

A Study of Project-Based Learning through Learning Tools: A Case Study of Darunsikkhalai School

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Abstract: Purpose of this research was to study Project-Based Learning through learning tools: A case study of Darunsikkhalai School for Innovative Learning. The research followed qualitative methodology using participant observation, interviewing and note-taking for 4 months. Result of the study was that the Project-Based Learning composed of three models as follows. 1) Policies of the school were constructionism, learning organization and the fundamental of mindfulness meditation practice. 2) Role of teacher was as facilitator. 3) Learners' characteristics consisted of goal setting by using "Agenda Book," and meetings. Learners' interesting/attention took place when the facilitators asked questions or they were on a field trip, their skills are relevant to team's assignments. Their abilities included goal setting, planning, searching for information, note-taking, team learning, sharing ideas, and presentations. Furthermore, the learners' planning also consisted of short and long plans, and ranked the plans in order of priority. Lego and Microworlds were used for creative thinking while Mind Map could be used for classification thinking. Integration of concrete matters was Lego and Microworlds and the integration of abstract was rather complex. Scientific process was a process of finding answers. Sharing ideas began with time schedule of the school giving learners opportunity to express their ideas openly and naturally with congenial atmosphere. Transfer of learning occurred when the learners acquired direct experiences, explicit knowledge, and/or tacit knowledge. Cooperative learning could be built up when all team members had equally received their assignments. In terms of multiple intelligences, it was found that spatial intelligence and bodily intelligence were ranked at a highest level while linguistic intelligence and intrapersonal intelligence were at a lowest level.

Keywords: Project-Based Learning, Learning Tools, Darunsikkhalai School for Innovative Learning

Introduction

From interviews with educators and literature review, it was found that Project-Based Learning (or PBL) covers such topics as learner's opportunity to learn, search for, set goal, plan, design, practice, experiment, present works, and evaluate according to his/her interest, skill and ability (Moonkhum, 2002); (Office of the National Primary Education Commission 2002) individually or in a group using thinking process, integration, and scientific process to conduct a project at each step. Besides, during PBL implementation learners have chances to share ideas, work together to solve problems under the supervision of instructor (Buck Institute for Education, 2002) until learners can build up pieces of work in a meaningful way and useful to themselves.

Therefore, PBL is really important to today's educational system, namely, learning to improve each learner through thinking process and practical work by themselves (Kaewdang, 1998). This complies with National Education Act B.E. 2542 (Second Amendment B.E. 2545) "Section 24 In organizing the learning process, educational institutions and agencies shall: ... (2) provide training in thinking process, management, how to face various situations

and application of knowledge for obviating and solving problems; (3) organize activities for learners to draw from authentic experience; drill in practical work for complete mastery; enable learners to think critically and acquire the reading habit and continuous thirst for knowledge” (Office of the National Education Commission, Office the Prime Minister, 2000). This is considered the development of learner’s thinking process and procedure according to their real potential.

Moreover, PBL also supports learner’s life skills in a Knowledge-Based Society as well as potential diversity enhancement. Besides, it will connect all kinds of knowledge into multidisciplinary (Wasri, 1999). Learners could build up their own knowledge throughout their lives as in UNESCO’s report on Education in Twenty First Century says ‘learning for life must come from 4 pillars: Learn to Know, Learn to Do, Learn to Be, and Learn to Live Together’ (Autodesk Foundation, 1999) in order that they could compete in the globalization.

However, there were some instruction difficulties at the present like most instructors recognized the importance of PBL but did not understand how to utilize it. Most of them also have the impression that a facilitator who needs to guide and supervise learners has to do more works; therefore, they prefer to lecture instead. Instruction becomes worse due to boredom and recitation without real practice and experiment (Petchrak, 2004). From these reasons, learners cannot apply their knowledge in real-life situations.

According to above-mentioned importance and problems, it gave rise to an idea of undertaking a research on Project-Based Learning through Learning Tools: A Case Study of Durunsikhalai School. The findings could be very beneficial to designing and developing classroom instructions and activities to comply with PBL so that learners learn from real-life practice, think, do, develop their own knowledge that help prepare students to be lifelong learners.

Conceptual Framework

Primary education is still related to content. However, the real world is the world of learning which changes fast. To make learners intelligent, the instruction should be done in accordance with National Education Act B.E. 2542 (Second Amendment B.E. 2545) (Moonkhum, 2002). Hence, learners could develop themselves to compete in the globalization era.

Content-based learning cannot show the relationship between life and complicated situation. To reform education, education should be based on real-life situation (Office of the National Primary Education Commission 2002). Learning from real source or by project will allow learners to practice, design and test so that they could think by themselves in the information worlds all their life (Buck Institute for Education, 2002).

