The Development of the Virtual Learning Media of the Sacred Object Artwork

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ABTRACT
This research aimed to develop the virtual learning media of the sacred object artwork by applying the concept of the virtual technology in order to publicize knowledge on the cultural wisdom of the sacred object artwork. It was done by designing and developing the virtual learning media of the sacred object artwork for the virtual presentation. Subsequently, the virtual media which had been developed would be evaluated with the index of item-objective congruence (IOC) by ten experts. It was found that the IOC value was more than 0.8, so it indicated that the virtual learning media of the sacred object artwork which had been developed was consistent with the content. The meaning and knowledge about the sacred object artwork could be correctly conveyed through the virtual learning media; and moreover, the virtual learning media which had been constructed was brought into use in publicizing and transferring knowledge about the sacred object artwork to the sampling group of sixty persons. It was found in the research result that the learning result about the cultural wisdom of the sacred object artwork of the sampling group increased seeing from the comparison of the difference between the pre-test and post-test results after using the virtual learning media of the sacred object artwork. The hypothesis was tested by using T-Test, and it was found that there was a statistical significant difference at the level of 0.05 and the efficiency evaluation was measured by the satisfaction of the sampling group towards the virtual learning media of the sacred object artwork. The mean value was 4.81, and the standard deviation value was 0.39. Therefore, it could be said that the virtual learning media of the sacred object artwork which had been developed gave more effective learning process.
Keywords: Virtual Learning Media, Sacred Object Artwork, Artistry.

INTRODUCTION

The sacred object artwork was considered a cultural heritage and inherited knowledge from the ancient time which the new generation should conserve and maintain. The sacred object artwork is an intelligence property both of Thailand and the nearby countries. There has been a long story since historic period which was recorded in details like a textbook beginning with the steps of construction, the materials being used, and methods of construction as well as the consecrating procedure which was recorded in details. This secret was kept by the people involved. They all cherished it and kept it secret until there were people filled with halo to be given to, and they could transfer it to others.

With the faith and respect of the monks and the sacred things according to their belief, the constructing of the sacred objects could occur. It could be considered that such thing happened from faith and the values of material. The object that one group of people or some particular people believed that they could cause some benefit or goodness to the owners one way or the others; for example, they might believe on the protecting aspect, on the aspect of being able to drive away bad things, or on inspiring some consequences to the owners according to the belief and faith that the sacred object was the supernatural influence could affect the mind of the owner. There has been a worship of the sacred object since the ancient time. It was believed that it occurred in the first period of human society because there were findings of remains of different things from digging at different historic sites of all cultures. Moreover, all races worldwide came with the faith civilization according to their doctrine or religions (Phoglong, 2009).

The sacred object artwork is considered a Thai national artwork. It is the center of faith. It is the symbol of goodness of the monks whom the general people respect, and it became the center of their minds as well as being a part which tempts tourists to visit which affects the foundation of the major cultural tourism sources of Thailand. However, at present there is a storing of information, and its presentation is shown in the form of

Figure and message which was not presented with any virtual forms. There was a lack of information storing and there was no publicity of information to general people. While there were some or groups of people who had faith in it and they were searching for the sacred objects according to the Buddhist belief to be able to repose their trust on them, but they did not know the construction history, the makers and the Buddhist places where they made them. If there were any storing of information, the presentation of that information and the virtual propagation, it should give cultural knowledge of the sacred object artwork and the long inherited knowledge. Moreover, it should promote the sustainable cultural tourism in the future (Jirapan, 2012).

