
Article:
Felasari, S. and Peng, C. orcid.org/0000-0001-8199-0955 (2021) Collating a city's collective memory in co-production of an online urban design learning space. Interaction Design and Architecture(s) (49). pp. 84-96. ISSN: 1826-9745

https://doi.org/10.55612/s-5002-049-005

Collating a city's collective memory in co-production of an online urban design learning space

Sushardjanti Felasari[1], Chengzhi Peng[2]

[1] Department of Architecture, Universitas Atma Jaya Yogyakarta, Jl. Babarsari 44 Yogyakarta 55281, Indonesia
[2] Sheffield School of Architecture, The University of Sheffield, Arts Tower, Western Bank, Sheffield S10 2TN, United Kingdom
s.felasari@uajy.ac.id

Abstract. Drawing on a city and collective memory as a theoretical framework for exploring how collating such memory into a Web-based 3D virtual city could initiate and sustain co-production of an online urban design learning space. Co-working with students and design tutors at the Universitas Atma Jaya Yogyakarta, Indonesia, we conducted a "Yogyakarta Experiment" by constructing 3D virtual models of parts of central Yogyakarta as a virtual city platform for collating participants' personal memories of the city lives and places. The experiment shows that the learners' and tutors' relationships with the city communities and environments were mediated through participation in collating the city's collective memory into the 3D virtual city platform, resulting in the co-production of an online urban design learning space.

Keywords: city and collective memory, 3D virtual city, Yogyakarta, online urban design learning space, co-production.

1 Introduction

Learning in urban design can be characterised as a process through which the learner gains an understanding of how the forms and functions of public urban spaces/places are interrelated to the inhabitants' lived experiences. Thereby the learner may produce responses as design proposals for bettering the urban environment concerned. In urban design learning, therefore, an urban context is something that a learner needs to grapple with first. A more context-aware and sensitive design outcome is often thought of as resulting from investigating the social and architectural changes of buildings and places, connecting the memory of the past urban form to the current issues [1]. However, comprehensive historical studies and people's memory of a city are not always easily available and accessible to design thinking.

In this paper, drawing on city and collective memory as a guiding concept, we report our study of how digital representations of urban spaces of a real city and

instances of citizens' memories associated with the city can be assembled and linked to form a virtual social world in which urban design learning may take hold.

Focusing on a city's collective memory rather than on scholarly written city histories, we conducted a multi-staged experiment to explore how a 3D virtual city constructed with records of collective memory can affect urban design learning in a higher education setting. In this experiment, using SketchUp, Google Earth and Google Site as 3D modelling and digital asset organisational tools, a 3D virtual city was modelled for a selected area of the city centre of Yogyakarta, Indonesia. Co-working with students and urban design tutors at the Universitas Atma Jaya Yogyakarta, the design and implementation of the Web-based 3D virtual Yogyakarta was tested for collating memories of the city centre area contributed by participants.

We evaluated the pedagogical effects of the virtual city platform by reviewing the students' urban design proposals presented at the end of the course. The experiment shows that the students' active participation in collecting and sharing what and how the city is remembered via the virtual city platform has affected their learning outcomes in areas mostly associated with urban space qualities, places linkage and continuity with cultural heritage. The digital records collated represent not only images of buildings and places three-dimensionally but also the stories behind them; the virtual city as built and used became an online interface through which the process of collective remembering of the city was mediated in a bottom-up manner. In theorising our observation and reflecting on the current experiment, we propose a model of co-production of an online urban design learning space.

In the following sections, we first review the recent concepts and discourses of city and collective memory in Section 2 and explore a conceptual framework for how two categories of digital representations of a real city might be linked in Section 3: (a) interactive virtual models representing the 3D physical form of the city, and (b) multimedia pieces representing records of the city's collective memory contributed by individuals or groups. Section 4 presents our design and implementation of a Google Earth enabled virtual city platform focusing on Malioboro Street, a historical street at the centre of Yogyakarta city in Indonesia. We report in Section 5 the application and evaluation of the Yogyakarta platform as an online urban design learning space for the urban design course at the Department of Architecture, Atma Jaya Yogyakarta University. Finally, conclusions of the Yogyakarta experiment and implications for further studies are discussed in Section 6.

