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The Effect of a System with GPS and e-map on Junior High School Student's Achievement and Sense of Direction in Geography m-learning

Yu-Feng LAN*, Yu-Hsien WANG
Department of Information Management, National Formosa University,
No.64, Wunhua Rd., Huwei Township, Yunlin County 632, Taiwan, R.O.C.
*yflan@nfu.edu.tw

Abstract: M-learning is an important role in e-learning environment by mobile device. However, in Taiwan junior high education, few research was to develop an m-learning system on the geography curriculum. Geography courses are quite indispensable. The sense of direction of training is one of the first studies in Taiwan junior high education of geography curriculum; however, many students' sense of direction is not particularly good. In addition, geographic information systems (GISs) and global positioning systems (GPSs) are the best technology of map in this era. Thus, this study attempts to develop a system with GPS and e-map function to foster the students' sense of direction. The participants, 12 junior high students on Taiwan for first year students, were invited to participate in this study. After the experiment, the study conduced a post-test and a satisfaction survey of the system. The results showed that using the proposed system enhances students to learn in terms of the sense of direction.

Keywords: M-learning, Geography curriculum, GPS, E-map

Introduction

In Taiwan, the geography curriculum is very vital in junior education. The sense of direction is a personal sensation skill. Generally, students in Taiwan have not any chances to learn about the sense of direction, except the junior education. In the geography curriculum, students often felt boring because they just used a compass for learning the sense of direction. Therefore, the research aimed to enhance the sense of direction for learners. To solve the limitations of the teaching methods, this study used the advance technology and moved the learning activity outdoor. In fact, e-map system is not only a navigation system, but also an education system. Through the use of e-map system and outdoor learning, the learning activities improved students learning and enhanced the attention of learning geography.

Recently, a variety of software on the navigation has been developed [8] . People used the navigator's service in presentation of route and stations. Now, many kinds of mobile device navigator receivers and professional software on the navigation have been recognized. Hence, this research used these devices with e-map system to experiment. This study investigated the effect of e-map system on junior high school student's achievement and the sense of direction

in geography m-learning. The present study hope through mobile device can enhance student learning geography in terms of the sense of direction.

1. Related literature

1.1 M-learning content

As the wireless network and handheld technology advances, it is not limited to the classroom learning environment to allow time for no more conflict, ubiquitous learning since then becomes possible. Mobile devices have the potential to change the way students behave, the way students interact with each other, and their attitude towards learning [4] . Previous research has pointed out the [2] conducted an outdoor mobile learning activity for a bird-watching lesson using scaffolding pedagogy in Taiwanese elementary school. Learners can use handheld devices to share information with peers during group discussions and learning activities [7] .

1.2 Literature of geography

Geography's study area is ''the world and all that is in it" [3] . Tuzun [9] developed a 3D Multi-User Virtual Environments game in geography education. Adams [1] used SimCity 2000, a Commercial-Off-The-Shelf (COTS) game, in an undergraduate introductory urban geography curriculum.

What is the sense of direction, and how do we measure it? According to Kozlowski [6] , the sense of direction is ''an awareness of location or orientation''. Ishikawa [5] used mobile device (GPS), self-report sense of direction and paper to experiment. Above study assigned three groups to carry out wayfinding skill experiment. According to the result, they found GPS map is not really benefit for helping the learner to find the best way and goal. According to above evidences, these motivated the authors to explore the effect of mobile devices on geography curriculum in terms of the sense of direction in m-learning.

1.3 The purpose of this paper

This paper has the following objectives:
1. Through e-map system to learn the sense of direction,
2. Developing a m-learning process,
3. Assessing students' attitudes toward the collaborative learning.

Thus, this study utilized an outdoor collaborative activity to train the sense of direction on the learners and to carry out the pre-test and post-test for evaluating their performance. Collaborative learning is very vital in this research, especially the mutual aid. In collaborative learning, the students acquire social skills by discussing and expressing their opinions. After the experiment, this study conducted a questionnaire to the students regarding the system satisfaction. Finally, this study provided some suggestions to the future researcher.

2. Method

2.1 Participants

Twelve junior high school students (6 male and 6 female) participated in this experiment. There were from Huwei Township junior high school, Yunlin County, Taiwan. Their ages ranged from 12 to 13. The experiment time was about 60 minutes, and the participants were divided into three groups (one group with four members).

This study provided each group with a mobile device, carrying e-map system. A map approximately radius 1km was selected for experiment. In addition, the e-map system provided pin function. Thus, the students could use this function to move and draw up the pins regarding their positions on the screen (800 x 480 pixels / 3.2 inch), and they can use this function to find peers (Figure 1).