At present the computer technology, the internet communication, the website and the social network have a role in assisting the learning in different aspects. The use of learning media in an appropriate form is more necessary because the media will help the perception to be more effective. With the efficiency of the computer and the computer program that is in progressing development, it will enable the processing of the information and the presenting of the information, the picture, the sound and message to be efficient. Moreover, when it is added with the good designing, it should render good consequence to the learning. The virtual technology (Augmented Reality: AR) is a technology mixed with facts as a major phenomenon of modern communication which can be applied with different activities to stimulate the learning to accept new experience widely because it can render good consequences to the perception by merging the real world with the virtual world harmoniously by applying it with communication aspect, medical aspect, industry aspect, and entertainment and education aspect. For instance, AR was applied in advertisement for marketing promotion of Nissan Company. With the use of webcam, it allowed the users to access the products without seeing the real products. In medical science, AR was applied in the complicated operation allowing to see the required parts easily and clearly for the convenience of a particular treatment such as the virtual picture from X-ray films or ultra-sound pictures in real time during the treatment. In the aspects of military service, navigation and traffic controlling, AR eased to have interaction and enabled to see things real and perfectly clear. In the entertainment and educational aspect, AR was applied allowing to see the virtual objects in the museum, the exhibition, the virtual park and AR Quake game which is popular, etc., (Jiravarapong, 2010). AR promotes the virtual learning miraculously from the designing and the AR technology which makes AR an important technology in constructing the major learning media in the present time and in the future.

This study held the concept of developing the virtual media to be a virtual learning media in publicizing the sacred object artwork. This case studied on the metal sacred objects in Ratchaburi province which is considered to be a province where there have been metal sacred objects since the ancient time of Thailand. It aimed to collect information, present the data and publicize it through the virtual media in order to present the knowledge of the cultural artwork of the sacred objects and the long inherited knowledge in order to conserve it and make known the artwork of the sacred objects which is considered a national property so that it can remain longer, and it can also promote the sustainable cultural tourism in the future.

LITERATURE REVIEW

The virtual technology is a technology developed to respond to the interactions between human and computer which causes the presentation of the information and the perception of the information by being able to contact new experience in the virtual dimension with the technology that merges the virtual world with the real world by using the overlaying of three-dimensional pictures in the virtual world (3D) with 360-degree angle (Volkan et al., 2013). In the present time the virtual media takes a role in assisting the education which has limitation and problems as stated above. The role of media on the aspect that, in the present time, the society is filled with information. The use of learning media in an appropriate form is more necessary because the media can assist the perception to be more effective. Moreover, with the efficiency of computer and computer programs which were in progressive development unlimitedly, the computer system can efficiently process the data, present the information, pictures, sound, and message. When added with a good program designing, it will render good result to the learning and the researching of information. Besides, the virtual technology is considered to be the type of technology innovation which can support the learning and fulfill the audience with knowledge (Tieranabunjong et al., 2011). The learners not only students, but also people or interested people in general can learn through the virtual media and may be able to practice in reality from the communicating technology process of various forms which bring interesting and virtual communication (Kaufmann, 2013).

True learning requires experience. The more senses that are involved (sound, sight, touch, emotions, etc.). In this context, AR appears as an interesting emerging technology for education (Luckin and Fraser, 2011), (Lai and Hsu, 2011). Lin et al. (2011). In their project, the authors used AR and a touch-screen to enhance the educational resources about fish conservation in Taiwan. Their results focused on system usability, which was positive in an educational context. Three-dimensional renders and other virtual objects were also used to augment real objects in Chemistry (Chen, 2006). Virtual systems are useful when a laboratory is not available or when the experiences

are dangerous, expensive, or time-consuming. Chen and Su (2011) conducted a study where elementary school children could learn to paint. The system used a sketch environment with computer vision and AR. Children could draw directly on the interface which provided additional functions such as contour extraction, image processing, and AR rendering. Results showed that the sketch system encouraged young children to participate and brought the natural painting experience to a virtual environment. The study opened up alternative opportunities for AR applications and tracking technologies. In a different study presented by Shamsuddin et al. (2010), Malaysian underwater habitats were simulated using AR. The virtual system provided similar educational value to students as that found in a real ocean, but time, cost, and manpower constraints were saved. As discussed in previous lines, AR in education has been used in every field of knowledge at every academic level, from kindergarten to college.

