

INTERACTING ONLINE: A CONTENT ANALYSIS OF MUSEUM EDUCATION WEBSITES

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Abstract

The purpose of this research was to assess the degree of viewer interaction capabilities of features found on the education portion of museum websites. A content analysis was completed where features were categorized by learning levels including: narrative (the learner is a passive recipient), interactive (the learner chooses what he/she views), communicative (the learner engages in discussion), adaptive (the learner discusses with instructor feedback), and productive (the learner expresses what was learned). From the 153 websites analysed 69 (45.1%) had narrative and 51 (33.3%) had interactivity functionality. There were 55 (35.9%) websites that had communicative, 38 (n=24.8%) had adaptive, and 34 (22.2%) had productive features. Features found at the adaptive and productive levels tended to incorporate offline activity. The results contribute to an understanding of the adoption of technology to educate and can be used as baseline data to assess future changes in online education by museums.

Keywords

Online education, websites, museums, textiles, costume

Introduction

Teaching online has become common in both traditional education and non traditional museum-type settings. There has been an increase in the use of the Internet by museum professionals causing debate about capabilities and limitations of technology in representing and teaching lessons online. Currently, there are many online tools (e.g., e-mail, videos, Wikis) available that are being used and that have the potential for further use to stimulate learning. The purpose of this study is to assess the degree of viewer interaction capabilities of features found on the education portion of museum websites, specifically museums with costume and textile collections. This research will contribute to an understanding of the degree of interaction that is available on museum education websites and will provide baseline data for further study of the use of the internet by institutions that traditionally value teaching using the authentic object.

Museums and Educating Online

The transition to online education has presented many challenges. Teaching with objects is pivotal to the learning process. Zaharias and Poulymenakou (2006) said that visuals of objects are one of the primary criteria in designing websites that enable learning. Museums are focused on object based learning and provide a resource for analysing how objects are being used to educate online.

Educating online is notoriously more difficult than in a traditional classroom setting. Online learners are more diverse in abilities and learning styles (Zaharias & Poulymenakou, 2006).

Viewers of an educational website provided by a museum can also be in any location in the world at any possible income level, social class, age, and background (Moussouri, 2002). In addition, the visitor to a website, particularly of a museum website, does not learn information in the same organized manner as the classroom student.

Saiki and Robins (2008) described a tension between adopting new website technology and maintaining the museum value in the physical artifact. Karp (2004) noted that museums avoid online communication with the public because the museum essence is the actual artifact, not a replication of the artifact. As museums have been moving to the Internet, Swade (2003) agreed that the actual object is prized above virtual copies.

Saiki and Robins (2008) noted, after comparing features of costume and textiles artifacts online in 1997 versus 2006, that museums did not appear to be adopting technology as quickly as other educational institutions. One reason for this slow adoption of technology by museums is that online exhibits by museums and other cultural institutions were designed to only complement visits to the physical institution. This idea supports research that suggests museums should use online media to support activities rather than replace them (Liew, 2006; Saiki and Robins, 2008). Also, the hands-on nature of the artifact, particularly costume and textiles, limits using new technology at a higher interactive level (Goodrum & Martin, 1999).

However, new online technology has forced museums to rethink the role of the Internet. There have been numerous new ways to use technology to manipulate the presentation of the artifact. Bearman and Trant (2007) noted that museums are changing their web pages from static to interactive pages, which later may include talking with and listening to the viewer. The authors describe the transition as one from a web page to one that is less and less “page-like.” Swade (2003) argued that digital images of an artifact are different than the actual artifacts, better fulfilling a museum’s mission of not only communicating with the public, but also educating them. Virtual artifacts can be manipulated in size, shown up close, and shown in relationship with other artifacts to better enable education and interactivity.

Interaction abilities of electronic media

Researchers have looked at ways in which electronic media is designed to interact with the viewer. Laurillard (2002) discussed several types of electronic media that enable the learner to reach different cognitive levels as identified by Bloom, Englehart, Furst, Hill, & Krathwohl (1956). The first level is the “narrative” level where the viewer of the website is a passive receiver of information. Media at this level includes text to read and videos. The next level, “interactive,” includes media that allows the viewer to explore the website actively and decide what to view without changing the content. Online tours and links to other web pages are examples of media at this level. The third level, “communicative,” includes media that allows the viewer to discuss and debate ideas, such as through e-mail and discussion blogs. The fourth level, “adaptive,” includes media that allows the viewer to discuss ideas with direct feedback from the instructor. The fifth and highest cognitive level, “productive,” includes media that allow learners to discuss and show their understanding of information, such as writing stories or creating a garment.

