Interpreting Digital Heritage: A Conceptual Model with End-Users’ Perspective

Hafizur Rahaman and Beng-Kiang Tan
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Abstract

Present virtual heritage projects are mostly focused either on ‘process’ or ‘product’ but rarely consider ‘users’ (end-users’ perception of the content) with project contents predominantly developed with an ‘ocular-centric’ tendency. There is no significant interpretation method or principle for interpreting digital heritage like other disciplines such as archaeology. This paper argues that, for better interpretation and experience of a digital heritage site, a comprehensive interpretation method is required, which should address end-users with various background, overcome the linearity in narrative level and subjectiveness in content creation. This paper also argues that instead of predetermined instructional sequences or descriptive interpretation, the interaction setting can be participatory and contributive, where the end-users and environment may engage in ‘dialogic-interaction’. In terms of methodology, ‘Interpretation’ is first conceptualized by assimilating definitions from various heritage scholars and interpretation organizations. Notions of interpretation-practice and level of interaction are identified from reviewing some online digital heritage projects. By identifying weaknesses, this paper finally proposes a conceptual model for developing a comprehensive interpretation method for future digital heritage projects.
1. INTRODUCTION

‘Heritage’ is a broad term that refers to the study of human activity not only through the recovery of remains (as in archaeology), but also through tradition, art and cultural evidences and narratives. It is a process of engagement [1] rather than a condition; “it is a medium of communication, a means of transmission of ideas and values and a knowledge that includes the material, the intangible and the virtual” [2]. On the other hand, UNESCO [3] refers to ‘digital heritage’ as unique resources of human knowledge and expression “created digitally or converted into digital-form from existing analogue resources”. According to this definition of UNESCO, any digital content that possess cultural values either in the form of 2D (such as text, image and motion pictures) or 3D (such as navigational virtual environment, three dimensional objects), both belong to ‘digital heritage’. In addition, ‘Virtual heritage’ (VH) is commonly used to describe works that deals with virtual-reality (VR) and cultural-heritage [4], and by definition falls under digital heritage. Depending on the point of creation, digital heritage can be either ‘born digital’ (e.g. electronic journals, worldwide webpage) or ‘digital surrogate’ (made from analogue resources such as 3D scanned objects or digital video of a ritual). So far, digital heritage has three major domains i.e. (i) documentation, (ii) representation and (iii) dissemination [5] and one of its major objectives is to disseminate knowledge of history and culture to general people [6].

2. UNDERSTANDING THE END-USERS

In a digital heritage or virtual heritage environment while end-users interact with the system or interface, they are primarily interacting with ‘information’. Information are accessed, manipulated or created during interaction to achieve some objectives and computer or other peripherals devices work as a mean through which the objective is achieved.

Figure 1 shows that experience and learning from the existing or offered content depends largely on both media and end-users’ background (i.e.
physical and psychological). A person certainly inherits a specific cultural, technical and cognitive background that is unique from others. According to cognitive psychology, meaning-making in our mind is a complex process and follows a series of steps which predominantly depends on individual’s capabilities (visual perception, attention, memory, learning and mental model) of mental process [7]. Hence, not only the media but also end-users’ background, sense of perception, technical knowledge, learning ability, interest and ideology largely influence how that person will react and interpret the content.

Built-heritage is not just about ‘tangibility or materiality’, but comprises cultural and socio-spatial attributes related to built-environment. To understand the inherent significance of a culture heritage site, mere watching or navigating through 3D virtual model is inadequate. As digital heritage deals with cultural artefacts, demographic differences always influence users’ value judgment. What we see, our concept-oriented mind tells us about it; not only our eyes but also our previous experiences deeply influence filtering the perceived meaning [7]. Therefore, experience and interpretation of prehistoric artefacts and landscapes largely depends on our own embodiment, subjectiveness and cultural positioning [8]. Content without relating directly to how we perceive the world, does not impart any meaning; rather it causes ‘heritage dissonance’ or ‘disinheritance’ [9].

