Sub-theme: 14.6. Social media and new information flows: effects on innovation

Enrich knowledge in online museum via social media

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Abstract The Tokugawa Art Museum was established under the non-profit the Tokugawa Reimeikai foundation in 1935. Its collection includes nine designated National Treasures, fifty-seven registered Important Cultural Properties, and forty-six Important Art Objects. This research is a part of a collaboration project between our lab and Tokugawa Art Museum.

Researches on social media's application in online museum is very popular gradually, many museum websites allowed audiences share favorite links via social media is common occasion, online comments and users forum brings chances for audiences to get professional knowledge from curators or professionals. However, these researches paid more attention to one-way communication strategies of social median's application. Social media is only used as a communication tool to larger or newer audiences. The value of massages or social knowledge generated by social media is neglected.

In this research, we emphasize that social media should be utilized based on two-way communication strategies. Besides one-way communication strategy, two-way communication strategies highlight enriching online contents by taking advantage of social knowledge generated by social media. Wikipedia and Tweets from Twitter are used to present related social knowledge around collections in online museum. It's important reference for audiences who have little historical knowledge to understand collections well while they are carrying out constructivism learning online via Wiki platform.

Keywords: Social Media, Online Museum, Social Knowledge, Constructivism Learning

1. Introduction

1.1 Online museum and social media

Many recent researches irritate more attention to the application of web 2.0 tools in online museums (Bernstein,S., 2008, James Yasko, 2007). Since the widely use of Web 2.0 technologies, social medial made a typical example of participatory service on the Internet. "Websites which build on Web 2.0 technologies to provide space for in-depth

social interaction, community formation, and then the tackling of collaborative projects(Bruns & Bahnisch, 2009)". Online museums are also evolving into social museum or public participatory museums. One of main trends of online museums is to increase the public participation in online museums via social media. An obvious example of social media utilization in online museums is that they are enthusiastic about providing visitors channels to social medial so as to allow users sharing favorite web pages with friends freely and easily. Axel Vogelsang and Bettina Minder (2011) mentioned that social media enabled users' participation on many levels, it offered a variety of methods to not only "support museums experience", but also "extend it beyond actual visit".

1.2 Existing application of social media in museums

The application of social media in online museums is widely accepted (Boost, A. 2009). Some attracted visitors via social media groups. The Brooklyn Museum, for instance, used Flickr, the photo management and sharing application, to increase its reach. Brooklyn Museum on Flickr encourages users upload photos relevant to this museum in museum group. Photos about collections, garden and fountain of museum, or that of friends and family visiting the museum are available in this Flickr group (Figure 1). It's no doubt a good way to attract more visitors to physical visit.

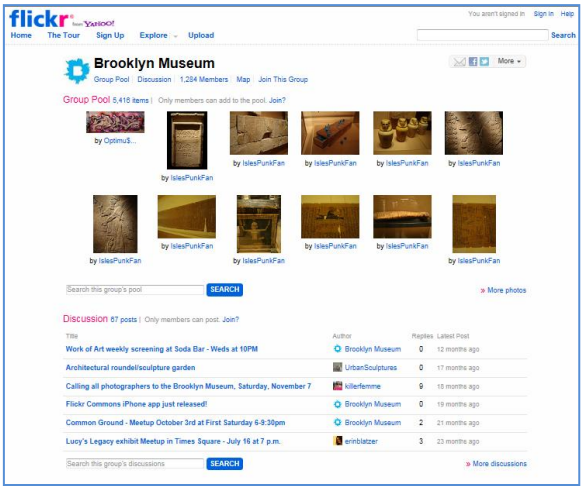

Figure 1 Brooklyn Museum on Flickr

From http://www.flickr.com/groups/brooklynmuseum/

Holdgaard, N. (2011) made an investigation of social media in Danish museums, and found that "Danish museums in general use social media in order to attract more visitors to the physical museums". "11% of the museums have one or more active blogs on their websites". Facebook, as "a social utility that connects people with friends and others who work, study and live around them (Skeels & Grudin, 2009)", is by far the largest

social media site online. Creating a Facebook page is the most popular way for Danish museums to utilize social media. 74% of Danish museums have their Facebook pages, in which 21% have their museum group in Facebook. The crucial difference between page and group lies some museum groups will send some information relevant to upcoming events etc. to their members. Whatever Facebook pages or groups, are the extension channels for museum to bring physical visit to themselves, whilst, members are able to participate in the discussion on certain topics related to a museum events or something else. Figure 2 shows us the Facebook page of Louisiana Museum of Modern Art.

