

Development of the Learning System for Outdoor Study Using Zeigarnik Effect

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Abstract. What is the best way to feel the spirit of the location? In Japan, the students of the elementary school and the secondary school have the school trips for several days with classmates. The purpose of those trips is to visit historical areas in Japan or foreign countries to encourage the students to learn about history, culture and nature in a proactive way. However, it is not easy for them to recognize and understand valuable points such as the artistic points and historical points even if they look at the objects or scenery. To solve this problem, we have developed a new learning model for outdoor studies using mobile phone applying Zeigarnik effect that explains human beings takes much interest in uncompleted or interrupted tasks. In this paper, we explain our study model for outdoor study and evaluate the usefulness of our tool through trials.

Keywords: E-learning, Zeigarnik effect, Outdoor study, Mobile Phone, Secondary Education.

1 Introduction

Mobile communication gives us access to others whenever and wherever we want, however it is still important to go to the field in order to know the place or the thing thoroughly. In Japan, students go on several day school trips to encourage students to learn history and nature in more positive way. For that purpose, 87.3 % of junior high schools allow students to walk around the area by themselves in small groups [1]. Such outdoor studies are very precious in the view point of history, architecture and some site-specific art [2], however, they cannot recognize artistic or traditional points and understand the meaning and the value just by look at the objects or scenery. To solve this problem, we have developed a new learning model for outdoor studies using Zeigarnik effects [3]; human beings take an interest in uncompleted or interrupted tasks. This paper examines our learning model for outdoor study, our original application and the results of 2 trials.

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2 Background

2.1 Children's Mobile Phone Usage in Japan

Increasing the crimes using mobile phones, the Ministry of National Education informed Education Committees of Japan announced that children should not take mobile phones to their schools in 2009. Exceptionally, however, students sometimes use mobile phones while outdoor studying in order to get contact with teachers. In addition after the big earthquake in Fukushima, many parents hope their children to bring mobile phones with GPS. Telephone, e-mail and location technology of mobile phones are regarded as a useful instruments for disaster. However, such special use means just bringing something like a safety box for students.

2.2 Learning for the Several Day School Trips

Before visiting the area, the students learn about history, art, architecture and some special points of place to visit for several hours in the classroom. They can use the Internet by PC to search information where to visit and write down the important points on their notebooks. They sometimes make a leaflet for the school trip, however, they seldom have chances to check with the document when they visit the area.

3 Our Methods for Students to Take an Interest in the Objects

3.1 Characteristic Points of Human Beings from the Viewpoint of Cognitive Science

It is said that “seeing is believing”, however, we, human beings do not recognize what we are looking at. For example some like a game named photo hunt. If we can recognize all the things our eyes catch, photo hunt would not be a game. We sometimes don't see the differences between two resembling photos. However, once we have caught the object, we cannot help looking at that particular point. If students walk around the area without any marks, their memory would become ambiguous. We utilize this special quality of human beings and use the quiz as a trigger to focus on the object from the whole scenery in front of them. Then the special point of the object would make a marked impression on their minds.

In addition, we treat the class in which students prepare for their outdoor studies as an incomplete experience. Before the trip students learn the history and specific arts in the area and make some quizzes for the other classmates by making use of the preparation. They do not know what kinds of quizzes are being prepared for each other. Such an incomplete experience rouses human interest in the object. This is on the basis of a version of the Zeigarnik, that tasks that have been completed are recalled less well than uncompleted tasks. Nowadays some engineers have created detailed navigation systems for trips, however, we deliberately create such incomplete experiences for students by a design based on the Zeigarnik effects.

3.2 Related Works

For the Zeigarnik effects, a study made by Greist-Bousquet and Schiffman 1992[4] provided evidence. There are several related works about Environmental psychology and tourism. Pearce & Stringer 1991[5] studied from the view point of physiology, cognition and individual variation etc. Fridgen 1984[6], van Raaij 1996[7], Toshiji Sasaki also studied about this field. T.Sasaki told that we can part a trip into 3 scenes: before the trip, during the trip, and after the trip [8]. We focus to connect before the trip and during the trip using our new application.