The creation of three-dimensional model is the increase of information which is a three-dimensional model in order to be presented through the virtual technology which is a type of technology innovation to support the learning. The virtual media was developed into games mem-card with the virtual technology to assist with the memorizing skill (Kiatsangtong et al., 2014). The virtual technology was applied in the Chemistry subject. Chemistry together with the three-dimensional model assists the students to be able to learn the contents by seeing pictures and imagining things according to the content which promotes the easier and quicker understanding (Izzurrachman, 2012). The application of the reality technology supplemented to assist the teaching of English alphabets A-Z can work well. It makes the teaching system interesting, easily and quickly understood like learning in the virtual world (Utkrit and Wongwattanachai, 2012). When the virtual technology was brought to develop the learning media on the atom structure and chemistry, it can add more correct and quicker understanding of the contents than learning with the original kind of lessons with two-dimensional pictures (Ditchareon et al., 2014). The virtual technology joined with the creation of a cartoon book called “Phra Mahachanok” in order to promote the learning could increase interest of the readers, and it could add participation of the readers by increasing their imagination with the Toopputsa (2011).

METHODOLOGY

The study on the development of the virtual learning media of the sacred object artwork had the following implementing steps:

1. The study of documents: this research studied, analyzed and collected the information on the sacred object artwork. The researcher implemented the study by analyzing, and collecting the information from theory, the related literatures of the sacred object artwork in order to use those information received for the development of the virtual media. The thirty-two designs of sacred objects were from ten amphur in Ratchaburi province at Thailand. They were famous sacred objects of Ratchaburi province since 1995 to 2002.
2. The design of the virtual learning media of the sacred object artwork: getting the information from the sacred object artwork, the thirty-two designs of the sacred objects were picked to be analyzed on the aspects of their component: shape, pattern, texture, color, proportion and the bas relief of the thirty-two designs of the objects. Subsequently, the three-dimensional models of the sacred objects were all made. Then, they would be presented as the virtual media on the website https://sketchfab.com. The design of the virtual learning media of the sacred objects is as shown in Figure 1 and Figure 2.

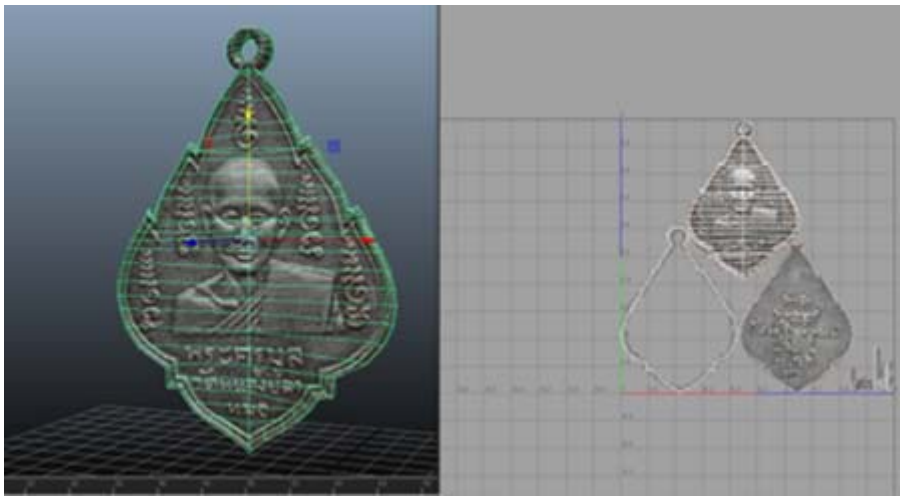

Figure 1: The designing of the sacred object shape

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Figure 2: The designing of the sacred object texture

