Publicizing Thai Dress of Royal Endorsement by Augmented Reality

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Abstract: Thai dress of royal endorsement is the knowledge sources of local arts and wisdom. Since, the information related to Thai dress of royal endorsement has not been done by augmented reality yet, the researcher gathered the data and developed and later presented through social network which patrons are able to access in real time. Besides, they are able to identify the difference of Thai dress of royal endorsement which was very difficult to do before. The result of the research revealed that learners are able to gain more knowledge related to Thai dress of royal endorsement by using augmented reality as well as having higher achievement than learners who have only learned through document or two dimensions of media. Moreover, the satisfaction on the augmented reality is very high. To sum up, by publicizing Thai dress of royal endorsement through augmented reality on social network, this can support in enhancing more knowledge related to Thai dress of royal endorsement effectively.

Key words: Thai dress of royal endorsement, augmented reality, social network, publicizing, enhancing

INTRODUCTION

Dressing in traditional Thai costumes is extremely valuable reflection of the local Thai wisdom. Beginning from weaving to neatly tailoring, Thai dress of royal endorsement can be survived with supports from Thai local wisdom and the grace of Queen Sirikit. However, without any helps from many organizations including Fine Arts Department in Ministry of Culture and people who study Thai cultures such as teachers and students, few people recognize Thai dress of royal endorsement or have chances to study Thai cultures closely since Thai dresses of royal endorsement can be worn only in special occasions. Because the costs to make Thai dresses are very high, this makes very few people have chances to wear them. Some people in then whole life may not have an experience in wearing Thai dress of royal endorsement. If people would like to see Thai dress of royal endorsement closely, they have to go to the museums which still have several limitations such as travelling and the costly fee. Thus, those kinds of things which cause educational media related to cultures and Thai local wisdom become more 2nd more distant from Thai daily living nows a day and these existed only in texts or still photos. However, in the information technology era to publicize Thai dress of royal endorsement to people who can later learn and understand Thai cultures and architectures, only texts or even photos cannot entice people both locally and internationlly anymore.

Nows a day, people are surrounded with computer, technology, internet and smart phones which can be handled everywhere. Therefore, using suitably educational media is very necessary because these kinds of media help in efficiently learning, as well as the advance in computer and programming which are continuously developed, make computer be able to compile and present data, pictures, audio and texts efficiently. Better computer, together with well-designed program, leads to many advantages in learning and researching data (Jirapong, 2012). Moreover, augmented Reality is considered as the innovation in technology which supports learning and can fulfill knowledge of viewers very well. People can learn (Sopirak, 2007) and apply what they have learned from Augmented Reality in real life through the technology. By using different procedures in publicizing can make it more interesting and lively.

The researcher thought of the important of culture and value of publicizing the knowledge of Thai dress of royal endorsement to new generation of people and foreigners in order to make them become more enticing into cultures, beauty and wisdom of Thai. However, there were problems in presenting information of Thai dress of royal endorsement. With the advance in computer programming, the researcher conducted the research to study the presentation for Thai dress of royal endorsement by using computer programs and presenting them on social network. The hypothesis was to use augmented reality in presenting Thai dress of royal

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endorsement on social network which can make people be more enticing and more understanding in Thai dress of royal endorsement.

Literature review: Augment reality is developed in response to the interaction between humans and computers which makes the presentations, data and information received by the users become more real. Viewers can experience in dimensional virtual world with virtual technology that can merge the real world in form of three-dimensional pictures and displays them on built in digital camera on smart phones, tablets and webcams on computers in 360-degree 3D.

The work consists of three stages: image analysis which is the marker searching process from digital camera that is stored in database which is designed and kept in the Marker database in form of a square black border on a white background. To calculate the three-dimension position of markers on the photos from a digital camera which identifies the relationship between the position of the camera with the marker, the value was presented in metric sizes 4×4 (TCM) (Utkrit and Wongwattanachai, 2012) to specify the relationship between the position of the camera (Camera Coordinated Frame) the relationship between the position of the maker (Marker Coordinated Frame) as shown in Eq. 1.

