

**MINISTRY OF EDUCATION
THE VIETNAM INSTITUTE OF EDUCATIONAL SCIENCES**

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**ENVIRONMENTAL EDUCATION BASED ON EXPERIENCE
IN TEACHING SCIENCE IN ELEMETARY SCHOOLS**

**Major : Theory and History of Education
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DISSERTATION SUMMARY

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INTRODUCTION

1. Reason for choosing the topic

Living environment is in a severe crisis. Environmental education is one of the measures that has the most positive and effective impact to improve the environmental conditions. Environmental education for primary students is very important. Primary level of education is the foundation and the universalized level of the national education system. For elementary students, environmental education is not taught as a separate subject. Its contents are integrated in subjects, including Science. However, in recent years, the organization of utilizing contents of environmental education in teaching Science has yet to confirm high results.

Experiential learning emphasizes on the subjective experience of learners, requires practical experience of learners in practical environment and reflect personal experience of things and phenomena. At primary schools, experiential learning creates opportunities for students to be in direct contact with the surroundings and to have practical experience with different senses. Besides, it helps promote and encourage the active role of the subject, initiatives and creativity of students. Furthermore, it trains positive traits to students themselves. For environmental education, this is an important education orientation - education in the environment.

Worldwide, the organization of learning activities based on teaching experience were in research and applied in some areas of training for university students, which initially had a positive impact on learners and brought good results. In Vietnam, researches on experiential learning, experiential learning in teaching subjects and environmental education based on experience in teaching subjects are limited. Specifically, there is not any study on environmental education experience in teaching Science in elementary schools.

The above analysis are the reason for me to choose the topic "**Environmental education based on experience in teaching Science in Elementary schools**".

2. Purpose of the research: Proposing contents and process of environmental education based on experience in teaching Science for primary students, which contributes to improve outcomes of environmental education in elementary schools.

3. Scope and object of the research

3.1. Scope of the research: Environmental education in teaching in elementary schools.

3.2. Object of the research: The relationship between contents and environmental education activities based on experience in teaching Science for elementary students.

4. Hypothesis

In teaching Science, if conducting environmental education based on experience for students follows the contents and processes accordingly, in which, students experience positively, utilize the most of the existing capital of them selves, combine their senses in learning activities, it will enhance results of environmental education for students.

5. Tasks of the research

5.1. Construct theoretical and practical basis of environmental education based on experience in teaching Science in elementary schools.

5.2. Determine contents and process of environmental education based on experience in teaching Science in elementary schools.

5.3. Organize pedagogical experiment to verify the feasibility of the contents and processes as proposed.

6. Research Methodology

6.1. Theoretical research methods: Theoretical study; System analysis methods.

6.2. The empirical research methods: Pedagogical observation; Conversation; Investigation by Anket; Pedagogical experiment.

6.3. The information processing methods: Using mathematical statistics, computer software, diagrams, tables, graphs.

7. Limit the scope of the research

7.1. About investigation at site: Survey in the city of Da Nang.

7.2. About Pedagogical experiment: The study conducts pedagogical experiment among students of grade 4 and grade 5 in Danang city.

8. The protecting points

8.1. Environmental education based on experience in teaching Science in elementary schools brings high efficiency that helps raise awareness, attitude and behavior for elementary students .

8.2. Environmental education process based on experience in teaching Science in primary schools should be conducted under a strict and reasonable process. The process carried out in the sequence of steps: (1) Assign the task to experience ; (2) Organize students to observe, compare and have feedback; (3) Organize students to build concepts by themselves; (4) Organize student for positive test.

8.3. Contents of environmental education based on experience in teaching Science make up a unified shape. Thereby, simultaneously it can address two intertwined but not separated tasks which are environmental education and teaching Science.

9. New contributions of the dissertation

9.1. Firstly, the research systemizes and expands the theories of experiential learning, environmental education based on experience in teaching in elementary schools. Besides, the study recommends principles, determines the contents and processes of environmental education based on experience in teaching Science in elementary schools that bases on Kolb's model of experiential learning.

9.2. Secondly, the research describes the current status of environmental education, environmental education based on experience in teaching Science in elementary schools; assesses the current status of knowledge, attitude, opinion and the implementation of environmental education of primary schools teachers in teaching Science in particular and in the activities of elementary education in general.

9.3. Thirdly, the study determines the conditions for implementation, guides to establish a plan and illustrates the construction of some environmental education plans based on experience in teaching Science. In addition, the study has demonstrated that it is scientific, feasible and effective of applying environmental education based on experience in teaching Science.

10. The structure of the thesis

The dissertation includes: Introduction, three chapters, Conclusions and Recommendations

- Chapter 1: Rationale and practical basis of building the content and process of environmental education based on experience in teaching Science in elementary schools.

- Chapter 2: The content and process of environmental education based on experience in teaching Science in elementary schools.

- Chapter 3: Pedagogical experiment.