Brown (2006) used Laurillard’s five-level framework to evaluate museum websites. The first website Brown analysed was visually appealing with text for stories, timelines, guided tours, and learning modules, but it reached limited interactive levels. A second website analysed was less visually interesting, but it met the highest levels of cognition with an exercise where a visitor to the website could act as if he or she was part of the historic setting. Brown noted that it was more difficult for museums and libraries to have websites that meet the highest cognitive level of interaction because they are held to high quality images and copyright. He encouraged museums to look for ways to incorporate features on their websites that meet the highest level of cognition.

Saiki and Robins (2008) used Laurillard’s interactive levels to assess categories of websites of textile and clothing museums. They analysed features present in websites in a study conducted in

1997. Categories included information on websites beyond the education portion of the website, such as membership, staff information, hyperlinks to other sites, and so on. From 1997 to 2006 there was an increase in media that required viewer interaction at higher cognitive levels (adaptive and productive levels).

Tools to educate online

There has been a tremendous increase in the number of courses offered online and thus an increase in research that has examined online tools used to educate. Organized by levels of interactivity as discussed by Brown (2006) the following literature demonstrates that the most common tools used in education are at the less interactive “narrative” level and that research about social network tools show potential for enabling high levels of interactivity in educating online. Researchers have emphasized the need for interactivity in online teaching, but question if it is actually happening. According to Georgina and Olson (2008), “One of the most common assertions made about digital learning environments (DLE) or computer learning environments (CLE) is that they are focused upon delivery of information and not upon student learning; this assertion bears close inspection” (p. 2). Most early online learning materials were created by simply translating traditional textbooks into an electronic version, which limits learning (Bonk & Reynolds, 1997). After surveying learners, Luckin, Clark, Graber, Logan, Mee, and Oliver (2009) later found that the majority of technology used was at the basic learning level of gathering information and not at the more interactive levels, such as collaborating with others and producing work. For teaching history, which is what museums with costume collections often focus upon, there tends to be text-heavy web pages for teaching with few interactions with the user beyond links to explore information (Vess, 2004). There was also a tendency for teachers to use technology they were familiar with, such as e-mail (Georgina & Olson, 2008; Luckin et al., 2009).

Luckin et al. (2009) examined technology use among middle school students and found that 74% had at least one account within a social network. At the “narrative” and “communicative levels,” these learners tended to share photographs the most followed by music, and a few said they uploaded videos. Other researchers have supported the use of images in teaching, particularly in teaching history (Coohill, 2006; Wiersma, 2008). Coohill (2006) found that students tended to use images to help them with the material. Images made teaching more effective and facilitated greater retention. Spoehr and Spoehr (1994) applied a computer-based hypermedia to teach historical thinking. The results indicated that texts, pictures, and video materials spanning history were useful to teach history in electronic formats.

Changes are taking place where digital communication is integrated in everyday lives; there is an increase in connectivity of creative and communicative technologies, development of participatory networks at local and global levels; and there are real-time, real-world scenarios for learning (Luckin et al., 2009). Within the literature about education and technology, there is plenty of emphasis on the need for and abilities of interactive sites, as well as, proof that these sites increase learning (Chandra & Chalmers, 2010; Kumar, 2000). At the levels of interactivity, “communicative” and “adaptive,” researchers have emphasized the importance of online learning communities (Granger & Benke, 1998; Meyer, 2003; Pauls, 2003). Pauls (2003) noted that this interaction can be accomplished through technology, such as e-mail, instant messaging, voice conferencing, discussion boards, and chat rooms. A feature of websites that has been studied often is the discussion board. It has been shown that it allows students to learn the material and respond to each other directly (Ginns & Ellis, 2007; Schrum, Burbank, Engle, Chambers, & Glassett, 2005). For example, Ginns and Ellis (2007) examined mixed learning that incorporated online and offline experiences. They surveyed students about the effectiveness of the teacher, the extent to which offline activities assisted learning, the appropriate work load, and student interaction. They found that student interaction including the online discussion boards correlated with learning.