Project-Based Learning (or PBL) covers such topics as learner’s opportunity to learn, search for, set goal, plan, design, practice, experiment, present works, and evaluate according to his/her interest, skill and ability (Moonkhum, 2002); (Office of the National Primary Education Commission 2002) individually or in a group using thinking process, integration, and scientific process to conduct a project at each step. Besides, during PBL implementation learners have chances to share ideas, work together to solve problems under the supervision of instructor (Buck Institute for Education, 2002) until learners can build up pieces of work in a meaningful way and useful to themselves.

Learning tools means tools which support and allow learners to practice by themselves until they could think and solve problems. Examples are 1) MicroWorlds, 2) Lego/Logo, 3) Photo Journalism, and 4) Electronic Magazine. Its purpose is based on constructionism that can be used to make a learner-centered learning through project until learners achieve the expected results as shown in Figure 1.



Figure 1: *Darunsikhalai Students Working with Lego/Logo*

Constructionism is a learning process developed by learners through thinking and doing. Learners must be in a facilitating environment where technology is used as a tool to support learner's progress so that they could apply their knowledge in real life.

Nevertheless, at present there are still learners who cannot learn by thinking and doing on their own because they are accustomed to teacher-based learning, in other words, they wait for assignments from teacher. PBL will help resolve these problems in order that learners could learn on their own, think creatively, and become a lifelong learner.

Objectives of the Study

a. Immediate Objective

To study Project-Based Learning instruction through learning tools: A case study of Darunsikhalai School.

b. Ultimate Objective

To study the mechanism or factors affecting the success in Project-Based Learning instruction through learning tools.

Expected Outcomes of the Study

1) Teachers could apply the results from PBL instruction through learning tools in designing learning styles to develop and improve learning behaviors, for example, multiple intelligence should be observed in all learners at all levels so that activities could be prepared to meet their learning styles.

2) Teachers and administrators could explain PBL in details to learners, parents and related persons in a clear manner so that learners could create body of knowledge by themselves. This will help all concerned people to keep up with the new challenge of Project-Based Learning in the near future.

3) Educational institutions could use PBL to improve both instructor's and learner's potential at all levels such as basic education, vocational education, and higher education so that the development of thinking process and learning process will meet the specified objectives of each learner with effectiveness and efficiency.

Assumption of the Study

Darunsikhalai School was chosen for this study because the school is connected with Project-Based Learning and technology application in learning such as MicroWorlds and Lego/Logo as required by researchers. Moreover, Darunsikhalai School does not offer any lecture in any subject and/or any period of time so that learners could devote all their time to the project.

Limitations of the Study

This study is a qualitative research and needs some time for researchers to observe and notice the changes in fabric of learning in learners over time. Thus the limitation in this study is the time.

Research Methodology

One of the reasons that the researchers chose Darunsikhalai School because one of the researchers used to work there from 2001 to 2004.

a. A Case Study Selection

- 1) Researchers chose Darunsikhalai School to be a case study because this school initiated Project –Based Learning at basic education for at least 3 years. Thus, Darunsikhalai School is a school that mixes and applies 3 principal ideas in learning management as follows: (1) Constructionism through Learning Tools, (2) Learning Organization, and (3) Meditation Principles.
- 2) Students at Darunsikhalai School could be divided into 2 groups as follows: Group 1 consisted of 7 students, aged 6-10, at House of Nature, and Group 2 was composed of 12 students, aged 10-14, at Siam Renaissance.
- 3) Instructors included teachers at Darunsikhalai School who act as facilitators to guide students by using instruction related with Project-Based Learning according to conceptual framework of Constructionism.

b. Scope of the Study

The study focused on concepts, principles, Project-Based Learning, Problem-Based Learning, Constructionism, Brain-Based Learning, Multiple Intelligences, and Learning Tools.

c. Tools for Data Collection

- 1) Researcher was a qualitative tool because he/she has to collect the data at the field, do focus group discussion as well as participant observation. Since a researcher used to work as a teacher at Darunsikhalai School (from 2001 to 2004), it is an advantage of the researcher to adjust to key informants quickly because they know the researcher very well.

- 2) A non-structured interview for in-depth study
- 3) Unstructured observation form developed by researchers along with tables for note-taking using field note-taking form, data-computer, video taking, and sound effects.

d. Duration of the Study

A researcher had conducted participant observation for one term, from November 1st, 2004-March 18th, 2005.

e. Data Analysis and Synthesis

Researchers analyzed and synthesized the data qualitatively as follows:

- 1) Analyzing secondary data such as theoretical framework as well as theories concerned before going to the field.
- 2) Synthesizing data concerning the meaning of 'Project-Based Learning', 'Problem-Based Learning', and 'Integrated Learning'.
- 3) Analyzing and describing the content through data procession, and summarizing the field data emphasizing on three parts: systematics, objectivity, and related theoretical framework.