Figure 2 Facebook page of Louisiana Museum of Modern Art

From http://www.facebook.com/editaccount.php?language#!/louisianamuseum

In addition, sharing button is almost standard function in online museums, it made sharing online links conveniently. For example, online museum of the Metropolitan Museum of Art installed "Share this", an open source widget, to encourage its audiences to share favorite contents (Figure 3). In the Louvre Museum, e-mail button allow audiences sharing web links through e-mail (Figure 4).

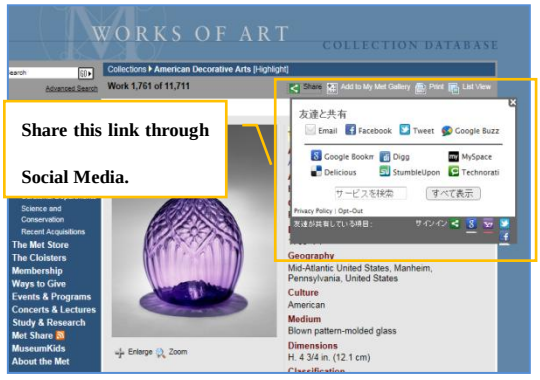

Figure 3 the Metropolitan Museum of Art

From http://www.metmuseum.org/

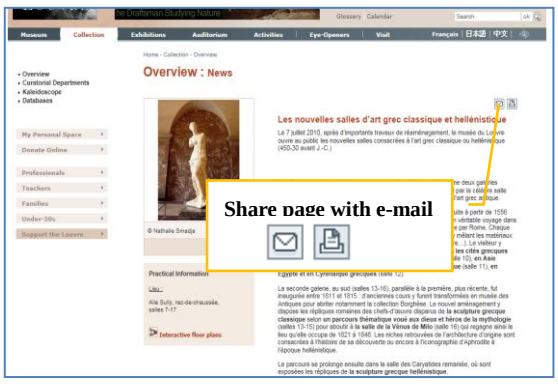

Figure 4 the Louvre Museum

From http://www.louvre.fr/llv/musee/alaune.jsp?bmLocale=en

Social media's application in these cases released the trend that museums attempt to evoke audiences to participate museums online events and sending notification to them. It's a pretty well idea to socialize museum on the Internet.

In the existing applications in museums, social media is used as a public platform or channel between museums and the audiences. However, museums' becoming involved with social media is important but not in high level, it stays in "one-way communication strategies using" step, social media is used mainly limited to "event listing, reminders, reaching larger or newer audiences, and promotional messaging", museums should increase their utilization of social media for "two-way and multi-way communication strategies (Adrienne Fletcher, 2010)". Social media's application in museums brought bridges between audiences and museums, attract larger audiences from Internet, rather than reduced the gap between what the collections want to tell audiences and the audiences' understanding to the collections.

Our research aims at building a new knowledge model for online collections in a historical art museum by enriching knowledge about online collections with social knowledge from social media, so as to facilitate ordinary visitors, especially young people, history beginners or even foreigners, to understand knowledge or traditional cultures behind collections well.

2. Methodology

In this research, we investigated and analyzed the situation of applications of social media in museums, and found the application is limited to social media's one-way communication strategies. And try to find a new way to use social media in online museums.