$$\begin{bmatrix} x_c \\ y_c \\ z_c \\ 1 \end{bmatrix} = \begin{bmatrix} R_{11} & R_{12} & R_{13} & T_1 \\ R_{21} & R_{22} & R_{23} & T_2 \\ R_{31} & R_{32} & R_{33} & T_3 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_M \\ y_M \\ z_M \\ 1 \end{bmatrix} = T_{CM} \begin{bmatrix} x_M \\ y_M \\ z_M \\ 1 \end{bmatrix} \quad (1)$$

The relationship, between any points of X_c, Y_c and Z_c and between the position of the camera with the corresponding point on the relationship of the image was displayed on the screen (Ideal Screen Coordinated Frame) according to a projection (perspective projection) as shown in Eq. 2:

$$\begin{bmatrix} hx_1 \\ hy_1 \\ h \end{bmatrix} = \begin{bmatrix} sf_x & 0 & x_c & 0 \\ 0 & sf_x & y_c & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} x_c \\ y_c \\ z_c \\ 1 \end{bmatrix} = C \begin{bmatrix} x_c \\ y_c \\ z_c \\ 1 \end{bmatrix} \quad (2)$$

where, C was a 3×4 matrix which consisted of the s, f_x, f_y, X_c Y_c and generally these were collectively called the parameters of the camera (Camera Parameters) which was calculated from the comparison of the camera (Camera Calibration). The correlation between any points on the correlation displayed on the screen at the right of X_1 and

Y_1 as well as the relationship of the display on the screen at the observation points (Observe Screen Coordinated Frame) of X_0 and X_0 which was actually seen in the image as shown in Eq. 3:

$$d^2 = (x_1 - x_0)^2 + (y_1 - y_0)^2, p = \{1 - fd^2\}$$
$$x_0 = p(x_1 - x_0) + x_0, y_0 = p(y_1 - y_0) + y_0 \quad (3)$$

The procedures of how to get TCM value when the position of the markers on the four-point correlation display screen is recognized. That was a landmark in the photos taken by the camera. In particular, this value was able to be calculated from the answers of the error (error function) as shown in Eq. 4 and 5 which was generally used for the proper value:

$$err = \frac{1}{4} \sum i = 1, 2, 3, 4 \left\{ (x_i - \hat{x}_i)^2 + (y_i - \hat{y}_i)^2 \right\} \quad (4)$$

$\hat{x}_i, \hat{y}_i$ represented by

$$\begin{bmatrix} h\hat{x}_i \\ h\hat{y}_i \\ h \end{bmatrix} = C.T_{CM} \begin{bmatrix} x_{Mi} \\ y_{Mi} \\ z_{Mi} \\ 1 \end{bmatrix}, i = 1, 2, 3, 4 \quad (5)$$

Three-dimensional visualization model was created by adding the latest in three dimensional models from digital cameras that was detected the position of step 1 using the position of step 2.

Augment reality was an innovative form of technology to support learning (Kiatlianthong *et al.*, 2009) developed a card game Memory virtualization technology to help promote recognition skills. Izzurrachman (2012) adopted virtualization technology applications in chemistry, the chemical bonds with three-dimensional models which allowed students to learn the content of the graphic and imaginative content to understand faster and easier. Utakrit and Wongwiwatchai (2012) adopted virtual technology to assist in the teaching of English letters A-Z which was able to be used very well and that made teaching be more interesting, easier to understand and faster to learn by using a virtual world, Discharoen used virtualization technology to develop learning materials on the atomic structure and chemical bonding which helped increase understanding of the content accurately and this was faster than learning from the traditional classroom lessons with only a two-dimensional image and Karnmart and Thooppudsa (2011) used virtualization technology in developing comic books with the public to help promote learning, enhanced attention of readers and increased engagement with an imagination to visualize three-dimensional.

From limitations in the presentation of arts, culture and local wisdom of Thai dress of royal endorsement, advanced virtualization technology to enhance learning can entice people and encourage them to engage more when seeing things in three dimensions which also help them learn more and the understanding in the content was very easy and very fast. Researchers used the technology to develop a virtual learning to present Thai dress of royal endorsement for this allows people to experience new virtual things. Together with the process of learning the cognitive and attention on Thai dress of royal endorsement can be enhanced even more.