3. The development of the virtual learning media of the sacred object from the step of the designing of the virtual learning media of the sacred object, the three-dimensional model of the prototype picture was made according to the information of the sacred object artwork designing. Then, the shape was analyzed with the use of Maya program starting by forming the rectangular picture with the same height and width as the prototype of the sacred object. Subsequently, add the thickness of the model to be about the same as the real thickness of the sacred object prototype. The next step was to bring the front and the back of the sacred object prototype articulated with the rectangular model made previously. The next step was to be done more delicately by using the designing tool to draw curves to the rectangular model according to the front and the back view of the sacred object picture of the sacred object prototype picture (Nuanmeesri et al., 2016) as shown in Figure 3 and Figure 4. Then, with the tool, we drew the model to have the bas relief according to the side view of the sacred object protocol pictures by switching around the front view, the side view and the back view. After that, we adapted the convexity, and then we would add patterns by placing the sacred object picture over the model already made called texture of all sides to get the virtual view in looking at all sides. Next, we would enter the step of decorating the texture and color to be the most alike to the metal material of the sacred object prototype. Finally, the already developed model by Maya program would be presented in website https://sketchfab.com as shown in Figure 5 to 8.

Figure 3: The construction of the sacred object structure

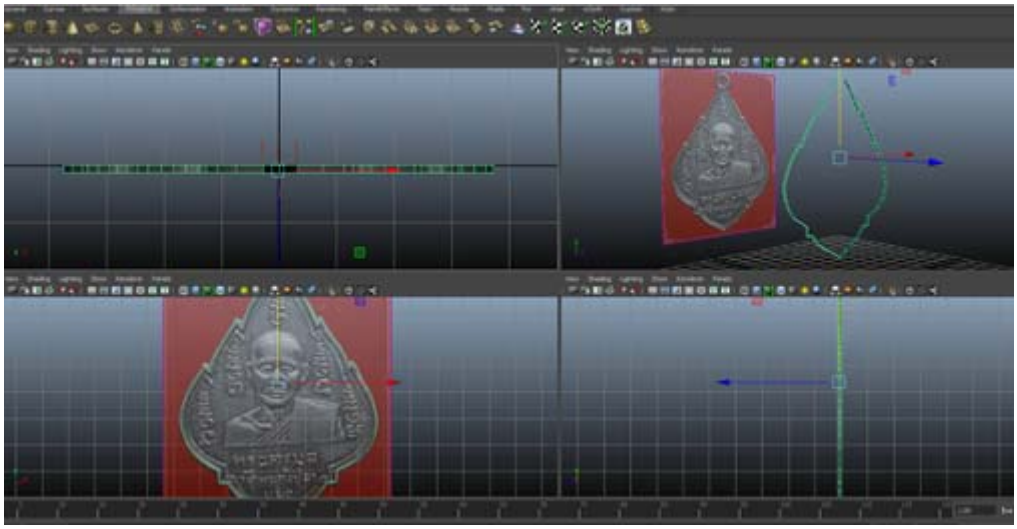

Figure 4: The pattern forming and designing of the virtual learning media of the sacred object artwork with Maya program

Figure 5: The virtual learning media of the front part of the sacred object artwork

Figure 6: The virtual learning media of the back part of the sacred object artwork

Figure 7: The virtual learning media of the top part of the sacred object artwork

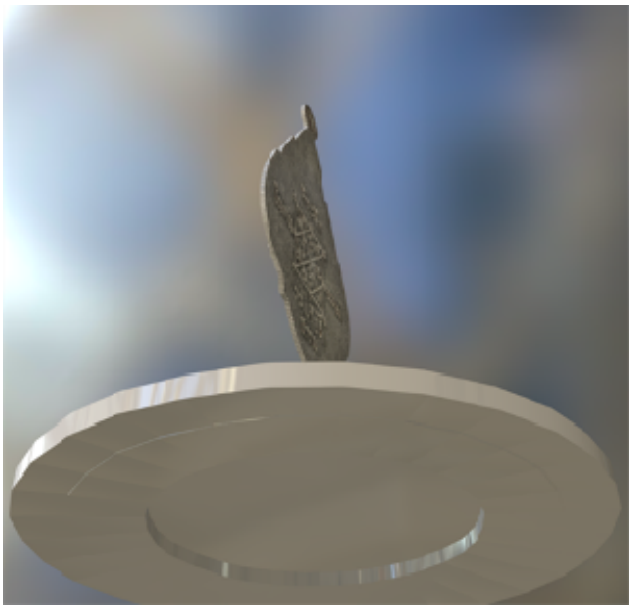

Figure 8: The virtual learning media of the bottom part of the sacred object artwork

The virtual learning media of the sacred object artwork which was developed for thirty-two designs would be presented as virtual media on website https://sketchfab.com as shown in Figure 9.