2 City and collective memory

The concept of collective memory was first introduced in the 1920s by Maurice Halbwachs, a French philosopher and sociologist. Halbwachs defined collective memory not as a socially constructed idea about the past, but rather as a socially shared notion, a way that a group conceptualised the past while in the present [2]. His thesis is that all memory is socially constructed through spatial imagery. Since then, various authors from different disciplines have proposed theories on the conjunction between space and memory. Pierre Nora, for instance, called the re-collective remembrance occurring in the 19th century as a 'modern memory' and that 'modern

memory' relies entirely on the materiality of the trace, the immediacy of the recording, and the visibility of the image [3]. In his study of the Galata Bridge in Istanbul, Turkey, Umut Sumnu presents a case of how our memory tries to find meanings in a material context, and that the material sites are valued and experienced as entities that visualize our memories in the present [4].

Although the term collective memory was not explicitly used in his seminal study of The Image of the City, Kevin Lynch pioneered the method of collating images hand-drawn by people from their memory to reveal any shared or public images of a city [5]. In his treatise on the roles of collective memory in architecture and cities, Aldo Rossi explains that the city is the locus of the collective memory of its people and the city's predominant image can be depicted from the relationship between the locus and the citizenry, flowing through history and giving shape to it [6]. Christine Boyer describes collective memory and city as the way urban public compose their images of their city as work of art, panorama, and spectacle; the connection between collective memory, history and urban spaces has been changed by worldwide uses of digital media in creating virtual environments [7].

Drawing on the above and other authors' discourses, we hypothesise that urban design learning can take place by designers' accessing a city's collective memory as linkages to the social, cultural, environmental, and physical dimensions of urban spaces in the past, present and future. Such linkages are conducive to urban design thinking for place-making. We propose that appropriate digital media and processes can be developed around the idea of a virtual city for collating a city's collective memory as the core elements of an urban design learning space. In this approach, an urban design learning process can be initiated with remembering, sustained through continuous production of representational or denotational content, and progressed onto making design proposals. In the next section, we describe our current approach to building a virtual city for collating the city's collective memory.

3 Virtual cities for collating a city's collective memory

Three-dimensional (3D) virtual city models have been built previously in studies of historical urban environments such as the Heusden Study [8] and the Sheffield Urban Study [9]. Bringing forth the concept of city and collective memory to the construction of a 3D virtual city, we consider several propositions below.

- Collective memory is not the summation of memory from personal recollections of its various individual members but the entirety of those that are commonly shared by all of them and collectively commemorated [10][11]

- Digital collective memory is created and sustained through the continuous production of information such as text, graphic, image, film and audio, multimedia computers and the Internet by selecting, organizing, storing, and retrieving wherein particular events are emphasized [12][10][13].

- Web-based archives could contribute to the formation of collective memory by providing dialogues and interactions through which meaning emerged [14].

- As the past is frequently used as the mirror in which explanation and remedy to our present-day problems are searched, the content of collective memory could be seen as solutions to problems in daily life [15].

We began with a simple idea that initial instances of some persons' memory associated with a particular segment of a city could be gathered into a 'collective memory bank' as 'seeds' to grow further contextual and historical information contributed by others. In representing the collective memory of buildings or places digitally, virtual 3D models were hyperlinked to these memory instances and other historical resources found from other web-based resources. Through a Collective memoRy EnhAnced virTual cIty (CREATI) built as an interactive website, users can add and share the content to and from the collective memory repository (Fig. 1).