Results of the Study

The results of the study could be concluded as follows:

1) Purpose of Darunsikhalai School is to develop students' self learning process in all 4 aspects as follows:

1.1 Life skills : The School aims at encouraging students to gain systematic learning, being able to think, doing practical work in solving problems, team working, management and administration, creative thinking, and self-reliance. These should be parallel with ethics, virtue, and awareness of tradition, culture and Thai wisdom as well as good quality of life and happiness.

1.2 Academic skills: It focuses on students' ability to learn and understand the subjects in deep through practical work and real experiment, guiding by subject experts to help them in learning.

1.3 Technology fluency: It implements technology and information as well as educational technology, especially from the results of research and development of The Media Lab of Massachusetts Institute of Technology (MIT), USA, as tools to support student's skills, to help students learn with happiness and joyfulness. Students will develop positive attitude of higher level of learning, and be a nice person who can share ideas and experience with others.

1.4 Knowledge and language usage skills, especially Thai and English that help students to communicate with others effectively, will increase their abilities of searching and analyzing data all over the world. This will lead students to know and comprehend international tradition and culture.

2) Vision of Darunsikhalai School

From the discussion and dialogue between administrators and team of teachers, the vision of Darunsikhalai School is created as follows:

2.1 Lifelong Learning: To develop personnel to become learners who are proactive and ready to learn things endlessly and always open their minds to new things.

2.2 Experience Seeking: To develop personnel to be able to utilize critical mind to gain more new useful experiences through learning and doing practical work.

2.3 Wisdom Creating: All personnel in organization will learn to create wisdom. This process can take place inside one's self by planning, analytical thinking, evaluating, and doing practical work through different kinds of activities and projects within virtual environment. Thus, it can support students' learning so that they are able to apply them to live, construct body of knowledge, as well as create new innovation.

2.4 Keeping Abreast with International: All personnel in organization will be one of global citizens, performing international duties actively and fluently both on languages and technologies as well as understand traditions, and cultures of all foreign countries.

3) Mission of Darunsikhalai School

In order to develop Darunsikhalai School's personnel, the mission will be taken into 5 main principles as follows:

- 1) IQ (Intelligence Quotient): Skills including scholar for personnel development intelligently and more knowledgeable.
- 2) EQ (Emotional Quotient): Emotion including state of mind of personnel to learn about themselves and emotional stability.
- 3) AQ (Adversity Quotient): Confrontation of multi-situations and skills of solving problems that were hardly seen before as well as abilities to work well under pressure.
- 4) TQ (Technology Quotient): Technology skills and/or abilities to utilize technology fluently.
- 5) MQ (Morality Quotient): Virtue and ethics for personnel to polish their good heart and be able to live together in societies with happiness.

One of the most significant of Darunsikhalai School's mission which school administrator has put a lot of effort on it is to develop students to be able to change selected data that are plenty of it at the present time to be useful information and vice versa to become knowledge and wisdom. Then, it can be a fundamental of proper decision making in accordance with time and situation that is taken place (Darunsikhalai School for Innovative Learning, 2002).

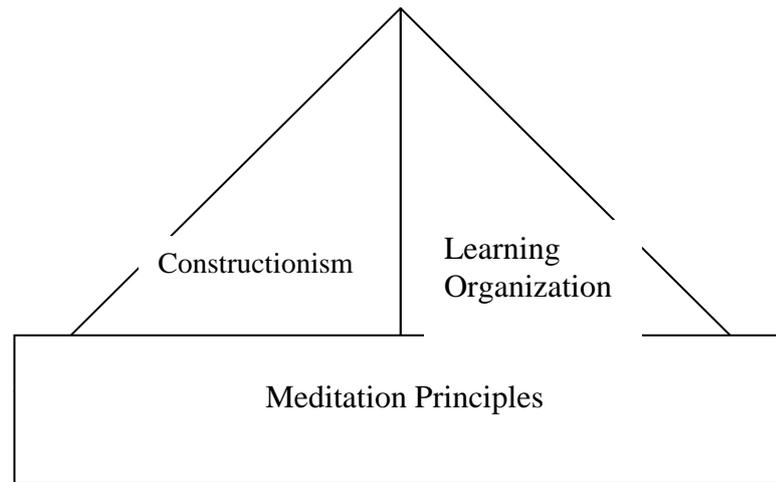


Figure 2: *Concepts and Principles of Darunsikhalai School Foundation*

4) The Foundation of Darunsikhalai School

From Figure 2, concept of founding Darunsikhalai School was from mixing and/or applying concept of 3 principles: Constructionism by Seymour Papert, Learning Organization by Peter Senge, and Meditation Principles.