Chapter 1

RATIONALE AND PRATICAL BASIS OF BUILDING THE CONTENT AND PROCESS OF ENVIRONMENTAL EDUCATION BASED ON EXPERIENCE IN TEACHING SCIENCE IN ELEMENTARY SCHOOLS

1.1. History of the research

1.1.1. Research of environmental education

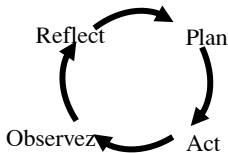
a. Research of environmental education in the world: Researches of environmental education in the world studied and concluded in some aspects: (1) The contents of subjects once integrated with contents of invironmental education will have great impact on education for students about awareness of environmental protection. (2) Different factors have various influences on human attitude to environmental protection. Teenagers have more concern about environmental issues than adults do Besides, teenagers have more hope of environmental protection activities in the future than adults do. (3) The construction of subjects' syllabus in different grades should be focused and based on conceptions of environmental conservation. (4) Learners participating in training courses called "Experience with the environment" will be supported to have opportunities of learning and enhance nessesary skills for their safety. Besides, they will have reasonable attitude and behavior to ecological environmental areas. (5) Experience will be absorbed through positive activities of students to environment which have decicive impacts on forming notion as well as concern to environment and environmental issues.

b. Research of environmental education in Vietnam: Researches of environmental education in Vietnam had achievements including : (1) Clarify objectives, methodology, general form of organizing environmental education for primary students; (2) Methodology and form of specific teaching for each subject. However, there is no mention to environmental education based on experience in teaching Science; (3) Establish and instruct the utilization of contents of environmental education locally in subjects and teaching activities.

1.1.2. Research on experiential learning

a. Research on experiential learning in the world

Lev Vygotsky (1896 - 1934) is the father of the theory “Sub-development zone”. This is the conception of personal experience zone. John Dewey (1859 - 1952) in *Experience and Education* clarified the meaning of personal experience and the relationship between personal experience of learners and teaching activities. Zadek Kurt Lewin with the study relating to experiential learning indicated that subjective experience of individuals is a crucial part of experiential learning and he proposed a model of experiential learning. (Model 1).



Model 1: Kolb's experiential learning

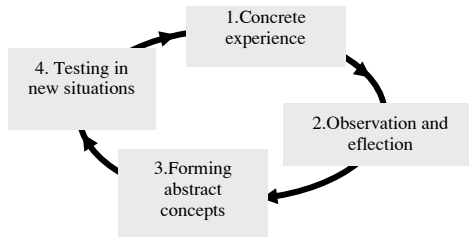
Notes:

1. *Reflect – Thinking about a case study.*
2. *Plan – Plan and solve the case.*
3. *Act – Conduct the plan.*
4. *Observez – Observe the results.*

Jean Piaget (1896 - 1980) argued that “intelligence formed by experience and that intelligence is not an internal innate feature but is a product of interact between humans and their surrounding environment”.

In 1984, David Kolb had a research: *Experience the learning: Experience is a source of learning and development.* The model of experiential learning of Kolb consists of four stages within a self-contained circle (Model 2). Since 1984, David Kolb et other scholars have has a variety of researches relating to experiential learning, which focused on

various fields including: economics, education, culture, etc for undergraduate students.



Model 2: Kolb's experiential learning

b. Research on experiential learning in Vietnam

In 2006, experiential learning was mentioned in Vietnam in a document called “*Learning by playing – Playing through learning*”: *Guiding environmental education activities based on experience*” introduced some kinds of practical playing activities in order to educate environment for primary and secondary students. In 2011, the subject “Experience Education” was taught for undergraduate students specializing in Management Science in order to help students have more insights in life, society and have more practical experience.

1.2. Some relating conceptions

1.2.1. Conceptions relating to environmental education: The research systemized and clarified conceptions relating to environmental education: Environment, environmental protection, environmental education.

1.2.2. Conceptions relating to experiential learning: Experience, learning by experience, education, education and teaching, experiential learning. Besides, the study also proposes other relating conceptions including: environmental education based on experience.

Environmental education based on experience is a process for learners to form knowledge, proper attitude and behavior with environment based on personal experience combining utilizing their senses to observe, feel relating things and phenomenon. In that process, teachers design, organize, and guide activities so that students can experience, absorb lessons by

themselves, achieve objectives of knowledge, attitude and express behavior proactively.

1.3. Environmental education in Elementary schools: The research presents and verifies contents as follows:

1.3.1. Some general issues about environmental education in elementary schools: The role and position of environmental education for primary students; Objectives of environmental education in elementary schools; Contents of environmental education in elementary schools; Directions of environmental education in elementary schools.

1.3.2. Environmental education in teaching Science in for students in elementary schools: Analyze objectives, contents of Science; contents of environmental education in teaching Science; Some methods of environmental education through Science.

1.3.3. Some characteristics of primary students have impacts on environmental education based on experience in teaching in elementary schools: The study analyzed characteristics of primary students such as: characteristics of awareness, behavior development and physical development so that the study can determine the competence, the suitability and the efficiency of environmental education based on experience.

1.3.4. Factors have impacts on the process of environmental education based on experience in elementary schools

- Subjective factors: Leadership and management, pedagogical competence of teachers, the coordination among educational forces, facilities, guiding documents, reference documents of experiential learning.

- Objective factors: natural environmental factors, socio-economic factors.

1.4. Nature, characteristics of learning models based on experience

1.4.1. The essence of experiential learning: the essence of learning based on the experience is that the learning process focuses on learners and their experience.

1.4.2. Features of experiential learning: (1) Experiential learning is a continuous process based on experience; (2) Experiential learning is the process that requires learners to use all the senses to interact with things

and phenomena to perform assigned tasks; (3) Learning based on experience is learning through mistakes as well; (4) In experiential learning, the relationship between teachers and students is an interact relationship and this relationship is put to the test directly to environment and learning content; (5) In experiential learning, student assessment not only intends to recognize the situation and adjust the learning activities of students, but also facilitates assessment of the status and adjust the teaching activities of teachers; (6) In experiential learning, teaching methods are closely linked together in a whole.