4 Quizzes for Site-Specific Learning

4.1 Preparing for the Trip – Using Zeigarnik Effects

On our methods students learn about the area: famous persons, arts, architecture etc. (knowledge input). Then they make quizzes in preparation for the trip (Learning outcomes). They make quizzes about the objects they are interested using our authoring tool, and then they study about the area more. For, if they want to win the game, they should remember many kinds of things. They do not know which quizzes they will be answering and they do not know which course they will be taking until the trip. Teachers make the courses and choose quizzes. In such an incomplete situation, students go to the destination and will complete their study on the trip.

4.2 For Outdoor Learning

Using the quizzes, we make some special points to keep students' eyes on. (Refer to Figure 1) This is an example.

Do all dragons have wings on their back?

1. Yes. All dragons have wings.
2. No. Dragons don't have wings.
3. Though Eastern Dragons have wings, Japanese Dragons don't have wings.
4. There are several kinds of Dragons in Japan. Some have wings and some don't have wings.

Correct answer : 4

There are several kinds of dragons in Japanese legend. Some belong in water and some belong in the sky. The Dragon of the sky, TENRYU has wings. Let's go to the temple and look at the sculpture of a flying dragon.

Fig. 1. An example of the quizzes

After answering this quiz, students will look at the sculpture of the dragon with beautiful wings (Fig.2) at the temple with more interest. The quizzes are triggers to accept objects positively.



Fig. 2. The sculpture of the dragon

4.3 About Our System

Figure 3 shows an outline of our learning model and the behavior of this system. Students use mobile phones to access this system. We named this system as “Stasta eye”. “Stasta” is our project name. That is an abbreviation of “Study Studio” and “eye” means to see the visiting location deeper.

- Scene 1: Preparation in the classroom by PCs

Students make quizzes before going to outdoor studying. Teachers input the walking routes, information of emergency call and select quizzes in the classroom. ((1) and (2) in Figure 2).

- Scene 2: Our door studying by mobile phones

When a group of students visit a place, they answer a quiz and find the next place to visit, as in an orienteering game. They compete on points and can also check the status, such as points and location of other groups. Teachers can also access the same information. At the same time, they can upload photos and comments. ((3)(4)(5) in Figure 3)

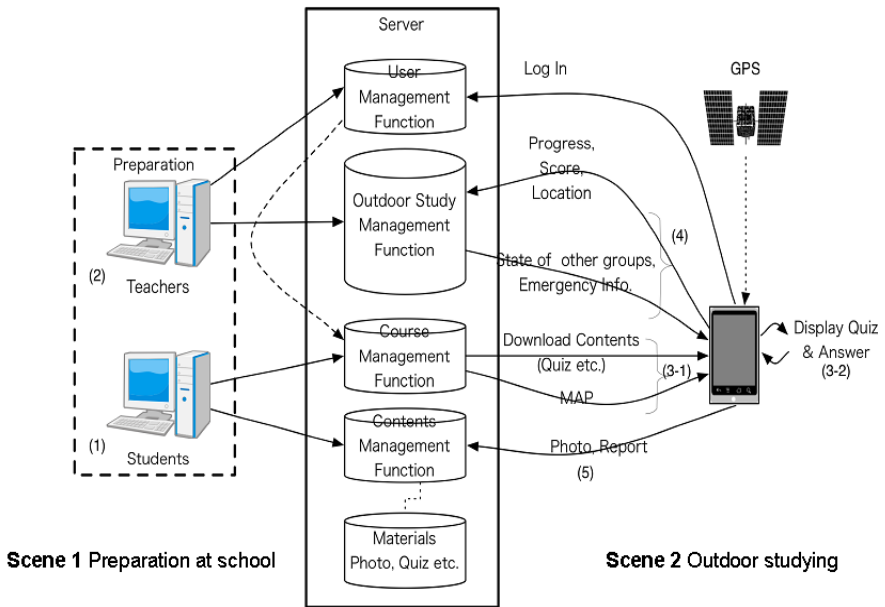


Fig. 3. Outline of our learning model

4.4 As the Safety System for Emergency

In addition to the learning effects, parents and teachers concerned about safety of their children on the school trip. When we had a big earthquake on 11 September in 2011, many groups on outdoor studying were isolated for several hours. That became a big problem. Using our application on the trip, teachers can check students' positional information on time and contact with them by several methods: telephone by one push, short mail, SNS. In addition students can know publish shelters around them by the mobile map in which they usually look for next quiz point. See Figure 4. This is the image of pages of our application. Under the icon of the camera, several functions are displayed. One of them denotes emergency call to teacher and one lead to map with shelters. Students can find these icons in every page if they need.