At the “adaptive” level, researchers have tested features that include feedback for the user, such as simulation games. Computer games that stimulate competition have been found to be successful in teaching students (Regueras, Verdu, Munoz, Perez, de Castro, & Verdu, 2009), and games are commonly noted as tools used by learners (Luckin et al., 2009). Another website feature used for

teaching that has been studied by researchers are Wikis or websites that allow users to create and edit content, compare previous versions of a page, have a separate page for discussion, and see user history. It has been found that learners use Wikis at the “communicative level” to research topics (Luckin, et al., 2009). However, Wikis have been used in more collaborative efforts, such as small group collaboration on business projects, and online special interest groups (Chandra & Chalmers, 2010). Studies indicate higher quality learning with Wikis and interactive games (e.g., Chang, Yang, Yu, & Chan, 2003; Ebner & Holzlinger, 2007; Siddiqui, Khan, & Akhtar, 2008), which are tools that allow participants to actively engage in and get feedback about their learning. Chandra and Chalmers (2010) specifically found that Wikis and Podcasts were helpful in sharing ideas and blogs allowed for feedback. All were effective tools in allowing students to engage socially in the learning process. There is limited research about website tools that stimulate learners at the “productive” level. Luckin et al. (2009) found learners were not using technological to produce their own material.

Methods to investigate websites and educating

The methods to investigate websites for education include student and teacher surveys, case studies, and content analysis. The quality of learning using these features has been examined from the student and teacher perspectives with surveys such as the e-Learning Experience Questionnaire and by noting the grade a student earns (Ginns & Ellis, 2007). Survey studies tend to focus on a particular type of technology, such as Wikis (e.g., Grant, 2008) rather than overall trends in many types of technology. Also, many studies survey students in a case study setting; setting up a particular assignment and testing it (e.g., Chang, et al., 2003; Regueras, et al., 2009). The content analysis technique has also been used to examine websites. The technique is important in objectively and systematically examining the characteristics of websites. Results from a content analysis helps in understanding websites through outsider observation (Holsti, 1969; Stewart & Featherstone, 2007). The technique has been used to examine trends in museum website design (Saiki & Robins, 2008; Williams, 1997) and to assess communication in many websites designated for advertising (Stewart & Featherston, 2007).

Purpose

Increases in technological capabilities have certainly allowed for interaction between the user and the webpage (Bearman & Trant, 2007). Even in an assessment of a clothing and textile museum website where the tradition is rooted in the actual artifact, interactivity with the viewer of the website has been found to increase over time (Saiki & Robbins, 2008). The education part of a museum website has been suggested to be the best place for museums and other cultural institutions to utilize interactive technology (Swade, 2003). Research about online tools specifically designed for education has identified a variety of ways to stimulate interactivity and has shown that while tools that stimulate interactivity at high cognitive learning levels exist, these tools are not always fully utilized (Anderson, 2004). The purpose of this study is to assess the degree of viewer interaction capabilities of features found on the education portion of museum websites, specifically museums with costume and textile collections. Laurillard’s (2002) levels of cognitive interaction for media--narrative, interactive, communicative, adaptive, and productive--were used to frame the study. Therefore, the research questions are how frequently do museums have parts of their websites designated for user interaction in relation to: 1) narrative, 2) interactive, 3) communicative, 4) adaptive, and 5) productive features?

Method

Data collection was a content analysis of costume and textile collection websites. This method allows for systematic and objective outside observation of the websites (Holsti, 1969; Stewart & Featherstone, 2007). It is also an important method to assess how people are communicating with each other and trends in modes of communication (Marris, Bassett, & Thornham, 2000; Weber, 1990). It gives a broad scope of what is happening, rather than focusing on a particular method of teaching or technology. The original instrument was developed and framed according to

Laurillard's (2003) cognitive levels of electronic media. The features examined were found in the education section of each of the museum websites with a clothing and textile collection. A systematic sample was derived from a guide published by Costume Society of America (2006) with a list of 2604 clothing and textile collections in the United States. To ensure an 80% confidence level, 153 websites were examined.