5) Learning Skills includes abilities of Thai coupled with English languages fluency, having moral, virtue including Thai awareness, technology fluency, well adjusting to international culture, and being self-dependent in new Knowledge-Based Economy with happiness (Darunsikhalai School, 2003).

6) Educational Goals of Darunsikhalai School

6.1 Develop students' knowledge and in-depth understanding towards theories, reasoning, concepts, facts, and different hypotheses on sciences, social sciences, and liberal arts through co-activities, short and long projects, integrated with theories and technologies necessarily and properly.

6.2 Foster students to love and possess good attitude towards learning, have self-confidence in his/her abilities in data searching, think analytically on problem-solving, always be ready to learn new things, and be skillful in unseen problem-solving.

6.3 Enhance each student to develop him/herself according to his/her interests, potential, and life goals (or life curriculum) already planned.

6.4 Give students' opportunities to develop abilities in technology, Thai-English language usage skills through learning activities and under atmosphere that helps encourage learning development.

6.5 Foster each student to take responsibilities for him/herself and societies as a whole, have low individualism, show kindness of heart, be able to work and live well with others in the societies including having good manners and characters appropriately through physical, conversation, and heart in congruence with Thai beautiful tradition and society.

6.6 Support each student to develop his/her self potential to become professional including to know and comprehend different kinds of international traditions.

Darunsikhalai School not only aimed at developing students to become 'Learners' but also teachers as well. Thus, teachers and students would be trained in basic learning process in Lego and Microworlds Projects. These projects can be considered as prototype of Constructionism. Lego tools are considered as learning tools to stimulate students to learn trial and error, dare to learn. For Microworlds or program computer, these programs are able to apply from basic to higher levels. Students can construct their projects or virtually simulate through computer monitor.

As we can see, Darunsikhalai School has utilize information technology or computer as learning tools in searching and creating so that students can lead to thinking process more clearly than any conventional schools which seems to utilize these new learning innovation by formulating a computer course in a curriculum as past tradition of teaching and learning used to be.

7) Futures of Darunsikhalai School

Darunsikhalai School in future will concentrate on real responding. Thus, policy and planning of the School is to expand classroom to higher levels as in secondary education. Teaching and learning will be arranged through Project-Based Learning and Career-Based Learning. Besides, community integration consists of students, teachers, and parents as part of Holistics of Wisdom Centre. The School has already included parents as a community of the School. This group of parents will participate in administration, curriculum development, and teaching and learning activities. Since careers of School's parents are diversities such as doctors, nurses, engineers, teachers, instructors, businessmen etc., these professionals can help support students' interests in the future as well.

8) Internal buildings

- 1) Classroom for teaching and learning for group of students at 'Siam Renaissance' will be used as learning corners for students to learn different things by themselves such as computer corner for data searching, and text corner concerning related topics for studying. Inside the rooms, there will be no tables for teachers. Desks will be arranged in circle and can be adjusted at all time according to learning activities.
- 2) Mini theatre room for teaching and learning for group of students at 'House of Nature' in which inside there were projector, screen for movies, and a room controlling sound system as well as movie displays system.
- 3) Library contains text and learning mediums such as Lego and videos.
- 4) Meeting room will be utilized by teachers and students to share ideas, present their assignments/projects through projectors, and meeting together.
- 5) Parents' room is used for parents to share ideas or dialogue while waiting to pick their children home or sometimes for parents' meeting.
- 6) Nursing room
- 7) Resting room for teachers is used for keeping students' portfolio. What's more, there is a corner of computer for data searching or project sheet preparation for students.

9) Teaching and learning activities of Darunsikhalai School will mainly concentrate on Constructionism and Project-Based Learning. However, these activities should meet with the student's interests. Then, in each academic year, students will be able to select the next project for their activities after they finished the first one within 2-3 weeks so that the teacher can prepare materials and activities for the projects. In fact, the main learning activities can be concluded as follows:

- 1) Learning activities through project work
 - 2) Activities to enhance different kinds of skills utilized in the projects such as mathematics, English language, science through text and paper-based learning according to their aptitude.
 - 3) Activities for sharing ideas to work on the projects by telling learning experiences including problems arising from team working, drilling of data presentation and paper work twice a week.
 - 4) Activities for self-evaluation each week by making daily note-taking of their work,
process the data, analyze his/her own work, and goals setting in order to adjust themselves for next week.
 - 5) Activities for music, arts that interest students each week.
 - 6) Activities for sports so that students can do some exercises, play sports in order to instill positive attitude towards exercising, keeping good health, having good hygiene, playing sports, being sports spectators, and possessing of sports mind.
- 10) Steps of Project-Based Learning at Darunsikhalai School were shown in Figure 3 as follows:

