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Towards Safe Cities & Resilient Communities

13 & 14 SEPTEMBER 2018
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PLANTING COMPOSITION FOR VISUAL QUALITY OF GREEN CAMPUS ENVIRONMENT

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Abstract - Campus landscape is an everyday life experience for students. But, do students perceive the landscape in every space within the campus? Proximity and access to green spaces on campus are related to how they perceive the campus environment. The aim of this study was to understand the assessment of planting composition pattern through objectivist and subjectivist paradigm which is useful for campus landscape development. Planting design as critical component contributes to the overall design concept and objectives, and this is achieved by spatial design and by the themes employed in detailed planting composition in the campus as well as shaping the outdoor campus spaces. However, planting composition is rarely issued in landscape assessment study. The landscape visual quality assessment is significant to achieve the aim in order to gain the appropriate pattern or layout of planting that is most preferable by students. The evaluation of this quality can be both objectively (physical) and subjectively (psychology). Both these paradigms can guide the researcher to identify the existing pattern and preferred planting design that is able to satisfy the students' needs. Physical factors of plants only help in identifying the pattern and visual properties but, the psychological factors can open to different possibilities of results in landscape quality assessment. Therefore, the recognition of the relationship between planting composition and students' preferences should be established as to bring a new model of green campus environment at the university.

Keywords - Campus landscape, planting design, planting composition, students' preferences, visual quality

1 INTRODUCTION

In recent years, many universities around the world have attempted to transform their campuses to make them greener (Tiyarattanachai & Hollman, 2016). Green is used to define sustainability, energy saving, comfortable living, and many others. Nowadays, many developments such as commercial building and housing scheme have considered green infrastructures as environmental factor to market their product (Nazir et al., 2015), including universities (Tiyarattanachai & Hollman, 2016). The exploitation of landscape to promote the universities have long been practiced (Yahres & Knight, 1997). The promotion such as exposing students studying under the widespread canopy trees or socialising on green lawns on campus can be seen on universities websites. Indeed, these planting attributes have positively supported the image of the university (Speake et al., 2013). Furthermore, landscape has obviously become valuable resource for visual aesthetic quality in environment (Kalivoda et al., 2014). This situation substantiates that campus landscape or explicitly planting design can influence the students to enrol in the universities.

In the context of this study, the green campus is referred to the appearance of plants coverage in the outdoor campus environment which is related to landscape planting design around the campus. In planting design, one of a fundamental parts is composition. Planting composition entails devising a concept in the abstract and combining this abstraction with the environmental demands of the site to produce a beautiful, functional and appropriate space (Leszczynski, 1999). In a simple explanation, planting composition is an art of creative combinations and arrange plants according to a specific

site. Planting composition consists of shrubs, trees and groundcovers and definitely is important in reviving the condition of the surrounding environment (Othman et. al, 2015). Planting composition has elements and principles that should be followed in the landscape design (Leszczynski, 1999), which are necessary to be determined at the early stage of landscape design. According to Robinson (2004), the primary objective of planting design is to meet user's requirements and provide visual pleasure by increasing functional and aesthetic qualities of the landscape. It also can transform the grey space before making it greener space by injecting it with intelligent planting composition (Robinson, 2004).

The character and purpose of planting design are as varied as human use of the land (Robinson, 2004). As context of this study, the campus has distinctive character and purpose that should be considered before designing the outdoor spaces with plants. Most of the previous researchers stated that plants are regard as the most critical component which influence viewer's perception of distinct types of landscape (Kaplan, 1981; Ulrich, 1981). Plants traits can give some clues to visual preferences (Kendal et al., 2012). Therefore, planting design practices can make a real difference in landscape aesthetic when visual properties and basic design principles are well accomplished (Yilmaz et al., 2018). Concurrently, the image of campus will demonstrate differently and will motivate students more (Cheang et al., 2017) with a sense of belonging to their spaces (Rumao, 2016).

2 CAMPUS LANDSCAPE

From past history, the design of campus was predominantly about architecture and structures and less focus on landscapes (Rumao, 2016; Hanan, 2013). Nevertheless, campus designers' perspective on campus design has changed over time and argue that nowadays students often choose an institution based on their impression and perception of a campus (Rumao, 2016). Campus landscaping is becoming the new public face of universities (Rumao, 2016). On that note, the quality of campus landscape still is an issue towards enhancing the quality of campus life.