To establish criteria for evaluating websites, the type of each website was first categorized as belonging to either a general museum or a collegiate museum. The approximate number of artifacts in each collection was also recorded. The educational attributes that were evaluated included whether or not the website had educational information. If the website did have educational information, narrative components--a feature where the viewer passively acquires the information--were analysed. The first type of narrative information recorded was if a visual was present. It was also noted at the narrative level if a description of the program(s), as well as, a description of the historical content within the program was available. In addition, it was recorded whether or not there were links that had definitions of terms, book citations, and video clips.

The interactive category included availability of exploring the website in an active way and the ability to make decisions about what to view (Laurillard, 2002). The interactivity category included: links to websites, searchable images, and citation links to other materials offline. The communicative media or the ability to discuss ideas included the availability of e-mail instructors and discussion groups. It was noted whether or not the viewer was prompted to chat with someone either online or offline.

A viable option for most viewers using online sources for educational purposes includes an adaptive category, which allows for feedback to know whether or not something was done correctly (Laurillard, 2002). This category was noted as present if a response to correct/incorrect answers was available either online or offline through sounds, lights, or other similar cues.

The last category noted during data collection was the productive level of each website. This included the physical step of recreating a garment or product, writing a story or essay, doing an oral report, making a model or demonstration, or other similar features that would engage the viewer at the highest level of cognition (Laurillard, 2002). These features were noted as occurring online or offline. Online indicated the instructor and the viewer interact online only and offline indicated the objective of the learning activity/feature met the criteria for a cognitive learning level, but the interaction/feedback from the instructor took place offline.

A pilot study was conducted where three individuals independently analysed ten websites and the responses were compared and discussed. A few changes were made regarding the inclusion of specific content and definitions of each category to increase the inter rater consistency among responses. For example, online and offline activities were found at the adaptive and productive levels, creating mixed results in the pilot. Therefore, offline and online categories were added to the instrument. Each website in the final sample was examined independently by at least two individuals. Data were compared and discussed until at least 98% agreement was reached.

The data collection consisted of logging codes. For example, "1" indicated the feature was found on the website and "2" indicated the feature was not found. Basic information about the museum was also collected, including the type of museum (general or college) and, to get a sense of the size of the museum, the number of artifacts as stated on the websites. Frequencies of website types and features were calculated in quantities and percentages.

Results and discussion

Of the total sample of 153 websites reviewed, only seven (4.6%) were collections in collegiate museums. The remaining 146 (95.4%) were collections in general museums. One hundred and thirty-nine (90.8%) had a website that could be accessed. The size of the collection was not noted on the website often enough for a comprehensive description of the collections analysed, but the

collections ranged from small collections of less than five hundred artifacts to collections with several thousand artifacts. Sixty-two (40.5%) of the 153 websites in the sample had a webpage that focused specifically on education, which is a relatively low number of websites. An additional seven had descriptions of education programs. These findings support previous findings that museums are not fully exploiting the capabilities of technology for education (Swade, 2003).

All of the websites with education information ($n=69$; 45.1%) had functionality at the first cognitive level, narrative, where the viewer is a passive receiver of information. Fifty-nine websites (38.6%) had some type of visual on the website. Sixty-three (41.2%) websites had a program description, and 57 (37.3%) websites had historic content descriptions. Seventeen percent ($n = 26$) of the websites had definitions related to the historic content. Twenty-five (16.3%) of the websites had book citations in reference to the historic content found on the site. Thirteen (8.5%) of the sites had video content associated with the subject matter (see Table 1).

Table 1

Frequencies of narrative features from (1) total websites ($n = 153$) and (2) websites with narrative features ($n = 69$)

	(1)		(2)	
	Yes (% / n)	No (% / n)	Yes (% / n)	No (% / n)
Total Narrative	45.1 / 69	54.9 / 84	100 / 69	0 / 0
Visuals	38.6 / 59	51.4 / 90	85.5 / 59	14.5 / 10
Describe program	41.2 / 63	58.8 / 90	91.3 / 63	8.7 / 6
Describe content	37.3 / 57	72.7 / 96	82.6 / 57	17.4 / 12
Definitions	17.0 / 26	83.0 / 127	37.7 / 26	62.3 / 43
Book citations	16.3 / 25	83.7 / 128	36.2 / 25	63.8 / 44
Video	8.5 / 13	91.5 / 140	18.8 / 13	81.2 / 56

The fact that 85.5% of the websites with education sections had visuals, supports the important object-focused nature of the museum and highlights the importance of images in teaching online, particularly historical subjects (Coohill, 2006; Spoehr & Spoehr, 1994; Wiersma, 2008). Furthermore, these results support findings by researchers of museum websites (Brown, 2006) and education websites (Anderson, 2004) that features at the lowest level of cognition are common. The results suggest that the web page, despite recent observations of increased interactivity, is still very much "page-like" (Bearman & Trant, 2007).