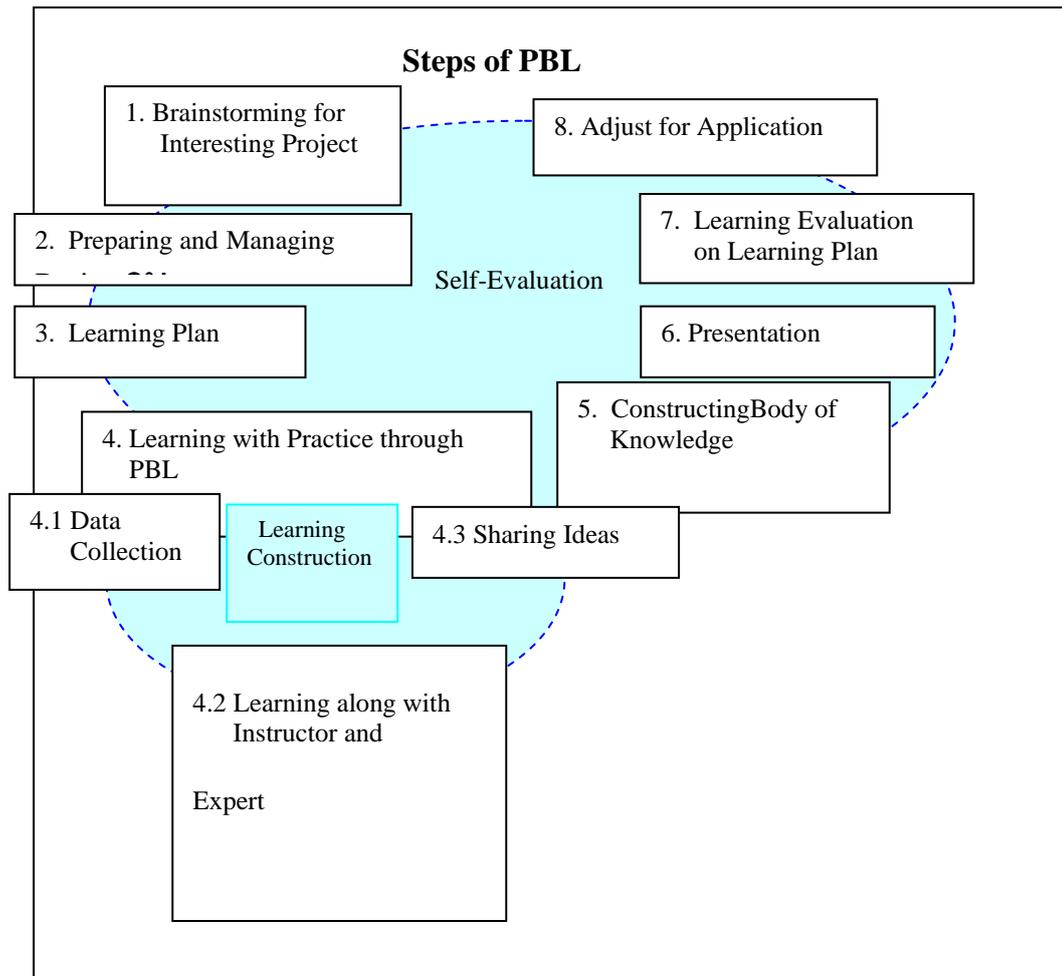


Figure 3: *Steps of Project-Based Learning*

From Figure 3, steps of Project-Based Learning were as follows: 1) Brainstorming for Interesting Project, 2) Preparing and Managing, 3) Learning Plan, 4) Learning with Practice through PBL including Data Collection, Learning along with Instructor and Expert, along with Sharing Ideas, 5) Constructing Body of Knowledge, 6) Presentation, 7) Learning Evaluation on Learning Plan, and 8) Adjust for Application

11) Darunsikhalai School of Project Models during 2/2005 Academic Year

During 2/2005 academic year, Darunsikhalai School's projects were divided into 2 periods in accordance with students' evaluation criteria especially on self-discipline, readings, writings, and learning process. However, age and abilities were randomly selected for each group so that there would be no differences or too many differences among them that might be hard for them to learn effectively.

12) Students are divided into 2 big groups as follows:

- 1) House of Nature Group: It is a group of students aged 6-10. Learning management model emphasizes on basic knowledge, thinking skills, team working, and learning process. Learning does not concentrate entirely on academic purposes. Roles and duties of teacher of the group are checking, closely attending and assisting with follow-up of work group as well as guiding on Project-Based Learning development continually.

