

The Digital Ecosystem of Multilingual Augmented Reality Technology to Promote Learning and Culture Tourism

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Abstract - The objectives of this research are: 1) to synthesize elements of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism in Suphanburi province; 2) to architectural design of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism; 3) to develop the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism; 4) to study the results of using the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism; and 5) to study satisfaction of the tourists who use the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism.

Keywords - Digital Ecosystem, Augmented Reality with Interaction, Multilingual, Culture Tourism

I. INTRODUCTION

A city of battles, famous literatures, celebrated amulets, prosperous agriculture, exceptional history, a city of artists, attractive dialect, is the motto of Suphanburi Province.

Suphanburi is an ancient city. Archaeological evidence of age 3,500 – 3,000 years old were found in Suphanburi. These found archaeological objects are accounted as new Stone Age, Bronze Age, and Iron Age, which have inherited from Suvarnabhumi time. Regarding to Suphanburi, it has known as an abundance and enrichment land of the central region since 1420 B.E. Phanthum Buri was the original name in the Dvaravati era. According to archaeological evidence, "Suphanaphum" was appeared in inscribed of the Northern Chronicles from King Ramkhamhaeng. The Great king stated that "Suphanaphum" was a significant city state before Krungsri Ayutthaya era. When Ayudhya was established as a city thereby Suphanburi was classified as an inner district where was very fertile [1].

Digital learning ecosystem; Thailand has been aware of the step up to globalization era for decades. With the development of technology infrastructure and the promotion of ICT learning skills, which may consider the scopes of work into 4 phases. First, creating equal accesses to technology by creating learning resources that provide computer equipment and internet networks such as ICT community learning centers and modern libraries due to

computer equipment and network charges are high in the past. Nowadays, the learning resources are spread out quite thoroughly. Together with the technology being cheaper, it can be believed that the problems and obstacles in accessing Thai technology have been resolved in the second phase. Providing knowledge on how to use basic technology and computers, such as internet surfing, the use of ready-made programs for work, the use of navigation maps, communication with email, and social media, etc. The new generation of youth, who are digital (digital native) are familiar with these basic digital tools. Moreover, these digital native also have the opportunity to learn computer skills from educational institutions. For the people before Millennium era who are digital immigrants, they need to learn by themselves or through the informal and non-formal education system. The third phase supports the use of technology in the way that creates solutions to everyday problems including raising the level of work or quality of life, such as online trading, art designs by computers, and online marketing, etc. "Smart user" or users that have applied skills are important mechanisms for adding value to production. This value counts as a principle of the digital economy that the government aims to achieve in the next 3-5 years. Phase IV: Creating developers with specific expertise in programming for new innovations. There are many countries, promoting the skills of writing commands (coding) and programming for youth at the young age, as they perceive the importance of this group as people who can change the societies from "technology consumers" to "technology makers". Consequently, it will be economic advantages for Thailand. The creation of this skill has been promoted more and more by private agencies and education institutions. However, there still lacks clear guidelines for teaching plans of basic education level. Promoting digital skills all 4 phases do not need to occur in order. Although, encouraging majority of habitants to the usage of technology with effective skills is necessary. This action will be the first step of creating IT developers [2].

The technology of augmented reality is a technology that combines the real world and virtual world together through various materials such as webcams, computers, patterns, software, and other related devices. Virtual images will display via computer monitors, projectors, or display devices. The virtual image will interact with the audience immediately. It may appear as a slide image, 3D image, animation, also includes animations with sounds, depends on the design of each media type [3].

Multilingual is a tool to communicate the understanding of people both now and in the past. People use their own dialects and accents. Multilingual is normal in many countries. It is necessary for living and working, helping children to develop because children often try to adapt, such as adjusting themselves to a group of friends.

Cultural tourism is a trip to sightsee or experience various arts and cultures, including traditional festivals, as well as visiting historical heritages, historical monuments, and religious places. It can be divided into artistic tourism, traditions and historical sites where artistic and traditional values that ancestors created and inherited are. This type of tourist attraction consists of traditions, people's way of life, cultural performances, local products, local costumes, languages, and tribes etc. Examples of important tourist attractions in Thailand, in this category include Damnoen Saduak floating market, elephant show in Surin province, Bo Sang umbrella (handmade umbrellas), Loykratong festival, and Songkran tradition, etc. [4].

Based on such problems and backgrounds, the researcher therefore has the concept of creating brochures with the multilingual. The brochures are included the information of augmented reality technology to promote learning and culture tourism through the digital ecosystem. The usage of modern technology will be beneficial unlimited accessing of places and time. Not only the tourists will benefit from the brochures, but also students or people who are far from the

city and the tourist attractions, will be able to learn, watch, listen through AR books without having to travel to the actual places.

II. OBJECTIVE

1) To synthesize elements of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism in Suphanburi province.

2) To architectural design of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism.

3) To develop the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism.

4) To study the results of using the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism.

5) To study satisfaction of the tourists who use the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism.

III. METHODOLGY

The research methodology is divided into 5 phases as follows:

Phase 1: Synthesizing the elements of augmented reality technology.

Shows the analysis of the used patterns, of augmented reality technology with interaction, concluded that there are 3 popular patterns which are: 1) location based, which is used via smart phones, with a built-in compass, 2) marker or image based, use via computers or smart phones, and 3) object based, use through communication devices by spotting it at the specified object.

In this research, the researcher chose Marker pattern because it is very popular.

Phase 2: The architectural design of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism, as shown in Figure 1.

