Design two systems to improve students Environmental Education knowledge - a case for the Barclay Memorial Park

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Abstract: In recent years, the rise of the Electronic map gradually replaced the use of traditional paper maps such as the Google Map, Bing Map, and Apple Maps. In the Google Maps which offers Street View, street maps, and satellite imagery etc. Especially, Google Street View was launched in 2007, it provide 360° panoramic views of streets, and make everyone to use the Street View to explore the world. However Google uses cameras, GPS equipment, computers and lasers to capture images, it need a lot of money. Such requirement is big challenge, so we use Digital Single Lens Reflex Camera (DSLR Camera), GPS and Tripod to design a simple Street View backpack. In order to makes everyone use simple equipment to produce panorama, we use Google Street View service to build two system: Street View system for "Testing Student degree" and Street View system for "self-education". In the Street View system for "Testing Student degree", we combined the Testing menu with Street View service let student browsing the street, landscape and answer the question. With this method, teacher can using Street View system for "Testing Student degree" to know how many ecological knowledge that the Student have. After used the Street View system for "Testing Student degree", we provide Street View system for "self-education" to make student learning by themselves. In the Street View system for "self-education", not only learn the knowledge about ecological, historical and humanistic, but also offer the Environmental information that make student learn more Information about the Barclay Memorial Park.

Keywords: Street View, GIS, Environmental Education

1. Introduction

With advances in internet technology, people have gradually replace the forms of traditional maps with Electronic maps. Electronic maps become more people used, because it is easier than traditional maps. For user to say, just input the place where they want to go, Electronic maps will display the destination. With Electronic maps you can also save the time to find the location and route. In addition, traditional maps can only provide information on paper, such as location, direction, and distance. However, Electronic maps is a virtual map, provide the same information and also provide extra services, such as Street View, geography and geology, transportation routes, satellite imagery, 3D buildings, and Environmental Information. After a period of time, Electronic maps will be updated, it is the reason that Electronic maps can replace traditional maps. Some studies have indicated that GIS have started to use in classroom. For example, Miller (2006) suggest that Google Maps applications allow user to make a mark values directly GIS-based maps. Yansen Wang (2013) suggests that Google Maps/Earth GIS takes advantages of resources in map, data visualization, image data handling, and it is offer from Google Maps/Earth Service.

In the 1992, United Nations Conference on Environment and Development (UNCED) are famous for the Earth Summit, it proposed Agenda 21 that make Environmental Education become a general knowledge. From the view of historical, Environmental Education has belong to conservation education, outdoor education, education for sustainable development, and Environmental literacy (Joe E. Heimlich，2010). However, the purpose of education is Environmental, preservation, and conservation, it is a point of thesis. Environmental evaluation has only recently become an outstanding component of Environmental Education. (Jacobson et al., 2006).

In this study, we use Google Street View Service as our tools, and produce two systems with the Street View Service. One is Street View system for "Testing Student degree", and the other is Street View system for "self-education". In the Street View system for "Testing Student degree", we use it to test student ecological knowledge and Environmental information of the Barclay Memorial Park. We hope that through this system can let teacher know how many ability they will have. In addition, in the Street View system for "self-education", we used the Barclay Memorial Park for instance, and combined Street View Service with the surroundings information to guide students to understand the Environmental information.

2. Literature review of Environmental Education

The Stockholm Conference (Dias, 2002) determined that the contents of Environmental Education would save the education issue able to manage the resources of nature, and make it sustainability. (Ministry of Science and Technology, 2007:12) In 1997, the main theme of the first World Conference is Environmental Education, and it held in Tbilisi. The classic Tbilisi Declaration definition were authored by 265 representatives from 66 member states, which emphasizes knowledge, attitudes, values, skills, and behaviors. (UNESCO, 1977) In the 21st century, the economy grows rapidly, we face more challenging task to protecting environment and the resources. In the West Country, Environment and Environmental Education has become people's concern. Many countries have reached consensus on the necessity of Environmental Education provision in the school. (Shi & Liu, 2010) Environmental education strives to engage the global citizenry in new ways of thinking and acting for the environment. Environmental education is often delivered through an educational program and try to change the learner's cognitive, affective and participatory knowledge, skills and behavior. (Annelise & J. William Hug, 2010) environmental education that heavily depends on direct experiences of natural phenomena outside the classroom. (Shultis, 2001)Researchers and evaluators also need to develop new research tools to learning in environmental education. (Heather & Lucy, 2014) Thus, we developed two system, and we will introduce it in next section.

