D.	t	df	p-value
Pre-experiment						
Experimental group	35	43.51	4.53	0.844	72	0.402
Comparison group	39	42.56	5.09			
Post-experiment						
Experimental group	35	44.37	4.82	0.574	72	0.568
Comparison group	39	43.72	4.95			
Experimental group	35					
Pre-experiment		43.51	4.53	-1.014	34	0.318
Post-experiment		44.37	4.82			
Comparison group	39					
Pre-experiment		42.56	5.09	-1.692	38	0.099
Post-experiment		43.72	4.95			

2.4 Table 11 revealed that the two study groups had not shown the significant different of the perception means score on the cost benefit both before (p-value = 0.402) and after experiment (p-value = 0.568). When the perception means score between before and after the experiment, the significant different was also not found.

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Part 3 Comparison of House Index (H.I.) between experimental and comparison groups.

Table 12 Comparison of the House Index (H.I.) between experimental and comparison group before, during and after experiment.

	No. of House inspected	No. of larvae infested houses	H.I.	Z-test	p-value
Pre-experiment (wk.1)					
Experimental group	13	12	92	0.1585	0.4364
Comparison group	10	9	90		
During-experiment(wks.5)					
Experimental group	13	12	92	0.1585	04364
Comparison group	10	9	90		
During-experiment(wks.7)					
Experimental group	13	11	85	-1.1887	.1190
Comparison group	10	10	100		
Post-experiment (wks.8)					
Experimental group	13	8	61	-1.5718	0.582
Comparison group	10	9	90		

3.1 According to table 12, H.I. of the experiment group was decreasing gradually from before experiment (the 1th week), during experimentation (the 5th and the 7th week) and after experiment (the 8th week) while H.I. of the comparison group was almost the same. However, when the H.I. of the experiment and of the

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comparison group, before, during and after experiment, were compared, the significant different were not found.

Since the decreasing of the H.I. of the experiment and of the control group was not the same. Thus, the proportional difference between the proportion of household that the *Aedes aegypti* larvae were found, before and after the program implementation was compared. Table 13 showed that the proportional difference between the proportion of household, that the *Aedes aegypti* larvae were found, before and after the program implementation of the experiment group was 0.31 and of the comparison group was 0.00. When the Z-test was used to test the significant different between the two value, the statistical significant was found at p-value = 0.025.

Table 13 Comparison of the proportional difference between the proportion of household, that the *Aedes aegypti* larvae was found, before and after the program implementation of the study groups.

Sample group	No. of Houses Surveyed	No. of positive houses	Proportion of positive houses	Proportional difference	Z-test	p-value
Experimental group						
Pre-experiment	13	12	.92			
				.31		
Post experiment	13	8	.61			
					1.96	.025*
Comparison Group						
Pre-experiment	10	9	.90			
				.00		
Post experiment	10	9	.90			

*** significant difference (p-value <0.05)**

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Table 14 Comparison of the House Index (H.I.) of the experimental group before, during and after experiment

Study group	No. of houses being surveyed	No. of positive houses	H.I.	Z-test	p-value
Pre-Experiment (wk.1)	13	12	92	<0.001	>0.500
During Experiment (wks.5)	13	12	92		
Pre-Experiment (wk.1)	13	12	92	0.5490	0.2964
During-Experiment (wks.7)	13	11	85		
Pre-Experiment (wk.1)	**13**	**12**	**92**	**1.8570**	**.0322***
Post-Experiment (wks.8)	**13**	**8**	**62**		
During-Experiment (wks.5)	13	12	92	0.5490	0.2912
During-Experiment (wks.7)	13	11	85		
During-Experiment (wks.5)	13	12	92	1.8507	.0322*
Post-Experiment (wks.8)	13	8	62		
During-Experiment (wks.7)	13	11	85	1.3785	0.0858
Post-Experiment (wks.8)	13	8	62		

*** Significant difference (p-value <0.05)**

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3.2 As explained in 3.1 that the H.I. was assessed at different points in time, before experiment (the 1^{th} week), during experimentation (the 5^{th} and the 7^{th} week) and after experiment (the 8^{th} week). When the H.I. value among the different points in time were compared, it was found that only H.I. between before and after experiment and H.I. between during experimentation on the 5^{th} and the 8^{th} week was significantly different (p-value = 0.0322) as shown in table 14.

