

Literature Survey on How Planting Composition Influence Visual Preferences: A Campus Landscape Setting

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Abstract

Campus landscape is a created for aesthetically pleasing, educationally satisfying and environmentally sustaining. Unlike other places, the university has a distinct characteristic. The demand for high education required more space for students living. Previous research has mentioned on viewing landscape with stress recovery and reduce mental fatigue. Furthermore, several studies also suggested to university to provide a classroom with a window for viewing the landscape. The benefits gain from that has correlated with enhance positive emotions, mental health, quality of life as well as students' academic performance. Vegetation is an essential element in visual landscape assessment. Plants traits able to attract viewers attention. Better landscape scenery often composed of various plant properties with properly design based on principles guidelines. However, the study on planting composition seems neglected. Therefore, this study is to explore the significance of planting composition in visual interest within the campus context. Different context anticipated different composition depends on the location, concept or function. Crucially, students are exposure with a lot of stress and challenges. Moreover, less daily contact with nature, spend more time indoors and continuously technology connectedness has predicted to negative impact on student performance. Thus, this study is suggestive to encourage nature connectedness. Before that, the preferred planting composition must be reviewed to ensure the effectiveness in visual preferences. The review process then analyses using qualitative software Atlas.ti© Version 8.0. The precedents literature was recorded and categorised in coding. The result demonstrates that there are the factors that should be pursued to influence more visual interest, particularly on campus.

Keywords: Planting composition; Visual preferences; Campus landscape; Plant properties; Principles design.



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1. Introduction

In landscape research, a plant is a powerful factor which influences viewers' perception. Vegetation has discovered mainly as a tool to measure visual quality. Recently, most articles review the relationships between plants and visual assessment (Kuper, 2017; Wang *et al.*, 2016; Yilmaz and Mumcu, 2018). Plants also serves as a method of beautification (Raskovic and Decker, 2015); influence aesthetic satisfaction (Yilmaz and Mumcu, 2018); induce positive emotions (Hoyle *et al.*, 2017; Polat and Akay, 2015); as well as human well-being (Gerstenberg and Hofmann, 2016; Li and Sullivan, 2016). Since plants are identified as an essential component in determining visual preferences, the structural and vegetation properties are essential to consider in the appraisal.

Design with plants means to design with nature which has the dynamic patterns. Therefore, this challenge must be supported with fundamental knowledge and principles in planting design. In planting design, compositions are related to visual interest and spatial quality. According to Booth and Hiss (1991); plants should be massed together to be more unified rather than scattered. Planting compositions have the guidelines or principles to design the space which pleasant to the eye. When principles are sensitively applied in compositions, the design is apt to be attractive to perceive and to experience (Booth and Hiss, 1991).

Too much planting is described as being uncoordinated, chaotic and visually disturbing, while too less and similar planting is described as being too simple, less attractive and unpleasant view (Booth and Hiss, 1991). Therefore, planting composition genuinely critical and influence viewers to perceive and experience the landscape space.

In the context of the study, the campus is a place for an educational purpose and has a unique environment to meet the needs of students and community. In campus, a landscape is believed to have critical roles to generate the quality of the environment. The scene can be a symbol of beautification. A lovely campus landscape can expressively represent a good quality of image of the university which also benefits beyond the educational aspect (Gumprecht, 2007). This effect can be enhanced by green elements such as more planting area on campus (Dober, 2000). On that note, (McFarland *et al.*, 2008) has been found that the appearance of the campus was the most significant factor for students in deciding which university to attend. Previous scholars also supported that students' choice of university critically depends upon their perception of the campus (Griffith, 1994; Groen and White, 2003; Shuhana *et al.*, 2007). The finding by Speake *et al.* (2013) has result students are more appreciate and value the campus with a formal and garden-style landscape which added more aesthetic value and adequately managed and maintained. Speake *et al.* (2013) added in recognition of this

critical factor; most universities have actively designed in maximum high-quality green landscaping to the most recent phase of development in their campus.

This study is to explore the relationships between visual preferences and planting composition which regards to apt with campus context. The approach was to use literature survey to visualise the association of planting composition with plant properties and fundamental principles in spatial design. The effective use of principles in planting composition for different setting thereby examine and relate to visual preferences.

