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An Integrated Inquiry-based BYOD Approach for Supporting Social Studies Learning Abilities in Museums

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Abstract: History is an important required subject on every level and every country. In particularly Thailand has prioritized to study history. Nevertheless, there has a limitation in studying history. Especially teaching and learning approach that still mostly be taught through lecture-based learning, and memorization skill. In this study, the author designed the historical learning approach that integrating inquiry-based BYOD approach to learning and experiencing in the historical museum. 62 grade 12 participants were assigned the mission through the communication gadget. In the mission, participants were anticipated to trained Collaboration, Communication, Creativity, and Critical Thinking skill in the 21st century through the mission associated with historical, architectural, and cultural knowledge's content. From the experiment, it founded that participants mostly developed and increase Collaboration, Communication, Creativity, and Critical Thinking skills after experienced this museum education approach. The findings of this study could serve as a model in adopting blended learning with museum learning activities for social science and other subject.

Keywords: History Study, museum education, BYOD, experiential learning, inquiry-based learning, 4Cs skill in 21st century

1. Introduction

Social Studies course in the secondary school level of Thailand consists of many disciplines such as Political Science, Law, History, Economics, etc. In particular, the history course, Thai Ministry of Education has significantly prioritized to study Thai history. Owing to Thai history has faced with many severe crisis. For instance, the diversity issue among people within these country in the context of religion, ethnicity, culture, poverty, corruption, etc. These problems exactly affected to the political, and economic stability. Therefore, Government agreed that the main causes caused by National History misunderstanding.

Teaching History in Thailand mostly remain to teach in classroom through lecture-based learning by using instructional media such as ancient pictures, videos, historical documentaries, etc. According to those learning processes mentioned, students were trained to apply knowledge in ordered to memorize the historical incident but they weren't trained to construct and comprehend the content of history logically by themselves. Furthermore, they couldn't apply knowledge content to real life. Therefore, learning the history beyond the classroom; the historical sites, the national museum would accelerate the self-learning process through Inquiry-based learning.

Historical museums are increasingly positioning themselves in the market as places for rich learning and experiences. Many study has shown that people visited museums for learning and experience (Ahmad, 2013). Learning process and experiences from the historical museum could encourage students having an ability to interest the history course through ancient artifacts in the museum.

Bring Your Own Device remained as an effective approach, in particular, to support mobile learning. BYOD concept is used to describe the students using personally owned devices in education

settings. Besides, it was considered as a significant technique of learning encouraged learners to compare knowledge content through traditional learning and online learning.

According to the current phenomenon of the historical education that is always be challenging topic for Thai education sector. Therefore, blending both traditional with mobile learning in the approach of BYOD in ordered to learn history in the museum could be an interesting learning process. Hence, this research mainly aimed to study the effectiveness of an approach that integrating an inquiry-based BYOD for learning the history through the historical museum by analyzing with 4Cs skill of the 21st century that learner could derive and construct. 4Cs's considered as the most popular learning strategies in today's environment. It's a necessary skills for students so that they could learn and apply knowledge's content both in the context of Education, and the future occupation.

2. Related Studies

2.1 Museum Education and History Learning

Museum education considered as a field devoted to developing the education role of education spaces. It aimed to engage visitors in learning experiences to enhance their curiosity and interest through objects and collections (Griffin & Paroissien, n.d.). Ohatsuka defined museum education as the public service of education that broadest sense includes exploration, study, observation, critical thinking, contemplation and dialogue (Paper, Ohtsuka, Biwa, Biwa, & Ohtsuka, 2016). Hence museum education defined as the public space for learning through objects, collections, and others channel. Nevertheless, Ahmad prioritized to study the infected agenda in National Museum because it could be expressed to overall national history (Ahmad, 2013). Nevertheless, nowadays the interactive technology rapidly influences to traditional museum inevitably (Bourke, 2013).

Currently, National museum considered as the most effective place for learning national agenda inevitably. In the same time, interactive technologies were gradually applied in the museum. Jornet divided the process of learning in the museum into the main two approaches (Jornet & Jahreie, 2013). First, traditional museum, the physical, conceptual artifact, tool. Visitor could get the knowledge's content but rarely interact with any interactive multimedia (Vartiainen & Enkenberg, 2013). Second, the interactive virtual museum, the multimedia, tool, the artificial artifact (Huei-Tse Hou & Sheng-Yi Wu, 2014). It represented through both tangible and intangible cultural heritage.