Upon investigation of the websites for features at the second cognitive level, interactive functionality, in which the viewer can explore in an active manner, 51 ($n = 33.3\%$) were found to have some type of an interactivity feature. Forty-eight (31.4%) of the sites had web links to other sites. Nineteen (12.4%) of the sites had the interactive ability to search images. Twenty (13.1%) websites had links to citation for further information (see Table 2).

Table 2

Frequencies of interactive features from (1) total websites ($n = 153$) and websites with interactive features ($n = 51$)

	(1)		(2)	
	Yes (% / n)	No (% / n)	Yes (% / n)	No (% / n)
Total Interactive	33.3 / 51	66.7 / 103	100 / 51	0 / 0
Web links	31.4 / 48	68.6 / 105	94.1 / 48	5.9 / 3
Search Images	12.4 / 19	87.6 / 134	37.3 / 19	62.7 / 32
Citation links	13.1 / 20	86.9 / 133	39.2 / 20	60.8 / 21

Fifty-five ($n=35.9\%$) websites had communicative functionality giving the viewer an opportunity to discuss and debate their ideas with others. Fifty-one (33.3%) of the websites reviewed had e-mail functionality. Twelve (7.8%) sites had some type of forum for discussion of content on the site. Twenty-two (14.4%) sites had communicative functionality online only, and 20.9% ($n=32$) had the communicative functionality available in an offline forum (see Table 3). The majority of the sites with an education section had interactive and communicative functions, which supports Bearman and Trant (2007) notion of the web page becoming less "page-like."

Table 3

Frequencies of communicative features from (1) total websites ($n = 153$) and (2) websites with communicative features ($n = 55$)

	(1)		(2)	
	Yes (% / n)	No (% / n)	Yes (% / n)	No (% / n)
Total communicative	35.9 / 55	64.1 / 98	100/55	0 / 0
E-mail	33.3 / 51	66.7 / 102	92.7/51	7.3/4
Discussion	7.8 / 12	92.2 / 102	21.8/12	78.2/43
Online	14.4 / 22	85.6 / 131	40.0/22	60.0/33
Offline	20.9 / 32	79.1 / 121	48.2/32	41.8/23

Of the 153 reviewed websites, 38 ($n = 24.8\%$) had features at the fourth cognitive level, adaptive functionality, which largely mirrors the communicative functionality however; feedback is given that is directly related to viewer response. Eleven (7.2%) had features at the adaptive level strictly for online use, and 34 (22.2%) had interactive adaptive functionality requiring offline use (see Table 4). The majority of the 62 websites with education sections had communicative features (61.3%), particularly e-mail. This contradicts the findings of previous researchers who indicated higher levels of educating were not used (Brown, 2006; Saiki & Robbins, 2008). However, the use of e-mail could be a result of familiarity with the tool, as found with educators (Georgina & Olson, 2008). The total drops significantly for discussions and the majority of the discussions were prompted offline, despite the use of the tool in successful interaction online in the education field (e.g., Ginns & Ellis, 2007).

Table 4

Frequencies of adaptive features from: (1) total websites ($n = 153$) and (2) websites with adaptive features ($n = 38$).

	(1)		(2)	
	Yes (% / n)	No (% / n)	Yes (% / n)	No (% / n)
Total adaptive	24.8 / 38	75.2 / 115	100/38	0 / 0
Experiment	24.8 / 38	75.2 / 38	100/38	0/0
Online	7.2 / 11	92.8 / 142	28.9/11	71/1/27
Offline	22.2 / 34	77.8 / 119	89.5/34	10.5/4

Thirty-four ($n = 22.2\%$) websites in the sample had some type of element from the fifth and highest cognitive level, productive, where the visitor is allowed to experiment with skills and ideas provided by the website. Twenty-four (15.7%) had the productive element of producing a garment. Twenty-one (13.7%) websites provided the opportunity for visitors to write an essay or short story reflecting site content. Twelve sites (7.8%) provided guidelines for an oral presentation related to site content. Twenty sites (13.1%) had some type of demonstration, which fulfilled the guidelines for an activity related to the productive level. Five sites (3.3%) provided the productive functionality online, and 19.6% ($n = 30$) provided the interaction only offline (see Table 5).