1.4.3. Model of experiential learning

In the study, it is referred to the learning model based on the experience of David Kolb (1984) (model 2) as presented.

- Phase 1 - Experience: Students themselves once beginning to participate in learning activities based on experience have had practical experience already. These certain experience on subjects, contents needed to be learnt is the important "inputs" of learning process.

- Phase 2 - Observe, compare and feedback: students experience practically, interact directly with learning environment. Students observe, feel, compare things, phenomena; analyze, evaluate, combine with their experience to learn about things and phenomena.

- Phase 3 - Forming concepts: Each student starts with the formation of the concept of the object, phenomenon. Entering this learning phase, knowledge of things and phenomena formed in each student is very clear despite the fact that the knowledge about things and phenomena may be true or not true.

- Phase 4 - Positive test: Students already have a conclusion memo drawn from the practical with arguments and inferences closely linked in the previous period. The conclusion memo can be seen as a hypothesis for each student. That hypothesis must be put into practice for testing. Through practical testing activity, students reframe the hypotheses proposed.

1.5. Current status of environmental education based on experience in teaching Science in elementary schools in Danang city

1.5.1. An overview of the current status survey

1.5.1.1. Contents of the survey: Awareness of related concepts; Views on environmental education issues, experiential learning and environmental education based on experience in teaching Science, the reality of the organization of environmental education in teaching subjects and in teaching Science, demand for training and fostering, demand for documentation of environmental education based on experience in teaching Science.

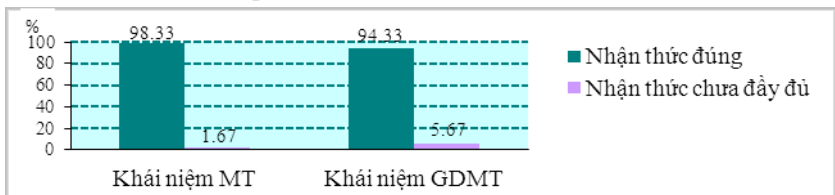
1.5.1.2. Subjects of the survey: including 300 people (teachers, management officials) and 8 students' parents.

1.5.1.3. Survey methods: questionnaires, talks, pedagogical observations.

1.5.2. Findings

1.5.2.1. The awareness of concepts

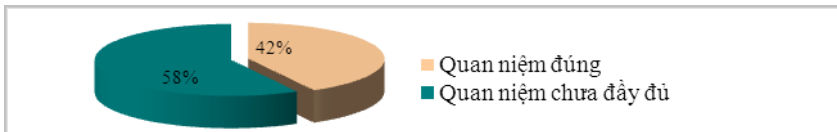
- Awareness of concepts: environment and environmental education



Graph 1.1. Awareness of teachers about the concepts: environment and environmental education

Through Graph 1.1, there is still a negligible percentage (less than 5%) of insufficient awareness. Perception is incomplete, it will impact negatively on effectiveness of environmental education in primary schools.

- Awareness concept -based learning experience



Graph 1.2. Teachers' conception of learning base on experience

There is still a relatively large number of primary teachers (42%) understanding incomplete and incorrect about notions of experiential

learning, the main reason is not accessible to learning materials based on experience.

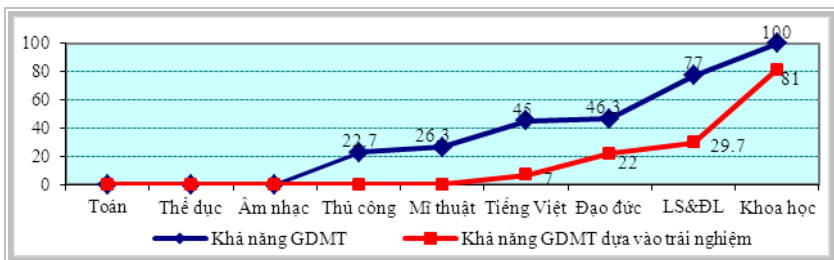
1.5.2.2. The views of teachers on the objectives, contents, and the directions of environmental education for elementary students

- On target: Among environmental education goals for students learning through Science, most of Management Officers and teachers (80%) do not identify adequate enough.

- About the directions of environmental education for students: Most teachers believe that teaching integrated subjects, incorporating environmental education contents in subjects is the most effective way for elementary students. And a significant proportion (total 27.67%) said an effective path is not the teaching of subjects, but through the media, communications, organizing group activities, labor participation. Thereby, it is clear that students participate directly in the activities of labor and propaganda is also effective for environmental education.

1.5.2.3. The views of teachers on the importance of environmental education for elementary students: almost 100% of teachers agreed that environmental education for elementary students is essential and necessary.

1.5.2.4. The views of teachers about the possibility of environmental education based on experience in teaching in elementary schools:



Graph 1.3. The views of teachers about the possibility of environmental education based on experience in teaching in elementary schools

There are 81% of teachers agreeing it is feasible to organize environmental education activities based on experience in teaching Science. There is also a significant proportion of teachers (19%)

disagreeing about environmental education based on experience in teaching Science. This suggests that, as a percentage of teachers are confused about the efficiency, how to apply, or do not understand about the environmental education based on experience, they do not agree to apply in teaching this subject.

1.5.2.5. Attitudes of teachers about some perspective of environmental education based on experience through teaching Science: Most elementary schools teachers (over 90%) have confidence in efficiency of applying experience in teaching Science, as well as effectiveness of environmental education based on experience through teaching Science.

