

## PERFORMING VISUAL INTERPRETATION AND ANALYSIS IN VIRTUAL SERIAL VISION (VSV) USINGSATELLITE IMAGERY AS NAVIGATION TOOLS

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**Highlights:** This study aims to improve students' learning experience by integrating satellite imagery as navigation tools in the Urban Planning Theory module using satellite imagery. This module guided by the Design Thinking Theory, the visual interpretation and analysis are based on the five-structure set which is empathise, define, ideate, prototype and test. The result shown the significant increase after students applied the navigation technique in performing visual interpretation and analysis. Although this module focused on the design course, insights from this research may be relevant to many teaching practices and pedagogical approach in higher education and professional practitioner to support urban visualisation and design.

**Key words:** *Virtual Navigation, Virtual Serial Vision, Online Learning, Design Thinking Theory*

### Introduction

For the past several years, the delivery of serial vision is mainly using traditional methods based on 'The Concise Townscape' (Cullen, 1971). He presented elements of townscape as an 'Environment Game' through the concerning optic (Serial Vision), concerning place (Here and There) and concerning content (This and That). This study explores the connection between serial vision and virtual navigation, leading to better urban visualisation and design. In the Sheffield Urban Contextual Databank (SUCod) project, Peng, Chang, Blundell and Lawson (2002) and Peng (2003) developed a Web-based virtual city platform to produce a new kind of virtual city application that allows end-users to reconstruct urban contexts online. Asanowicz (2011) integrates digital technology with urban composition teaching in serial vision. Recently, with the digital era taking over, it is important to include digital and online tools into the Urban Planning Theory (UPT) module. Students rely on smart devices and internet more than on conventional learning methods. Hence, the application of virtual navigation tools has been introduced in Serial Vision project to continue with this trend to better understand students and their needs. This paper urges for an integration of virtual navigation developed from the work of Gordon Cullen. Therefore, this paper aims to enhance the student's learning experience by integrating virtual navigation tool in visual interpretation and urban analysis using satellite imagery.

### Advantages of the Virtual Navigation Tool in Performing Visual Interpretation and Analysis

A simple survey was disseminated on 47 students that were completed the UPT module to assess the usefulness and applicability of virtual navigation tools used in Virtual Serial Vision (VSV) project. This can also help in providing on the advantages of the UPT module. As illustrated in Table 1, there were seven (7) items using 5-point Likert scale (strongly disagree, disagree, neutral, agree and strongly agree). Overall, almost all students (87.2%) agreed that the UPT module provided several advantages than the conventional approach especially with the application of virtual navigation to present an illustration in VSV project. The application of virtual navigation tools that have been used make more than half of the respondents improved better understanding of course and project respectively (74.4% and 80.9%). The results of the simulation indicate that about 76.6% from the respondents generally agreed that the VSV project improved learning experience when it involves the usage of the virtual navigation such as Google Earth, Google Map and Google Street View as the learning tools. The UPT module inspired students to be resourceful in innovative learning with technology. With the virtual navigation tool, students thrive in hands-on learning environment and had improved drawing and design visualisation (74.9%). Furthermore, the result can be defined as considerably high especially on the time efficiency and speed since students may not have to continuously doing the virtual navigation unlike conventional serial vision, the self-navigation can be pause when needed which get around 72.4%. The virtual navigation allows students to be self-directed and flexible to work within their timeline and location without the need to travel. The fun elements that appear while using the virtual navigation is that it can increase students' learning motivation (72.4%) especially in online learning and improved students' ability to foster spatial thinking through Satellite Imagery. Solem and Gersmehl (2005) have demonstrated that online resources have helped improve student comprehension of significant concepts and skills while helping students gain confidence in their knowledge of geographical issues. Monet and Greene (2012) also support the use of Google Earth and Satellite Imagery to foster place-based teaching due to the students' difficulties in interpreting the geologic processes that shape the local and regional natural environment characteristics.

Table 1: Results on usefulness and applicability of virtual navigation in Urban Planning Theory module

Item	Scale				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Effective to present an illustration	0% (0)	0% (0)	12.8% (6)	46.8% (22)	40.4% (19)
Enhanced better understanding of course	6.4% (3)	6.4% (3)	12.8% (6)	55.3% (26)	19.1% (9)
Improved understanding of project	6.4% (3)	4.3% (2)	8.5% (4)	66.0% (31)	14.9% (7)
Improved learning experience	6.4% (3)	6.4% (3)	10.6% (5)	53.2% (25)	23.4% (11)
Improved drawing and design visualisation	8.5% (4)	4.3% (2)	12.8% (6)	60.0% (28)	14.9% (7)
Improved time efficiency and speed	10.6% (5)	2.3% (1)	14.9% (7)	49.0% (23)	23.4% (11)
Increased learning motivation	8.5% (4)	6.4% (3)	12.8% (6)	51.1% (24)	21.3% (10)

### The Design Thinking Theory of the Urban Planning Theory Module in Virtual Serial Vision Project

The design process of innovation in UPT module based on VSV project encompasses five stages of Design Thinking Theory: Empathise, Define, Ideate, Prototype and Test. The first stage of the Design Thinking process was to understand the students' perspective by identifying and addressing the problem. For example, not all the group members live in the same case study compound. Hence, some cannot participate in going to the site and cannot produce manual sketches of serial vision. The second stage was to define the problem statement clearly. The brainstorming session was conducted in the meeting of the project brief attended by lecturers in the Landscape Architecture Department. Brainstorming members brought different approaches to comprehend problems and yet provide various ideas of consideration. Next, the ideation stage was composed of two steps which were idea generation and concept development. Researchers used the KJ method for idea generation. The output from the KJ method was used as a starting point for the concept development step involved the clustering, combining, and selecting of the ideas generated and then further developed the selected ones. During the prototype phase, 47 students from 10 groups were engaged in the VSV project using the Satellite Imagery as a navigation tool. The implementation of the UPT module will be upgraded based on the current advancement of technology and the users' feedback throughout the testing phase. In the testing phase, the UPT module was built based on three pillars: assumptions using a storyboard as a planning tool, prototyping where the critique session happens with the lecturer to control the potential impact of the experiment, and running the experiments through recorded video.

### Commercial Value of the Virtual Navigation Tool in Urban Planning Theory Module

The UPT module reveals the prospects of virtual navigation as an enhancement tool in urban analysis and design process. The targeted groups for UPT module are Landscape Architecture and Urban Design undergraduate students. Although focused on the design courses, insights from this research may be relevant to many teaching practices and pedagogical approaches in higher education. Most importantly, it is also can be employed by the professional Landscape Architect or Urban Designers who are really interested to use virtual navigation for urban visualisation and design. Thus, UPT module has a very high potential to be employed especially by other higher learning institutions and landscape architectural firm based on the collaborated experts' recognition that VSV project received from institutions and industry.

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