3.3 When the H.I. value among the different points in time of the comparison group were compared, the significant different was not found in any compared groups as shown in table 15

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Table 15 Comparison of the House Index (H.I.) of the comparison group before, during and after experiment

Comparison group	No. of houses being surveyed	No. of larvae inspected houses	H.I.	Z-test	p-value
Pre-Experiment (wk.1)	10	9	90	0.000	.5000
During -Experiment (wks.5)	10	9	90		
Pre-Experiment (wk.1)	10	9	90	-1.0256	.1515
During -Experiment (wks.7)	10	10	100		
Pre-Experiment (wk.1)	**10**	**9**	**90**	**0.0000**	**.5000**
Post-Experiment (wks.8)	**10**	**9**	**90**		
During -Experiment (wks.5)	10	9	90	-1.0256	.1515
During -Experiment (wks.7)	10	10	100		
During -Experiment (wks.5)	10	10	100	-1.0256	.1515
Post-Experiment (wks.8)	10	9	90		
During -Experiment (wks.7)	10	9	90	0.0000	.5000
Post-Experiment (wks.8)	10	9	90		

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CHAPTER V

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

The purpose of this quasi-experimental research was to assess the effectiveness of the application of participatory learning approach for mosquito larvae control among the 6th grade students, Muang District, Nonthaburi province. The participatory learning concept was used as guidelines for developing health education program activities which, were designed for the experimental group to enhance their experimental learning, and stimulating their participation in problem solving and cooperative learning as well as skills practices (Department of Mental Health : 2000 : 8 – 9).

The study program emphasized on the positive changes in knowledge regarding Dengue Haemorrhagic Fever and the mosquito larvae, perception on severity from getting the Dengue Haemorrhagic Fever, susceptibility to the Dengue Haemorrhagic Fever and cost benefit in controlling of *Aedes aegypti* larvae.

The study samples in this study were 74 students in the 6th grade level under the Office of Primary Education of Muang District, Nonthaburi Province. The sample group was divided into 2 groups: experimental group- 35 students of Wat Puttiprangpramote school, and comparison group – 39 students of Choomchon Wat Smorakote school.

The participatory learning program activities were implemented in the experiment group for 8 weeks during November and December 2000. During the 1st

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week, data were collected from both the experimental and the comparison group, using constructed self-administered questionnaire and other instruments.

Conclusions

Part 1 : Demographic Characteristics of the sample

It was found that both the experimental and the comparison groups had quite similar demographic characteristics for example. majority of them was females, their parents were unskilled employees, and their residents were located in semi-urban community. The majority of the student samples had ever done *Aedes aegypti* larvae control at least once.

Part 2 : Research Results

2.1 Pre-experiment No significant difference was found in both groups in terms of knowledge on Dengue Haemorrhagic Fever and *Aedes* mosquito, perceived severity, perceived susceptibility of Dengue Haemorrhagic Fever, perceived benefit in controlling of the *Aedes aegypti*, larvae as well as on HI value. .

2.2 Post-experiment

2.2.1 Knowledge on DHF and *Aedes* mosquito

The experimental group had a significant increasing in knowledge means score of the Dengue Haemorrhagic Fever and *Aedes aegypti* larvae control than before the-experiment and than that of the comparison group, thus the hypothesis 1.1. was accepted.

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2.2.2 Perceived severity of Dengue Haemorrhagic Fever

It was found that the experimental group had a significant higher mean value of perceived severity of Dengue Haemorrhagic Fever than that in their pre-experiment, and that of the comparison group, as hypothesis 1.3.stated.

2.2.3. Perceived of susceptibility to Dengue Haemorrhagic Fever

The experimental group had significant higher mean value of perceived of Dengue Haemorrhagic Fever than that in the pre-experiment, and than that of the comparison group, conform to hypothesis 1.2.

2.2.4 Perceived cost benefit in controlling the *Aedes aegypti* larvae

The result showed that the experimental group had higher cost benefit means score than the comparison group, but the different was not significant. So the hypothesis 1.4. was rejected.

2.2.5 House Index

H.I. of the experimental group after program implementation was found significantly lower (p-value = 0.0322) than before the experiment and of the comparison group. This finding confirmed the hypothesis 2.