1.5.2.6. Current status of environmental education based on experience in teaching Science: A small percentage of teachers (18.3%) occasionally have "organized environmental education activities based on experience in teaching Science ", the rest do not organize these activities.

1.5.2.7. Advantages, disadvantages and the demand of teachers about educational environments based on experience in teaching in elementary Science in elementary schools

Most teachers cited that there are many advantages of organizing environmental education based on experience. According to teachers, if the problems of training and retraining , the documentation, how to organize, content and process of environmental education based on experience are tackled, and coordination among the social forces, the difficulties of organizing environmental education based on experience will be addressed.

All surveyed teachers need training and retraining in experiential learning. Teachers also wish to have documentation guiding the organization of environmental education activities based on experience in teaching Science.

Chapter 1 Conclusion

For environmental education issues, this is an important issue which many organizations and many international researchers have interest in. In our country, the Party and Government, at all levels and departments have also made written guidance, many plans and projects to implement education of environmental protection awareness for all people, including elementary students. In recent years, environmental education for elementary schools students have been generalized and synthesized by

many researchers in many different aspects, namely: the content of the program; integrated activities; the local environmental education activities; methods and forms of extracurricular organization.

Worldwide, experiential learning is studied and applied in many fields such as economy, culture, education for students at the universities. In Vietnam, the research literature on experiential learning in teaching in elementary schools is generally limited. A few documents building gaming activities of practical experience for students through which environmental protection behavior is educated in order to improve the effectiveness of environmental education in schools. In particular, there is not nay study of environmental education based on experience in teaching Science in elementary schools.

The study analyzed, clarified the nature of experiential learning; the characteristics of the study based on experience. Besides, the study also had deep analysis of experiential learning model by David Kolb's. It is a spiral cyclical process including 4 phases: Phase 1 - Experience; Phase 2 - Observe, compare and feedback; Phase 3 - Formation of the concept; Phase 4 – Positive Test.

Science in elementary schools is a subject providing students with the knowledge of subsistence and development of human beings and animals and plants to environment. This subject helps students see the role of some forms of popular energy and substances. This subjeet also gives students skills formation to prevent diseases, the skills in environment; help students consciously keep healthy, love and protect surrounding environment. Therefore, environmental education based on experience in teaching is necessary in order to improve the efficiency and quality of teaching the subject.

The status of teaching Science, the environmental education for students primarily focused on providing knowledge based on textbook content without paying attention to the attitude and behavior of students for environment. Upon organizing curricular or teaching this subject, teachers exploit contents primarily through having students observe pictures (in the textbooks or mini teaching kits), asking students to read textbook contents

to learn, discuss the knowledge. Teachers explain, provide them more information, data, additional content written in textbooks.

In elementary schools, teachers have proper awareness about the objectives, the importance of environmental education for the students in general and in teaching Science in particular. The access to learning materials based on experience and applying environmental education in teaching Science for students is limited. Teachers have not yet fully understood the concept of experiential learning, not had access to the documentation of experiential learning, not organized environmental education activities based on experience in teaching Science.

Despite this, initially, elementary teachers have certain confidence in the success and efficiency of organizing environmental education activities based on experience in teaching Science. Primary teachers have the desire to have access to experiential learning through thematic training, through the documentation of the contents, processes, plan's templates of environmental education activities based on experience in teaching Science.

Chapter 2

THE CONTENT AND PROCESS OF ENVIRONMENTAL EDUCATION BASED ON EXPERIENCE IN TEACHING SCIENCE

2.1. The principles of environmental education based on experience in teaching Science

Guaranteeing not alter the objectives, subject's contents; Ensuring to maximize the utilization of personal experience of students; Ensuring to maximize the mobilization of students' senses in the learning process; Ensuring the consistency between the role of students in learning and the role of teachers in the organization and guidance.

2.2. The content and process of environmental education based on experience in teaching Science in elementary schools

2.2.1. The content of environmental education based on experience in teaching Science in elementary schools

The study has determined the content of environmental education based on experience in teaching Science in Grade 4, Grade 5, including 30 lessons taught in Science curriculum (Grade 4: 16 lessons; Grade 5: 14

lessons). The specific content is fully presented in the study. This summary presents four specific illustrations (2 lessons for each Grade) in the following table:

Table 2.1. The content of environmental education based on experience in teaching Science in elementary schools

Ord.	Lesson	The content of environmental education	Environmental education activities based on experience
Science Grade 4			
1	Lesson 14: Preventing some infections in the gastrointestinal tract	Food hygiene ; personal hygiene ; environmental hygiene	Students directly involve in the daily dining activities and express feeling about what they feel when eating unhygienic food, when feeling the gastrointestinal disease, when discovering the taste of food and drinking water; observe sanitary conditions around food, water and living areas; observe and participate directly in environmental sanitation activities.
2	Lesson 57: What plants need to live ?	The necessary conditions for plants to have normal life and development	Students directly perform planting, taking care of trees. By doing so, observe and monitor the conditions required for survival and normal development of trees.
Science Grade 5			
3	Lesson 29: Glass	Preserving glass utensils to use economically, durably.	Students observe, directly contact with glass materials; participate in mopping, washing glass gently, avoid collision to use economically, durably.
4	Lesson 53: Seedlings growing from seeds	The conditions for seed germination and development of plants	Students directly involve in seed nursery, care for seedlings grown from seeds.