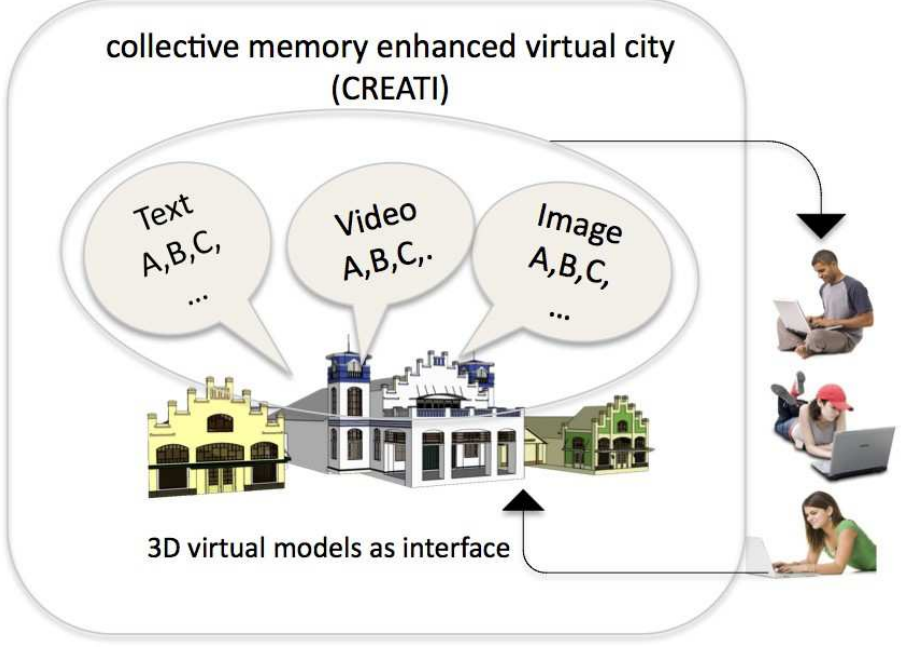

Fig. 1. Virtual city as repository for a city's collective memory

In representing the collective memory of buildings or places digitally, 3D models of a virtual city become an interface through which the process of remembering can be mediated. Through a dedicated website, registered users could add and share the digital memory record of the history and story of buildings and places of a city using 3D virtual models as an interface. By selecting, organizing, storing, and retrieving the

record's content through the website as well as having dialogue and interactions, the collective memory could be formed (Fig. 2).

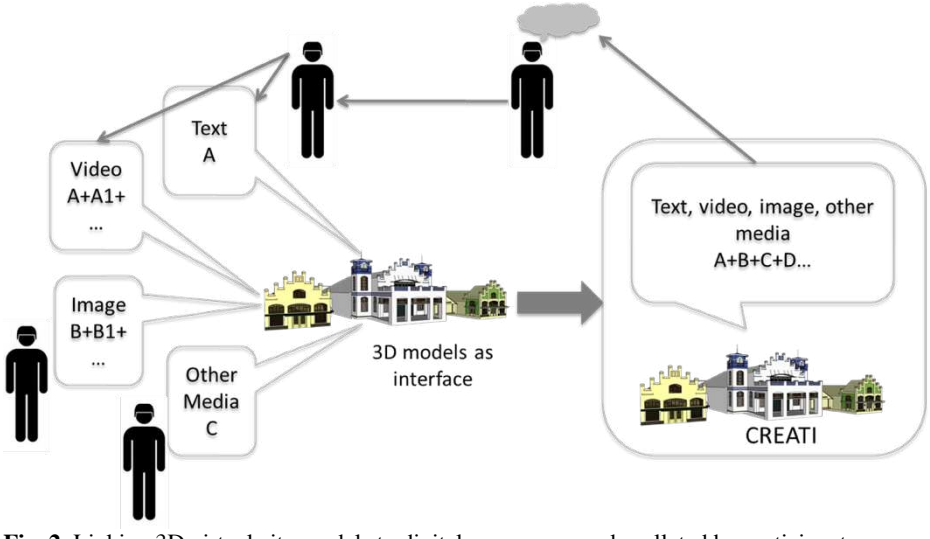

Fig. 2. Linking 3D virtual city models to digital memory records collated by participants

In relating to supporting learning, the CREATI site has become a single point entry through which learners may access urban design learning information as well as the 3D models. The 3D models of virtual city embedded with collective memory can be displayed in a 3D virtual world and enable users to have richer experiences such as they obtain historical information from people's memory while they are experiencing the virtual space i.e., by walking through or flying around.