Table 5

Frequencies of productive features from (1) total websites ($n = 153$) and (2) website with productive features ($n = 34$)

	(1)		(2)	
	Yes (% / n)	No (% / n)	Yes (% / n)	No (% / n)
Total productive	22.2 / 34	77.8 / 129	100/34	0 / 0
Make garment	15.7 / 24	84.3 / 129	70.7/24	29.3/10
Write essay/story	13.7 / 21	86.3 / 132	61.8/21	38.2/13
Oral presentation	7.8 / 12	92.2 / 141	35.3/12	64.7/22
Demonstrate	13.1 / 20	86.9 / 133	58.8/20	41.2/14
Online	3.3 / 5	96.7 / 148	14.7/5	85.3/29
Offline	19.6 / 30	80.4 / 123	88.2/30	11.8/4

Despite the assertion that education websites for museums are not considering productive features (Brown, 2006; Saiki & Robins, 2008), there appears to be an attempt to incorporate high interaction levels. The majority of these websites stimulate higher levels of learning using offline activities, suggesting a merging of online and offline activities (e.g., asking participants to make a garment, write stories, and do demonstrations) with feedback usually offline. Although these results suggest an attempt to push the learner to higher cognitive levels as defined by Laurillard (2002), there appears to be a limitation in technology to incorporate these activities only online, which could in part be due to the hands-on nature of learning with costume and textile artifacts (Brown, 2006; Goodrum & Martin, 1999). These results also support the research in the education field. There are less tools used that are at the highest cognitive level, particularly in the area of history, that meet this productive level (Bonk & Reynolds, 1997; Luckin et al., 2009; Vass 2008).

Summary, conclusions, and recommendation for further research

The most common features found were within the lowest level (narrative) of cognition/interactivity ($n = 69$; 45.1%). All websites that had an education section ($n = 62$) had narrative information and another seven websites did not have a section for education, but had information that described education activities on the general museum webpage. The next most common feature was communicative ($n = 55$; 35.9%) and interactive ($n = 51$; 33.3%), which are, following narrative, at the next levels of cognition/interactivity (Laurillard, 2002). The least common features were the highest level of cognition, including adaptive ($n = 38$; 24.8%) and productive ($n = 34$; 22.4%) (see Figure 1).

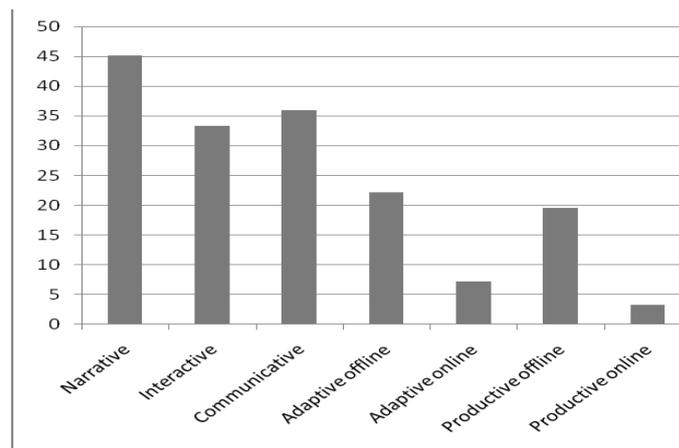


Figure 1: Percent of websites ($n = 153$) with features at the narrative, interactive, communicative, adaptive, and productive cognitive levels.

Less than one half (45.1%) of the 153 websites had sections designated for educating, and the adaptive and productive features were mostly a result of the inclusion of offline activities with 89.9% ($n = 34$) of the total adaptive features and 89.5% ($n = 30$) of the total productive features offline. Although the Internet is progressing to web pages with greater interactivity as described by Bearman and Trant (2007), many are not progressing to the point of interacting with the viewer at high cognitive levels. It could be a limitation in current technology or demonstrate the tension between adopting new technology by museums and their value in the actual object as discussed by previous researchers (e.g., Saiki & Robins, 2008; Swade, 2003).