A "green campus" has sustainability policies in promoting the construction of green buildings and greening facilities. The green design such as liveable green street networks constitute planting that is available at footpath locations such as trees, planting trees in unused spaces, replacing pavement with trees and planted landscapes, and promoting the use of green roofs on campus buildings; these are some of the ideas in developing green campus (Srivanit and Hokao, 2013). The studies by most scholars proved that landscape on campus could improve not only the outdoor environments but also improve the university community's well-being (Matsuoka, 2008; McFarland et al., 2008; 2010; Speake et al., 2013; Liprini, 2014; Hipp et al., 2015; Cheang et al., 2017). A campus with minimal landscape is incomplete, inchoate, and incapacitated (Dober, 2000).

In conjunction with the situation, a lot of benefits of landscape provided in the campus are diversely discussed by scholars. For example, the landscape could encourage students to spend time and socialise on campus (Hajrasouliha, 2017). Psychologically, plants also could reduce students' mental fatigue level (Hajrasouliha, 2017; Wee, 2017; Li & Sullivan, 2016), which reflect positive response (Han, 2010), and increase students' performance (Matsuoka, 2008). Thus, the landscape indeed becomes a major influence on the visual quality (Benfield et. al, 2015), and strengthen the image and substance of higher education venues (Dober, 2000). Recently, most of the study on campus have included landscape as a significant component and should not be neglected in campus development. In fact, many universities around the world have attempted to invest in green campus initiative (Tiyarattanachai and Hollmann, 2016) by taking part in the competition and green status such as Universiti Indonesia (UI) GreenMetric World University Ranking for a better quality of life of universities' community.

The landscape on campus is the everyday experience to students (Speake et al., 2013; Zhang, 2006). Therefore, the assessment of their surrounding is necessary towards satisfaction and well-being on campus. Landscape preference, one approach to landscape assessment, is an evaluation of how people perceive the surrounding environment and which preferred landscape is that people have

in mind (Zhang, 2006, Mirza, 2015). The specific landscape preference will influence the students' behaviour (Wee, 2017; Mirza, 2015; Wilkins & Huisman, 2013; Shuhana et al., 2012; Zhang, 2006). Therefore, currently the preferences study on campus landscape by students is among the customary practice for university's enhancement. Moreover, Akpınar (2016) have proposed the importance to study students' perception and preferences for certain qualities and features of green space in campuses. He mentioned that the landscape in campuses should not only consider green or aesthetic rather it should also puts emphasis on the benefits of restoration and healthy living in campuses.

3 PLANTING COMPOSITION

Green space is a significant component of the campus design that adds value to the campus experience aesthetically, educationally, and environmentally (Karimian et al., 2017). It includes landscaped natural areas which composed of trees and vegetation (Karimian et al., 2017). Compared to other variables in landscape research, plants are regarded as a particularly powerful factor in perceived landscape aesthetic and the relationship between plants and visual quality (Ulrich, 1986). Most of the scholars stated that vegetation often serves as a method of beautification and as a visual attribute with their traits like form, texture, colour and scale of plants (Yilmaz et al., 2018, Polat & Akay, 2015). At many scales, design with plants in a landscape is intelligently determined by some criteria and by a set of objectives that define success (Yilmaz et al., 2018). Therefore, each campus must design carefully the landscape with plants because it has a strong association with function, ecology, and aesthetic qualities (Robinson, 2004).

In planting design, the primary objective is to meet user requirements and provide visual pleasure by increasing functional and aesthetic qualities of the landscape (Robinson, 2004). Robinson (2004) added plants offer enjoyable sensory experiences and create opportunities for art and design. Visual pleasure, derived from landscapes of high aesthetic quality and scenic beauty, directly affects perceptions, preferences, and uses (Daniel, 2001). Therefore, high quality of campus landscape will have a meaningful relationship with the positive responses such as happiness, excitement and energy (Han, 2010). Designing of a high-quality landscape also deals with principal disciplines with plant as a primary medium for defining space within the scene. This principle can explain how component of plants can be used in the design to create particular qualities (Leszczynski, 1999). Therefore, understanding the visual attributes of plants that are presented through colour, form, and texture is very important as to search their effects on people through aesthetic pleasure and to articulate these effects in planting design principles (Yilmaz et al., 2018). Even though there are various principles of planting design, Robinson (2004) has highlighted in his planting design handbook, there are five principles mostly employed to evaluate and determine the effects of the visual quality of certain planting composition in landscape spaces. There are harmony and contrast; balance, emphasis, sequence and scale.