4 The Yogyakarta Experiment

To develop a virtual city enhanced with collective memory, we have been experimenting with a Google site as an implementation tool. Our site is designed to support urban design learning in mind. According to Boeykens and Neuckermans [16], a virtual learning environment has the characteristics of both content and learning management. In terms of urban design learning, it may incorporate interactive 3D virtual worlds [17]. We envisaged a collective memory enhanced virtual city as an experimental virtual learning environment through which students can access 3D models of a virtual city linked with records of collective memory and urban design learning resources. Applying the CREATI concept, we chose Jalan Malioboro (Malioboro Street), a historical street at the centre of Yogyakarta city in Indonesia, as the start-up site for building collective memory enhanced Virtual Yogyakarta.

As one of the celebrated historical areas, Jalan Malioboro cannot be separated from the memory of Yogyakarta. Among the many places in Yogyakarta, Malioboro is found to be the most memorable for visitors to Yogyakarta compared with any other historical sites, such as The Sultan's Palace and its Public Square, Parangtritis Beach, Kaliurang Landscape, and the Gadjah Mada University. Jalan Malioboro's central location and proximity to historical buildings as well as its commercial shopping arcades and the attractive ambience brought by its street performance arts and cultural activities explain why it is very popular and memorable. In Virtual Yogyakarta, about 1.2 km of the Malioboro Street with buildings and places along the side have been digitally modelled and hosted in a website. The 3D models required the students to have the Google Earth installed in their computers so that they can be displayed. In generating a collection of memory records, we used the 'placemarks' menu of the Google Earth to write or to link the information to the 3D models and save them as kmz files (Fig. 3).

(a) (b)

Fig. 3. An example of memory records in video format (a) and image format (b) associated with a particular building were displayed using Google Earth

The 'placemarks' have coordinates embedded (latitude, longitude, and altitude) so as a memory record will visually appear at a specific location inside the 3D Google Earth model. Nevertheless, the 'placemarks' have limitations such as they cannot be associated with a large area/region such as a building complex, street, or a district in a clear meaningful way. We organized the structure of the collective memory repository into different formats (image, text, video, and audio). In each format, we divided the memory records into several sections based on the locations of buildings and places in the urban context. At present, this structure of the repository is specific to the Jalan Malioboro site and may not apply to other locations in Yogyakarta or other cities.

We conducted a pilot experiment in a real educational setting at university level to evaluate the effectiveness of Virtual Yogyakarta in supporting urban design learning. There were around 30 students grouped into four small groups to take part in the experiment. As a part of urban design assignment, students were given an urban design project in which it consists of both a group task and an individual task. In the experiment, Jalan Malioboro was used as the project site and was divided into 4 sections. Each group had to choose one specific site in the street section where they were asked to submit a design proposal. The proposal should be carefully designed

based on the existing condition without losing the historical context. Each member will collaborate to author memory records related to buildings and places on that site in any format. As part of course's assignments, students were asked individually to write such memory records related to buildings and places in that street in any format using 3D model as an interface and to upload into the CREATI website (Fig. 4).