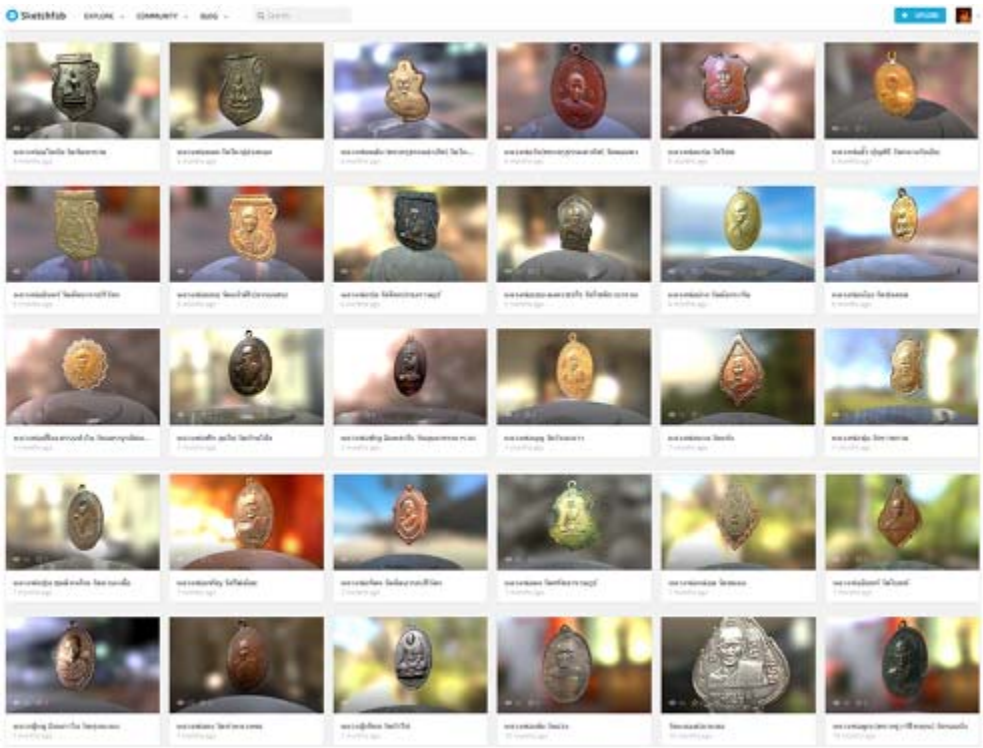

Figure 9: The virtual learning media of the sacred object artwork which was published on website https://sketchfab.com.

4. The efficiency evaluation of the virtual learning media of the Thai sacred object artwork by the experts: when thirty-two pieces of the sacred objects had been developed, the efficiency evaluation was done on the virtual learning media of the Thai sacred object artwork by ten experts who had expertise in Information Technology and who had expertise about the sacred objects from the Association of Amulets in Rajburi and Kanchanaburi province. This was done with the content consistency analysis (Index of Item-Objective Congruence: IOC) by analyzing the content consistency (Nunthasukon, 2011). The experts were able to rate by using the assessment criteria as in Table 1

Table 1. The rating criteria for the content consistency

Rating criteria	Meaning
+1	sure that there is content consistency and it can work
0	not sure that there is content consistency and not sure if it can work
-1	sure that there is not content consistency and it cannot work

Subsequently, take the information from the consideration of the experts and find IOC value by using the formula as shown in the equation:

$$IOC = \frac{\sum R}{N}$$

$\sum R$ is the sum of the scores that the experts rated.
R is the score that the experts rated.
N is the number of the experts.