These principles should be considered in conjunction with the available spaces especially in campus. The principles and objectives that landscape designers and planners have been applying for the last several hundred years did support the implication that coherence and complexity are integral in creating landscapes that people like (Kuper, 2017). According to Kaplan's Information Processing Model (1979), the four predictors of preferences; coherence, complexity, legibility and mystery were identified as preference matrix. Kaplan's (1987) research found that coherence and complexity were the essential preference predictors than others. However, the predictors evolve when dealing with the different setting from natural to human-made or urban to a rural environment. In this situation, campus may have different setting that possibly found different predictors.

In planting design, unity and diversity are fundamental to all design and all expression (Robinson, 2004). Unity, like the informational concept of coherence, creates aesthetic harmony, balances the composition that binds various parts into a whole; links or emphasises elements; and forms an ordered sequence of spaces and planting (Robinson, 2004), while, diversity like informational concept of complexity that can be achieved with a range of plant species and cultivars (Robinson, 2004). Additionally, legibility was found to be an ineffective predictor of the

environmental preference primarily because of its correlation with another predictor, coherence (Zhang, 2006). In the urban settings, earlier urban planner, Lynch (1960) suggested that “legibility is the ease with which a city’s parts can be recognised and can be organised into a coherent pattern” (p.2). Lynch (1960) asserted that legibility is a crucial predictor in the city setting. Meanwhile, mystery predictor often was found had a high rating in the natural environment, such as forests and wetland (Zhang, 2006).

Hence, campus environment has a complex ecosystem that gives some challenges in landscape design including the planting design setting. Through planting composition, the outdoor campus spaces will have different charm and scenery. Robinson (2004) has asserted “it is always important that the planting design contributes to the overall design concept and objectives, and this is achieved by spatial design and by the themes employed in detailed planting composition” (p.122). Unconsciously, planting composition has a power to control the visual and image of universities.

4 LANDSCAPE VISUAL ASSESSMENT

Based on the argument on the importance of planting composition in preparing quality landscape in campus, the landscape visual assessment should be comprehended. Zhang (2006) asserted that in The Macaulay Land Use Research Institute (2005), during the 1960’s to 70’s, landscape assessment focused on producing “objective” and quantitative methods with the value for the “subjective” responses to the landscape quality. These methods were developed to consider the tools to enable an evaluation by different observers which provided reliable and consistent information about observers’ responses to landscape visual quality (Zhang, 2006). According to Lothian (1999), these objective and subjective approaches have their philosophical arguments which acknowledged landscape aesthetics paradigms.

In landscape aesthetic, the objective paradigm lies in the inherent physical properties of the landscape such as landform, water bodies and colour. On the contrary, the subjective paradigm lies in people’s mind behind the eyes and their response to the landscape. The subjectivist or psychological paradigm considers landscape quality as solely a human construct based on the interpretation of what is perceived through the memories, associations, imagination and any symbolism it evokes (Lothian, 1999).

The classical philosophers all regarded aesthetics as a physical attribute (objectivist) such as Plato and Aristotle. Both philosophers argued that aesthetic qualities could be assessed objectively, and these qualities lie in the intrinsic properties of the object (Lothian, 1999). Based on this argument, the landscape can be judged from its formal quality such as line, colour and form (Lothian, 1999). However, the subjectivist places the observer in the central position, like Burke and Hume viewed aesthetically in a subjectivist or psychological term (Lothian, 1999). Burke in 18th century thought aesthetic originates with the emotions, Dewey’s in 19th century focused aesthetic with experience (Lothian, 1999).

The aesthetic quality of the landscape comes from the human mind’s perception and interpretation of the landscape (Kaplan, 1987). This approach argues that the human preference for different landscapes or perception of aesthetic qualities of the landscape is based on human knowledge and understanding of the landscape (Suhardi et al., 2006). Some of this knowledge and understanding may be innate such as something that people is born with, and some may be learned or acquired through experience and education (Suhardi et al., 2006).