The results support previous research that found that museum websites are designed to inspire a visit to the museum (Liew, 2006; Saiki & Robins, 2008). When an education portion was found on the websites, the programs encouraged interactivity once at the museum (e.g., scavenger hunts at the museum). However, some of the activities were separate from a visit to the museum (e.g., making a garment, writing a story). Further investigation of the offline activities could assess activities that prompt a visit to the museum versus prompting activities separate from the museum.

The basic narrative information incorporated visual means for learning, with the majority of the websites with education web pages including visuals. The narrative information also provided participants with knowledge about the program and activities related to learning. Most of the websites with education web pages offered features at the interactive level with web links that enabled learners to control their own pace of learning and discovering. Providing informative feedback, as well as, a place for social learning was limited to presenting online activities that required offline feedback. As with the suggestions found by Zaharias and Poullymenakou (2006), further simulations and case studies could be included, particularly online.

Laurillard's (2002) framework was a useful method to evaluate and to start thinking about designing interactive education experiences on museum websites and it would help future website development to keep this framework in mind. Further research could include using the same

framework to analyse websites features of other educational institutions to investigate how institutions that are not focused on objects differ in their use of the Internet to educate.

There is evidence that communicative features are found online with almost 40% ($n = 22$) of the 55 websites with communicative features found online (see Table 4). As technology develops and pages become less “page-like” then more features at the adaptive and productive levels may be found strictly online. This research also shows what was not on museum web pages versus what has been used within education. The websites did not include the highly interactive Wikis (Grant, 2008) or online games (Chang, et al, 2003). This data can, therefore, serve as baseline data to be used for later comparison studies that demonstrate changes over time. Perhaps these features will eventually be used by museums in educating.

The data is limited to costume collections within the United States. Other comparisons could be made with different regions of the world to see if there are pending cultural differences in how object education is approached. The data could be compared to museums without a costume collection. Also, museum professionals could be polled about the development, goals, and criteria for their websites, particularly with regards to educating.

References

- Anderson, T. (2004). Toward a theory of online learning. In T. Anderson, & F. Eljouni (Eds.), *Theory for online learning* (pp. 33-60). Canada: Athabasca University. Retrieved June 15, 2010, from http://cde.athabascau.ca/online_book/pdf/TPOL_chp02.pdf
- Bearman, D., & Trant, J. (2007). *After the web page: The world as matrix for meaning*. Retrieved July 20, 2010, from http://www.archimuse.com/publishing/mw_2007_intro.html
- Bloom, B. S., Englehart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of education objectives-handbook I: Cognitive domain*. New York: Longmans.
- Bonk, C. J., & Reynolds, T. H. (1997). Learner centered web instruction for higher-order thinking, teamwork, and apprenticeship. In B. H. Khan (Ed.), *Web-based instruction* (pp. 167-178). Englewood Cliffs, NJ: Educational Technology Publications.
- Brown, S. (2006). Do richer media mean better learning? A framework for evaluating learning experiences in museum website design. *International Journal of Heritage Studies*, 12(5), 412-426.
- Chandra, V., & Chalmers, C. (2010). Blogs, wikis, and podcasts - Collaborative knowledge building tools in a Design and Technology course. *Journal of Learning Design*, 3(2), 35-49.
- Chang, L. J., Yang, J. C., Yu, F. Y., & Chan, T. W. (2003). Development and evaluation of multiple competitive activities in a synchronous quiz game system. *Journal of Innovative Education Training International*, 40(1), 16-26.
- Coohill, J. (2006). Images and the history lecture: Teaching the history channel generation. *The History Teacher*, 39(4), 455-465.
- Costume Society of America. (2006). *Clothing and textile collections in the United States*. Lubbock, TX: Texas Tech University Press.
- Ebner, M., & Holzlinger, A. (2007). Successful implementation of user-centered game based learning in higher education: An example from civil engineering. *Computer Education*, 49(3), 873-890.
- Georgina, D. A., & Olson, M. R. (2008). Integration of technology in higher education: A review of faculty self-perceptions. *The Internet and Higher Education*, 11(1), 1-8.
- Ginns, P., & Ellis, R. (2007). Quality in blended learning: Exploring the relationships between online and face-to-face teaching and learning. *Internet and Higher Education*, 10(1), 53-64.
- Goodrum, A. A., & Martin, K. (1999). Bringing fashion out of the closet: Classification structure for the Drexel Historic Costume Collection. *Bulletin of the American Society for Information Sciences*, 25(6), 21-23.
- Granger, D., & Benke, M. (1998). Supporting learners at a distance from inquiry through completion. In C. C. Gibson (Ed.), *Distance Learners in Higher Education: Institutional Responses for Quality Outcomes* (pp. 127-137). Madison, WI: Atwood.