Fig. 4. Screens of our application, "Stasta Eye"

5 The Results of Our Trials

5.1 Summary of Trials

We should prove safety and efficiency before practical use in junior high school. Especially for outdoor study we had to demonstrate not only in the laboratory but also our door. After several experiments [9] in our workshop “Study Group on School Trips”[10], we had two trials using our orienteering system as table 1.

Table 1. Our 2 trials

	Date	Number	Age	Area	Device
I	15, Sep, 2012	30	16-60	Sumida-city, Tokyo	Smart Phone
II	15, Aug, 2013	35	9-22	3 cities, Tokyo	Tablet PC

At the first trial we ascertained movement of our application at the large area with several groups. We have also investigated the effectiveness of the system by questionnaires. At this time we only researched a part of using application. (Refer to Figure 2)

After having ascertained our system, we had second trial with younger subjects enclosing junior high school students by the cooperation of Academy Camp [11]. Students had a lecture in the room to know about the areas and history to answer the quizzes at the outdoor study. They should keep new knowledge till answering the quizzes. This situation would cause Zeigarnik effects. In order to prove the effect, we performed questionnaires at the next day of the trial. At first trial we performed them when subjects arrived at the goal. If the second subjects remembered the points of quizzes, Zeigarnik effects will be proved.

5.2 The First Trial

Summary. 30 persons (students and adults) formed 8 groups (3 or 4 persons per group) with smart phones and 1 teacher managed them by PC. They walked around the Tokyo sky Tree, where there are many old historical Japanese temples, gardens and architecture. After they answered one quiz, the next point was shown by our application, “Stasta eye”. They could also see the point on the map with their smart phones. 10 quizzes were prepared for each group. The teacher could have the information through the PC, such as the telephone number which students use, their location and the score of the quizzes.

Results: Our system worked normally. All groups reached the goal using “Stasta eye” within 2 hours. Teacher got 3 calls from 2 groups using emergency button as a part of testing. The results of questionnaires show us that people were interested in the objects and scenes they saw by answering the quizzes. (Refer to Figure 5 and Figure 6.)



Fig. 5. Impression of using “Stasta Eye”

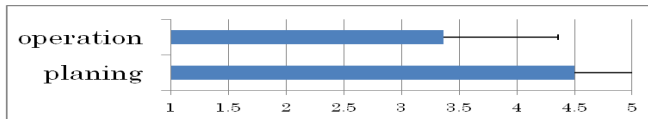


Fig. 6. Evaluation about the planning and the operation (Likert scale)

The evaluation of planning was 4.5/5(Average). It is very high and seems to affect other elements; Planning and operation $R=0.312$ / Planning and “interesting” $R=0.452$ (Both results means moderate positive correlation) The evaluation of the operation was 3.36/5(Average). The standard deviation was 1.08. We had high evaluation about the planning and our methods of learning.

5.3 The Second Trial

Summary. 35 persons (pupils and students) formed 7 groups (5 persons per group) with tablets and 1 manager used PC. Before the orienteering with quizzes, they had a lecture about 3 traditional areas, where they would walk around, in the room for 1 hour. After the lecture 2 or 3 groups walked with our application each area. Only the start point and the goal point are same. Answering a quiz, they took pictures or compared their records with other groups.

Results: The results of questionnaires are following.

- The evaluation of our application (Likert scale)

The evaluations were very high level. Though the quizzes are little difficult for younger students, they enjoy the outdoor studying and gave “Quiz” a high evaluation as Figure 7. In addition many students used several functions. 94% of the subjects took photo. 80% of the subjects answer the quizzes (Some elder students didn’t answer and encouraged children to answer quizzes). 83% of the subjects input something at tablet.

Comparing with the results of the first trial (Figure 6), evaluation of operation is higher (+1.0 point). At the first trial we used smart phone and second one we use Tablet. The result reflected the differences of interface. The evaluation of quiz was excellent at the second one.