Yet in most cases, digital heritage projects are developed as an afterthought of some research work or to demonstrate new technologies [10] while contents are often created in a ‘descriptive’ manner rather than ‘interpretive’ [11]. Tan and Rahaman [12] claimed that present digital heritage or VH projects are mostly focused either on ‘process’ (authentication of data, site survey to epigraphy) or ‘product’ (closer to reality and technical artistry) but do not necessarily consider the ‘user’ (end-users’ perception of the content). Consequently, ‘interpretation’ has always been understood as a linear process, "a single and universal viewpoint about the past" [13] supposing everyone should learn and understand similarly. Nevertheless, in reality everyone’s thought and reaction to action and situation are unique and it is simply not possible to reproduce events exactly as ‘actual’ in any sense [14]. Therefore, digital heritage should address the ‘cultural uniqueness’ of end-users and overcome the linearity and allow multiplicity in interpretation.

3. HERITAGE INTERPRETATION IN ARCHAEOLOGY

“The chief aim of interpretation is not instruction but provocation”- Freeman Tilden [15].

‘Interpretation’ is actually the act or process of interpretation. In Archaeology, interpretation has always been considered as an effective learning, communicating and management tool that increases visitors’ awareness and empathy to the site and artefacts. Freeman Tilden [15]
defined interpretation as “an educational activity which aims to reveal meanings and relationships through the use of original objects by first-hand experience and by illustrative media, rather than simply to communicate factual information”. However, interpretation is often used to indicate the storylines, adopted to help visitors to engage with and understand the place or objects. According to ICOMOS’s mission statement, ‘Presentation’ denotes the carefully planned arrangement of information and physical access to a cultural heritage site. As such, it is largely a one-way mode of communication. ‘Interpretation’ on the other hand, refers to the full range of potential activities intended to heighten public awareness and enhance understanding of cultural heritage sites [16].

Table 1: Definition of heritage interpretation.

<table>
<thead>
<tr>
<th>Affiliation</th>
<th>Definition of Interpretation</th>
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<tbody>
<tr>
<td>Uzzell</td>
<td>Interpretation is that it opens a window on the past.</td>
</tr>
<tr>
<td>Harrison</td>
<td>The art of presenting the story of a site to an identified audience in a stimulating, informative and entertaining way to highlight the importance and provoke a sense of place.</td>
</tr>
<tr>
<td>Beck and Cable</td>
<td>Interpretation is an educational activity that aims to reveal meanings about our cultural and natural resources.</td>
</tr>
<tr>
<td>Moscardo</td>
<td>Interpretation is a special kind of communication.</td>
</tr>
<tr>
<td>Howard</td>
<td>Interpretation is deciding what to say about heritage and how and to whom.</td>
</tr>
<tr>
<td>Goodchild</td>
<td>Interpretation is, in fact, only one aspect of the broader topics of presentation, supplementary education and visitor satisfaction.</td>
</tr>
<tr>
<td>Interpretation Association, Australia</td>
<td>Heritage interpretation is a means of communicating ideas and feelings which help people understand more about themselves and their environment.</td>
</tr>
<tr>
<td>The National Association for Interpretation, USA</td>
<td>Interpretation is a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and the meanings inherent in the resource.</td>
</tr>
<tr>
<td>The Association for Heritage Interpretation, UK</td>
<td>Interpretation is primarily a communication process that helps people make sense of, and understand more about, your site, collection or event.</td>
</tr>
<tr>
<td>ICOMOS Enname Charter</td>
<td>Interpretation refers to the full range of potential activities intended to heighten public awareness and enhance understanding of cultural heritage site.</td>
</tr>
<tr>
<td>ICOMOS Charleston declaration</td>
<td>Interpretation denotes the totality of activity, reflection, research and creativity stimulated by a cultural heritage site.</td>
</tr>
</tbody>
</table>

