

## DEVELOPMENT OF TEACHING-LEARNING MATERIALS FOR THE FIELD EXPERIENCE ACTIVITY AT ELECTRICITY MUSEUM

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### Abstract

We developed the teaching-learning materials for the field experience activity at KEPCO (Korea electric power corporation) Electricity Museum and had various funny activities for the students to be familiar with the concept of electromagnetism.

This activity consists of 3-steps: pre-learning about the field experience activity, field trip activity, and post-learning, with linking the electromagnetism parts in science curriculum. It was shown that the attended students played a leading part in activity in contrast with the other existing, common field trips.

It is well believed that the science knowledge by hands-on experience is maintained for a long time, because it is given by inquiring skill through direct seeing, observation and experiencing process from the field experience activity. For the effective activity, it is necessary for students not to get unconditional observations, but to have guides on “what is that?” and “how to observation it?”

Our research suggests that we should offer them the opportunity about experiment, book, or worksheet related learning after museum visit, and the opportunity to get a learning impetus immediately, to realize the effective field experience activity. In conclusion, we propose that exhibition is not given with just a visual pleasure, but it should keep pace with expert's lecture or experiment.

Keywords: Field experience activity, Electricity Museum

### 1. Introduction

Inquiry activity is only come true in the classroom. Otherwise, students face up more to problem context and to useful information in the reality. Out-classroom activity is interested more than classroom. Therefore, to provide student with giving a chance of various experience will help for student to not only foster active attendance but also develop of thinking power. The styles of inquiry activity are, for example, discussion, experiment, field trip, task research, etc. Among many inquiry activities, case of out-door inquiry activity and field learning must be examined to be suited to learning purpose by advance investigation of field trip place [1]. In order that student have correct science concept and positive attitude toward science through the field experience activity, education program, link before and after with field trip, is managed. We attempt to field experience activity linked science content that based research result is effective learning by field experience activity [2],[3].

Teacher must be ahead of preparation that field experience activity to enhance the effect of activity. Not only too troublesome that teacher arranges the field experience activity every time, but also troubles of risk that safety concerns in progress. In order to be ready for safety concerns, it is necessary that teacher should go through before the activity and devise a plan. However, it is difficult that science teacher plan for field experience activity; make a worksheet and assessment with teaching at once. Because teacher affairs is too heavy a responsibility, it is reality that field experience activity is not carried out activity for being fit for propose actually. Therefore it is developed field experience activity materials which are available at school. Also most field experience activity is many case end the ended once and away event. Hence, to be matched a subject with activity, thorough analysis about subject and proper teaching-learning at before and after activity is needed.

This research should do to develop the teaching-learning materials which are connected learned science content at high school with field's content at electricity museum. Research task is 3 problems. First, extract content from high school science textbook which is energy unit analysis. Second, extract field experience theme from making a field investigation in advance. Finally, develop teaching-learning materials.

### 2. Rationale and Stage

#### 2.1 Rationale

According to research of Sul and Lim (2001), students learn not only by various ways at school, but also informally from out of school. Field trip, training, school excursion, inquiry activity, etc are examples of informal learning [4]. Field trip activity consist of various learning styles such as informal learning circumstance, museum, zoo, out of school activity, such activities have been positive effective against learning of student. A term against a field experience activity comes to be described the terminology which is various. For example, out of school science activity and study trip, school trip, excursion, field study, field trip, science visiting, outdoor education, etc. Thus, the field experience activity is used with style and the terminology which are various. The following definition synthesized the defined concept the Korean language dictionary or the NAVER encyclopedia about a field experience activity.

\* Field trip:

Though the field is extended from school around to the whole world here, has directive connection with class learning in that the aim is education, anyway. Special plan and preparation need to execute a field study, and there must be a study process of the special method. From here the point which will consider most to recognize the basic difference of sightseeing and field study. Namely, it means that the one sees a field on passive position; relatively the other observes a field on active position. Also field study have to be consider that teacher provide student with related classroom learning at before and after of field study.

Though it is different that the place where there is a possibility of searching easily as field study place in feature and style of the community, examples of the place are farm, fishery, mine, factory, large scale shopping center, newspaper publishing company, government agency, various service agency, etc.