2.2.2. The process of environmental education based on experience

in teaching Science in elementary schools

For environmental education based on experience in teaching Science complying with the principles and contents as presented, we propose the process of environmental education based on experience with 4 steps: (1) Assigning the tasks of experience; (2) Organizing the students to observe, compare and feedback; (3) Organize student to have self-concept formation; (4) Organizing the students to have positive test. The specific process of environmental education based on experience in teaching Science is indicated by the following diagram:

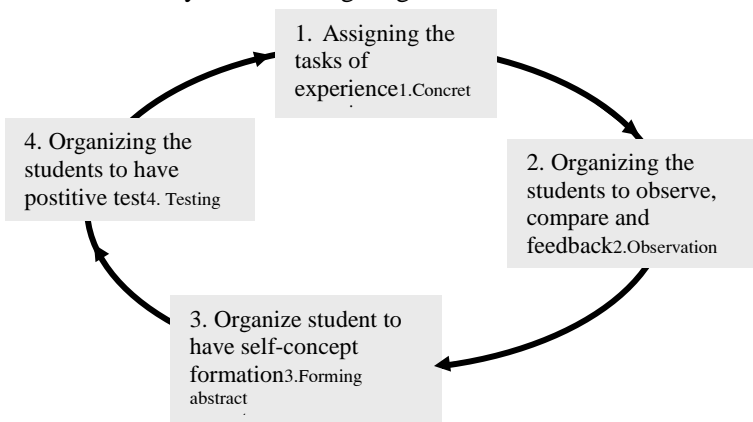


Diagram: The process of environmental education based on experience

2.2.2.1. Step 1: Assigning the tasks of experience: Teachers should anticipate students' experience relating to environmental education contents. The forecast of students' experience helps teachers assign appropriate tasks; facilitate students to maximize the utilization of their experience, combine with their senses to perform their assigned tasks.

2.2.2.2. Step 2: Organizing the students to observe, compare and feedback: Teachers must be the overarching person in the class, timely adjust their instruction in learning activities, help children with difficulties, who are not familiar with practical learning environment through task reminders, supporting searching activities, guiding the practical searching.

All involved students experience and present the results obtained on the content being assigned, emotions created when experiencing. The

suggested questions for students to discuss: What did students do? What happened? Which kind of flavor (taste, color) did students feel? What is the most difficulty for students? What is easiest thing for students? Etc

2.2.2.3. Step 3: Organizing the students to form knowledge by themselves: Teachers organize students to discuss, analyze, reflect, consider the experience; discuss about how things were implemented to get experience; discuss about the topics, the problems upon experiencing; discuss about the issues having been resolved; discuss about personal experience of groups' members and of the groups either.

Oriented questions help students analyze, process the achieved experience through experiencing: In obtained matters, which problems occur more and more often? Is the achieved experience similar with the existent experience?

In this step, once students learned the involved concepts, teachers should help students connect generalized things to real life to move to the next stage of learning through the questions: What you've learned for yourselves through these activities? Are things learned in life important to you? How do you apply what you've learned into life?

2.2.2.4. Step 4: Organizing the students to have positive test

Teachers are the people who orient situations, exercises for students to test. Teachers should create conditions for students with individual test about results drawn from the previous period. Besides, it is necessary to adjust and timely answer to doubts and queries of students upon testing. Teachers can assist individuals in the process of applying and testing so that students feel a sense of ownership of what they have learned.

To apply knowledge relating to environmental education into practice, teachers need to guide students through questions: How can you apply what you learned in a new situation? How will you act differently from your action in the past?

2.3. The basic conditions to guarantee the organization of environmental education activities based on experience in teaching Science

2.3.1. The management and direction of the leaders: Planning and directing the application implementation of experiential learning in

teaching Science in order to help foster teachers' awareness and implementation of experiential learning for effective environmental education.

2.3.2. *Direct teaching teams*: Teachers need to be trained, to learn and exchange with colleagues about applying and coordinating teaching methods, organizational forms of teaching upon implementing environmental education activities based on experience.

2.3.3. *The coordination between education forces inside and outside schools*: facilitating and coordinating well with schools, with teachers to have environment to organize learning activities based on experience for the children. It is very important, indispensable in experience teaching.

2.3.4. *Elements of the facilities, documentation, references in experience teaching*: It is necessary to equip the documentation; references of experiential learning so that teachers can foster self-learning and exchange professional expertise to organize environmental education activities based on experience effectively.

2.3.5. *The natural elements*: These elements in each different geographic area will vary. Such differences may have certain influence on the experience of each student, and also on assigning the tasks of experience, and on the organization of activities based on experience.

2.3.6. *The social factors*: Regulations, customs and practices of the local environmental protection will help students shape the right behavior to the environment, thereby forming positive habits for environmental protection in each student. Family, adults are always examples for children to follow. The demand, assessment, encouragement, motivation of parents to students in favor of environmental protection actions or positive habits for the environment will help them achieve high performance and vice versa.

2.4. Develop a plan to organize environmental educational activities based on experience in teaching Science

2.4.1. *Develop a plan*: Teachers should ensure implementation of the following requirements: Defining goals based on environmental education experience; Identifying environmental education activities based on experience; Determining the time to implement experience, the

infrastructure conditions, coordinated and supported forces upon organizing experience; Expecting of evaluation results of environmental education activities based on experience; Completing teaching plan and informing the relevant stakeholders.

2.4.2. Evaluate the results: The assessment of experiential learning is conducted within the school time or through the activities after students finish the lessons. Assessment results are used to determine the current status of students' learning and adjustment of students activities in order to help them achieve the goals of the lessons, and to help teachers learn from experience and adjust the teaching activities more consistently and more effectively.