The concept of museum learning was currently applied to many sector. In particular, Science, and Business. Chalas studied the comparison between the Art Museum and Art Gallery to improve the exhibition's approach (Chalas, 2017). Similar to Yi studied the behavior of Museum visitor in the Art Museum in ordered to improve and develop their exhibition to be Contemporary Art (Yi, 2019). Achiam designed astronomy’s education in the space museum (Achiam, 2015). She concluded that it could accelerate learning behavior. Similar to Chang, a science museum could encourage student learning behavior more than the classroom (Chang, Huang, & Chen, 2005).

According to the literature review associated, In the context of Museum education, authors used the Ohatsuka as the overall concept of museum education’s definition. From these concepts, we adopted both Ahmad, and Bourke's idea blending the interactive technology to be the contemporary museum of learning which according to Chang’s ideas.

2.2 BYOD and the 4Cs skill

Nowadays, technology rapidly has an important role in broad sector. Such as Manufacture, and Education. Bring Your Own Device currently remained as an effective learning technique that particular support mobile learning. It is used to describe the students using personally owned devices in education settings (Burns-sardone, 2014). In the past decade, many research studies have applied BYOD strategy to promote in-field learning. For example, Handfield created Google Art Project allowing the students to see the artworks from famous museums (Handfield, 2014). Similar to Jang and Lien founded that graphic-user-interface and mobile computing technology could improve exhibition form in the museum to enhances the learning experience (Jang & Lien, n.d.).

The 4Cs considered as a significant skill which deserved for the student at every level. It comprised of Collaboration, Communication, Creativity, and Critical Thinking. There are many studies applied the 4Cs concept to conform to social studies, in particular, field activity. Mhlauli applied the 4Cs among the social studies teacher in order to develop a school curriculum (Mhlauli, 2017). Orly assessed student learning's efficiency through the field trip 4Cs activity (Orly, 2011). Similar to Reynolds, he also used TPACK (Technological Pedagogical Content Knowledge as an appropriate model for Social Studies curriculum. In addition, each 4Cs skill associated to connect with history study. For example, Collaboration could promote teamwork, and brainstorming. Communication could be represented through presentation, and debate skill. Creativity also created a continuous skill from knowledge content. Lastly, the critical thinking could be assessed from the assignment, lectured-based approach (Reynolds, Tavares, & Notari, 2017).

According to the literature review associated, the author adopted many ideas which could be applied to this study. In the concept of BYOD, the author used Burn-sardone as the overall concept of BYOD. In addition, Handfield's idea also considered as a modern learning approach through BYOD's concept which is similar to Jang and Lien's idea. From the BYOD conceptual idea, we could collaboratively evaluate to blend with the 4Cs skill, in particular Reynold's idea in order to consort with history and other social science in this study.

3. Approach and Design Development

The Museum learning field-trip is a required activity that Grade 12th students must join to comprehend Contemporary Thai History (1850-1932), and understand the concept of National Museum in Asia after World War II. According to the course's regulation, students have to study the Four Reign Course (The Reign of King Rama V-King Rama VIII) in the context of history, society, politics, and economy. Hence the teacher created the active learning activities in the most important historical museum in Bangkok; The national museum, and Museum Siam to consort with this course's regulation.

