The Development and Implementation of the Experienced-Based Learning Program through Field Trips to Ancient Palaces

WISET Regional Agency of Seoul
Duksung Women’s University
Prof. Lee, Ju Young
Ancient Royal Palaces in Seoul

- Many palaces with long history in Seoul
- Built with the best available technology
- Values of not only culture but also science and engineering
- Suitable for getting hand-on experiences for science, engineering, and history
Five Ancient Royal Palaces in Seoul

Science behind the ancient palaces (1/2)

Cycloid curve
Science behind the ancient palaces (2/2)

Arch bridge

창경궁
Science field trips to ancient palaces in Seoul
Program for female middle school students
Has been run once a year every fall since 2012
Purpose of Field Trip

- Utilize ancient palaces to develop and implement the science education program
- Enhance students’ interest in science through the field trips
  - Educate students in a more interesting and stimulating environment

Overview of the Program
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Previous studies</td>
</tr>
<tr>
<td>2</td>
<td>Development – Draft of Ancient Palace Program</td>
</tr>
<tr>
<td>3</td>
<td>Inspection and modification of draft</td>
</tr>
<tr>
<td>4</td>
<td>Implementation (on middle school students)</td>
</tr>
<tr>
<td>5</td>
<td>Data analysis</td>
</tr>
<tr>
<td>6</td>
<td>Program modification</td>
</tr>
</tbody>
</table>
Program Development Methods

- Finding scientific research activity capable at ancient palaces
- Literature investigation
  - Analyzing the curriculum
  - Understanding historical value
  - Setting the contents that can be connected with the middle school curriculum
- Site visiting beforehand
  - Finding materials, collecting information
  - Choosing places considering students’ safety
- Make field trip activity sheets and hands on activity
Field Trip Program

Theory Education

Self Study

Field Study

Experience Learning

Orientation {20 min}

Overview of Field Trip {40 min}

Group Activity {90 min}

Lunch {60 min}

Meeting with an expert {60 min}

Hands on activity {90 min}

Presentation {30 min}
Participants

- 20~30 middle school girls in Seoul
- 4~5 students per group
- 6 Mentors (University student)
- 2 Teachers
Program Implementation
Pre-Activity (1/2)

- Explain the historical backgrounds of and research tasks at the palace
- Assign groups and review the mission goals
Pre-Activity (2/2)

- Conduct safety education
- Use maps to introduce the field trip site
- Distribute research activity sheets
공포는 지붕 하중을 기둥에 전달하는 기능을 하는데 주두, 소로, 첩자, 낙미 등의 부재로 이루어진다. 그 종류로는 다포게, 주심포게, 엽공게 등으로 구분한다.

※ 공포 주변에 '망'이 쌓인 이유는 무엇일까?

위 사진(창호)의 이름과 각각의 해당 건물 이름을 찾아보자.
Field Trip Activities - **Group Activity(1/2)**

- Research ancient palaces and complete missions in groups
- Move to each mission places using a layout drawing (Reading a map -> enhancing spatial perception)
- Overcome difficulties through group discussion (Improved social interaction skills)
Field Trip Activities – **Group Activity (2/2)**

- Mentors observe students and take safety measures
- Explore historical remains and find scientific principles from them

Korean Traditional House

Arch Structure
Extension of Classroom Study

19

Bernoulli's principle

Cycloid curve

Arch bridge

이 원리를 무엇이라고 할까요?

CYCLOID

아치교에 작용하는 압축력
반원에서의 힘의 분산
Field Trip Activities - **Lecture**

- Meeting with an expert

Museum founder and director Gwon Young-du

mady by Gwon Young-du
Field Trip Activities – Hands-on Activity (1/2)

- Make architectural models, such as the Korean Traditional House (Hanok)
  - Opportunity for students to apply what they researched
Field Trip Activities – Hands-on Activity (2/2)

- Make magic cubes based on the science and history that students learned through the process
Field Trip Activities – Quiz and Presentation

- Review and organize what students learned from the field trip
Result of survey

- Conducted before and after the field trip

<table>
<thead>
<tr>
<th>Participant satisfaction of the program and change in perception toward science (maximum points: 5.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
</tr>
<tr>
<td>4.4</td>
</tr>
</tbody>
</table>
Conclusion

- Enhanced the students’ interest and curiosity toward science and engineering through visiting ancient palaces
- Verified whether the students could apply what they learned in class to real life
- Developed an ability to solve problems independently and cooperate with group members
THANK YOU
# Field Trips for the Last 3 Years

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Places</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Aug 2012</td>
<td>Gyeongbokgung, Unhyeongung *Duksung Univ., School of Continuing Education</td>
<td>30</td>
</tr>
<tr>
<td>25th Oct 2014</td>
<td>Gyeonghuigung *Seoul Museum of History</td>
<td>31</td>
</tr>
</tbody>
</table>

* * place of hands on activity
Sample Survey Questions for Perception toward Science

1) I like mathematics and science.
2) I'm good at mathematics and science.
3) I am considering math and science as a major or career
4) I think women should be successful in math and Sciences
5) ...
Survey Questions for Program Satisfaction

1) Theme of experiment and contents were fresh and interested.
2) A mentor's explain was easy to understand and interested.
3) Direction and materials were useful.
4) It was suitable program schedule and contents
5) It was satisfied experiment environment
6) Overall, I am satisfied this program.
7) I'd like to participate in this program again.