3. Technology
3.1 Technology for photography

In our Street View system, we don't use the panorama of the Google Street View, and we use the images were captured by ourselves in the Barclay Memorial Park. The method of the panorama used Panorama stitching software (Panorama Studio 2 Pro) to stitching the images. However, in the shooting of the images have two way: One for vertical and the other for horizontal. In this study, we adopt vertical shooting that vertical shooting have much more range than horizontal shooting. In the test, we can see the difference between the horizontal shooting (left of Fig.1) and vertical shooting (right of Fig.1). In the Fig.2 show the method of shooting a panorama, we take every 30 degree for a shoot, and total we have shooting 12 images. After shooting the images, we used Panorama stitching software to make a panorama (see Fig.3). In this study, we have taken 492 images and make 41 panoramas.
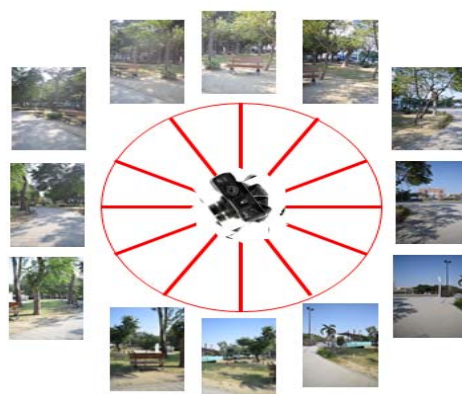

Fig. 1. The method of shooting image.   Fig. 2. The method of shooting panorama.

Fig. 3. The panorama.

3.2 Technology for making Street View

In the Technology for making Street View, we used the Google Maps JavaScript API (https://developers.google.com/maps/documentation/javascript/streetview). The First step, we set the number to each panorama (see Fig.4). The second step, we record the latitude and longitude of each panorama, and input the value to the Google Maps JavaScript API (see Fig.6). Finally, we use the service of Street View, set the setting about the number of panoramas, coordinate, direction, and show the result on the website (see Fig.5). For example, we set the images (01.jpg), input the value of coordinate (22.973228, 120.222538), and the Street View Service will show the result.

Fig. 4. Set the number to each panorama.

Fig. 5. Show the panoramas on the website.

```
streetViewPanoramaData["location"] = {
  latLng: new google.maps.LatLng(22.973228,120.222538)
};
```
Fig. 6. Input the value to the Google Maps JavaScript API

4. Process of the system production
In this section, we will describe two example systems of using Street View services.

4.1 Street View system for "Testing Student degree"

In the process of making Street View system for "Testing Student degree", we use this system is intended to test the ecological knowledge about the Barclay Memorial Park. We can divided this system into 2 parts: One for the Street View, and the other for the problem menu. In the part of the Street View, we went to the Barclay Memorial Park to shooting images, and used Panorama stitching software to stitching the images into a panorama. However, the panorama in the Google Street View not aim at the right direction (see Fig.7), so we using PhotoScape tools to do some process. We recut the panorama into 12 parts (see Fig.8), and change the number to the panorama that make the number 1 - 12 become 4 - 12 and 1 - 3(see

Fig.9). After change the number of the panorama, the incorrect direction change to the correct direction, and we can see the result in Fig.10. In the problem menu, we only collected ecological knowledge about the Barclay Memorial Park, such as what the name for this tree or what time will this flowers bloom. The reason of only collected ecological knowledge is we hope that teacher can through this system to testing students' knowledge.