5 THE RELATIONSHIP BETWEEN CAMPUS LANDSCAPE, PLANTING COMPOSITION AND LANDSCAPE VISUAL ASSESSMENT

An implicit study on people preferences for landscapes is required in the objectivist paradigm as these preferences provide the basis for human evaluation of landscape. In the subjectivist paradigm, landscapes provide a means of understanding the cognition, perception and preferences of

human observers (Lothian, 1999). As landscape researchers, it is essential to understand and identify the advantages and disadvantages of both paradigms.

We all have personal responses and views to particular plants and combinations of plants (Robinson, 2004). Tanguy and Tanguy (1985, as cited in Robinson, 2004) have described differences between what they call the 'objective plant' and the 'subjective plant'. They mention that 'objective plant' refers to the all features or physical attributes of the plants that can be agreed and described by different people. However, 'subjective plant' refers to observer's interpretation and meaning of the objective plant such as symbolic meaning and cultural meaning. Table 1 describes landscape inherent for both paradigms.

Table 1 Comparison of the objectivist and subjectivist paradigms

Objectivist (physical) paradigm	Subjectivist (psychological) paradigm
Beauty - an intrinsic quality of the landscape	Beauty - a quality in the eye of beholder
Essentially subjective	Essentially objective
Generally, lacks any theoretical framework	Often derives from a theoretical framework
Seeks understanding the landscape's physical attributes, often for management purposes	Seeks understanding of human preferences to understand the physical components which contribute to landscape quality
Differentiates landscape quality on the basis of implicit assumptions	Differentiates landscape quality on the basis of human preferences explicitly derived
Silent on causal factors	Seeks explanation of causal factors
Empirical; application of an approach	Experimental; tests hypotheses and extends approach
Site and area specific; results generally cannot be extended beyond area of study. Does not seek explanation of preferences	Not area or site specific; seeks results for wider application. May be applied to understand preferences in different landscapes
Assessments are often field based	Mainly uses surrogates (e.g. photographs) for assessments
Relatively easy, inexpensive and rapid to undertake	Relatively difficult, expensive and slow to undertake
Does not use respondents to evaluate landscape quality so cannot account for differences in preferences	Quantifies influence on preferences of respondent characteristics - age, gender, education, socio-economic, culture
Non-replicable and unique: application of approach by different individuals likely to result in different assessments of landscapes	Replicable: providing the sample is adequate, the preferences identified should be consistent across a range of studies
Being subjective and non-replicable, the results may be of questionable value and of short-lived application	Being objective and replicable the results extend knowledge and are relatively permanent for a given community
Unable to be used in a predictive sense except generally	Capable of predicting effect of landscape change on landscape quality
Subjectivity presented as objectivity	Objective evaluation of subjectivity

(Sources: Lothian, 1999)

Table 1 displays the advantages and disadvantages of both paradigms. It depends on the research aspect but Lothian (1999) has suggested that subjectivist rather than objectivist or both paradigms should be combined. Subjectivist can offer objectivist more accuracy of the result on preferences of the community since its method is capable in predicting the effect of landscape quality of land management as well as the context of the study campus landscape management is a crucial part especially for maintenance work.

Therefore, in the context of designing campus landscape, both paradigms will help researchers to understand and assess the preferences on vegetation. Furthermore, the survey and investigation on campus landscape preferences also will assist planners and designers to carefully compose the planting design in different campus spaces with a specific composition. Both paradigms can be combined into landscape perception which provides a means for reconciling the two and

providing a role for each (Lothian, 1999). This will help a lot for landscape development in the campus community as well as an image of the university.

Figure 1 shows the conceptual framework of this research. This research begins with the understanding of landscape preferences as a study of human rating on the landscape and the reasons of preferences. They are also related to some theories in environmental psychology and landscape aesthetic, which affect perceptions. Through literature review, the researcher gathered some issues related to landscape planting that focuses on planting composition.