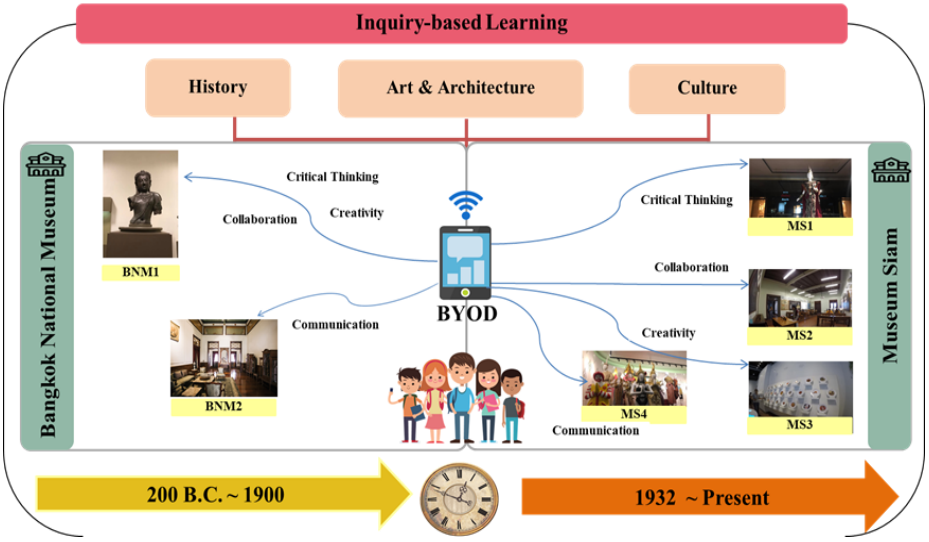

Figure 1. Overall Framework.

In this study, the learning approach was divided into two museums by using the historical timeline as criteria. Bangkok National Museum exhibited the artifact since the origin of Thai historical period-1900. In the case of Museum Siam is the contemporary interactive museum which mostly exhibited the duplicate artifact that represented to Thainess after 1932, the Siamese revolution of 1932. From the figure, students applied BYOD as the learning approach to inquire knowledge increasing the 4Cs skill through the mission that the teacher assigned.

According to figure 1, it showed the overall framework of this museum learning which was integrating main three social science knowledge content, such as, History, Art & Architecture, and Culture. From these contents, it was integrated into the assignment. The first location is Bangkok

National Museum (BNM). In this place, students were assigned to do the mission in two exhibition's room. First, BNM1, Sivamokpiman Exhibition room comprised of 3 missions which's trained Collaboration, Critical Thinking, and Creativity skill. Second, BNM2, another exhibition room where're chosen by students to make tourism VDO. For the second location is Museum Siam (MS). In this place, students were also assigned to do the four missions in four exhibition room. They were required to do the mission in 3 exhibition room which's trained Collaboration, Critical Thinking, and Creativity skill. In the case of Communication skill, students had to choose the other room to make VDO Clip to recommend that exhibition room.

Table 1

An Integrated BYOD Learning Activity

Activity	Descriptions	Expected Result
Pre-field learning (15 minutes)	Students were assigned the mission through Google Form. In this activity, students had to comprehend the mission in their group.	Critical Thinking (Analyzing the mission)
Brainstorming activity (30 minutes)	Students brainstormed in their group to share and work collaboratively. In this activity was directly trained the Collaboration skill to do group work.	Collaboration (Teamwork, Working toward a shared goal)
In-field learning (2 hours)	Students did the mission through inquiry-based BYOD approach in the exhibition room. Each mission was interpolated 4Cs skill. They could use mobile phone to inquire knowledge's content through a credible online database in ordered that they could construct knowledge from critical thinking, creativity, and communication skill because from each question, students could relate their previous, new knowledge through those mission. The assignment of both Bangkok National Museum and Museum Siam comprised of 4 questions in each place. For instance, Making tourism VDO in both two museums. This is the Communication mission.	Critical Thinking Collaboration Creativity Communication

Figure 2. Students joined the museum learning through Brainstorming Activity.

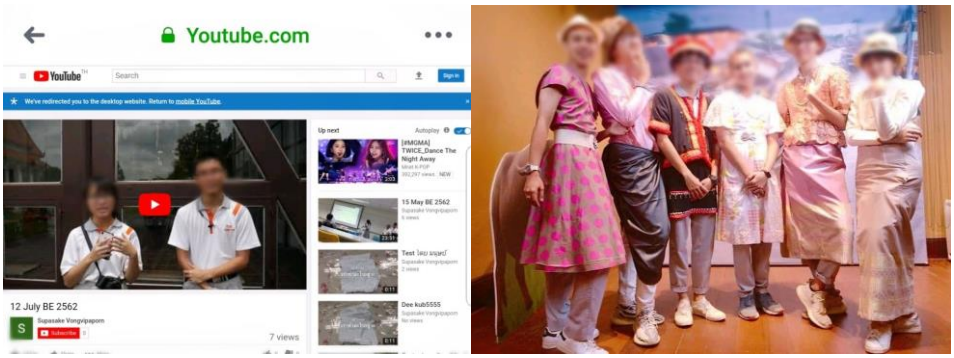

Figure 3. Students did the mission through Inquiry-based BYOD approach.