Social features of Web 2.0 bring a very open space for users to learn or communicate each other. Besides individual learning, collaborative learning has higher efficiency via social media. Meanwhile, in order to explore whether application social media is needed by young people in online museums or not, a survey is made among teachers and undergraduate students who are major in computer science and machine engineering for the 3rd or 4th year at university. We get 80 questionnaires valid as feedback, 3 of which came from teachers aged 35-45, 77 questionnaires from students aged 18-25. The result shows social media is needed as an aided knowledge sources in online museums. The social knowledge from social media enriched contents in online museum, whilst inspires audiences' interests to historical knowledge and contribution to collaborative learning.

In previous research, we developed an online museum for history beginners. On the

bases of this system, we build a platform for audiences to learn more social knowledge form social media. And allow them to communicate and exchange individual experience by building and editing Wiki about certain collection under the supervision of curators or professionals.

3. Understand collection better by constructivism learning in online museum

3.1 Main audiences of online museum are young people

In Web 2.0 period, younger audiences, who mastered skill surfing online, are primary visitors to online museums for amusements or learning in online museums.

In our previous research, we found online instruction of one collection is mainly limited to basic introduction and related images or 3D models etc., data come from professional knowledge in local data base of museums. This cannot attract and retain online audiences due to they have little idea about history, what's more, no concrete instructions or further details can be found in web pages of online museums. Obviously, the online audiences of museums are almost young people. President of market research firm Reach Advisors James Chung, pointed out "Those who are 65 and over aren't as dependent on the Internet. Those who are in their late 20s and older depend on the Internet as a tool, while those who are younger live, eat and breathe connectivity. For any museum that wishes to cultivate this younger audience, technology will be a necessary part of their outreach strategy (James Yasko, 2007)".

Compared with the elders, they have lesser interest to history or traditional cultures. If they cannot find enough knowledge to satisfy their curiosities, they will lose interests and passion to know more.

3.2 Constructivism learning theory

Jean Piaget has done important works on Constructivism learning theories. This theory is inspired by the constructivist theory, based on which individual learners construct mental models to understand the real world around them. But, constructionism holds that learning can happen most effectively while learners are active in making tangible object correspondingly in the practice. It is somewhat related with experiential learning and some ideas of Jean Piaget. On this basis, Seymour Papert succeeded work of Jean Piaget in Constructivism learning theory and developed an original and highly influential theory on learning that called constructivism or constructivism learning theory.

Constructivism learning theory said that "humans generate knowledge and meaning from an interaction between their experiences and their ideas (During infancy, it is an interaction between their experiences and their reflexes or behavior-patterns)

(Wikipedia, 2010)".

Constructionism as a learning theory places students or learners in the role of designers and focuses on creating physical artifacts in a social environment, meanwhile, learners discuss with fellow learners and others in their social community online (Papert, s., 1991; Kafai, Y.B.,2006); Papert (1991) addressed that learning "happens especially felicitously in a context where the learner is consciously engaged in constructing a public entity, whether it's a sand castle on the beach or a theory of the universe". Young and Maxwell stated that constructionism emphasizes the construction of new knowledge by learners, meanwhile, focus on active learner-centered experience (Young, L.E., Maxwell, B., 2007). Ayşe Okvuran stated that according to constructivism approach, "education is given in student-centric, experience based, multiple communication and learning environments and assessed in cognitive, affective and motor dimensions (Ayşe Okvuran, 2010)." Bruner (1973) emphasized that learning is a social process, whereby the learner construct new concept based on current prior knowledge. The learner select information to construct hypotheses and make decision, till put new knowledge into existing knowledge framework, turn the new knowledge into a part of existing prior knowledge. This principle is the same as that of constructivism study.

Online museum associated with social media is able to build a convenient environment for online users to understand local culture or traditional heritages well during the course of increasing participation of museum audiences via social media. Whilst, irritate users learning passion.

3.3 Constructivism learning in online museum

During the constructivism learning in online museum, the learners are the audiences or visitors online, each one is unique individual and has their own natures. They may have different background knowledge, cultures, or events learn with various motivation. What's more, different individual have different learning habit. It's hardly to find a suitable way to cater to all the audiences or users for their online learning. Therefore, find a popular method to evoke their learning interest is crucial. Constructivism learning emphasizes the cooperation learning under the guidance of teacher. The cooperation among learners is able to give full play to learners' initiative to mine more details or more interesting sub-topics around one bald topic.