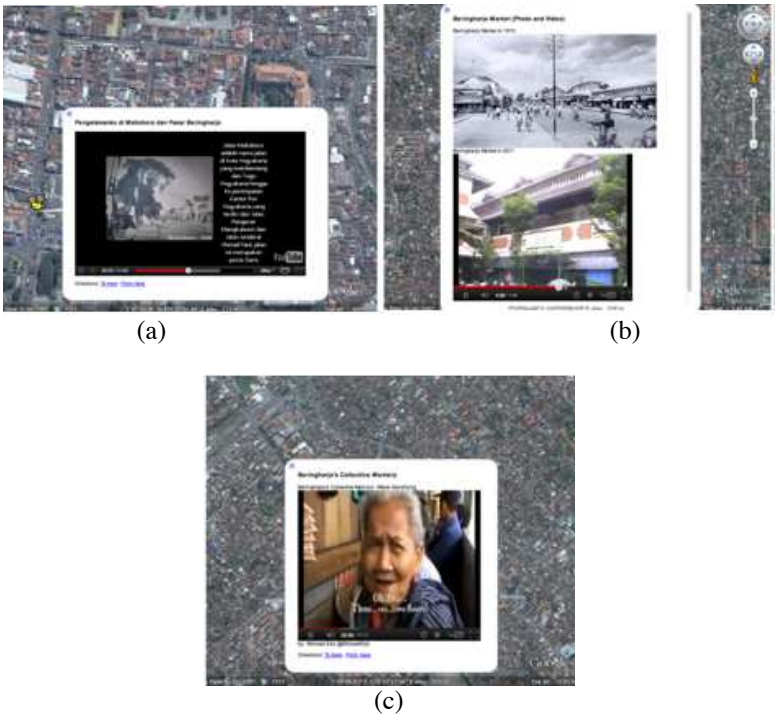

Fig. 4. Examples of collective memory records collated by students individually in (a) text and video format, (b) image format, and (c) video format

The memory records could associate with buildings or places in a particular site along Malioboro Street. Students can participate to write memory records by adding more content to the initial example of memory record already available in the repository or they can create a completely new first-hand memory records by investigating information from primary sources such as records of someone's experiences in the past or findings on the information from the field like direct interviews with informants they meet in the site. Each student doesn't necessary write memory record only related to the buildings and places in their project site, but they can do it for other sites along the street. It is expected that the memory records from the students are complementary. Therefore, in doing so, students need to aware of any repetition of the content uploaded (Fig. 5). As a group project, students were also required to submit a joint design proposal for a particular site using any information they have gathered either from the Virtual Yogyakarta repository or from the field

study. Proposed design concept should be based on the analysis of findings, which should be based on theories of urban spaces as written in the assignment.

During the presentation of design progress, the tutor gave feedback such as emphasizing the strength and weaknesses of each group in terms of analysis and how students could relate it to urban design theory. The tutor also emphasized the role of collective memory in the analysis stage by pointing out an example of the students' task.

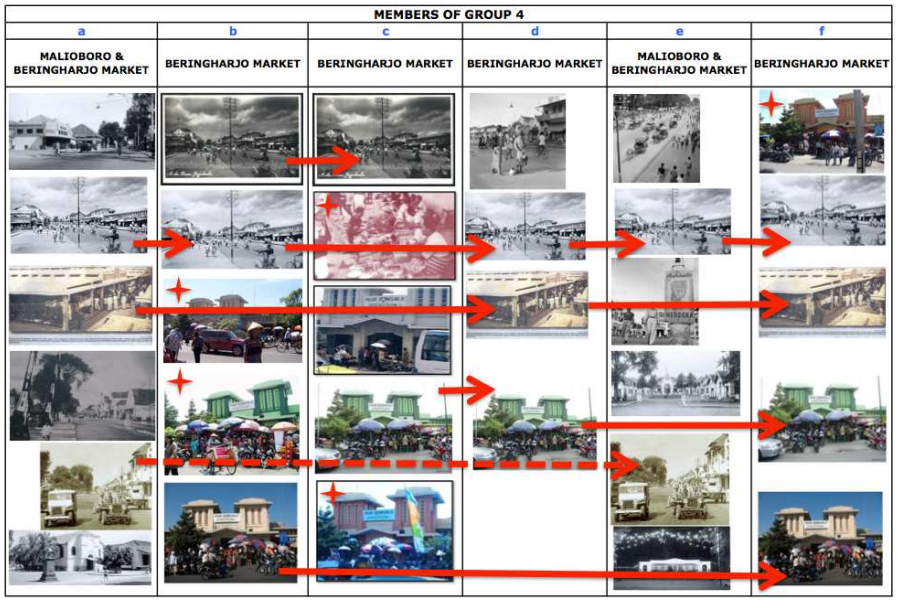

Fig. 5. Photos used by members of a particular group in their memory records. Several photos were used several times by students to narrate the story of buildings and places

5 Results and evaluation

In evaluating how the collective memory enhanced Virtual Yogyakarta could have supported urban design learning, we analysed the content of collective memory records and the content of group project reports. The potential correlation between students' accessing and using collective memory records and the qualities of urban spaces achieved in the students' design proposal were investigated using a qualitative software tool. Using NVivo's matrix-coding query, we examined and compared the content by coding and classifying it into 15 parameters borrowed from Gordon Cullen's book on Townscape [18] and Raymond J. Curran's work on Urban Experience [19]. We found the results interesting showing that the content of collective memory records students collated into the virtual city repository appeared significantly in their group design reports. The number of contents appeared variedly

between the groups, but the experiment shows what the past (in terms of urban space quality) is most remembered in a particular period.