Discussions

1. **Hypothesis 1 After the participation of the study program, the students will gain more positive behaviors on the following: -**

1.1 Knowledge of Dengue Haemorrhagic Fever and *Aedes aegypti* larvae control.

After the experiment, the experimental group gained more significantly essential knowledge on Dengue Haemorrhagic Fever and *Aedes* mosquitoes than

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before the experiment, and than that of the comparison group. This finding could be explained that the increasing of essential knowledge due to the student's participation in the 1st and 2nd health education activities. These activities were designed according to the participatory learning approach which, student-center was carefully focused.

Dr. D.J. Nicol, a specialist in training believed that such approach is the most effective mean to develop knowledge and attitude (Department of Mental Health ; 2000 : 9). In addition, the distribution of educational sheets and leaflets that can be brought home for self-study enhance students' maximum learning.

This research finding is in consistent with Jiamjit,N. (1999 : 86) who found that after the health education program through lectures with posters, leaflets and VDO tape, students had significantly higher knowledge means score regarding Dengue Haemorrhagic Fever than before the experiment. Duangkumsawas,D.et.al (2000 : 175 – 176) applied group process and social support from village health volunteers to change housewife's behavior in prevention of Dengue Haemorrhagic Fever. He found that the program yielded significantly higher knowledge on Dengue Haemorrhagic Fever among housewives. Tusakunnee; C, 1999 : 146-147) applied to life skill with social support the experiential learning to prevent amphetamine observed the students in technical college student the students were increase in knowledge of amphetamine.

1.2 Perceived susceptibility to Dengue Haemorrhagic Fever and perceived severity of Dengue Haemorrhagic Fever infection.

After the experiment, there was significant positive change in perceived severity and perceived susceptibility of Dengue Haemorrhagic Fever among

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experimental group than before the experiment, and than that of the comparison group. This can be explained that an increasing in perception of the severity of and susceptibility to the disease among experimental group probably resulted from educational activities arranged by researcher in the 1st session, lesson plan 1. Each activity was geared to the student as a focal point of learning experience. This result conformed to Taluengpet,T. (2000 : 59), Koonawoot,S. (1997 : 91) and Sae-Ung ,P.(1992 : 85) who found that students had significantly higher positive perception on susceptibility and severity of the Dengue Haemorrhagic Fever. This research result also confirmed with Tianrawibool,S .(1999 : 92) and Deokul,w. (1999 : 85) studies that the experimental housewives had significantly increase in their perceived severity and perceived susceptibility of Dengue Haemorrhagic Fever.

1.3 Perceived benefit in controlling or destroying of the *Aedes aegypti* mosquito breeding places and the *Aedes aegypti* larvae

After the experiment, no significant differences were found, regarding the changes in perceived in controlling the *Aedes aegypti* larvae, for both pre and post experiment among experimental group. This result was also found among the comparison group. However, when comparison between groups were further analyzed it was found that both experimental and comparative groups had not much different in the perception means score. It should be pointed out that the perception means score of the two groups were considered quite high at the beginning. Considering the score of each question, it was found that after the experiment the experiment group had higher score in 8 out of 11 questions. This result suggested that an increasing in mean score among the experimental group be resulted from the health education program activities which, were developed based on the experiential

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learning (sited in Department of Mental Health: 2000 : 9). In the otherhand, during course of the study,the comparison group was gained knowledge of DHF., surveyed and destroying Aedes aegypti larvae breeding places from Health afficers of Muang Health Offices. That one because at near area of Choomchon Wat Smorokote school has DHF patients.

2. Hypothesis 2 After experimentation the House Index of the experiment group will be decreased.

After the program the H.I. of the experimental group was significantly decreased from before the experiment. However the H.I. value of the two groups after the experiment was not significantly different. However, when the proportional difference, between the proportion of household that the *Aedes aegypti* larvae were found, before and after the program implementation, of the two groups was compared the statistical significant different was found. .