Table 1 presents a compilation of definitions of ‘heritage interpretation’ from diverse authors and institutes prepared by Rahaman and Tan [17]. Notions presented in this Table 1 elucidate that, archaeological ‘interpretation’ has always been considered as a method or tool of presentation or communication with visitors for the purpose of: (i) Learning (conveying symbolic meaning), (ii) Provocation (facilitating attitudinal or behavioural change) and (iii) Satisfaction (enhancing enjoyment of the place). Regarding archaeological interpretation, these considerations actually refer to a passive mind-set of ‘experts’: here archaeologists have always been considered as the interpreters of past and present, whereas visitors are treated as consumers with petty knowledge, merely “to make sense of the information” [18].
Heritage is not a concrete object; meaning evolves and updates by subsequent generations, e.g. the interpretation of 'scriptures'. Oxford advanced learner's dictionary defines interpretation as "the particular way in which it is understood or explained". This definition points to an inherent duality underlying the terms. 'Explained' indicates 'presentation' or 'communication' factor [18, 19]; i.e. more as an act of the interpreter or interactive interface; while 'understood' commonly refers to self-interpretation or self-learning, or rather as a reflexive phenomenon. In this, the understanding of interpretation may differ between archaeology and hermeneutics. Interpretation can also be seen as a reflexive process; instead of considering it as a medium of communication with passive audience. The process of interpretation therefore should be dialectic and hermeneutic to empower social groups to tell their own stories [20]. This way interpretation can allow more flexibility in the process and ensure a comprehensive portrayal of multiple viewpoints of the past, which are often absent in most digital heritage projects.

4. DIGITAL HERITAGE INTERPRETATION: SURVEY OF SOME ONLINE PROJECTS

Digital heritage (or especially Virtual heritage) has been an active area of research throughout the last decade. With the advancement of technology, digital heritage projects have enhanced their capability from linear limited interactivity to non-linear immersive environment. Due to cheaper computer hardware and the phenomenal growth of World Wide Web, present trends in virtual reality applications are motivated towards the use of immersive technology for real-time interaction with high detail.

We carried out a short survey on some digital heritage projects based on the level of interaction (i.e. exploration, manipulation and contribution) offered and the technology/media used for interpretation (Table 2). This study reveals that early projects typically focused on 'faithful' representation and visual realism; thus, most of them are static, descriptive and inflexible for further interpretation. Even though the problem of large file size and free movement inside the virtual world has been solved though VRML and gaming software, interaction as the core of embodiment largely remains limited in terms of exploration and manipulation. Descriptive nature of interpretation has been found still dominating in most projects, as they rarely consider end-users contribution. Nevertheless, a few recent cases demonstrate the possibility of heritage interpretation through shared annotation-basis like 'wiki'; such as 'Memory Capsule' [11] and 'Digital Storytelling' [21]. These projects indicate new frontier in interpretation while opening up possibilities of creating multi-vocal, shared and heterogeneous perspective of the past through active participation by end-users.
4.1. PRESENT LIMITATIONS

Present day’s digital heritage scholars and professionals are trying to enhance heritage interpretation through different approaches, such as (i) Hermeneutic environment through game-style interaction; (ii) Embodied interaction through somatic impulse or haptic devices; (iii) Multiple user virtual environment (MUVEs) with artificial agent and dynamic contents (e.g. 2nd life, virtual Forbidden City); and (iv) Greater immersion through augmented stereographic panoramas or immersive displays. However, some limitations are quite evident and they are hindering the process of achieving a comprehensive interpretation method for digital heritage which can be classified as follows –

(i) **Historic knowledge and subjectivity**: The knowledge of the ‘past’ is limited because it is always a selection of events and not ‘complete’. To paraphrase Lowenthal [22], every time we make a new statement about an artefact or an event, we make a new interpretation and then something new is born, different from the original. In that sense, the past is thus a cultural construction; it is more aesthetic, intuitive and subjective. Similarly, digital heritage cannot also avoid the charges of subjectivity as heritage objects are mostly reconstructed out of long-lost ruins. Again, media experts (e.g. modellers, animators or programmers) who remain involved in reconstruction processes may not be aware of the intrinsic cultural values of particular artefact or environment although having a myriad of technical know-how. This way, the ‘apparent’ cultural preservationists and their implemented methods may well reflect their personal ‘inappropriate’ assumptions that Kalay [23] referred as ‘image of practice’. A comprehensive
understanding and reconstruction of history is only possible when the interpretation framework will allow multiplicity. Perhaps a collective interpretation of the past may overcome this subjective and linear viewpoint.

(ii) **Linear process of content development:** According to Fitch [24], interpretation constitutes two levels: 'Professional' and 'Popular'. The first is carried out from available evidences (excavations, ruins, artefacts, documents etc.) as professionals (such as archaeologists, historians and architects) examine and verify for authenticity, and document them to feed interpretation for public. Public is only imparted information in second level, described as 'popular' level (Figure 2); where limited or no scope remains for 'first-hand experience'. From case studies (Table 2), it is evident that digital heritage projects followed the notion of archaeological interpretation (i.e. professionals interpret and visitors consume), even though digital media possesses capability of developing dynamic polysemic content by allowing active participation in content creation, development and dissemination.