2. Definition of Planting Composition

The common thread that links us to the environments is plant materials. A plant is a group in Kingdom Plantae which includes all land plants and some aquatic plants (Mader, 2007). Plant materials can be used to add connectivity from one space to another space. Therefore, through planting composition, a whole space can be tied up together. Planting composition is the most significant element to display the landscape scene. The term of planting composition has various interpretation. Indeed, in the biological field define planting composition is refers to the contribution of each plant species to the vegetation area. However, this study is much related to the design field which describes this term in different ways. Table 1 summarise various definition or description of planting composition.

Table-1. Definition of Planting Composition

| Authors (Year) | Definition/ Description |
|---|--|
| Austin (1982) | Repertoire of trees, shrubs, groundcovers and grasses provides an extensive and complex base for selecting the ingredients that manipulate the spaces around us |
| (Booth and Hiss, 1991) | One important guideline of planting design is to organise plant materials in masses. A Mass collection is one other method for establishing order in planting composition. It is also the technique of grouping elements of plant together. |
| (Leszczynski, 1999) | Planting design composition entails devising a concept in the abstract and combining this abstraction with the environmental demands of the site to produce a planting plan that is beautiful, functional and appropriate. It has elements and principles of design that should be followed. |
| (Robinson, 2004) | The appearance of an individual or group plant can be analysed through its visual properties of form, line, texture and colour. These properties are fundamental to understand composition, and essential if we are to combine plants to form a visually effective whole |
| The University in a Garden-special edition (2004) | Mostly, categories of plants that necessary be composed and planted in landscape design are trees and shrubs. Without trees, a garden becomes monotonous and uninviting. |
| (Bassa <i>et al.</i> , 2011) | At the landscape scale, the composition of plants has linked to the different spatial arrangement of plant species |
| (Lynden, 2014) | Mixed plantings give people something interesting to see all year long. Good, lush, healthy plants are magnets that attract people. |
| (Noriah <i>et al.</i> , 2015) | Consist of shrubs, trees and groundcovers and undoubtedly crucial in reviving the condition of the surrounding environment |

Regarding the review of planting composition, most of the scholars have brief on the technique of combining plants with various properties to manipulate the spaces to give something interesting to see along with principles of planting design. Too much planting is done by those who have had no training in planting design principles (Leszczynski, 1999). In this research, campus landscape has distinct meaning towards students and how they perceived the green spaces. Green spaces also affect the frequency of utilisation of outdoor space in campus (Stepan *et al.*, 2014). However, how green is green enough for students learning space? How planting composition reflects the campus green spaces and adds value to the campus experience aesthetically, educationally and environmentally.

3. The Essence of Planting Composition in Visual Quality Assessment

Scenic beauty is evaluated using landscape scenery qualities or attributes. The attributes are variables which defined through shape, form, linearity, composition, structure, colour, scale, variety, unity, uniqueness or distinctness (Daniel, 2001). In planting design, a keen visual sense is needed to produce a composition that both brings out the best qualities of the individual plants and is useful as a whole (Robinson, 2004). This composition is varied as

human use of the land. Hence, for in the context of the study, planting composition can play a role in highlighting the function as an educational place along with aesthetic value and ecological function.

The essence of planting composition in visual judgement is undeniable. As Robinson (2004) said, “our analysis of the aesthetic characteristics of plants has given us a basic visual vocabulary. When this is put to work in planting design, it will convey a visual message of one kind or another. So, the composition regarded as the visual grammar of planting design” (p.110). Besides the added aesthetic value of the place, the view of planting likewise enhances a sense of place and restoration from mental fatigue and stress. In the relevant literature, the influence of plants on well-being, affect and quality of life has been well documented over the years (Felsten, 2009; McFarland *et al.*, 2008; Ulrich, 1986).

If the measurement of quality is referred to the degree of excellence, visual quality assessment at least must involve determining which instances of the visual landscape are better (more excellent) than others (Daniel, 2001). Therefore, it would be an entirely different task than to determine which is better for different purposes such as recreational, spiritual, educational, residential or commercial. Concerning the composition of plants in the different setting, assessment should associate with fundamental elements and principles. As found by Polat and Akay (2015); the composition of plants and their colours and plant species diversity are among the main elements of the visual quality of landscape area.