MATERIALS AND METHODS

The methods of research in presenting Thai dress of royal endorsement through Augmented reality were as the following.

Text analysis: The study analyzed data for designing the augmented reality for Thai dress of royal endorsement. The researchers conducted the study by analyzing data collected from the theories and researches associated with Thai dress of royal endorsement to determine the contents to develop augmented reality.

Augmented reality design: The design of augmented reality for Thai dress of royal endorsement was adopted from the data of Thai dress of royal endorsement before creating 3D modeling for the dress. It then created a QR code to recognize the position and linked to the 3D modeling of each dress. The users were able to see the augmented reality of the dress with the program the Junaio program which scanned the QR code and pasted a picture of the dress, displayed augmented reality of the dress.

Development of augmented reality for Thai dress of royal endorsement: The development of augmented reality for Thai dress of royal endorsement used for the augmented reality design for Thai dress of royal endorsement was kept in the form of photos which showed details of Thai dress of royal endorsement, each with ornaments. It consisted of 9 photos of Thai dress of royal endorsement for shooting all dresses were provided with the courtesy from Milan Wedding Studio. It was then used Maya program to create a 3D modeling package for every sets of Thai dress of royal endorsement and then it used QR codes to create a memorable image and linked to models and data sets of Thai dress of royal endorsement. Users were able to use augmented reality for Thai dress of royal endorsement on their mobile phones or tablets. By using

Fig. 1: Development of augmented reality for Thai dress of royal endorsement

Junaio program to scan the QR code and scan the image of Thai dress of royal endorsement, then the system displayed a 3D augmented reality of a series of Thai dress of royal endorsement as shown in Fig. 1.

Presenting Thai dress of royal endorsement on augmented reality: The presentation of Thai dress of royal endorsement was done by using augmented reality on social networks to develop augmented reality for Thai dress of royal endorsement. It then proceeded to the development of augmented reality to present on the social network like Facebook as shown in Fig. 2 as a source of knowledge of Thai dress of royal endorsement for public and was a data source of the sample in the training set to learn about Thai dress of royal endorsement. It then set up the training provided knowledge about Thai dress of royal endorsement with augmented reality from the developed augmented reality, later took it to the workshop to disseminate the knowledge of Thai dress of royal endorsement with augmented reality to a group of 30 students and the general people.

Assessment on the efficiency of augmented reality Thai dress of royal endorsement experts: The assessment of the effectiveness of augmented reality of Thai dress of royal endorsement on social networks was done by 5

experts who were expertise in information technology knowledge and specialists in analyzing the consistency of the content (Index of Item-Objective Congruence: IOC) By analyzing the consistency of content, the Eq. 6 was as follows:

$$IOC = \frac{\sum R}{N} \qquad (6)$$

Where:
$\sum R$ = The sum of the individual experts
N = Total experts

The IOC had an average value of 0.81 which indicated that the augmented reality of Thai dress of royal endorsement on social networks developed in line with the content and were able to convey knowledge about of Thai dress of royal endorsement correctly.

Testing and assessment on Thai dress of royal endorsement knowledge: measuring the knowledge of the subjects, that people learned with augmented reality in order to test knowledge was done before and after the use of augmented reality for Thai dress of royal endorsement. A test of sample group was conducted before and after to measure learning. A 10-question test was done before using the augmented reality. The test was done again after using the augmented reality. Both questions on the tests before and after were the same set of questions but

Fig. 2: Publicizing of Thai dress of royal endorsement with augmented reality with facebook

changed the order of questions and answers. It was then tested to check the accuracy and assessments to measure knowledge of a sample with t-test.

The achievement of learning was done by t-test with the 30 people of samples who used augmented reality for Thai dress of royal endorsement on social networks and then compared with 30 people of samples learning Thai dress of royal endorsement that used normal methods by reading the documentation.

There was performance evaluation on satisfaction augmented reality for Thai dress of royal endorsement displayed on Facebook from 30 samples. Then a researcher conducted satisfaction or augmented reality for Thai dress of royal endorsement. When users learned about Thai dress of royal endorsement with developed augmented reality, the data then were analyzed for mean and standard deviation (Kiatsangtong *et al.*, 2009).