(iii) **Missing the potentials of collective cultural memory:** The main objective of UNESCO’s [25] convention in Paris 2003 was to safeguard the intangible cultural heritage. Intangible cultural heritage such as oral traditions, knowledge and practice concerning nature and beliefs – transmits between generations and hence provide a sense of belonging, identity and community. Present digital heritage projects however, miss the potential of cultural transference and value placed on collective cultural memory; which could easily be supported by allowing a platform for dialogic interactivity and further capturing those to a knowledgebase. Undoubtedly, the locals or the natives value their heritage (tangible or intangible) differently while tend to show more concerns when compared with the reflections made by outside experts.

5. FUTURE PROTOTYPE DEVELOPMENT: A CONCEPTUAL MODEL

Present trends of interpreting digital heritage are linear (Figure 2), authoritative and rarely offer any possibility to contain or emerge multiple
meanings in a narrative level. As such, it is limiting the possibility of interpreting the inherent significance or intrinsic values of cultural heritage from multiple perspectives. We believe, ‘popular participation’ in the interpretation process as reflexive embodied interaction through dialogue and interaction (i.e. dialogic-interaction) may overcome this linearity and subjectiveness of past reconstruction, hence will enhance interpretation. Furthermore, dialogic-interaction can also promote social activities to evoke awareness on heritage conservation (Figure 3).

Referring to section 3, ‘interpretation’ should ensure three aspects i.e. (i) learning, (ii) provocation and (iii) satisfaction. As digital heritage has the potential of facilitating ‘dialogic-interaction’ and creating multiplicity in content, we suggest that the interpretation framework should also consider ‘multiple views of the past’ as another aspect. Therefore, to achieve a comprehensive interpretation of digital heritage, the process must consider four aspects i.e. (i) embodied interaction, (ii) cultural learning and (iii) an effective presentation (or communication) – within an environment that supports (iv) dialogic interaction among participants and experts to generate collective knowledge base through cultural disposition of common spatial experience (Figure 4).
(i) **Embodied interaction** : According to Dourish [26] embodiment is the property of our engagement with the world that allows us to make it meaningful while embodied interaction is the creation, manipulation and sharing of meaning through engaged interaction with artefacts. Embodiment plays a key role in designing interaction as user’s response to the environment, their engagement and understanding of space, and enjoyment depends on it. Similarly, to enhance interaction, digital heritage environments (2D or 3D) should encourage end-users to complete some tasks through level accomplishment (e.g. in Palenque Project) or online competition (e.g. bdheritage [27]). Allowing end-users to contribute or create and share content with others can enhance the interaction process and promote sense of ownership as well. After September 11, the Library of Congress, the Internet Archive, WebArchivist.org, the Pew Internet and American Life Project were able to save thousands of online media portrayals of that event – which have been perceived, understood and uploaded by general people [28]. Real-time feedback either from virtual environment (through tactile or haptic devices, e.g CREATE project), or by agents (e.g. in ‘The forbidden city’ virtual agents helps end-users to have guided tours and receive response of query) or from other participants (e.g. Memory capsule, bdheritage) may encourage engagement and deeper involvement. Therefore, an effective embodied interaction should –

- Promote active participation (in narrative level).
- Encourage task accomplishment.
- Ensure real-time feedback and practical action.

(ii) **Cultural learning** : In most cases, 3D environments are typically reproductions or reconstructions of archaeological sites or monuments. Therefore, it is important to understand how a digital object can express cultural values and how those values are perceived by the end-users. From cognitive science perspective, our learning occurs through a reticular way rather than in a linear pattern [29]. Referring to ‘ecological approach’, Bonini [30] describes ‘learning’ as a process that starts through perception and interpretation of the differences between the ecosystem and us. The feedback process simulates continuous and various levels of perceptive and cognitive interaction, as information transforms into knowledge. Hence, the interface should allow user to establish ‘some relationship’ with the context and at the same time should have the ‘feedback’ capability to satisfy viewers query. To ensure personal relationship with the context and getting feedback either from the environment or from other participants, Champion and Dave’s [31, 32] suggested cultural agency, personalization of artefacts and role-play as essential variables. To promote cultural learning from a digital heritage site, it is hence necessary to –

- Encourage end-users to collect information, artefacts, local knowledge (i.e. capturing image of artefacts or recording story of local belief and myth, e.g. The forbidden city)
• Encourage discovery of new information (i.e. asking question and answering to others in online forum, participation in online competition, e.g. bdheritage.info)

• Provoking to reveal symbolic meanings of artefacts and signs (through personal investigation e.g. Palenque project, or asking questions in the open forum e.g. bdheritage).