Specific literature has related visual landscape assessment with motivational theory. Noriah *et al.* (2015) studied the reasons of people motivated to visit the botanical garden. The result shows people motivated to view the well-maintained landscape, safe, clean and planted with ornamental topiary plants rather than bushes, and scattered plants. As mention on principles, scattered plants mostly affect less visual attractiveness. Good visual assessment relation to vegetation also influence willingness to visit, to stay and to revisit the place (Raskovic and Decker, 2015). Thus, it is ensured that planting composition influences the viewers’ perception about the place and able to motivate people to revisit. In this context, the campus landscape should have the better composition to encourage and motivate students to stay and get the benefits from the plants. Creating an attractive and relaxing campus landscape will help students mitigate stress and improve academic achievement (Griffith, 1994).

4. The Campus Landscape Setting

A landscape is an integral part of many university campuses. It is the first things people see when they enter a school, and it is the image they will carry in mind until they leave the school (Yahres and Knight, 1997). Universities often highlight beautiful landscape area as attractive attributes which benefits to the student experience and the image of the university (Speake *et al.*, 2013). A campus is a hub of activities like a city that serve both learning activities and public space with space to socialise and to relax. Precise, many campuses placed in distinctive cities atmosphere and face various concerns and demand for facilities and securities. Indeed, some of the campuses open to the public to enjoy an attractive landscape couple with sports services, excellent facilities and security concern. Consequently, a good living condition on campus is become increasingly important due to the increasing demand for the educational sphere.

The previous study found that the campus landscape with well managed and maintained and produced formal design in the green spaces more appreciated and valued by students (Speake *et al.*, 2013). The result highlighted the essential of campus landscape is not only for the aesthetical quality, but it is also clearly important to take cared the planting and maintained it to a high standard. Furthermore, the favourable landscape areas within the campus is not depend on size, but based on design, excellent quality, location and distance or convenience (Speake *et al.*, 2013). From the following research, it shows that the tidiness and cleanness is a important quality that influences the student selection and portray a good image of campus.

In contrast, the study by Abu-Ghazzeh (1999) mentions that the selection of favourite areas in the campus outdoor spaces based on a combination of settings, landscape, people, individual experiences, and in the context of other spaces. In that study, students searched for unique outdoor spaces couple with activities that they like to pursue which differ from the academic life as usual. Abu-Ghazzeh (1999) revealed that some students who expressed feeling like a home tend to prefer to be in the wooded environment. Abu-Ghazzeh (1999) also cited from previous researchers that landscape preferences correlate with a demographic profile, landscape exposure, social class and place of residence.

Subsequently, the perception of the campus landscape design must be examined in part as an attribute for the university to provide the quality of campus landscape. Campus design expresses institutional identity differently than the students perceive their campus life (Hanan, 2013). Molnar and J. (1986) strongly mentioned that it is essential to consider and proposed the design to accommodate the personality of a place, users, functions, and scale. On that note, a university is a formal place and the landscape also composed with formal plant staff in approach order for welcoming, graduation or other memorable campus events.

5. Methodology

The comprehensive literature reviews have discussed in this study in relating to landscape issues in university and the influence of landscape planting design towards visual perceptions and image of the campus. The review of previous research on the campus landscape also included in this paper. The review is needed to initially capture the indicators in creating planting composition, identified as physical properties of plants, fundamental elements or principles guidelines and place setting. From the initial indicators, a further review of the impact of planting

composition towards visual quality is discussed. The review from the precedent literature was analysed and categorised in coding using qualitative software Atlas.ti© Version 8.0.

6. Literature Review on Campus Landscape Study and Variables Relating to Planting Composition

Campus landscape studies discovered a long year ago. Until now, the issues on campus landscape are still debated. Most of the studies focused on how the landscape on campus improves the quality of students. Several scholars have proved that viewing landscape or green plants enhance positive emotions and recovery from stress (Li and Sullivan, 2016; Speake *et al.*, 2013; Wee, 2017). Most of the variables measured were landscape elements such as a gazebo, public art, open space, water features, and most important variables is vegetation types. Outdoor space with no trees mostly gets lower rate rather than outdoor space with trees or mixed vegetation (Raskovic and Decker, 2015).