Fig. 7. The panorama in the Google Street View not aim at the right direction.

Fig. 8. Recut the panorama into 12 parts.

Fig. 9. Change the number to the panorama

Fig. 10. The panorama in the Google Street View aim at the right direction.

4.2 Street View system for "self-education"

When we making Street View system for "self-education", we provide a system for students to learn. With this system, students can learn the relevant information and knowledge about the Barclay Memorial Park. We also divided this system into two parts: information menu and part of the Street View has mentioned above. In the Street View system for "self-education", we use the same set of the Street View service, but we don't test the student's ability. We use a different way to provide students to learn, students can see the tag and click the corresponding information menu. In the information menu, it provide about ecological knowledge, historical and humanistic knowledge, and Environmental information. For example, we will introduce the flowers and the trees in the Barclay Memorial Park, and introduce the history of Dr. Thomas Barclay.

5. The result of two system

In the result, show the Street View system for "Testing Student degree" and Street View system for "self-education" as follows:

5.1 The result of Street View system for "Testing Student degree"

In the show of Street View system for "Testing Student degree", can be students interface and teachers interface.

5.1.1 Students interface of Street View system for "Testing Student degree"

Fig.11 shows the process of students interface for operation, students can use the Street View to browse the panorama of the Barclay Memorial Park, and they can also see the problem tag to answer the questions (see Fig.12). With this system allow students to answer the ecological knowledge about the Barclay Memorial Park, and let teacher know the ability of these students. When students answer the question, we ask students to input the account, passwords, grade, class, number and gender (see Fig.13). After input the personal information, students can answer all of the questions, this system will display the answer what they do (see Fig.14).
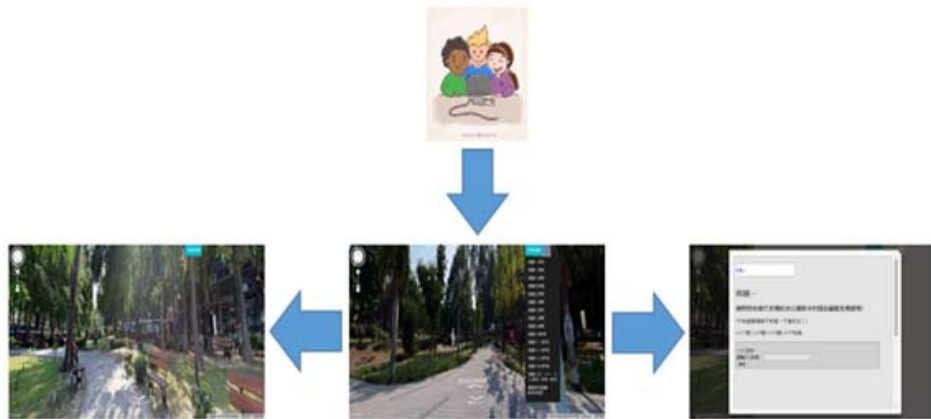
Fig. 11. The process of students interface for operation.

Fig. 12. Students answer the questions   Fig. 13. Students input the personal information.

編號	帳號	年級	班級	座號	性別	答案1	答案2	答案3	答案4	答案5	答案6
1	10101	1	1	1	女	1	2	2	4	1	2

Fig. 14. Display the answer what students do.

5.1.2 Teachers interface of Street View system for "Testing Student degree"

In the teachers interface, teachers can through this interface to know the situation what the students filled (Fig.15). When all of the students have completed this questions, teachers can go to the scores management interface to know the case of every student (Fig.16).

人員管理

編號	帳號	年級	班級	座號	性別	S1	S2	S3	S4	S5	S6
1	10101	1	1	1	女	1	2	2	4	1	2
2	10102	1	1	2	女	1	1	1	1	1	1
3	10102	1	1	3	男	2		3	1	3	4
4	10104	1	1	4	男	3	2	4	1	2	4
5	10105	1	1	5	女	3	2	2	1	4	2
6	10106	1	1	6	女	1	3	3		2	1

Fig. 15. Display the personal information and answer.