Who is the teacher in online museums? The professionals or experts in institutes or curators in museums, of course, have responsibility to guide audiences or users to learn more in online museums. The usual ways for museums to communicate with audiences are blogs, forums or professional communities and social media groups, via which, audiences can communication with experts, such as curators etc. and post some

comments or questions, then wait for the reply from experts.

Constructivism learning in online museum, curators is also the guider of audiences. They should define the key knowledge points of each collection by key words. Key words can be looked as the subtopic about one collection. In the frame work defined by curators, audience or users can discuss or learn. If there were some questions or history knowledge cannot be found by audiences, they can send message to curators. The curators will give suggestion or instruction on the page of this sub-topic.

The brief introduction of collection in the majority of online museum as well as the website of Tokugawa Art museum cannot meet demands of users' online learning by far.

4. Enrich knowledge in online museum via social media

4.1 Survey about demands to using social media in online museum

We made an investigation about the users' attitude to application of social media in online museum at University. There are 80 interviewees, including 3 teachers and 77 undergraduate students, form 18 to 25 years old, major in computer science and machine engineering for the 3rd and 4th years.

4.1.1 Should social media be applied in online museum?

In the answers of "what will you do when you was puzzled by some terms in online museum?" (Figure 5) 71.25% interviewees will search the terms by search engine, 12.5% would like to retrieve them in Wikipedia, there are 8.75% will try to post questions at forum and 2.5%. This indicate search engine is the most popular way for people to find knowledge online, Wikipedia is ranked 2nd due to its rich knowledge and complex knowledge link lists can facilitate users' better understand to the context knowledge. So, we select Wikipedia as supplementary knowledge source of online museum.

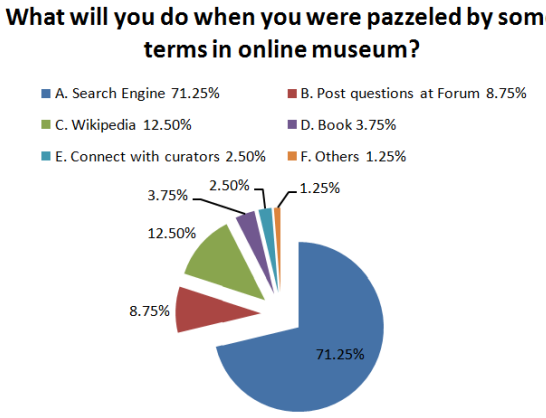

Figure 5 Questions: What will you do when you were puzzled by some terms in online museum?

4.1.2 Demands to share favorite collections in online museum via social media

Figure 6 shows the majority of people trend to sharing favorite collections with their friends via social media. Correspondingly, 72.5% interviewees are willing to view the link shared by their friends via social media (Figure 7).