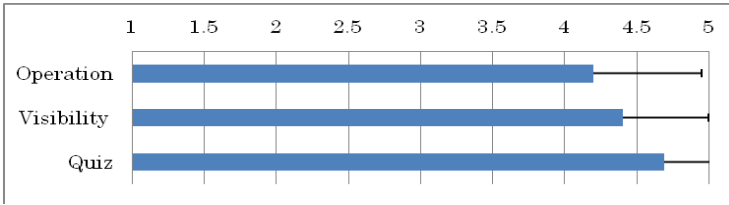


Fig. 7. Results of the application evaluation (Likert scale)

5.4 Comparing the First Trial with the Second One

Comparing 2 trials, we can find several remarkable points. (Refer to Figure8)

The second trial gave higher results about all positive evaluations. Exceptionally the negative item, “difficult” was indicated 17% of the second trial. None said “difficult” at the first trial.

The ages of the first trial were 16-60 years old. The ages of the second trial were 9-22 years old (Refer to Table 1). Young subjects felt something “difficult”, however they also said “interesting”.

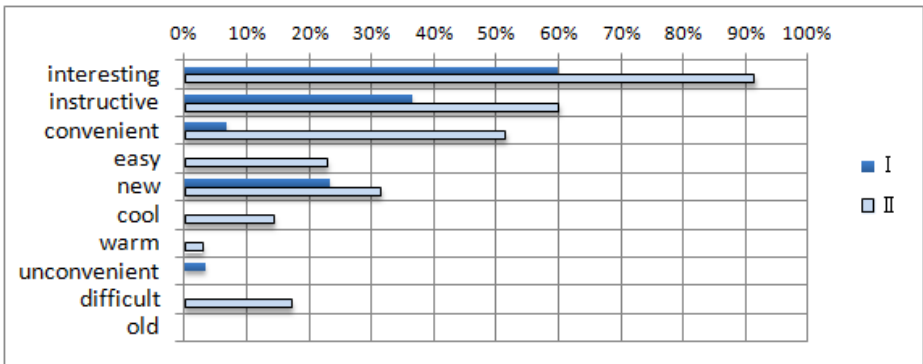


Fig. 8. Impression of 2 trials(1)

This tendency became clearer in the Figure 10 in which we assorted 2 layers about ages in the second trial. (Refer to Figure 9.) Ages of the second trial are from 9-22 (Average 13.34 years old). Main students are Junior high school students and pupils at elementary school.

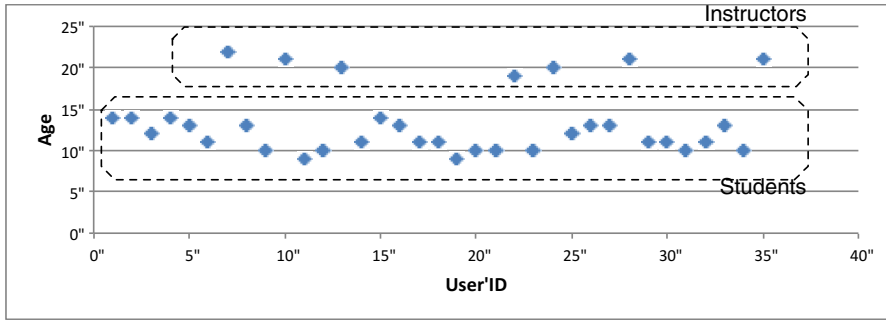


Fig. 9. Ages of subjects at the second trial

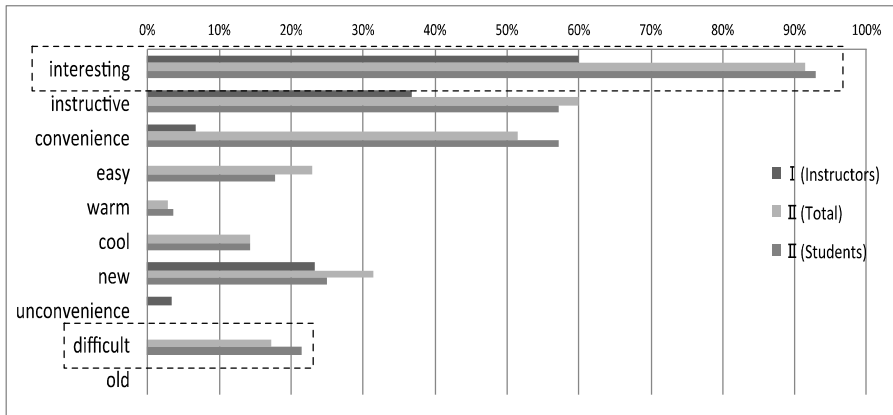


Fig. 10. Impression of 2 trials(2)

II (students) in the Figure 10 means Junior high school students and pupils and they are 28 persons. Comparing “Interesting” with “Difficult”, we find younger students interested in our application and felt interesting and convenience, though they felt the quizzes were difficult. In the scene of outdoor studying difficulty isn't necessarily a bad meaning for those students. To learn something is to solve some difficulties. This can gain the feeling of satisfaction from younger students.