The characteristic of landscape or plants in campus differs from parks or urban setting. Well composed vegetation (Rumao, 2016); formal and manicured garden (Speake *et al.*, 2013); clean and open grassland (Zhang, 2006) are among the result findings from the literature. Most students tend to choose landscape views with a clear and coherent setting (Speake *et al.*, 2013; Zhang, 2006). However, some of the studies found that complexity in the landscape can add diversity to their campus (Rumao, 2016). According to Kaplan and Kaplan (1989); the highly preferred on the spatial organisation of landscape scenes mostly were the “complexity” and “coherence”, as well as mystery in the natural environment. Lynch (1960) approach “legibility” is a vital indicator to understand the perception and experience in the urban landscape.

Therefore, the literature clearly stated that a different setting would result in a different response. The similar context of the study, coherence setting is the most preferred possibly the campus acknowledges as a formal place. Consistent with this, Speake *et al.* (2013) suggests that students are not aware of the ecological importance of green spaces. Students also consider green spaces to be necessary for the university’s image and that they comprise an intrinsic element of the character of the campus (Speake *et al.*, 2013). Contrary with Hajrasouliha (2017); park-like setting of campus landscape has an impact on student satisfaction. Therefore, the study on a composition of plants hopefully will help to clarify the most appropriate and preferred composition should be applied on campus. Table 2 provides the findings of landscape style and vegetation characteristics on campus.

Table-2. Main outcomes or findings in the literature on the campus landscape

| No. | Authors/Year | Outcomes |
|-----|-------------------------------|---|
| 1 | Scholl and Gulwadi (2018) | Specific campus landscape characteristics that correspond with Attention Restoration Theory might play a critical role in increasing our understanding of the processes underlying students’ selective attention and working memory capacities. |
| 2 | Wee (2017) | Perception of naturalistic campus settings preferred as a less stressful setting when compared to settings with minimal green. Photos with maximum green spaces were perceived as more stress relieving, especially in natural settings with a water feature. The unexpected outcome that may explain the importance of accessibility and aesthetics was the outcome of the image, which ranked the second most least stressful. The pathways and benches are inviting features and encourage people to stay within the space. For this reason, more students may have chosen the formal garden space as the stress-relieving environment. |
| 3 | Karimian <i>et al.</i> (2017) | This study confirmed that some demographic factors (age and gender), user type, and place of work affected the green space usage and the aesthetics and safety preferences by users. The study also found a strong correlation between the aesthetics and safety preference by users. |
| 4 | Hajrasouliha (2017) | This study indicates that the institution’s physical campus qualities may have a stronger impact on student satisfaction and academic performance. A well-design campus can be a fascinating place to be and allows students to rest and enjoy their college life. Taking a short walk in a park-like setting of campus (green dimension), visiting a coffee shop, galleries, watching vital street (urban dimension), or short nap in an open dorm (living dimension) have a positive impact on students’ mental health. |
| 5 | Rumao (2016) | Design characteristic finding: Pedestrian friendly, greenery, trees, well maintained and user-friendly campus were the topics that received the most votes from users. However, vegetation on this campus lack of diversity. The survey participants most agreed user experience finding: Aesthetically pleasing and a sense of place. The most important factors that affect the perception of users have choices for sitting and meeting places, water features and vegetation. Presence of vegetation on campus adds visual complexity and variety in the users’ minds and enhances their experience on campus. In a well-composed campus design, trees are major elements |
| 6 | Li and Sullivan (2016) | Note that the importance of enhancing students’ psychological and cognitive health by providing classrooms with green window views. This study demonstrated that classroom views to green landscapes have significant, positive impacts on recovery from stress and mental fatigue. |

| | | |
|----|-----------------------------|--|
| 7 | Hipp <i>et al.</i> (2015) | The findings indicate that existing and available green campus areas, when perceived as green by students, have the potential to promote perceived psychological restorative-ness that in turn has the potential to increase the quality of life. |
| 8 | Speake <i>et al.</i> (2013) | The majority of students appreciate and use green spaces, particularly the more formal and planned areas. A prominent outcome the research is that no students mention the naturalistic areas (woodland, scrub and tall grassland), either in their selection of favourite areas or in the benefits arising from campus green space. Conceptually, this is important as it suggests that students are not aware of the ecological importance of green spaces. This general lack of ecological awareness influences the tendency to prefer the aesthetics of tamed and manicured landscapes. Students also consider green spaces to be important for the university's image and that they comprise an intrinsic element of the character of the campus. |
| 9 | Cubukcu and Isitan (2011) | Students' behaviour was compared, the results showed that the students of the negatively evaluated campus reported that they tend to spend less time in the campus for social and recreational activities compared to students of the more positively evaluated campus. A beautiful landscape, comfortable seating areas and community gathering areas could invite students to spend more time in the campus. |
| 10 | Zhang (2006) | The results from this study indicated that the landscape scene types of "legibility" and "coherence" are most preferred on campus open space, which is different from the findings of Kaplan and Kaplan (1989) that the highly preferred the spatial organization of landscape scenes were the "complexity" and "coherence", as well as mystery in the natural environment. "Vegetations" including tree, seasonal flowers and open grassland, are the most preferred landscape feature on campus open space. This result agrees with the finding of Kaplan and Kaplan (1989) that the scene of "spaced trees and smooth ground" is highly preferred by people. |