The large proportion in the decreasing of the H.I. value was affected by student involvement in experiential learning activities in the 2nd session, lesson plan 5. This finding was relevant to Taluengpet,M. (2000 : 64) who found that students had significantly increased their proper behavioral practices in prevention and control of the DHF at home and at school than before the-experiment. The H.I. value also decreasing. Koonawoot,S. (1997 : 89) found that students practices regarding prevention of the DHF were increasing. While the percentage of containers infested with larvae (C.I. = Container Index) and the Breteau Index (BI.) had also significantly decreased. According to Sae-Ung,P. (1992 : 89) report, the students practices in

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prevention of the Dengue Haemorrhagic Fever was improved and the C.I. was significantly decreased.

Recommendations from Research Results

1. The application of participatory learning program for *Aedes aegypti* larvae control among the 6th grade students, Muang District, Nonthaburi province can enhance the student's knowledge on dengue haemorrhagic fever, perceived severity and susceptibility of Dengue Haemorrhagic Fever and perceived cost benefit in controlling the *Aedes aegypti* larvae. Such the student change will lead to the decreasing in percentage of houses infested with larvae (H.I. = House Index). This reflects the desired behavioral practices of controlling or destroying *Aedes aegypti* breeding places as well as the controlling or destroying *Aedes aegypti* larvae. Thus, schools in the endemic area of Dengue Haemorrhagic Fever can apply either this program or the participatory learning approach for active health problem solving.

2. This research focussed on the school age children, a high-risk group, that more susceptible to Dengue Haemorrhagic Fever than other groups. They were asked to participate in *Aedes aegypti* larvae control. It aimed at enhancing and creating awareness and proper practices in *Aedes aegypti* larvae control among these students. In addition, classroom teachers who are closed to and trusted by students should also be aware and realize the importance of proper practices by students. They should be promoted as well as motivated to practice continuously regarding the controlling or destroying of *Aedes aegypti* larvae. Since the endemic of Dengue Haemorrhagic Fever has been continuing all year round, it is important to motivate

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the students to perform *Aedes aegypti* larvae control regularly and continuously, for instance, destroying the *Aedes aegypti* breeding sites at home every Friday etc.

3. The research results revealed that students who participated in health education program activities based on the participatory learning in *Aedes aegypti* larvae control had a lower H.I. This resulted from their improvement in behavioral practices in controlling or destroying *Aedes aegypti* larvae or the *Aedes aegypti* breeding places. Hence, this participatory learning approach should be applied for other health education program such as the program for "national health practices".

4. In this research, the researcher used House Index to reflect the actual practices of the sample students in controlling or destroying *Aedes aegypti* breeding sites as well as the controlling or destroying the *Aedes aegypti* larvae. Since the H.I. survey is simply and conveniently to do. It is also safe a lot of time. Thus it can be used as one of the indirect indicator for behavioral practices in controlling or destroying *Aedes aegypti* breeding sites as well as the controlling or destroying the *Aedes aegypti* larvae.

Recommendation for Further Study

1. Further research should be carried out by simultaneously providing health education to family's members of the experimental group in order to involve all every family's members to participate in controlling or destroying *Aedes aegypti* breeding places. Social support from family's members, classroom's teacher and health personnel in respective areas are required.

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2. *Aedes aegypti* larvae survey for House Index (H.I.) in the experimental area should be carried out for more households, so that, the statistical testing will be more reliable. .

3. Health education program should not be arranged during the school activities such as school sport event, to avoid less concentration and absentee of students in health education class. Moreover, the program should be set for only 3 times a week, with 1 teaching plan each time to gain maximum interest from students. There fore the health contents should be more appropriate to integrate in the "enhancing life experience" subject. .

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BIOGRAPHY

NAME Mrs. Jarunee Chaicharncheep.

DATE OF BIRTH 30 December 1960.

PLACE OF BIRTH Nakornprathom, Thailand.

INSTITUTATIONS ATTENDED Boromrajonani College Of Nursing, Chonburi.
1979-1983 Diploma In Nursing And Midwifery: Equivalent To Bachelor Of Nursing.
2000-2001 Mahidol University.
Master Of Sciene (Public Health)
Major in Health Education And Behavioral Scienes.

POSITION & OFFICE 1983-1990: Graduate Nurse.
Nakornprathom Hospital, Nakornprathom Province.
1991-1992:Graduate Nurse.
Ubolrachthani Provincial Health Office, Ubolrachthani Province.
1993-Present, Health Education Division, Ministry Of Public Health.
Position : Health Education Officer.

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