- 2) Siam Renaissance Group: It is a group of student aged 9-14. Learning management model emphasizes on creating projects that branch-out body of knowledge, analytical thinking, systems thinking, self-project management and administration, time management, and learning process skills. It promotes participatory approaches to project development that allows student to take part in and be good initiator.

13) Different Projects of Darunsikhilai School within 2/2547 academic year could be divided as follows:

Phase 1: From November 1st – December 27th, 2004 as shown in Tables 1 and 2 as follows:

Table 1: *Projects Conducted by House of Nature 1*

Project Names	No. of Students	No. of Teachers	Teachers : Students
1. Movies	5	2	2:5
2. Dogs	5	2	2:5
3. Bees	2	1	1:2
4. Plants	2	1	1:2
Total	14	6	6:14

From Table 1, there were 14 students and 6 teachers in House of Nature 1 group.

Table 2: *Projects Conducted by Siam Renaissance 1*

Project Names	No. of Students	No of Teachers	Teachers : Students
1. Programs	5	2	2:5
2. Energy	5	2	2:5
3. Pollution	2	1	1:2
Total	16	7	7:16

From Table 2, there were 16 students and 7 teachers in Siam Renaissance 1 group.

Phase 2: From January 18th – March 18th, 2005 as shown in Table 3 and 4 as follows:

Table 3: *Projects Conducted by House of Nature 2*

Project Names	No. of Students	No of Teachers	Teachers : Students
1. Cars	1	2	2:5
2. Aeroplanes	3		
3. Bicycles	1		
4. Trains	4	3	3:8

Table 3: (Cont.)

Project Names	No. of Students	No of Teachers	Teachers : Students
5. Horses	3		
6. Ships	1		
Total	13	5	5:13

N.B. : There was a main foreign teacher who took care English Language.

From Table 3, there were 13 students and 5 teachers in House of Nature 2 group.

Table 4: *Projects Conducted by Siam Renaissance 2*

Project Names	No. of Students	No of Teachers	Teachers : Students
1. Spaceship	7	3	3:7
2. Farming	5	1	1:5
3. World War II	4	1	1:4
Total	16	5	5:16

N.B. : There was a main foreign teacher who took care English Language.

From Table 4, there were 16 students and 5 teachers in Siam Renaissance 2 group.

14) Learning Activities of Darunsikhalai School

Each term Darunsikhalai School had frequently arranged activities under students' projects as follows:

- Games to Buid up Relationships
- Activities to Formulate Rules of Manners
- Readings
- Mr. Wizard's Games
- Morning Talk
- Poster Displays
- Questions Leading to data Searching
- Hunting Parts to Assemble Whole
- Field Trips
- Debating
- 5S
- Essay Writing
- Geometry Specifying location on surface Games (Game-Based Learning on) and Cooperative Learning

Conclusion

From the results of the study, it could be concluded as follows:

1) Facilitating: School does not emphasize on academic performances. Instead, the school practices seek to motivate student to engage in learning process that promote collaborative with others through team working or democratic-participatory decision-making. This means that every student addresses various interesting comments and finds solution to problem together. Teacher do not use 'talk and chalk' lectures but give advice, counseling, or let student confront with the immediate problems encountered and try to solve problems by

themselves. Teachers are more that of facilitator rather than the sole dispenser of knowledge that always solve problems for student.

2) Goal Setting: Student used 'Agenda Book' as a main tool in setting up goals/aims individually. On the other hand, goals/aims of the group are defined through conversation, dialogue, and sharing ideas within group so that the group will travel along the same path and at the same pace.

3) Student individual interesting/attention are from teachers' questions. This way, it helps student searching their intrinsic interests. Thus, for student who can open to new horizon, he/she would take field excursion into school ground or outside places to explore things around them. Students use observation to develop experiences.

4) Aptitude of student could be found while working together as a group. In fact students divide work according to one's aptitude. Working on his/her capabilities helps heighten senses of personal responsibilities towards the assigned work, feeling challenges, as well as enhances positive reinforcement to their work.

5) Students gain abilities from school practical work such as goals setting and planning, data searching, note-taking, team working, sharing ideas, and paper presentation. These practical activities need teacher as a facilitator while student reflect his/her own ideas.

6) School plan is divided into short and long term objectives. Therefore teacher coaches student to achieve progress one stage at a time in stead of swiftly leapfrogging. Shift leapfrogging can be possible if the subject matter is of student' interest. Because of plotting a plan is a kind of skill that needs critical thinking, so complex plan require significant analytical thinking skills to derive solutions to complex problem. Thus, conventionally, planning is a thinking instrument.