All of the previous studies mentioned that demographic is the most critical variables that influence the research finding. Perhaps the contrast findings between coherent landscape and complexity design may result from different personality and background of respondents.

7. The Relevance of Planting Composition on Campus Landscape Setting

Students may not understand with a term of planting composition and principles guideline used. The term should identify by landscape designers which expert in design with plants. However, the application of principles in planting design can be valued by non-expert based on their perceptions. It is essential to discover whether designers understand what the students need on their outdoor spaces. From the literature survey, there are three leading indicators which associated with planting composition; properties of plants, fundamental or principles used and place setting. These three main indicators reflect the visual appearance of different spaces. To describe each indicator, a qualitative software Atlas.ti© Version 8.0 is used to ease the literature review process. Figure 1 shows a network of literature findings from Atlas.ti© is used to relate the description of the indicators and main coding of the quotations from the articles.

The coloured codings shown in Figure 1 represents the three indicators which influence visual quality assessment. The interpretation of the above network is included in the following description of the analysis.

7.1. Properties of Plants

Properties of plants is defined as physical elements of the plants itself. It also known as formal features which frequently defined as form, line, texture, colour and the visible relationships among them (Yılmaz *et al.*, 2018) in Document2:Quotation3 (d2:q3). This is also supported by Serpa and Muhar (1996) in the Atlas.ti© through Document4:Quotation1 (d4:q1) in the network of Figure 1. Characteristics of plants influence visual assessment and make a real difference in landscape areas. As referred to Yılmaz and Mumcu (2018) through network of Atlas.ti© at Document8:Quotation2 (d8:q2) and Document 2:Quotation1 (d2:q1). Generally, people preferred plants with flowers which induce positive emotions (Hoyle *et al.*, 2017). Mostly colour is among the high preference factor in visual assessment. Results supported in the Atlas.ti© through Document1:Quotation1 (d1:q1), Document 1: Quotation5 (d1:q5) and preferred colour finding by Kaufman and Lohr (2004) in Document3:Quotation4 (d3:q4). Hoyle *et al.* (2017) has stated planting with most natural characters was viewed as the least aesthetic, while planting with least natural species characters as the most aesthetic judgement. This result shows that most people preferred coherent in the visual landscape assessment.

7.2. Fundamental/ Principles of Visual Composition

Principles of planting composition also referred as formal aesthetic. It is combination of plant properties with fundamental guidelines in planting design. Formal aesthetic required of order, rhythm, scale and complexity and its related to aesthetic satisfaction (Yılmaz *et al.*, 2018) in the Atlas.ti© through Document2:Quotation9 (d2:q9) in the Figure 1. In addition, Yılmaz and Mumcu (2018) stated that principles add variation to the perception in the Atlas.ti© through Document8:Quotation3 (d8:q3). This is proved that planting composition able to influence

perception on landscape. In the context of this study, planting can add different characters on campus. On the other hand, how people perceived planting in spatial design is reported by *Yılmaz et al. (2018)* in the Atlas.ti© through Document2:Quotation8 (d2:q8).