分數管理

基本資料						學生答題內容						學生答題狀況						各題分數						總分
NO.	帳號	年級	班級	座號	性別	S1	S2	S3	S4	S5	S6	Q1	Q2	Q3	Q4	Q5	Q6	分數1	分數2	分數3	分數4	分數5	分數6	總分
1	10101	1	1	1	女	1	2	2	4	1	2	O	O	X	O	X	O	10	10	0	10	0	10	40
2	10102	1	1	2	女	1	1	1	1	1	1	O	X	O	X	X	X	10	0	10	0	0	0	20
3	10102	1	1	3	男	2		3	1	3	4	X		X	X	O	X	0	0	0	0	10	0	10
4	10104	1	1	4	男	3	2	4	1	2	4	X	O	X	X	X	X	0	10	0	0	0	0	10
5	10105	1	1	5	女	3	2	2	1	4	2	X	O	X	X	X	O	0	10	0	0	0	10	20
6	10106	1	1	6	女	1	3	3		2	1	O	X	X		X	X	10	0	0	0	0	0	10

Fig. 16. Display the scores of each students.

5.2 The result of Street View system for "self-education"

After the introduction to the Street View system for "Testing Student degree", we introduced the result of Street View system for "self-education", the purpose of this system is intended to combined information menu with Street View. Let students use this system, can learn the knowledge about the Barclay Memorial Park. In the Fig.17 shows the home page of this system, students can click the left image to go to Street View Service, browse the view, and click the information menu to learn some knowledge. In the right of this home page, we can see the video from youtube, and this video were provide by Chongming Elementary School where the school near to the Barclay Memorial Park. This video has described the origin of the Barclay Memorial Park, the story about the Barclay Memorial Park, and the ecological introduction. After click the bottom of this home page will pop up a new window, it provide some interesting story about the plants ,in this system not only can learn the knowledge about the Barclay Memorial Park, but also offer some interesting story to make students know.

Fig. 17. The process page of this system

Acknowledgements

References

Annelise Carleton-Hug, J. William Hug (2010)."Challenges and opportunities for evaluating environmental education programs", Evaluation and Program Planning, 33, pp.159–164.

Dias, G.F. (2002). Educação ambiental: princípios e práticas. São Paulo: Gaia.

Heather Toomey Zimmerman, Lucy Richardson McClain (2014)."Exploring the outdoors together: Assessing family learning in environmental education", Studies in Educational Evaluation, 41, pp.38-47.

Joe E. Heimlich (2010). "Environmental education evaluation: Reinterpreting education as a strategy for meeting mission", Evaluation and Program Planning, 33(2), pp. 180–185.

Jacobson, Mallory D. McDuff, and Martha C. Monroe (2006). "Conservation education and outreach techniques"

Miller, C. C. (2006). "A beast in the field: the Google Maps mashup as GIS/2", Cartographica, 41(3), pp.187-199.

Ministério de ciência y tecnologia y médio ambiente. (2007) Estratégia ambiental nacional 2007-2010. Anexo único de la resolución n.40/2007. Ed. Academia. Ciudad de La Habana.

Shi Ximing, Liu Chunzhao (2010)."Survey of environmental education (EE): case study of higher education institutions in Ningbo", Energy Procedia, 5, pp.1820–1826.

Shultis, J. (2001). Consuming nature: The uneasy relationship between technology outdoor, recreation and protected areas. The George Wright Forum, 18(1), 56–66.

UNESCO. (1977). Tbilisi declaration From www.gdrc.org/uem/ee/tbilisi.html Retrieved 4.06.13.

Yansen Wang, Giap Huynh, and Chatt Williamson (2013). "Integration of Google Maps/Earth with microscale meteorology models and data visualization", Computers & Geosciences, 61, pp.22-31.