RESULTS AND DISCUSSION

The findings of augmented reality for Thai dress of royal endorsement with social networking were presented as the following.

Sampling analysis: The sample used in this study was 60 students and the general people with the information below in Table 1.

Testing: The result of the test of sample group, before and after using a developed augmented reality for Thai dress of royal endorsement on social networks (Pechmalaikul, 2013), showed that their learning was better by comparing the number of people who were able to answer the questions correctly as shown in Fig. 3. By comparing the results of learning individually after learning, the number of points increased as shown in Fig. 4. By comparing the results of the test before and after using augmented reality with t-test showed a significant difference at level of 0.05.
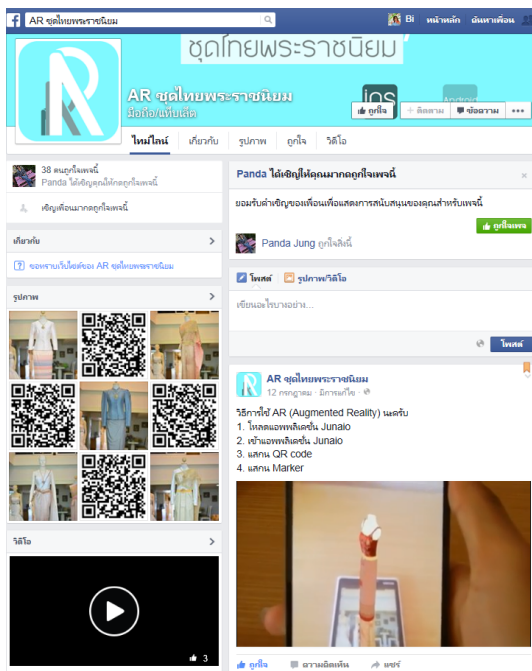
Table 1: The general people with the information

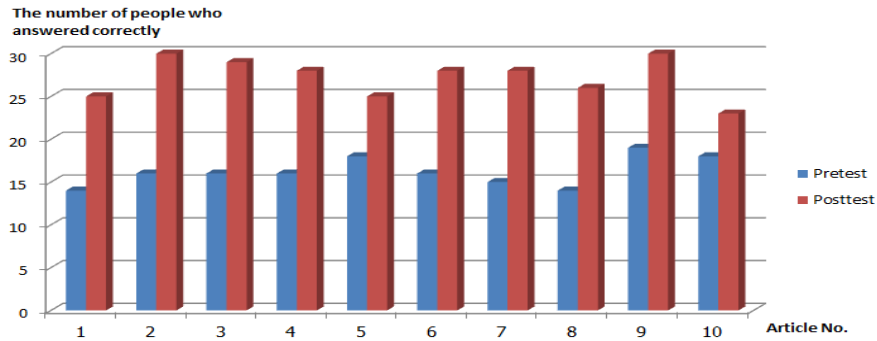| Catagories	Percentage
Gender	
Male	66.67
Female	33.33
Age (year)	
15-20	75.00
21-25	16.67
Over 25	8.33
Education	
High school	41.67
Bachelor degree	50.00
Higher than bachelor degree	8.33

Fig. 3: Comparison of the number of participants who correct answer per question for pretestand posttest
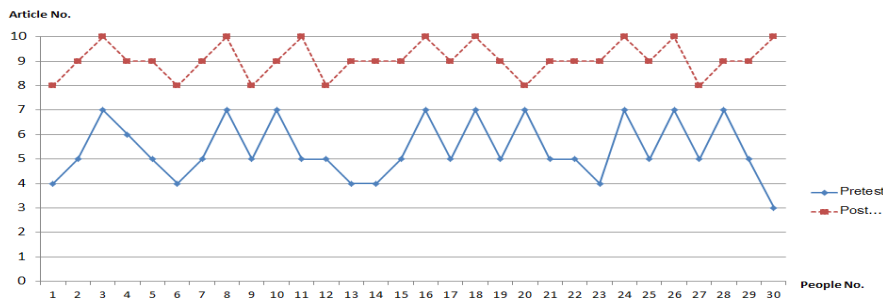