The criteria in determining the IOC value: if it is upper than 0.5 (IOC value is 1 as the highest), it shows that the content received is consistent to the objective, and it can be applied to work. If the IOC value is 0.8 which is an indicator that the virtual learning media of the sacred object artwork which was developed is consistent to the content and it can convey the meaning. Moreover, it can be used for the teaching of the sacred object artwork correctly.

5. The dissemination of the virtual learning media of the sacred object artwork. This research brought to public the virtual learning media of the sacred object artwork which was developed to use with the sampling group of sixty persons who were students and general people who applied to join the training course. The training course

contained lectures and workshops by demonstrating the using method for big group so that the sampling group could learn about the virtual learning media of the sacred object artwork as shown in Figure 10.

Figure 10: The dissemination of the virtual learning media of the sacred object artwork to the sampling group

6. The efficiency evaluation of the virtual learning media of the sacred object artwork which affected the learning: when the sampling group of sixty persons received the training as shown in Figure 11, the sampling group of the virtual learning media of the sacred object artwork would be evaluated of their learning result by doing the pre-test and the post-test. Before the training the sampling group would take a ten-question test which had been tested for the learning evaluation. In other words, the test had passed the content validity index: CVI (Polit and Beck, 2008) done by five experts. The CVI value is 1. The test had the same questions as the pre-test, but the questions and choices are alternately ordered. Before the training, the sampling group had to be tested with a ten-question test. After having taken the pre-test, they entered the training course which took two hours. After having finished the course, they would take a post-test. After having done the post-test, there would be an answering session for each question of the test to the sampling group (Kadmateekarun and Nuanmeesri, 2015) Subsequently, The tests were checked for correctness and assessment in order to evaluate the learning result of the sampling group of the virtual learning media of the sacred object artwork which had been developed. The tests were done to compare the learning result before and after the training using the T-Test Dependent Statistic.
7. The efficiency evaluation on the satisfaction towards the virtual learning media of the sacred object artwork of sixty persons: this research constructed questionnaire questions on the satisfaction aspect about the virtual learning media of the sacred object artwork of sixty persons in order to assess the satisfaction on the aspect of the knowledge acquisition and understanding as well as the application of the virtual learning media of the sacred object artwork which had been developed. Subsequently, the data would be brought to be analyzed for the mean value and the standard deviation value so as to find the efficiency assessment on the aspect of satisfaction towards the virtual learning media of the sacred object artwork according to the scoring criteria of Likert Scale to rate the satisfaction evaluation form (Nunthasukon, 2011) as shown in Table 2.

Table 2: The scoring criteria of the satisfaction evaluation form

Scoring Criteria		Meaning
Quantitative	Qualitative	
4.51-5.00	the most	The user has the most satisfaction
3.51-4.50	much	The user has much satisfaction
2.51-3.50	moderate	The user has moderate satisfaction
1.51-2.50	little	The user has little satisfaction
1.00-1.50	the least	The user has the least satisfaction

RESULTS

1. The result of the data analysis of the sampling group, the sampling group who were used in this research was sixty persons. The profile of the survey respondents was established from the demographics section of the survey with the following general information shown in Table 3 and Table 4.

Table 3: Sampling Group Demographics

Gender	n	Percent
Male	33	55%
Female	27	45%

Table 4: The scoring criteria of the satisfaction evaluation form

Age	n	Percent
below 15 years	45	75%
20 years	15	25%

2. The research result of the efficiency assessment on the virtual learning media of sacred object artwork which affected the learning result: the result of the pre-test and the post-test of the sampling group about the virtual learning media of sacred object artwork which had been developed by constructing the pre-test and the post-test. The sampling group had a better learning result seeing from the comparison of the number of people (sampling group) who were able to answer each testing question correctly as shown in Figure 12 and the comparison of the learning result of individual trainee which resulted in having increasing marks in the post-test as shown in Figure 13. From the comparative test on the knowledge acquisition before and after by using T-Test Dependent Statistic. It was found that there were differences at the statistical significance level of 0.05.