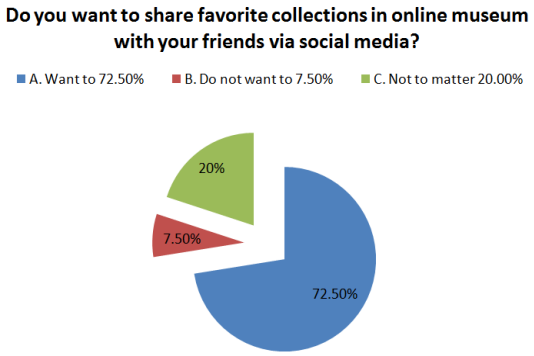

Figure 6 Share favorite collections via social media

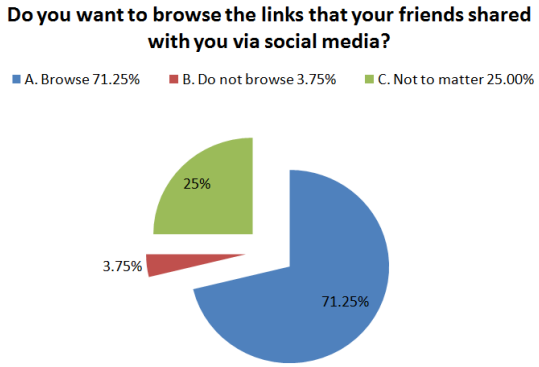

Figure 7 Browse shared link via social media

4.1.3 Most interviewees are interested in communicate with others and share experiences with them

During this investigation, we found most of people are curious at others comments to collections. 59 persons (Figure 8) are interests in others' comments to their favorite collections. 60% people (Figure 9) believe it is necessary to communicate with other like-mined persons to discuss some topics deeply. Meanwhile, they would like to share their individual knowledge or experiences with others online.

These data illustrate that audiences or users needs communication while they are enjoying online collection and trying to learn more.

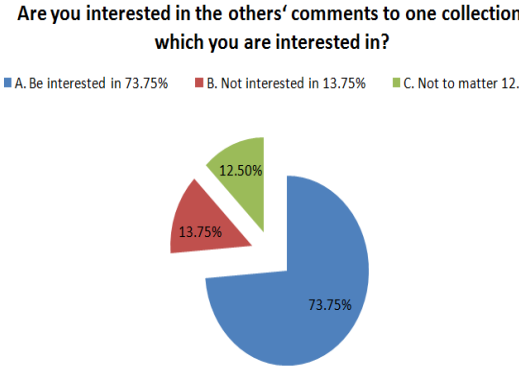

Figure 8 Be interested in others' comments to a collection

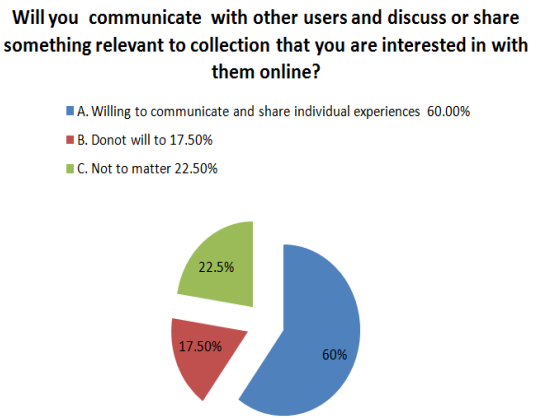

Figure 9 Be willing to communication with others

This survey indicated that social media is a very popular channel for online communication. It gives users immediate message and social knowledge from others. If there is channel between online museum and social media, users are willing to learn

more or exchange much individual experiences or knowledge with others.

4.2 Knowledge demands of constructivism learning in online museum

The online museums have to provide audiences or user with necessary knowledge or information about collections. Firstly, professional introduction is the basic material for audiences to get to knowledge one collection. Audiences' discussion will occur based on it. Secondly, users, especially young people with little historical knowledge can hardly find some imported points from basic introduction of collection. Sub-topic frame defined by curators or professionals is indispensable for them to learn more. Recently, social media is full of people especially young people's daily life, the others comments, ideas, or experiences are usually arouse others interest. Consequently, social knowledge generated in social media is also an indispensable part of knowledge in online museums. Table 1 shows us the knowledge demands from audiences in online museums.

Table 1 Knowledge demands of constructivism learning in online museum

Knowledge demands	Knowledge contents	Knowledge sources
professional introduction	Basic introductions	Local database
Sub-topic frame	Key words	Local database
Social knowledge	Related message generated in social media	Social media eg.Wikipedia, Twitter, Facebooks.
Guidance from curators	Directions or answers from curators	Curators or professionals online

5. System design and development

In table 1, the professional introduction is the common content in online museum, the

Figure 10 Online collection of Tokugawa Art Museum Form

http://www.tokugawa-art-museum.jp/artifact/room3/08.html

only difference among different online museums lies in the quantity of knowledge. When it comes to Tokugawa Art Museums, it is a sample (Figure 10).

In our previous research, we found the knowledge in existing online museums is not

enough for users' better understanding.