\* Experience

It is knowledge or skill in a particular job or activity, which you have gained because you have done that job or activity for a long time.

\* Activity

It means that moves the body like grease in a pan.

In order to obtain result of what kind of work it makes effort or it accomplishes what kind of work it goes around.

It means that condition where the body or spirit is changing.

Defined "field experience activity" at this research is,

It is activity that obtains a concrete and experience knowledge through direct and positive interaction with objects at the relation agency of school circumstance, the zoo, the botanical garden and the museum, science museum, etc.

According to Jung's research, actual condition regarding a field trip and recognition investigation of the teachers, it compared in preceding researches of past, and became the 7th curriculum and the field trip frequency increased far before than. In being preponderated in earth science or biology, field trip is executed connection various subject, chemistry and the environment, physics. The activity hour was applying special activity hour and vacation duration most plentifully. The teachers recognize that the field trip need to link subject commonly, and have affirmative opinion that providing worksheet, preview guide map, want to apply an the activity such worksheet.

To apply a field trip from physics, most it was "electricity and magnetic" at the unit which is appropriate, "force and motion", "energy conservation", "wave and particle", "modern physics", "science history" order. Because fundamental concepts of electricity and magnetic are difficult for student to understand, will be facilitated the understanding with direct hands-on by field trip. Because material is abundant that is related to everyday life at inquiry learning place, for example, science museum or museum, etc. Therefore, experience learning for students will be possible.

It is suitable that executes a field trip at introduction of the electric unit or finishing step, and it appeared that after field trip, adequate study's styles are expression study, experiment study in order. The teachers of most it have recognized the education value of field trip; have done not apply easily in study for the insufficiency information about field trip site and problem control of student [5].

## 2.2 Stage

The field experience activity stage is KEPCO (Korea electric power corporation) Electricity Museum. The foundation purposes are the following. The 20th century it repeated a growth steadily even from swirl inside of the history which changes suddenly and became the motive power of state economy development KEPCO in order to come true the infinite responsibility against a state economy and the customer and the promotion of the electric power culture arranged the electric history of the last century system and it preserved and electricity it was valuable in us and developmental process of modern science one it awakened and it found the electricity museum.

The electricity museum is located in, electric the public relations officer third floor, electric culture hall, 1335 Secho-dong, Seoul, Korea, and the theme of exhibition subject is electric history and modern electricity. Relation home page address is <http://www.kepcoco.kr/museum/>.

## 3. Research design and Actual

### 3.1 Participant

Scientific club activity student of the 10<sup>th</sup> grade 12 person join, develop a program; to provide many information. The student of 21 people participated to a field experience activity actually with developed activity worksheet.

### 3.2 Procedure

The research procedure is Figure 1.