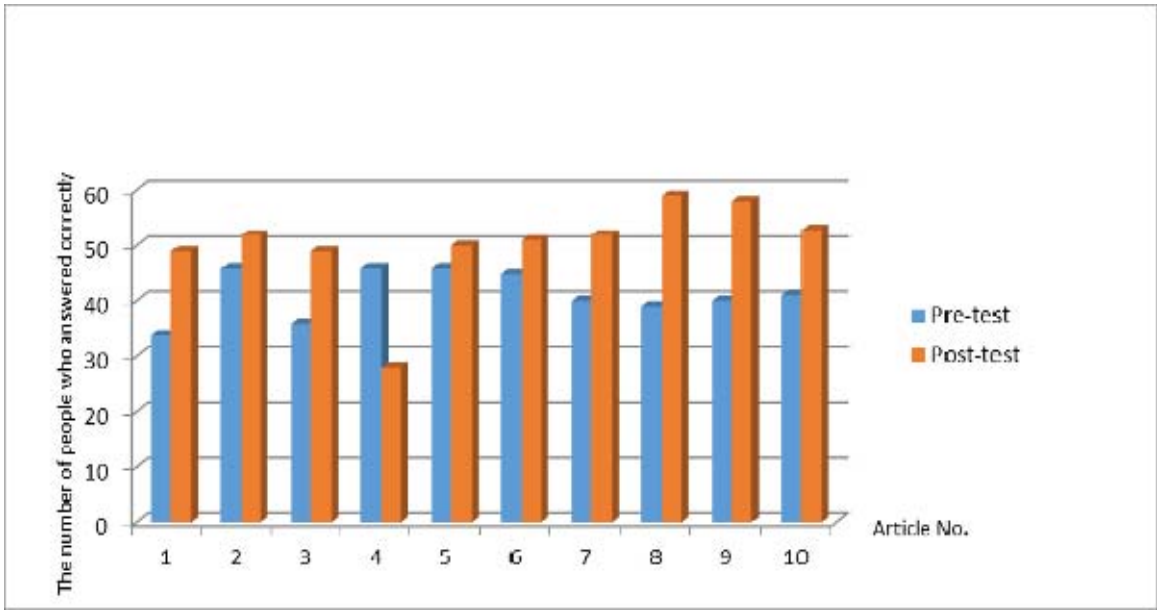

Figure 12: The comparison of the number of people who were able to do the pre-test and the post-test correctly for each question

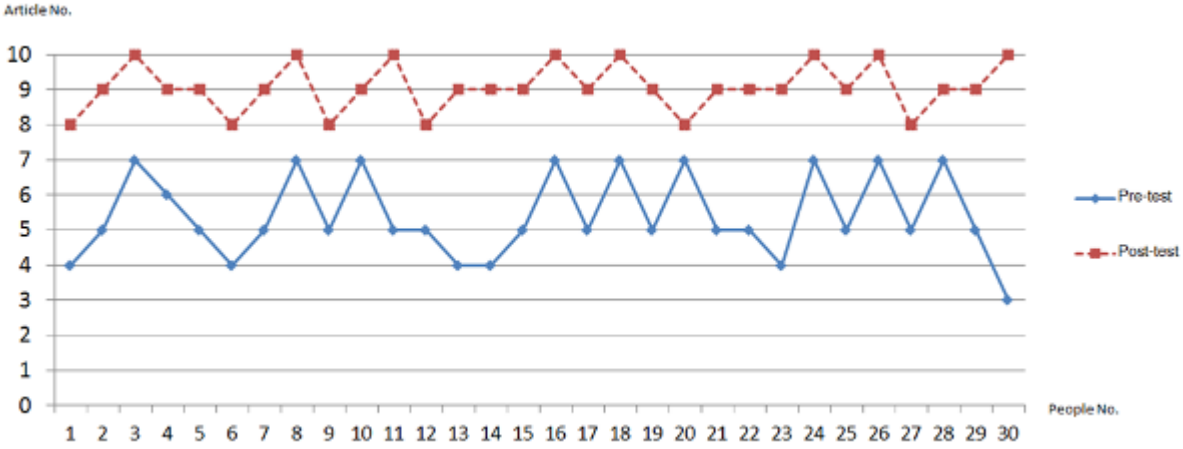

Figure 13: The comparison of learning result of individual before and after from the correct scores