The limited knowledge, on one hand, is difficult to understand by ordinary audience, especially young people; on another hand, audiences cannot find further introductions about terms in this introduction, let alone comments or ideas, experiences about it from others. In our previous research, we developed a prototype system for history beginners. This system provided audiences with both professional knowledge form local database and relative social knowledge for Wikipedia. As a result, it facilitates users' understanding to online collections.

Based on previous researches, we addressed facilitating user's constructivism learning through enriching contents relevant to collections in online museums via social media base on two-way communication strategies.

Figure 11 illustrates a rich contents web page of online collections. It indicates 2 distinct points in contrast with ordinary collections pages in online museums:

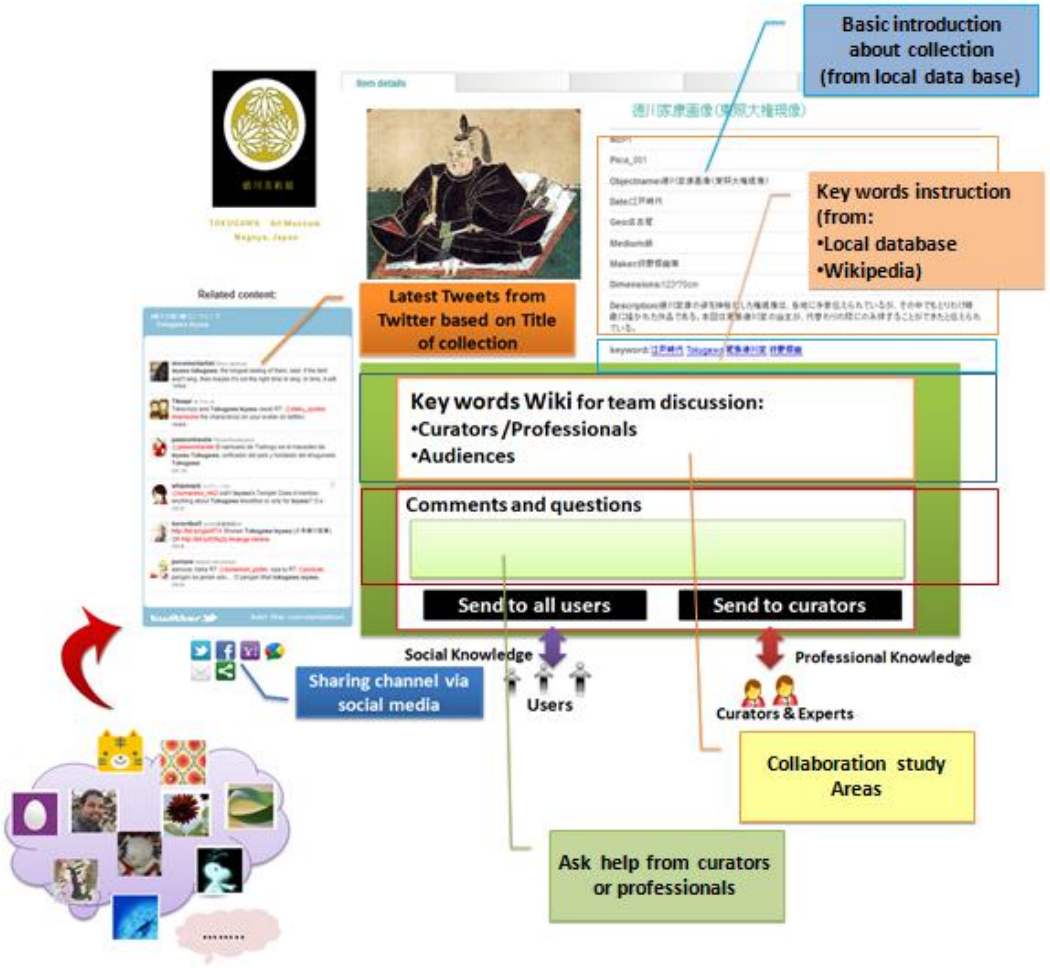

Figure 11 Enrich content of online museum with social knowledge

5.1 Social knowledge from social media

In this design, social knowledge from social media is available. While audiences are enjoying a collections, they can find term explain under the basic introduction. Term explain from both professional database and social media-Wikipedia. The professional knowledge helps audiences comprehend the basic background knowledge of the collection. However, professional knowledge in database is finite. It cannot meet users' further study. Therefore, we provided an access to Wikipedia, the free Encyclopedia, for each terms at the same time. Wikipedia is a web-based, freely available encyclopedia with multilingual versions. Wikipedia，as a "instances of knowledge bases that are collaboratively constructed by mainly nonprofessional volunteers on the web (Torsten Zesch and Christof Müller and Iryna Gurevych, 2008)"， is public wisdom, it is widely accepted and used online, and have reference values in formal and informal learning online.

Related tweets from Twitter are also cited in user interface shown in Figure 11. The updated short message brings inspirations about one collection. Users are allowed to share collection page as existing online museum did.

5.2 Constructivism learning platform

Wiki, as a collaborative knowledge platform, is a popular tool in education fields for over decade. Evans and Wolf (2005) stated that wiki and the relative technologies enable rich, flexible collaborations that have positive psychological consequences for its participants. Wiki enable a number of people, usually a team or the whole community, edit contents based on the participants' individual experiences; users are easily edit Wiki information through a web browser with previous versions, in which there are even mistakes (Chen, H.L. et al, 2005). These characteristics show that Wiki is a suitable tool for online learning, particular for group online constructivism learning.

In our design, there is a wiki area for ordinary audiences, professionals and curators. Users have authority to build and revise existed Wiki contents, if there were something wrong or some topics that the audiences cannot find related materials, the curators or professions will give some advices or professional knowledge when they are checking the Wiki knowledge every day.