Fig. 4: Comparison of the number of scores who correct answer per question for pretest and posttest
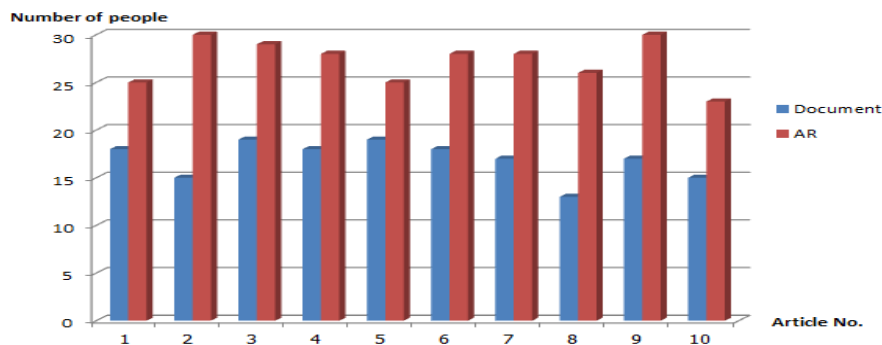

Fig. 5: Comparison of learning achievement of group of sample

Comparison in learning achievement: The research was conducted to compare the achievement of learning of 60 people of a sample group, divided into two groups: the first group of 30 people learned about Thai dress of royal endorsement by using augmented reality on social networks. The second group of 30 people learned about Thai dress of royal endorsement by reading and viewing documents only. It indicated that the first group was able to answer the question more corrently than the second group as shown in Fig. 5. It then was tested by t-test which showed a significant different level of 0.05.

Efficient assessment: The result of satisfaction in viewing a series of Thai dress of royal endorsement by using augmented reality on social networks of the samples of 30 people through questionnaires showed that the average was 4.83 and standard deviation was 0.38. It showed that the satisfaction on the augmented reality was the highest as shown in Table 2. The result of the satisfaction on the augmented reality for Thai dress of royal endorsement on understanding was 4.79 and standard deviation was at 0.41 which meant that the level of satisfaction was at the highest level.

Table 2: Satisfaction of publicizing Thai dress of royal endorsement by augmented reality

Contents	Average	SD	Level of satisfaction
Understanding			
Presenting augmented reality on online social networks provided insight into Thai dress of royal endorsement	4.73	0.45	Highest
Presenting augmented reality on online social networks provided freedom in learning	4.87	0.35	Highest
Presenting augmented reality through online social networks created self-learning	4.63	0.49	Highest
Presenting augmented reality on online social networks demonstrated continuity and easy to understand	4.77	0.43	Highest
Presenting augmented reality on online social networks used inspiring presentation techniques inspiring and interesting	4.93	0.25	Highest
Summary	4.79	0.41	Highest
Using			
Presenting augmented reality on online social networks was appropriated to present Thai dress of royal endorsement to people interested	4.77	0.43	Highest
Presenting augmented reality on online social networks created satisfaction and pleasure in learning about Thai dress of royal endorsement	4.93	0.25	Highest
Presenting augmented reality on online social networks encouraged to learn about Thai Dress of royal endorsement	4.87	0.35	Highest
Presenting augmented reality on online social networks allowed users to fully engage in learning	4.87	0.35	Highest
Presenting augmented reality on online social networks allowed the students to review the material at any time	4.90	0.31	Highest
Summary	4.87	0.34	Highest
Total summary	4.83	0.38	Highest

The result of the satisfaction on the augmented reality for Thai dress of royal endorsement on using was 4.87 and standard deviation was at 0.34 which meant that the level of satisfaction was at the highest level.

To sum up, the level of satisfaction in both understanding and using augmented reality for Thai dress of royal endorsement was at 4.83 and the standard deviation was at 0.38 which indicated that the level of satisfaction was at the highest level.

CONCLUSION

From the study of presenting Thai dress of royal endorsement on social networks as the sources of learning in cultures and local wisdom which the researchers gathered the data, designed, developed and presented through a augmented reality, the augmented reality was able to enhance the knowledge among the sample group in comparison with a group of sample who learned through texts only. Moreover, the sample group, who used augmented reality in learning had the highest level of the satisfaction. To sum up, using augmented reality in supporting the presentation of Thai cultures is useful and efficient.

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