7) Student can develop reasoning thinking, creative thinking through utilizing Lego and Microworlds which are considered an expressive medium that motivate student to practice thinking by engaging in self-practice and teacher are expected to guide them. In synthesis thinking, student use thinking-map as a guide in practicing thinking.

8) In integrating knowledge through projects work, teachers begin with integrating concrete example, for example, Lego and Microworlds and gradually move to abstract one. In learning abstract example, it needs various combinations of data and instruments including guidance of teacher.

9) Student' scientific process occurs when they generate possible solutions to problems. Presented with a problem, students need to find information to discriminate incidents through the use of criteria, hypothesizing, and so forth. However, solutions produced might be slightly different according to nature of problems or assignments.

10) Exchanging ideas of student are initiated through conversation, dialogue in the morning and afternoon of every day. With this practice, students touch the feeling of self-aptitude and recognize the diversity capabilities of each individual. It can be said that the practice cultivates student to perceive understanding and accepting the nature of work

variances. Students enthusiastically show their opinion, reveal suggestion openly and frankly that induce collaborative work and happiness that lies in diversity work group.

11) In transferring learning, student of the school transfer their own knowledge by utilizing knowledge acquired from one situation adapting into another. It is the knowledge that gained from direct experiences which are both explicit and tacit knowledge.

12) Team learning of student is practiced through assigning group tasks that allow for a fair division of labor. It generates the mutual exchange of opinions exchanging through conversation that supports effective decision making to select the best opinion. It is held as mutual objective of student.

13) Multiple Intelligence. We found that most of students possess optimum visual-spatial intelligence and physical intelligence. Perhaps, it is because of Project-Based Learning management promotes student to learn by doing in the real world context. It provides student with touching, constructing and making things by themselves. The secondary intelligences that students possess are reasoning, human-relationship and music intelligences. And the least intelligences are linguistic and bodily intelligences.

14) Authentic self-assessment is emphasized on guiding student to assess themselves by daily note-taking. It is aimed to reflect daily learning achievement. Moreover, there will be weekly assessment with learning behavior sheets. Group-mates and teachers are accountable in the assessment because the assessment will guide student to improve and develop their learning. Upon completion of the project, students make portfolio to collect and reflect upon their learning experiences and accomplishments.

15) Project-Based Learning model can be concluded in systematic way which consists of input, process, and output as follows:

15.1 Input includes concepts, administrators, teacher, student, policy, budget, and resources.

15.2 Process concerns with activity of teacher which is facilitating. Activities of student should match with their interests, abilities, and capabilities through the facilitating of teacher. Thus, activities of student can be grouped as: goal setting, planning, thinking, scientific method, team learning, integrating, transferring, and Multiple Intelligences.