In addition, online comments and questions can be posted if necessary. Audiences will get feedback from other like-minded users or from experts.

The utilization of social media in this online museum beyond the "one-way communication strategies", which trying to get larger and newer audiences, it' not only a communication tool, but also a social knowledge source and a learning tool in this design. We built a collection interface by using social media based on two-way

communication strategies. It means, on one side, web page of online museum can be shared via social media easily so as to larger and newer audiences; on the other side, audiences are able to get related immediate messages in online museum pages. The mutual knowledge exchanging might active audiences to learn more, whilst facilitate them to learn more.

6. Conclusions

Current researches are mainly focus on how to apply social media to implement effective communication inner museum or between museum curators and visitors, so as to connect visitors to physical collections. The application of social medial is mainly stain in "one-way communication strategies using". In this research, we are trying to find a way to utilize social media in a higher and comprehensive level. We build an enrich contents user interface for online collections, so as to facilitate audiences, especially young people, to study history knowledge actively during the course of constructivism learning in online museum.

In this system, we enriched contents in online museum through taking advantage of several social media according to their natures.

Audiences are able to understand online collection deeply with supports from Wikipedia, the social encyclopaedia. Wiki is used to build a collaboration study or contribution study environment. The audiences can build social knowledge base of their own under the guidance, modification and maintain from experts. Whilst, questions or comments are available, audience or learner can post what they are curious easily. However, they cannot get answers from curators at once in many cases. Consequently, we searched immediate social knowledge based on collection key words from Twitter as an example, to provide audiences with suggestion in real time at social knowledge, such as Twitter or Facebook.

However, there still some current issues in our research. The distinct one is that reliability of social knowledge is not so high. In Wikipedia, "users will visit Wikipedia and contribute to it on their own volition (Andrew Lih., 2004)", but not all of them are professionals, this decides the reliability of Wikipedia is not absolutely authoritative. Social media, such as Twitter, Facebook, Flickr etc. bring us the individual experiences, which are not traditional academic knowledge. How to understand this social knowledge is various from person to person. In addition, the Twitter knowledge is searching online dynamically, it comes from ordinary users, not comes from experts or hobbyists of history or certain collection. If social knowledge can be found in some hobby group of professional group in social media, the reference value might be higher.

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