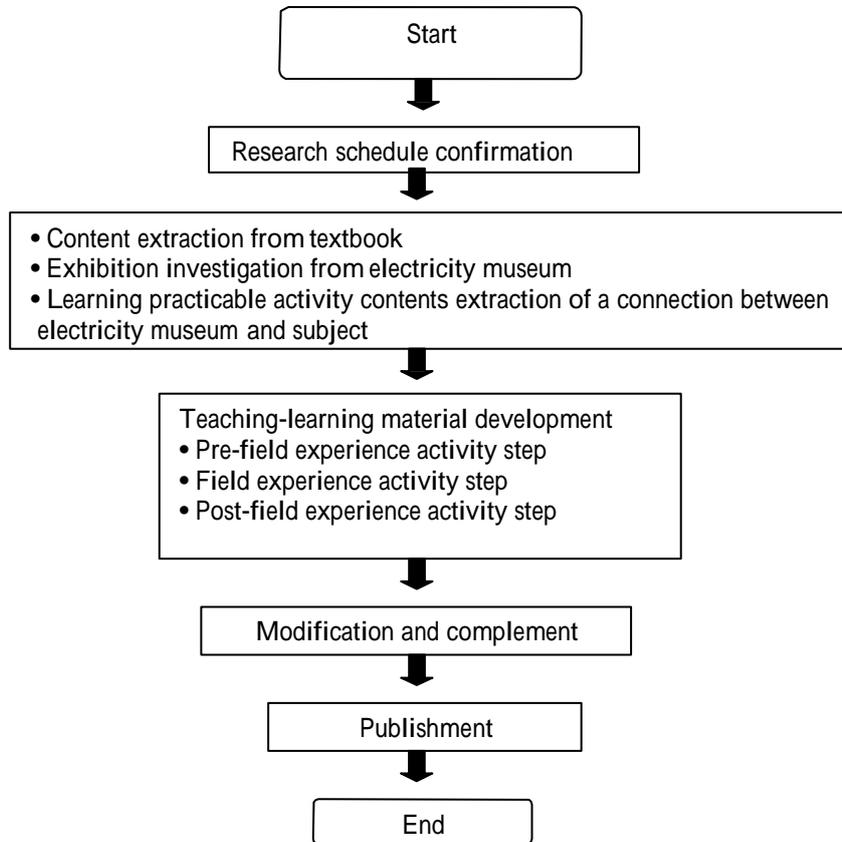


Figure 1. Procedure

### 3.3 Actual activity content

Research content by teacher and activities matter by scientific class is the Table 1.

Table 1 Content

| scientific class student |  | teacher                 |  |
|--------------------------|--|-------------------------|--|
| date                     | content  | date                    | content  |
| 2004.5.14                | Dok San scientific class establishment   |                         |  |
| 2004.6.18-<br>2004.6.24  | Study up Science textbook electric energy unit main concept studying   | 2004.6.18-<br>2004.6.24 | field experience activity relation preceding research investigation          |
| 2004.6.25-<br>2004.7.19  | Pre-learning from cyber <a href="http://www.kepco.co.kr/museum/">http://www.kepco.co.kr/museum/</a>                          | 2004.6.25-<br>2004.7.19 | Electricity museum relation data collection and preceding visiting           |
| 2004.7.5-<br>2004.7.15   | Assemble the radio   | 2004.7.5-<br>2004.7.15  | Teach to assemble the radio  |
| 2004.7.20                | Electricity museum visiting and hold a meeting(one teacher, nine students)   | 2004.7.20               | Electricity museum visiting and hold a meeting                               |
| 2004.8.27                | Make the paper cup speaker   | 2004.7.21-<br>2004.8.31 | Development teaching-learning materials are connected with The electricity   |
| 2004.9.1-<br>2004.9.20   | Electricity museum activity worksheet application (the participants: Scientific class and applicant student total 21 people) | 2004.9.1-<br>2004.9.20  | Hand out and collect the Electricity museum activity worksheet ,and visiting |

|                       |   |                       |   |
|-----------------------|---|-----------------------|---|
| 2004.9.11             | Select experiment task on electric and magnetic | 2004. 9.11-2004.9.18  | Electric and magnetic relation experiment activity subject collection |
| 2004.9.18             | Presentation to selected experiment task        | 2004.9.1-2004.12.31   | Teaching-learning materials development and electricity museum visit  |
| 2004.9. 30            | Field experience activity assessment            |                       |   |
| 2004.12.16-2004.12.17 | Make the basic robot                            | 2004.12.16-2004.12.17 | Guide to make the basic robot   |

#### 4. Research result

##### 4.1 Activity contents of a connection between electricity museum and science subject

Each step main activity component is extracted adequate content from textbook and exhibition of the electricity museum. Pre-learning about the field experience activity, field trip activity, and Post-learning, consists of subject of Table 2.