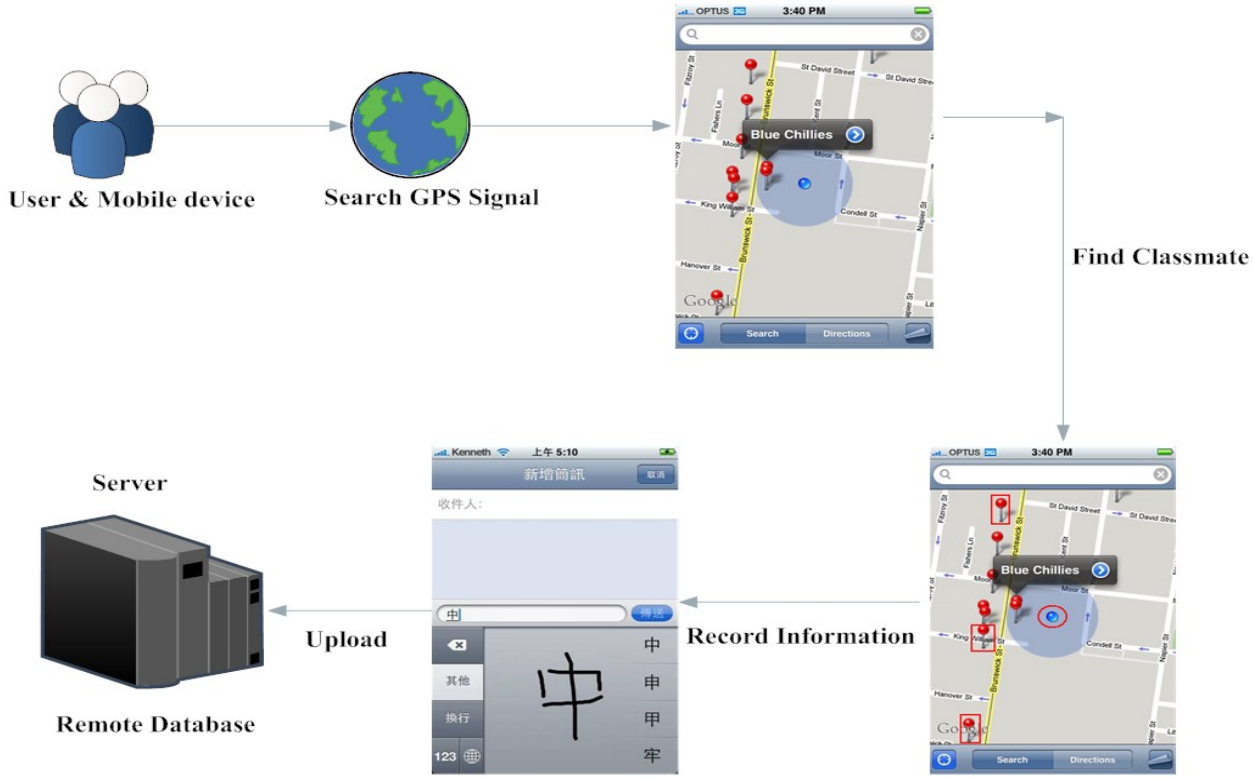

Figure1. System operating flow

2.2 Data analysis

Before the experiment, the students have to carry out pre-test. The question was divided into two parts. First part is about basic knowledge of geography (30%) and another part is about relative position and absolute position of cognitive knowledge (70%). After the pre-test, the researchers took all participants to the fixed location. They recorded assigned group

coordinates by using e-map system, and reported back to the researchers. After this step, the researchers inform all participants of each group coordinate. All participants of groups used pin function to record other groups' coordinates on the screen. This study then provided several questions for students. The students were asked to reply the questions. For example, a question describes: "Please answer other groups direction."(Answer example: Southeast, Northeast). After 20 minutes, three groups changed their fixed location, recorded coordinates and answered the questions again. The researchers hint about how to record coordinates for each group. Last, a procedure was retreated based on above manner, except without any hint. After the experiment, a post-test was administered to evaluate students learning performance.

3. Result

3.1 Analysis of the result

As shown in Table 1, there was no significant difference between pre-test and post-test in terms of part1 (pre-test = 20.27, post-test = 20.20). The result indicated that after experiment students' learning performance in terms of part1 not improved. However, regarding the students' learning performance in terms of part2, a significant difference was found. In other words, the cognitive knowledge with respect to relative position and absolute position significantly improved (pre-test = 47.3, post-test = 65.13). The reason for this explanation is that students improved their geography performance after using the e-map system.

Table1. The results of pre-test and post-test

Variable	N	Mean	SD	P
Pre-test	12	67.58	2.76	0.01*
Post-test	12	85.33		
Part1: Pre-test, for a basic knowledge of geography	12	20.27	0.12	0.69
Part1:Post-test, for a basic knowledge of geography	12	20.2		
Part2: Pre-test, for the relative position and absolute position of cognitive knowledge	12	47.3	2.72	0.01*
Part2:Post-test, for the relative position and absolute position of cognitive knowledge	12	65.1		

*$p<0.05$.

3.2 Analysis of the questionnaire

This study used a 5-point likert scale to execute the system satisfaction, (One is strongly disagree and five is strongly agree). Overall, the results had a positive feedback. In addition, the students agreed that this teaching method could enhance the entire learning process and

the interactions. Moreover, this study designed two open-ended questions, regarding the sharing and exchange of opinions, to evaluate students' views. Interestingly, the results showed that using the proposed learning mechanism could lead to a good learning environment and students not are afraid to learn the geography curriculum. In sum, the result showed using e-map system was useful and convenient for learners in learning geography curriculum.

4. Discussion and Conclusion

This study has many valuable results. The researchers believe the analysis results could provide more help on future researchers. The mobile device has many advantages, such as engaging students in learning activities and discussion and facilitating the organization of conceptual information. This study found the students could use the e-map system to train the sense of direction. In conclusion, these findings give positive support and the collected data were consistent with our expectation.

Interestingly, in the first 20 minutes each group try to record other groups' coordinates. The result revealed there exists several wrong answers. After the researchers hint, the ratio of correct answer improved. In the last phase, the results showed that the accuracy was not declined. In sum, the proposed method is useful by training the sense of direction.

Previous research showed that the rapid development of wireless communication has attracted the attention of researchers. According to this study, using handheld devices could achieve better outcome in m-learning. In the future, it is predicted more outdoor learning activities are popular.

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