- The most impressive place

The students of the second trial answered the questionnaires at the next day of the outdoor study, however, 18 persons (51.42%) answered the points of quizzes concretely. For example 10 years old pupil answered that the bronze statue of Takamori Saigo, who was a famous person on Meiji Restoration, was the most impressively. 13 years old students answered that The Stone Hut at Edo Castle was the best. Those objects were explained in the lecture before outdoor studying and also they answered quizzes at the points. At the first trial in which we didn't have a preparing lecture, only 2 persons (6.67%) answered the points of quizzes and the

names of the places were incomplete. We presumed the Zeigarnik effects can make such results.

Pupils are not usually interested in such inanimate objects. They look at something moving objects; animals, trains or such active things. There is a big zoo at the same area and many pupils like to look at lions, pandas and other animals, however, they do not notice any bronze statues near the zoo.

Having lecture before the outdoor study in order to win orienteering game with quizzes, they keep and remember the contents well. They have one point to know the place using our application.

6 Conclusion

Our learning model has succeeded to obtain good results for outdoor studying. Students noticed the points and were interested in the objects. We had higher evaluation in the second trial that is similar to the situation of practical use at secondary education and confirmed the effectiveness of Zeigarnik Effect.

We consider the smart phone or tablets as the connecting device between classroom study and outdoor study. Zeigarnik Effect is the method to connect them. Students looked around the area, architectures, and site-specific arts more positively by using our application. We would like to design opportunities for students to feel and know about the objects of where they are.

According to the results of the second trial, we also considered about the elements of e-learning. When it comes to use the ICT, we need the usability and easy operation in our daily life. However, we need different idea in the field of learning application so that the students could find some problems or hard tasks and solve those matters. Then they get some knowledge and the sense of accomplishment. Much automatic information is never always necessary for their learning. It is important for students to make chance to think about something positively.

At the next stage we will have chances to use our system at junior high schools, where the whole process including scene 1 (Refer to Figure 2) perfectly.

Nowadays mobile internet users are increasing year by year throughout the world and some other countries in Asia become to have such several days school trip. We will use this system to introduce Japanese culture for them.

References

1. The Travel News (July 30, 2010), <http://www.travelnews.co.jp/news/kankou/1007301042.html>
2. Hatta, N.: The Commitment of 'Place' to the Birth and the Appreciation of Art Works" Shimane. *Journal of Policy Studies* 8 (December 2004)
3. Zeigarnik, B.V.: On finished and unfinished tasks. In: Ellis, W.D. (ed.) *A Sourcebook of Gestalt Psychology*. Humanities Press, New York (1967)
4. Schiffman, N., Greist-Bousquet, S.: The effect of task interruption and closure on perceived duration. *Bulletin of the Psychonomic Society* 30(1), 9–11 (1992)

5. Pearce, P.L., Stringer, P.F.: Psychology and tourism. *Annals of Tourism Research* 18, 136–154 (1991)
6. Fridgen, J.D.: Environmental psychology and tourism. *Annals of Tourism Research* 11(1), 19–39 (1984)
7. Van Raaij, W.E.: Consumer Research on tourism: Mental and behavioral constructs. *Annals of Tourism Research* 13, 1–9 (1986)
8. Sasaki, T.: *Kankoo-Ryoko no Sinrigaku*, p. 38. Kitaoji Shobo (2007)
9. Hiramatsu, Y., Sato, F., Suzuki, A., Ito, A.: Outdoor Study System for Mobile Literacy. In: PC Conference, Ehime Japan, pp. 463–466 (2009)
10. Study Group on School Trips, <http://joyful-shu-gaku.com/>
11. Academy Camp, <http://academy-camp.org/>