The physical factors or objectivist paradigm assist the researcher in identifying the existing planting composition on campus. The formal aesthetics such as the element of colours, forms, textures shadows, have briefly described the presence campus landscape. But, how people perceive their environment, which involves psychological factors or subjectivist paradigm is not highlighted. Demographic profile is the variables which have influenced most of the preferences rating. The previous studies on landscape preferences have proved gender, age, education and culture, which are the factors that have a strong relationship with a preference towards landscape (Wang & Zhao, 2017; Karimian et al., 2017; Hipp et al., 2015; Zhang 2006).

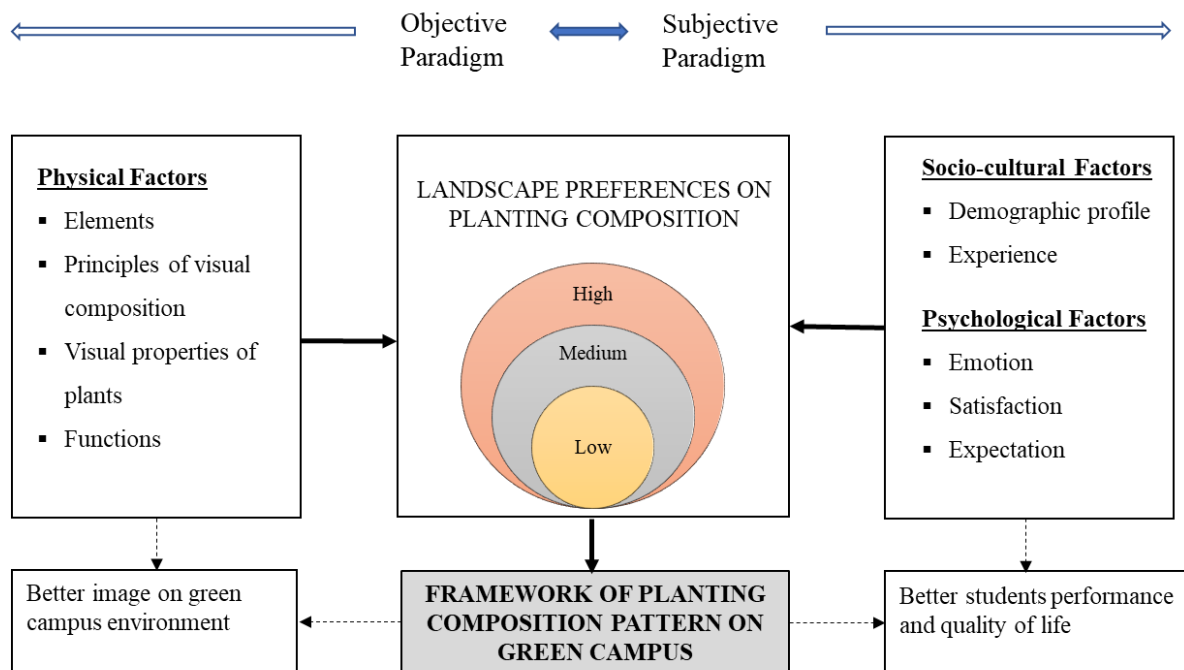


Figure 1 Conceptual framework of the relationship between campus landscape, planting composition and landscape quality assessment

The framework aims to develop planting composition pattern that can guide campus landscape development. The framework can be used for enhancing the image of the university as well as the quality of life on campus. Students are a major concern in this study because they encounter the campus landscape daily. Subjectivist paradigm application is assisting the future development on campus landscape that is explicitly referred to in as planting design to establish student's well-being. As mention by Robinson (2004), planting design focusses on visual sense that is produced by composition in order to bring out the best quality landscape.

7 CONCLUSIONS

Two landscape paradigms in an assessment of landscape visual quality for campus landscape have been discussed. Planting design has been identified as the primary contributor to control the

campus landscape as a whole. Planting composition objectively lies in the intrinsic qualities of formal aesthetic. However, objectivist has some disadvantages that could not assess human mind and satisfaction. Human perception and preferences towards landscape are significant for future development and landscape planning. “Objective plant” could be viewed similarly but, “subjectively” plant may encourage specific emotion or carry specific meaning and symbolism in the different culture. Indeed, some of the plants able to grasp people’s mind having more positive thinking (Han, 2010) and release the stress (Li & Sullivan, 2016). Therefore, further analysis of the relationship between planting design on campus and students’ preferences is desired in meeting the needs and students’ well-being as well as design for a green campus.

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