2.4.3. Illustration of building some environmental education plan based on experience in teaching Science

Regarding extracurricular activities for Grade 4 and Grade 5, five extracurricular activities are built.

Regarding teaching activities according to the distribution of Science syllabus:

- Grade 4: Lesson 25. Water pollution; Lesson 47: Light is vital; Lesson 57: What Plants need to live?; Lesson 63: What animals eat to live?
- Grade 5: Lesson 13: Petechial fever Prevention; Lesson 22: Bamboo and rattan; Lesson 29: Glass; Lesson 54: Seedlings can grow from some parts of the mother plant.

Chapter 2 Conclusion

Research of environmental education based on experience in teaching Science in Grade 4 and Grade 5 is shown in the following results:

- (1) Identify the principles of environmental education based on experience in teaching Science. The identification of the principles was analyzed and clarified on aspects such as: 1 - Ensure objectives, contents of Science; 2 - Ensure maximizing the utilization of personal experience; 3 - Ensure maximizing the mobilization of students' senses in learning process; 4 - Ensure the consistency between the role of positive subjects, which is the self-learning of students and the role of organization activities, which is the instruction of teachers.

(2) Propose the content of environmental education activities based on experience in teaching Science in elementary schools. The study analyzed and clarified the content of environmental education activities based on experience for each Science lesson, and level of experience in Science lessons.

(3) Propose the process of the content of environmental education activities based on experience in teaching Science in 4 steps: Step 1: Assigning the tasks of experience; Step 2: Organize the students to observe, compare and feedback; Step 3: Organize student to have self-concept formation; Step 4: Organize the students to have positive test. In every step, we clarified the duties of teachers and students, suggested the oriented questions and the application in each step.

(4) Identify the basic conditions to ensure the environmental education organization based on experience in teaching Science. In particular, the study identified and analyzed to clarify the conditions that affect the organization of environmental education activities based on experience in teaching Science such as: human elements, elements of physical facilities, guidance documentation, and references in teaching of the school; natural elements; and social factors.

(5) Guide to establish the teaching planning and to make illustration of some environmental education plans based on experience in teaching Science including: 5 extra-curricular activities of Science and 8 teaching plans of lessons in Science syllabus of Grade 4 and Grade 5.

Chapter 3

PEDAGOGICAL EXPERIMENT

3.1. Overview of the empirical process

3.1.1. *Experimental purposes:* Testing the feasibility of environmental education process based on experience in teaching Science, thereby proving scientific theories of the study.

3.1.2. *Object, time and place of the experimentation:* Object: 646 students (308 students in Grade 4 and 338 students in Grade 5, 324 students participating in the experimental group, 322 students participating

in the control group) were studying in 16 classes of 4 primary schools in the city of Da Nang.

3.1.3. The content and scope of the experimentation

3.1.3.1. For extracurricular activities: Students in the experimental group participate in extracurricular activities based on experience: Activity "Plants around you". Students in the control group also involve in extracurricular activities on the topic of plants, but the curricular content is built by teachers according to traditional ways.

3.1.3.2. For lessons following the distribution of Science syllabus: Grade 4: Lesson 57: What plants need to live?; Lesson 58: The water demand of plants. Grade 5: Lesson 53: Seedlings growing from seeds, Lesson 54: Seedlings sprouting from their mother's parts. In particular, teachers teaching students in experimental group follow teaching plan built according to the content and process of environmental education based on experience. Teachers teaching students in the control group perform the traditional teaching plan.

3.1.4. Experimental procedure and evaluation

3.1.4.1. Experimental procedure

The process is implemented through 3 phases as follows: Phase 1: Experimental preparation, Phase 2: Experimental Implementation, Phase 3: Experimental analysis and evaluation.

3.1.4.2. Identifying standards and rating scale for experimental results

We design the questions and assess the results on 3 contents: Knowledge, Attitude and Behavior. Upon marking, we analyze and convert into points for each question. The total maximum score of each part to assess the knowledge, attitude and behavior of is 10 points and is divided into 4 levels: Knowledge: Good (9-10 points), Fair (7 - <9 points), Average (5 - <7 points), Low (less than 5 points); Attitude and Behaviour: Good (9-10 points), Fair (7 - <9 points), Average (5- <7 points), Low (less than 5 points).

3.1.4.3 Selection and training of teachers involving in the emperiment: Teachers, who are selected, graduated from Pedagogy College specializing Elementary and above and are divided into 2 groups: the experimental group and the control group.

3.1.4.4. Survey of knowledge, attitude and behavior of students before and after the experiment: Before the experiment, we build the first test based on standards and common rating scale applying to both experimental and control groups. After the experiment, we assess the knowledge, attitude and behavior of students by separate tests for each group. Besides, we also assess the sustainability of knowledge for students participating in the experiment.

3.1.5. Method of processing, analyzing the results before and after the experiment: We use Excel for data capture of test result before and after the experiment of the students, and then export to SPSS 16.0 statistical software for processing and analyzing.

3.2. Experimental results

3.2.1. Results before the experiment

Survey results prior to the experiment are presented in details through tables, charts in the study. Based on the results, we have general reviews and comments about results prior to the experiment as follows:

- Regarding knowledge related to the environment and environmental protection, about 70% of students in the experimental group and control group reached the average point with the average score of knowledge, about 6.2 points (control group: 6.28 ; experimental group: 6.23) .