Table 1. Number of records in the content of collective memory (CM) and design proposal (DP) report.

	Number of Records										
	Group 1		Group 2		Group 3		Group 4		Total		
	CM	DP	CM	DP	CM	DP	CM	DP	CM	DP	CM+DP
Texture	0	1	0	0	0	0	4	3	4	4	8
Scale and Proportion	1	1	0	0	2	0	2	0	5	1	6
Colour	2	3	0	0	0	0	1	1	3	4	7
Architectural Styles	1	2	1	0	3	0	4	0	9	2	11
Places Linkage and Continuity with Historical Tradition	2	0	0	0	5	3	3	0	10	3	13
Places Linkage and Continuity with Cultural Tradition	0	2	0	0	3	2	5	1	8	5	13
Optical Viewpoint or Serial Vision	0	0	0	0	0	0	1	0	1	0	1
Interrelatedness among Urban Elements	1	2	1	0	2	0	4	0	8	2	10
Ground Treatment and Furnishing	0	2	0	4	0	10	0	4	0	20	20
Form and Content Relationship in Individual Building	0	1	0	0	0	0	2	0	2	1	3
Facades and Surfaces	0	1	1	0	0	0	5	0	6	1	7
Expressive Quality of Spatial Form	0	3	1	4	1	1	0	8	2	16	18
Expressive Quality of Building Relationship	2	1	0	0	0	0	2	2	4	3	7
Exposure and Enclosure	0	0	0	0	0	0	0	0	0	0	0
City or Urban Images	1	0	1	1	3	5	4	0	9	6	15
Building Skyline and Visual Continuity	0	2	0	0	0	0	0	0	0	2	2
	10	21	5	9	19	21	37	19	71	70	141

Table 1 shows that in terms of urban space qualities, places linkage and continuity with historical tradition seems to be the most memory records written by the students (10 records) of collective memory (CM) followed by architectural style and city or urban images (9 records), places linkage and continuity with cultural tradition and interrelatedness among urban elements (8 records).

Using a frequency word inquiry, we also investigated the content records from both students' individual task and the group's design proposal to find what kind of focus topic or idea the students have discussed. Initially, we explored the frequency word used by each group in their design proposal as the group worked at the different sites. We mapped these findings and found that a word can be proposed either only in a particular group/site, simultaneously used by two or three groups or used by all groups. Frequency words such as building, street, Malioboro, parking area and

pedestrian are the primary words used by all group, of which the three former words are founded in the collective memory records too. Using the frequency words, historical contextual issues might be able to be triggered either in a specific site or in a wider location.

From our observations of the final outcome, the content of collective memory had a significant influence on the quality of design proposals. The design group that achieved the highest average mark in the end was the group that produced the highest number of collective memory records. It could be said that the more collective memory collated and accessed, the more students become knowledgeable about the contextual issues in the city. From the design tutor's comments and feedback, collective memory was found especially beneficial to students at the analysis stage as students compared the past and existing conditions, so it could have helped students to project what the next development might look like.

We may thus infer that the information the students attained from the collective memory collated have contributed to the development of a design proposal. This information or knowledge helps students at the analysis stage by which students can compare the past and existing conditions to grapple with the contextual issues and to move to the stage of solution-finding and forming. An example can be seen in Figure 6 where students used photos from the collective memory repository as design references for developing their design proposals (Fig.6).