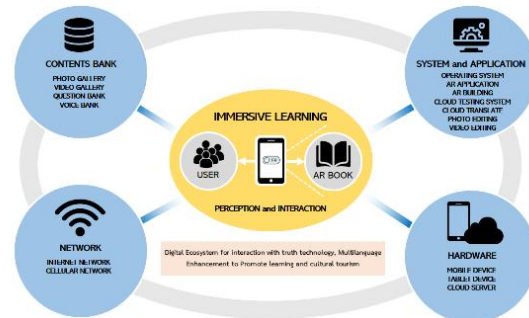


Figure 1. The Architecture of the Digital Ecosystem of Multilingual Augmented Reality Technology to Promote Learning and Culture Tourism

Phase 3: The development of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism, which the researcher develops the learning media through Zappar application.

Phase 4: Study the results of using the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism, with the following steps:

1) Pre-Trial Preparation Process

- Orientation: explain objectives, learning methods, measurements, and evaluations.
- Practice by using the augmented reality technology with interaction.

2) Experiment

Have tourists study by using environment of augmented reality technology with interaction for 4 weeks.

3) Evaluation

- Evaluate knowledge of the tourists who use the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism.
- Evaluate satisfactions of the tourists who use the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism.

Phase 5: Evaluate satisfactions of the tourists who use the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism with a satisfaction evaluation form. The criteria used are in rating scale, according to Likert's method by using 5 levels of assessment and has criteria in order to interpret and find the conclusion of the evaluation.

IV. RESULTS

The research on the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism, had summarized to 5 parts which are

Part 1: The synthesis results of the elements of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism in Suphanburi province, as shown in Table I.

AR	Suphot, 2559	Burin, 2558	Jaruwan, 2559	Supaporn, 2558	Chanin, 2559	Teeradej, 2559	Pongsak, 2559	Pijitra, 2560	Thunyaporn, 2559	Suwichin, 2559	Uraivan, 2559	Phanuwat, 2559	Total
Location-Based			/				/	/	/	/	/		6
Marker	/	/	/	/	/	/	/	/	/		/		10
Object Based		/	/	/	/		/	/	/		/	/	9

From Table I, Found that there were 12 researchers, used different patterns of augmented reality technology. In group 1 there were 6 researchers who used location based. Group 2 there were 10 researchers who used Marker (marker, image based), and Group 3 there were 9 researchers who used communication devices by spotting at the object based. From the synthetic table, the researcher chose Marker due to it is simple and widespread.

Part 2: The result of the architectural design of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism, as shown in Table II.

Description	\bar{x}	S.D	Result
Total average	4.23	1.15	high

From Table II, The results of the architecture the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism by three experts in educational technology and the creation of augmented reality technology.

The result of the suitability evaluation of architectural design of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism was suitable at a high level with the total average ($\bar{x} = 4.23, SD = 1.15$).

Part 3: The result of the development of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism. There are steps as follows:

- 1) Home of the learning media



Figure 2. The Main Screen

- 2) Display the main menu to allow the users to choose where they want to study as well as online books that users can use to study. Also

there are learning resources of the park that have contact channels such as Facebook, YouTube. It also has online tests including the satisfaction evaluation form toward the medias, as shown in Figure 3.



Figure 3. Shows the Main Menu

3) Show places where the users want to study. The interior consists of images and audio for user's convenience, as shown in Figure 4.



Figure 4. Shows the Contents inside the Park

Part 4: The results of knowledge evaluation of the tourists who use the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism, as shown in Table III.

The test	Full score	Average score (\bar{x})	Standard deviation, S.D.	Sig
Students	20	18.00	1.26	.00
Tourists	20	17.90	1.52	.00

From Table III, it's found that the results of achievement measurement of the 40 users who use the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism, when considering the average score, it is found that students had an average score of 18.00 and standard deviation was 1.26, and the average score was 17.90 and the standard deviation was 1.52 for the tourists.

Part 5: The evaluation result of the tourists' satisfactions who use the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism, as shown in Table IV.

Description	\bar{x}	S.D	Result
Average score, including 3 sides	4.23	1.15	high

From Table IV, it's found that the satisfaction evaluation result of using the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism, had an average score of 4.77 and standard deviation of 0.41 with a statistically significant difference at .05.

V. DISCUSSION AND CONCLUSION

From the use of the digital ecosystem of multilingual augmented reality technology to promote learning and culture tourism. It was found that the tourists had succeeded from using the digital ecosystem of multilingual augmented reality technology. The results demonstrated that there were a development greater than 70 percent. In addition, the tourists were satisfied with the media used of the developed digital ecosystem of multilingual augmented reality technology. It can be suggested that the tool succeeded to promote learning and culture tourism in Suphanburi, at high level. Preda Saelao [5] discussed about tourisms during travel in various ways. Tourists always travel to where they are interested, and often do the activities as they are based on well-trained expertise, such as trekking, hiking, biking, travel, rafting, long cruises, and diving. The activities mostly depend on eco-tourism activities, such as natural attractions, man-made attractions, cultural attractions, and lifestyles.

This research also complied with the research of the Jiranuch and her team, which had studied the potential to manage the world heritage sites of Thailand. Case study: Sukhothai Historical Park-Si Satchanalai-Kamphaeng Phet and Phra Nakhon Si Ayutthaya Historical Park for sustainable cultural tourism. It is

found that the historical park in Thailand, including Ayutthaya Historical Park, offers a wide range of tourists and tourist resources, the world's most famous, and diverse sightseeing spots. The park is equipped with infrastructure and travel facilities such as hotel accommodations, restaurants, local restaurants, souvenir shops, local tour companies including traditional and unique culture.

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(Arranged in the order of citation in the same fashion as the case of Footnotes.)

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