- Regarding the attitude to improper behavior in the environmental protection, more than 80% of students agreed. With improper behavior, about 90% of students had no response. This situation covered both groups and the majority of students with attitude at the average point, about 6.2 points (control group: 6.29 ; experimental group: 6.23).

- Regarding the proper behavior in the environmental protection: The survey found that the majority of students did not have an active and regular participation in environmental protection activities in daily life at home, in schools and in the society. Similar to the results of knowledge and attitude, the average point of environmental protection in the two groups show no difference, both groups had the average point of 6.1 (control group: 6.13; experimental group: 6.1).

- Through discussions, interviews with school leaders, they agreed with the results before experiment and school leaders concurred and said

that the results reflected the real status of environmental education for elementary students.

The above results reflect the actual situation of environmental education for students through teaching Science in primary schools only effective at average level. Therefore, we believe that if organizing environmental education for students based on experience in teaching Science will help shape the personality, attitude and behavior of children towards positive direction.

3.2.2. Results after the experiment

Based on the survey data after the experiment, which are presented in detail in tables, graphs in the study, there are some following comments:

- Regarding knowledge, after the experiment: the increasing average point of knowledge of the experimental group is 4 times higher than that of the control group (control group: +0.35; experimental group: +1.41). The percentage of students graded Good and Fair in knowledge in the experimental group increases from $\approx 21\%$ to nearly 70%; this percentage in the control group has no change before and after the experiment.

- Regarding attitude to environmental protection, after the experiment: The average score of attitude in the experimental group increases 2.02 point, many times higher than the increase of the average score of the control group on the aspect of attitude (just increase 0.13 points). The percentage of students graded Fair and Good in the experimental group increases from $\approx 21\%$ to over 90%; while that percentage in the control group only increases from $\approx 21\%$ to nearly 40%.

- Regarding behavior, after the experiment: The average score of behavior in the experimental group increases 1.73 points, while the corresponding points in the control group increases 0.35 points. The percentage of students graded Fair and Good in the experimental group increases from $\approx 19\%$ to nearly 80%; while the control group only increases from $\approx 20\%$ to nearly 40%.

- Regarding the sustainability of knowledge: the experimental group is better than the control group. In the control group, there is a big difference when examining the sustainability of knowledge. This change has a negative direction. However, in the experimental group, this change

is not significant compared with the control group.

In addition, by observing the activities of students, and by interviewing involved teachers, there are some comments:

- Students in the experimental groups are always express positive attitude and behavior to environmental protection. There are some cases showing little concern to environmental protection. However, in general, there is no case in all students in the experimental group having negative behavior to environment protection. In contrast, in the control group, there are still cases having negative behavior to environment protection; very few students in this group demonstrate positive behavior to the environment protection.

- Teachers teaching the experimental group said that environmental education activities based on experience help the students have a proper and deep perception on the issues related to the environment and environmental protection. Thus, most students in the experimental group have always shown positive and proper attitude and behavior to environmental protection, no students expressed negative behavior to environment protection. However, the teachers teaching the control group said that after the experiment, students did not have positive changes in awareness, attitude and behavior towards environment and environmental protection than before the experiment.

Chapter 3 Conclusion

The experiment has drawn the following conclusions:

(1) The content and process of environmental education based on experience in teaching Science that the study proposed have an appropriate and feasible insurance to implement in practical application in teaching in elementary schools.

(2) The effect of applying the content and process of environmental education based on experience in teaching Science that the study proposed has been confirmed by experimental results. Before the experiment, the experimental and control groups were at the same level. Students in both groups living in different living areas had no differences in the average point as well as on the distribution of point percentage in knowledge,

attitude and behavior to environmental protection. After the experiment, the results of knowledge, attitude and behavior of the experimental group is higher than that of the control group in terms of the total average point. No longer there is any case in the experimental group classified Weak or Poor in knowledge, attitude and behavior. The sustainability of knowledge of the experimental group is higher than that of the control group, the percentage distribution of Good, Fair, Average, Low of the experimental group is stable upon testing to confirm knowledge sustainability.

(3) When applying the content and process of environmental education based on experience in teaching Science in elementary schools, apart from ensuring the basic principles and conditions of the organization of environmental education activities based on experience, teachers should pay special attention to ensure maximizing the utilization of personal experience and senses when students participate in environmental education activities based on experience. Besides it is necessary to pay attention to the absolute safety for individuals when students go to school and throughout the learning process based on experience.

Thus, the study proved that pedagogical experiment has achieved its goals and ensured the effectiveness, practicality of environmental education activities based on experience in teaching Science in Grade 4 and Grade 5 that the study presented and proved the correctness of the scientific theory.

CONCLUSION AND RECOMMENDATIONS

1. Conclusion

1.1. Environmental protection issues have become a matter of global concern. Environmental education is considered to be the most effective and long-term measure to protect and develop environment sustainably. In Vietnam, environmental education is one of the important educational missions that the State Party and the Government have particular interest in. Therefore, equipping students with knowledge and skills about the environment and environmental protection appeals interest among

educators in teaching implementation of different subjects and by many different directions.

Primary students are children who are still in the period of developing and shaping their personality. Their personality forms only through their own activities. Through environmental education based on experience, students have more favorable conditions to express all the knowledge, combined with the utilization of the individual senses to learn knowledge, attitude, and behavior to environment protection. Environmental education based on experience will help teachers and students expose to practical environment, demonstrate environmental protection activities effectively. Furthermore, environmental education based on experience for students and teachers also help test and apply the knowledge they have learned into practice of environmental protection and timely adjust the attitude, behavior which adversely affect living environment.