15.3 Output includes authentic assessment and Project-Based Learning

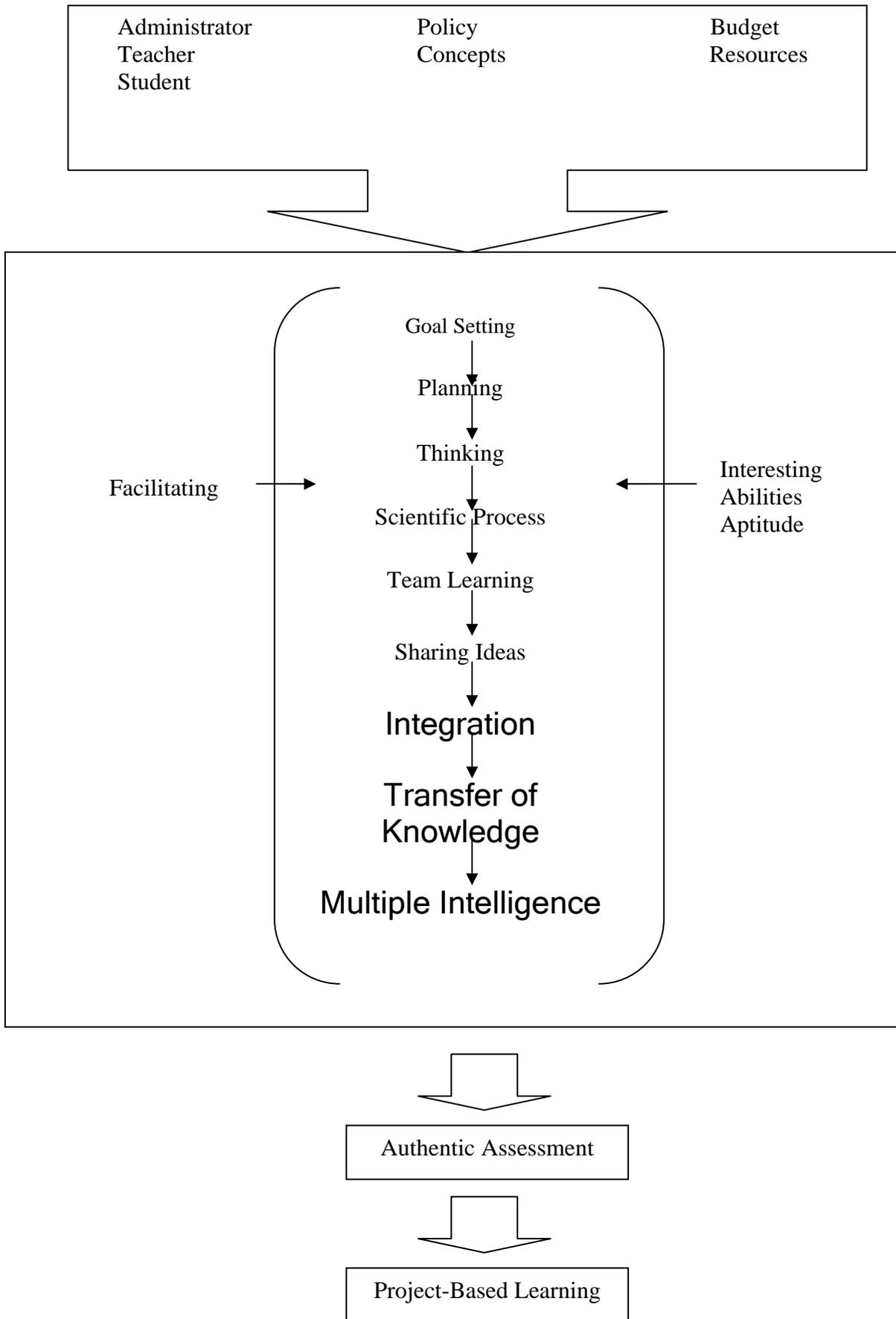


Figure 4: *Project-Based Learning*

Discussion

According to the results of the study, there were some **crucial** points to be discussed as follows:

1) Guidance of teacher/instructors is very important because it concerns with every aspect affecting Project-Based Learning success. Thus, the role of teacher/instructor should stimulate student's thinking by giving challenging questions so that student can think of ways to answer the questions or to contemplate continuously until they are clear of what they are eager to know. Additionally, learning atmosphere should promote the free expression of ideas and work, having ample time to learn, integrating student's experience into project, and being a model of thinker as well.

2) Practical work learning method is a practice that coherent to Project-Based Learning management which focuses on learning that allows student to learn by doing or making until discover a specific learning method that is suitable for oneself. Knowledge is constructed from student-self in stead of from instructor because the benefit of knowledge acquired is not only for answering question but it is also for other actions that lead to achieving goal.

3) Authentic assessment is an ability evaluation process that assesses the ability gained from real working experiences. However, teacher should keep track of recording competency of students. It can be done in form of Portfolio that reflects upon their accomplishments, problem-solving skill, and complex thinking skill and learning strategy across their learning time. Moreover, assessment sheets that verbalized recommendation of teachers and classmates should be kept in order to summarize learning development of students continuously.

Suggestions

Suggestion and recommendation of this research on the basis of its finding are as follows:

1) Guiding of teacher/instructor is very important to Project-Based Learning management; therefore, teachers should receive effective training from specialist or experienced teachers. In this awareness, it allows inexperienced teachers to practice and develop their ability regularly that would lead them to be a good facilitator.

2) Student's level of emotional of Darunsikhalai School. Result of Self-emotional awareness assessment is at satisfactory level. Temper control and management assessment is at satisfactory level. Self-motivation and peace creation assessment is at satisfactory level. Emotional perception from others assessment is at satisfactory level. Ability to create relationship assessment is at satisfactory level. Social responsibility assessment is at good level. The findings show that the average score of emotional levels assessment are ranging from satisfactory to good level, so that the school should encourage students to practice emotional control and management through Project-Based learning in order to cultivate them to have Emotional Quotient.

3) Actual assessment. It is advisable to have assessment from all sections concerned. Teachers must observe and keep record the progress of students continuously. Records should index areas of observation, for example, goal setting, planning, interesting, aptitude, way of thinking, scientific process integrating, idea exchanging, learning transferring, team learning and multiple intelligence of students. All records should be kept in computer in form of database for easy accessing to each student's data among teachers. Students should

record working timetable and new experiences throughout accomplishments received during project learning in form of portfolio. Information collected in the portfolios is reflection of all aspects of a student's life that made them know their own development.

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