Fig. 6. Examples of photos retrieved from collective memory repository and snap shots of the design proposal by Group 1

Narration from the content of collective memory: "…until now the shape of the train station building is still retained its authenticity. However, there is little change in the use of colours for the buildings…" (collective memory record - left side of Figure 6)

In the design proposal students wrote: "…one of the attractions is the use of the orange colours which shows continuity with the train station…" (Design proposal – right side of Figure 6)

In response to the individual task, the acts of adding and sharing students' memory records have in effect created a social world mediating remembering and interpretation. Students engaged in group production of comments and feedback to the content of memory records uploaded. From the collective memory records, we found that image is the most favourite format used by the participants. Some photos associated with particular buildings and places are used several times by students not only from the same group but also from different project groups.

6 Conclusions and pointers to further research and development

In this study, enhancing a virtual city with collective memory was taken as an experimental approach to developing an online learning space for urban design learning. Through the content of collective memory embedded into the 3D models as well as through the information presented on the Virtual Yogyakarta website, students came into contact with new concepts. Collective memory enhanced virtual city facilitates students to explore the contextual issues actively and engage more with the urban spaces and experiences of others by further contributing to the content online. Collective memory enhanced virtual city provides a broader historical information base in various formats such as texts, image, video, audio, etc.

Here we saw a pattern of co-production in the resultant digital collective memory content in Virtual Yogyakarta. It aids collaborative and participative learning that encourages dialogue and discussion both synchronously and asynchronously. The growth of collective memory can be continued into future semesters partaken by new student and tutor participants. Stories of buildings and places are continuously co-produced in text, graphic, image, audio, film, and other digital formats along with 3D virtual city models; and by selecting, organizing, storing, and retrieving wherein particular events are emphasized could also generate, maintain, and reproduce collective memory [12][10][13]. However, there are several areas not fully covered in this study that need further research and development.

6.1 The structure of collective memory repository

The current structure of the collective memory repository bank needs to be developed further in a wider and more complex area or region. In this study the organizing of the collective memory bank is only applicable to the study site (i.e., Malioboro Street) as it is structured based on the format of the records and the location of building or places represented in the 3D models. It is conceivably difficult to place the content of collective memory points/refers to building/places outside the study site as well as to place the content that refers to wider complex area. This study considers that combining a collective memory repository based on the building typology or building occupancy category and 'text/image tagging' system could be introduced as distinctive information organisation device for the next research to present content of collective memory that related to more complex area or region. The tagging system might ease to search an overlapping content of collective memory.

In the Yogyakarta Experiment, the original example of a collective memory bank is designed separately from the collective memory submitted by participants. Although students can check the updated collective memory submission in the 'recent site activity' page, they still need to open the content of collective in a different application program before knowing what content has been written and what has not. This mechanism is not effective and time-consuming. As a result, the collective memory submitted by students is sometimes overlapping with the content on the sample page. It could be helpful to provide a 'comment system' interlinked with 3D models, which enable memories could be directly posted and be seen by other users.

6.2 The graphical interfaces for design references

During the experiment, students have expressed a preference to seeing the list of 3D model files in images/icons instead of texts. This will help students to have clearer ideas of what kind of model they will download before displaying the 3D models on the other software. Similarly, in terms of the collective memory folder, presenting images/photographs of the objects in thumbnails will enable students to overview the content before downloading. As architecture and urban design students deal a lot with visual information during their learning process, more advanced features with better graphical interfaces are required to support students' communication and interaction while generating urban design proposals. The use of reference is important in communicating a design through which the design process can be explained and reflected upon so, as to avoid a black-box process. In this regard, the availability of a webpage displaying all photos and pictures related to the study site will benefit tutors and students to see the emergence of an urban design learning process.

6.3 Application of Virtual Yogyakarta to other design learning programmes

In this study, only a small area of a city was modelled as a study site (i.e., Malioboro Street instead of the whole city of Yogyakarta). However, the complex issues that occur in the site open the possibility to use it as a virtual learning platform for other design learning programmes such as architecture studio from a simple task to more advanced ones. The accessibility of the 3D models of buildings or places from a single source/platform enables design tutors to choose and determine the level of complexity of the design task suitable for students learning from a single building site to a building complex site.

Acknowledgments. The first author would like to thank Universitas Atma Jaya Yogyakarta, Indonesia for their support in conducting the research.

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