Table 2 Each step contains content

| Subject content                   | relation learning activity  |  |  |
|-----------------------------------|---|--|--|
|                                   | Pre   | Field experience activity  | Post   |
| The heat action of current        | * When the current flows in the circuit boat, the cause to which heat occurs.   | * Invention king Edison who is great<br>* The electric invention which is great<br>* Electric lamp of Korea<br>* Modern Electric lamp<br>* Electric discharges ladder<br>* Human cell  | * It was anxious.....<br>* Electric museum with quiz<br>* Energy saving plan |
| The use of electric energy amount | * Generation and transmission of electricity<br>* Consumption electric power and investigation power<br>* Electric saving ways<br>* The right way to use the electric | * Gun-chun palace and Hyang-won pavilion<br>* The history of energy<br>* Initial commerce generation of electric the Dong-Dae-Moon power plant<br>* Steam engine of the watt<br>* Our country initial generation of electric equipment<br>* Initial public transportation electric car<br>* World-wide initial electric power company New York power plant<br>* The electric invention which is great<br>* From generation of electric to home<br>* Farming and fishing villages electric supply<br>* South Korea maximum Yong-Wol thermal power plant<br>* Soo-Pung hydroelectric power plant of the Orient top<br>* Atomic age beginning 「Gori atomic power plant the first equipment」<br>* The small kerosene lamp and The electricity<br>* Korean standard atomic power plant<br>* Our country transmission of electricity network<br>* Generation and transmission of electricity equipment<br>* Nighttime electric power uses<br>* Alternative energy<br>* Future energy |  |

|                                |  |   |  |
|--------------------------------|--|---|--|
| The magnetic action of current | * The magnetic field which is made the circuit surroundings where the current flows<br>* Example of magnetic action use of the current | * Invention king Edison who is great<br>* The electric invention which is great<br>* Mysterious magnetism |  |
| Electromagnetism               | * Electromagnetism experiment<br>* Example of electromagnetism use   | * The electric invention which is great<br>* Electricity and communication<br>* Floating the wire         |  |

## 4.2 Teaching-learning materials development

### 4.2.1 Pre-field experience activity step

Before the field trip comes to accomplish, it made the teaching-learning material about 9 branch subjects which relates with the electric and magnetic unit of science textbook. The experiment which is included in each subject the students will do to be interest, is the possibility which they will do easily with matter of daily life, the students will be able to think plentifully it selected the contents. The headlines of the teaching-learning materials are unit title, the guiding of learning, the progress of a teaching-learning; introduction-development-summary, worksheet for student [6],[7].

### 4.2.2 Field experience activity step

The worksheet for the field experience activity contains guide map for looking up the field place and actually usable activity paper with doing the sights of electricity museum. By making a field investigation several times, makes the worksheet to move and to do in order. The components of the worksheet are which student may write the point which it wants knowing, anxious point, learned point, the impression.

### 4.2.3 Post-field experience activity step

After the field experience activity, it may discuss to anxious point, and recall the scientific concept or the exhibition by simple game form. Also, it does make promotional matters about the electric saving.

## 5. Conclusion and Suggestion

From this time research, we develop teaching-learning materials for the field experience activity at the electricity museum, various funny activities for the students to be familiar with the concept of electromagnetism. Learn to Electric relation concept, assemble parts into the radio and the robot, make to the paper cup speaker, it led the students to get into the electric circuit and electromagnetism concept. It was shown that the attended students played a leading part in activity in contrast with the other existing, common field trips.

It is well believed that the science knowledge by hands-on experience is maintained for a long time, because it is given by inquiring skill through direct seeing, observation and experiencing process from the field experience activity. For the effective activity, it is necessary for students not to get unconditional observations, but to have guides on "what is that?" and "how to observation it?"

While accomplishing the research it is found that is the following.

Students did not think about exhibits with visual pleasures but try to think and observe them related with the concepts of science. Also they asked many questions about the exhibit. Since the interactions among students and those between student and teacher are increased during and after field trip, it is considered that teaching process was happened not by one way but two ways.

On this, such research that the learning has a connection with subject at many field experience activity place must be advanced plentifully actively. We are planning better research on the bases of this research.

Our research suggests that is the following.

We should offer them the opportunity about experiment, book, or worksheet related learning after museum visit, and the opportunity to get a learning impetus immediately, to realize the effective field experience activity. We propose that exhibition is not given with just a visual pleasure, but it should keep pace with expert's lecture or experiment. It should turn around the exhibitions not to see with only the eye, but to make the best of the senses. Lastly, it relates with the time of war contents of the museum and the activities or the students who are the possibility of doing from the house will be able to study oneself in order, the cadence data to guide plentifully must be developed. It must be developed that experiment of doing at home in relation to exhibition contents of the museum, or materials to guide student in their studies.

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