- Grant, L. (2008). I don't care do UR Own Page! A case study of using wikis for collaborative work in a UK secondary school. *Learning, Media and Technology*, 34(2), 105-117.
- Holsti, O. (1969). *Content analysis for the social sciences and humanities*. Reading, MA: Addison-Wesley.
- Karp, C. (2004). Digital heritage in digital museums. *Museum International*, 56(1-2), 221-222.
- Kumar, V. (2000). Choosing the right track for IT's transformation of teaching and learning. *EDUCAUSE Review*, 35(3), 62-63.
- Laurillard, D. (2002). *Rethinking university teaching: A conversational framework for the effective use of learning technologies*. New York: Routledge Falmer.
- Liew, C. L. (2006). Online cultural heritage exhibitions: a survey of strategic issues. *Electronic Library & Information Systems*, 40(4), 372-388.
- Luckin, R., Clark, W., Graber, R., Logan, K., Mee, A., and Oliver, M. (2009). Do Web 2.0 tools really open the door to learning? Practices, perceptions and profiles of 11-16 year-old students. *Learning, Media and Technology*, 34(2), 87-104.
- Marris, P., Bassett, C., & Thornham, S. (2000). *Media studies: A reader*. New York: New York University Press.
- Meyer, K. A. (2003). The web's impact on student learning. *T.H.E. Journal*. Retrieved August 1, 2010, from <http://thejournal.com/articles/2003/05/01/the-webs-impact-on-student-learning.asp>
- Moussouri, T. A. (2002). *A context for the development of learning outcomes in museums, libraries and archives*. London: Council for Museums, Archives and Libraries.
- Pauls, T. S. (2003). *The importance of interaction in online courses*. Retrieved June 31, 2010, from http://www.olsn.org/conferences/OLN2003/papers/Importance_of_interactivity_in_Distance_Education_1.pdf
- Regueras, L. M., Verdu, E., Munoz, M. F., Perez, M. A., de Castro, J. P., & Verdu, M. J. (2009). Effects of competitive e-learning tools on higher education students: A case study. *IEEE Transactions on Education*, 52(2), 279-285.
- Saiki, D., & Robbins, A. (2008). Featuring clothing and textile collections online. *ASLIB Proceedings: New Information Perspective*, 60(2), 99-110.
- Schrum, L., Burbank, M. D., Engle, J., Chambers, J., & Glassett, K. F. (2005). Post-secondary educators' professional development: Investigation of an online approach to enhancing teaching and learning. *The Internet and Higher Education*, 8(4), 279-289.
- Siddiqui, A., Khan, M., & Akhtar, S. (2008). Supply chains simulator: A scenario-based education tool to enhance student learning. *Computer & Education*, 51(1), 252-261.
- Spoehr, K. T., & Spoehr, L. W. (1994). Learning to think historically. *Educational Psychologist*, 29(2), 71-77.
- Stewart, A., & Featherstone, M. D. (2007). A comparison of web use in marketing by local government in the United States and Australia. *Database Marketing & Customer Strategy Management*, 4(4), 297-310.
- Swade, D. (2003). Virtual objects: The end of real? *Interdisciplinary Science Reviews*, 28(4), 273-279.
- Vess, D. (2004). History in the digital age: A study of the impact of interactive resources on student learning. *The History Teacher*, 7(3), 385-399.
- Weber, R. P. (1990). *Basic content analysis*. Newbury Park, CA: Sage.
- Wiersma, A. (2008). A study of teaching methods of high school history teachers. *The Social Studies*, 3(99), 111-116.
- Williams, M. K. (1997). *Museums on the World Wide Web: A content analysis of historic costume and textile collections*. Unpublished Masters thesis, Colorado State University, Ft. Collins, CO.
- Zaharias, P., & Poulymenakou, A. (2006). Implementing learner-centered design; the interplay between usability and instructional design practices. *Interactive Technology and Smart Education*, 3(2), 87-100.