According to Figure 2, was the photos of museum learning's activities during students were learning in the field. The first above photo is the Brainstorming activity, students discussed and analyze artifact's configuration in BNM1 in ordered to analyze the criteria of BNM1 design. In this mission expressed to the critical thinking skill. For the second photo is the process of an exhibition's design, students discussed and analyze artifact's configuration in BNM1 in ordered to create new artifact's configuration in that room. It expressed to develop the creativity skill. The third photo is the process of Tourism VDO making; students were assigned to make VDO for recommending the other exhibition room. Students could be assessed the communication skill through online approach. From all those processes of learning mentioned, it's necessary to use BYOD as the approach to facilitate learning.

4. Method

4.1 Research Design

This study was designed to describe the overall museum learning approach which could be assessed the 4Cs skill. Authors used historical knowledge content as the criteria evaluating all of 4Cs skills. Therefore, authors evaluated the comparative result by using self-evaluated questionnaire before and after joining the field trip. In case of learning's objective, students were required to comprehend the historical knowledge's content in the period since 1850-1932 logically.

4.2 Participants

There were 62 students in grade twelve participating in this research study (male = 26, female = 36). All students learned the contemporary Thai history through the traditional and interactive museum which's consort with the required course, ESC 615 Four Reigns. Students were required to experience the museum learning activity within 1 day. The first museum is in the Bangkok National Museum, students joined the activity since 9.00 AM.-12.00 PM. The second museum is Museum Siam; they joined this learning approach since 1.00 PM.-4.00 PM.

4.3 Research Tool

There were the main instruments used in this study in order to evaluate 4Cs skills. They were used to assess the 4Cs skills by comparing before & after exploring the museum learning activity in the method of rating scale. In these questionnaire, it comprised of 12 self-evaluation question: 3 self-evaluation question for assess each skill. The data used in this study was collected from the self-evaluation from Google form. This instrument was adapted from Abdallah (2010) with self-assessment, and adapted from Likert Rating Scale self-assessment to evaluate the 4Cs skill development through an inquiry-based BYOD activity. For example, of the answer's meaning, 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree.

5. Results

5.1 4Cs Skill of 21st Century

Based on the evaluation result of the 4Cs skill, most students performed at the higher score of learning achievement after exploring the museum learning, as shown in Table 2. This implies that student can develop their 4Cs skill, particularly Collaboration, and Creativity skill.

Table 2
Result of 4Cs Skill

Skill	*n*	Experiment	Mean+SD	*t*	*p*
Collaboration	62	Before	3.98 ±0.84	1.99	0.025*
		After	4.23 ±0.61		
Communication	62	Before	4.31 ±0.80	-1.09	0.14
		After	4.18 ±0.56		
Creativity	62	Before	3.76 ±0.90	2.46	0.004*
		After	4.05 ±0.58		
Critical Thinking	62	Before	4.05 ±0.95	0.96	0.17
		After	4.16 ±0.52		

** $p<0.05$*

According to the result above, it founded that students can develop Collaboration, Creativity, and Critical Thinking. In particular Creativity, Collaboration students obviously increase this skill. It implied that student increased this skill through the attitude toward teamwork, working collaboratively. In contrast to other skills, for instance, critical thinking result slightly increases after exploring in the field. On the other hand, the communication skill, it slightly decreased. Due to some limitation of the museum's regulation didn't allow visitor making VDO clip inside the museum. Therefore, attitude tends to decrease.

6. Discussion and Conclusion

This study investigated the development result of 4Cs skills through an inquiry-based BYOD approach for study Social Studies in Museum. In this study, we reported the latest several museum learning activity and findings. Collaboration, and Creativity is the skill that students obviously developed.

In contrast to communication skill, it showed that it slightly decreased after they did the museum learning activity. From those result, it implied to these study's limitation associated with the museum regulation. Therefore, it tended to affect to the student's attitude toward the communication skill in this activity. Similar to critical thinking skill, it slightly increased after they did the activity. From the result, it assumed that students generally accustomed to the critical activity in the social studies class. Hence it is not too different from the museum learning activity.

However, the current study has some limitations that should be resolved and improved. First, the number of participants in this study was relatively small; therefore, many participants across different contexts and background would be challenged to study for further generalization of this proposed approach. Second, there are some limitations on activity that didn't consort with the museum regulation.

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