(iii) Effective presentation: Tilden [15] suggested a set of six principles for ‘effective or correctly directed’ interpretation practice. Later different heritage professionals and scholars including Richard Harrison [33], Beck and Cable [34], Gianna Moscardo [18] and Tim Copeland [35] proposed their own principles that are actually an elaboration and clarification of Tilden’s principles. These interpretation principles developed initially for archaeology may also work as a source for developing possible guidelines of presentation and communication for digital heritage, such as:

• Affordances and connection to visitors’ past experience (to make it more meaningful).

• Setting cognitive dissonance through challenges to explore (to encourage participants to explore and engage).

• Novelty, conflict and surprise in content presentation (to raise interest level).

• Easy orientation and navigation system (to allow participant to have more control over their experience).

• Variety in presentation (to support participant’s needs and interest, i.e. consumer-led) and

• Openness in adding or adopting new information (to enrich the content incrementally and having collective meaning from wider participation).

(iv) Dialogic- interaction: Dialogue is a quintessential hermeneutic event - a process where two people try to understand each other and both immerse in discussion [36]. In this perspective, interpretation is a dialogic process; the inquirer is involved in a reciprocity process of asking question and revealing answer at the same time from others. Allowing dialogue through the interpretation framework will influence active participants to get involved, explore deeper and having better understanding through shared experience or co-experience [37].

On the other hand, interaction relates to the base word ‘interact’, it refers to the process or situation where two or more entities have contact with each other. The definition of interaction differs according to the research domain and there is no agreed definition yet [38]. However, in order to establish more solid ground with reference to the nature of this study, the concept of interaction has been adapted from Pares and Pares [39]. According to these authors, any effective interaction should include:

(a) Exploration, i.e. freedom of exploring the digital content, (b) Manipulation, i.e. allowing users to manipulate digital objects or elements and (c) Contribution, i.e. allowing users to construct or contribute digital content.
Therefore allowing multiple users with diverse background (of social and ethnic identity) to contribute in the narrative level; pluralistic and multiple perspectives of historical views can be accommodated side by side. Meanwhile accepting these multiple voices (may be in the language of popular culture) and subsequently juxtaposing them in the narrative level; it is possible to overcome the present shortcomings of 'linear interpretation' and 'professional image'. Therefore, an effective dialogic interaction should –

- Promote dialogue between locals, participants and experts (i.e. to share information, ideas, stories and queries e.g. Memory Capsule).
- Encourage discourse (i.e. to allow long discussions and debate, i.e. ICOMOS ICP forum [40]).
- Maximize interaction (i.e. to allow participants to explore, manipulate and contribute, e.g. bdheritage).

**CONCLUSION**

This paper has set out to investigate the importance of end users’ perception of digital heritage and presented a theoretical basis for developing more collaborative digital heritage projects. It has argued that in order to minimize heritage dissonance and enhance understanding of inherent significance of cultural heritage, we need to consider ‘end-users’ as a multicultural phenomenon while presenting the past from various perspectives. That is to identify how heritage interpretation can be considered as a continuous process and at the same time how to ensure multiplicity in understanding the past.

This paper has pointed out some limitations of assuming a straightforward method for interpreting and transferring heritage knowledge from present practice. It argues that meaning making is a dynamic process. Meaning emerges while being contextualized, from some kind of reflection of being involved and through action. This paper hence suggests that past is culturally constructed, as well as should be reconstructed in a pluralistic manner. At this point, this paper proposes a conceptual model for interpreting digital heritage for future prototype development. The proposed model allows active participants in discursive content creation (through collective disposition of common spatial experience) and promotes **dialogic interaction** to leverage multiplicity in viewing the past cultural heritage. This way, our proposed model reconceptualises the role of end-users and speaks for a more comprehensive way of overcoming the present limitations in digital heritage interpretation.

**References**


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