The study generalized environmental education issues, experiential learning and environmental education based on experience in teaching Science in elementary schools. Besides, the study also presented the research aspects in other works of the author about relevant contents, clarified the concepts related to the research. Moreover, the study analyzed and clarified the contents and structure of the stages in the process of experiential learning of David Kolb: Stage 1 - Experience; Phase 2 - Observe, compare and feedback; Phase 3 - Formation of the concept; Phase 4 - Positive Test.

1.2. The teaching practices in elementary schools and environmental education for students were interested but the environmental education for students was implemented primarily through the teaching in the classroom with presentations, pictures in textbooks and knowledge from the teachers. Through the survey results, teachers wish to access and apply experiential learning in teaching. They are aware of the significance, importance and effectiveness of environmental education based on experience. However, due to the fact that teachers have not accessed to experiential learning, have not been trained and have not had any training of relevant content related to experiential learning in environmental education, they have not

had deep understanding about the effectiveness of environmental education based on experience in teaching subjects, especially in teaching Science.

1.3. The research proposed guidelines, contents, processes and conditions for implementing environmental education based on experience in teaching Science in elementary schools. Thereby, the contents of environmental education based on experiences were determined in 30 lessons in Grade 4 and Grade 5. The study proposed the process of environmental education based on experience in the order of steps, namely: Assigning the tasks of experience; organizing the students to observe, compare and feedback; Organizing the students to have self-concept formation; Organizing the students to have positive test. In each step, the study presented and clarified the activities of teachers and students, suggestive questions, leading and guiding the organization.

Regarding the conditions to ensure organizing environmental education activities based on experience in teaching Science, the study presented and analyzed in details the relevant conditions such as: Management and direction of the management levels; Direct teaching team; The coordination between education forces inside and outside schools; Elements of the facilities, guidance documentation, references of teaching based on experience; natural elements; and social factors.

Based on these principles, contents, procedures and conditions for the implementation of environmental education based on experience in teaching Science, the study also guided the planning and construction of illustration of some environmental education based on experience in teaching Science in Grades 4, and Grade 5, including 5 extra-curricular activities and 8 teaching plans (according to the program distribution) of Science in Grade 4 and Grade 5.

1.4. Pedagogical experiment proved the scientification, feasibility and effectiveness of implementing environmental education based on experience in teaching Science in elementary schools.

The above results allowed us to conclude: environmental education based on experience in teaching Science in elementary schools is entirely appropriate and essential.

2. Recommendations

2.1. For pedagogical schools training elementary teachers: Do research and apply experiential learning to organize teaching students the subject: "Teaching subjects in elementary schools based on experience". Including the application of experiential learning to organize environmental education activities in teaching subjects in elementary schools.

2.2. For management levels of education

- In terms of training and fostering: Management officials and elementary teachers should be trained about the content of experiential learning, about the process of experiential learning in teaching in elementary schools. Therefore, the management level of education should organize conferences, symposium about experiential learning, including the topic of environmental education based on experience in teaching subjects, especially Science for elementary staffs and teachers.

- The levels of education management from the Department of Education and Training should consider, encourage, facilitate schools and teachers to organize environmental education activities based on experience to enhance the results of environmental education in teaching subjects in elementary schools, including Science.

- Directing school units to further strengthen the socialization in teaching in order to facilitate the financial and human resources, and the coordination of the organization of environmental education activities based on experience in teaching subjects.

- Investment in compiling teaching materials based on the experience of subjects in order to improve the effectiveness of teaching, to facilitate students to experience in practical environment while studying environmental education contents.

2.3. For schools

- Leaders of elementary schools should encourage, monitor and supervise the organization of environmental education activities based on experience in teaching subjects; timely have guidance to coordinated departments in helping teachers organize activities based on experience in order to educate environment for students. It is considered to be one of the

ways to implement innovation in teaching and learning for teaching in elementary schools.

- Teachers are the direct force, therefore, teachers should be proper awareness of experiential learning to have positive changes in awareness and action, reflecting through the determination of the contents, organizing activities based on experience in teaching subjects to educate environment for students. Besides, teachers should regularly share experience, self-learning, researches to update, learn from experience in order to meet the requirement of the organization of environmental education activities based on experience to reach the highest effectiveness of environmental education.

- Schools need to have coordination between the forces inside and outside schools to create favorable conditions for students to participate in learning activities based on experience in learning subjects.

2.4. For parents and educational forces outside schools

Coordinate and facilitate, support personnel and material resources for students to participate in environmental education activities based on experience organized by the school. Pay attention to and create conditions for students to participate in environmental education activities based on experience by making relevant and moderate effort.

**LIST OF ARTICLES ALREADY PUBLISHED
RELATED TO THE THESIS**

- [1] Vo Trung Minh (2012), "Environmental education in primary schools through extracurricular report", *Journal of Education*, No. 278, January 2012, pages 48-50 .
- [2] Vo Trung Minh (2012), "Education based on experience in teaching Nature and Society elementary schools", *Journal of Education*, No. 288 in June 2012, pages 50-52 .
- [3] Vo Trung Minh (2014) , "Applying the model of education based on experience (David Kolb) in teaching in elementary schools", *Journal of Education*, No. 332 in April 2014, pages 23-25 .
- [4] Vo Trung Minh (2014), "The results of applying experience education aimed at environmental education to students through teaching Science in elementary schools", *Journal of Education*, No. 342 in September 2014, pages 31-33 .