3. The efficiency evaluation result in the aspect of satisfaction towards the virtual learning media of the sacred object artwork. It was found that the satisfaction assessment on knowledge acquisition and understanding had the

mathematical mean value at 4.74 and the standard deviation value at 0.44, so it showed that the satisfaction value was at the highest level. In the aspect of application, it had the mathematical value at 4.88 and the standard deviation value at 0.33, so it showed that the satisfaction level was the highest. In conclusion, the satisfaction assessment of the users had the mathematical mean value at 4.81 and the standard deviation value at 0.39. It showed that the users were satisfied with the virtual learning media of the sacred object artwork at the highest level as shown in Table 5.

Table 5: The satisfaction assessment result of the virtual learning media of the sacred object artwork

List of assessment	Arithmetic Mean	Standard Deviation	Satisfaction level
1. Knowledge acquisition and understanding			
1.1 The virtual learning media of the sacred object artwork helps to assist the acquisition of knowledge and understanding of the sacred object artwork.	4.73	0.45	The highest
1.2 The virtual learning media of the sacred object artwork shows the content which is easy to understand.	4.60	0.49	The highest
1.3 The virtual learning media of the sacred object artwork renders full freedom in learning.	4.87	0.34	The highest
1.4 The virtual learning media of the sacred object artwork causes the learning and the understanding by one's self.	4.77	0.43	The highest
Conclusion	**4.74**	**0.44**	**The highest**
2. Application			
2.1 The virtual learning media of the sacred object artwork is appropriate for being brought to disseminate the sacred object artwork to the people who are interested.	4.90	0.30	The highest
2.2 The virtual learning media of the sacred object artwork causes the satisfaction and happiness in learning the sacred object artwork.	4.87	0.34	The highest
2.3 The virtual learning media of the sacred object artwork causes enthusiasm in learning the sacred object artwork.	4.87	0.34	The highest
2.4 The virtual learning media of the sacred object artwork helps the sampling group have full participation	4.87	0.34	The highest
Conclusion	**4.88**	**0.33**	**The highest**
Conclusion for all aspects	**4.81**	**0.39**	**The highest**

CONCLUSION AND DISCUSSIONS

In this research, the virtual learning media of the sacred object artwork which had been developed with the content consistency analysis (IOC) by ten experts. It was found that the IOC value was more than 0.8 which is higher than the determined value at 0.5, so it could indicate that the virtual learning media of the sacred object artwork which had been developed was consistent with the content, and it could convey the meaning and could teach about the sacred object artwork correctly. Then, the virtual learning media of the sacred object artwork was propagated by organizing a training course for sixty persons in the sampling group together with pre-test and post-test. The test result found that the sampling group made more correct answers. It showed that the sampling group received a higher learning result from the learning using the virtual learning media of the sacred object artwork at the statistical significance level of 0.05. Moreover, for the satisfaction assessment of the users towards the virtual learning media of the sacred object artwork, it was found that the mean value was 4.81, and the standard deviation value was 0.39. It showed that the users were satisfied with the virtual learning media of the sacred object artwork at the highest level.

The development of the virtual learning media of the sacred object artwork: from the research result, it showed that the virtual technology helped in disseminating and promoting the learning which caused the learning to be easier and also quicker to understand. It promoted the participation and the creation of imagination which was correspondent to the research work of Utkrit and Wongwattachai (2012), Ditchareon et al. (2014), Kiatsangtong et al. (2014), Karnmart and Toopputsa (2011) and Izzurrachman (2012). In the near future the virtual technology will not be limited only to the creating of interest but also to be a part of the elaboration of knowledge, the survey exploration, and the collaborative learning which were also correspondent to the learning of the twenty first century (Meesuwan, 2011).

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