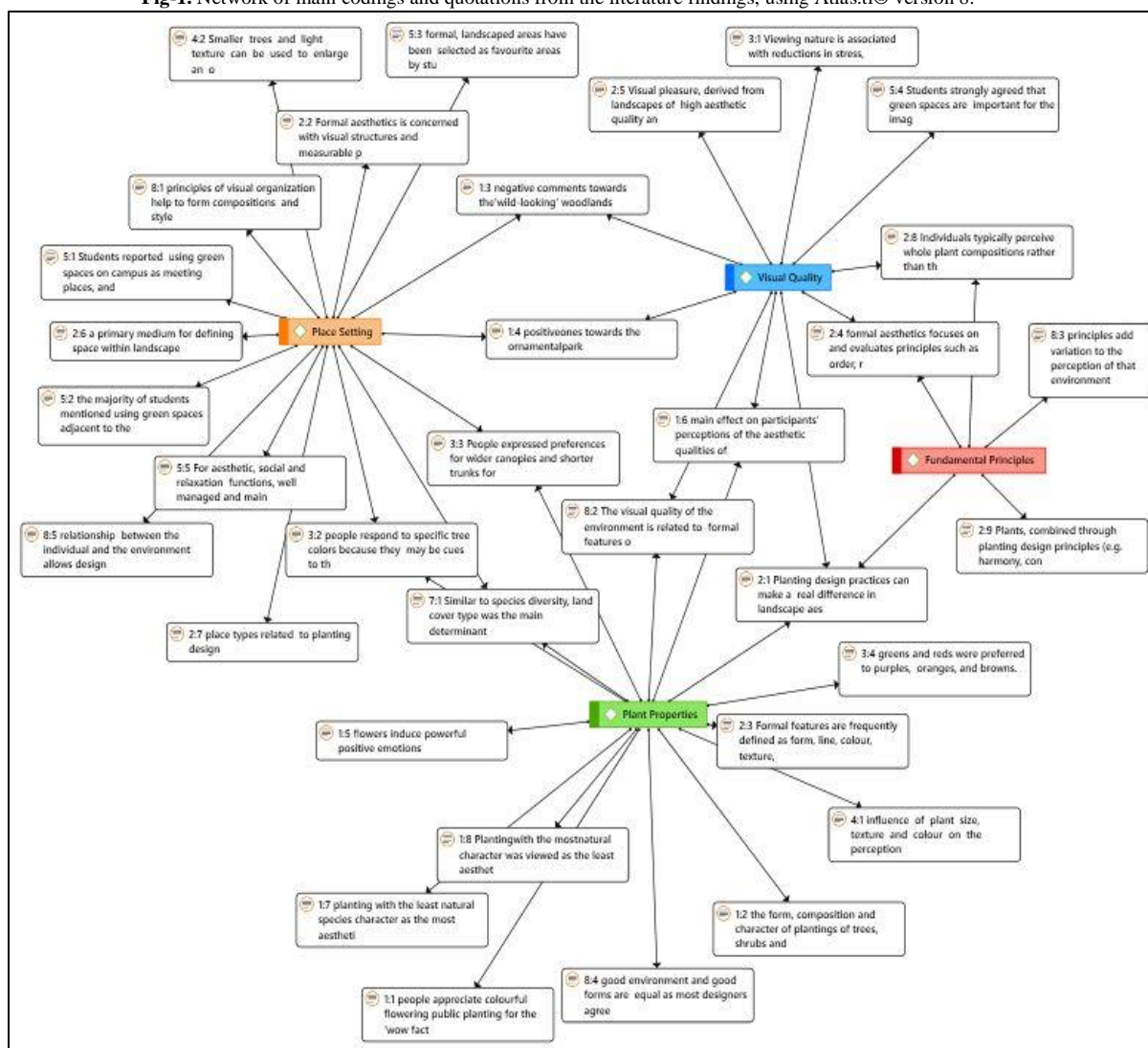
7.3. Place setting

Place setting is referred to spatial design that formed by formal aesthetic and formal features. Through formal aesthetic or principles organization of planting, it helps to create landscape in-style. As referred by *Yılmaz and Mumcu (2018)* in the Atlas.ti© through Document8:Quotation1 (d8:q1). In the context of the study, students reported mostly utilised the landscape space as meeting places, socialize spaces and relaxation space. Furthermore, majority of students mentioned that they frequently used the landscape space adjacent to the classroom or to the favourite building used such as library and sports centres (*Speake et al., 2013*). The reasons of used the place is recorded in the Atlas.ti©network through Document5:Quotation1 (d5:q1) and Document5:Quotation5 (d5:q5). In addition, the appearance of the place setting negatively commented towards ‘wild-looking’ plants. *Hoyle et al. (2017)* supported comments on appearance or place setting characteristics in the Atlas.ti© through Document1:Quotation3 (d1:q3) and Document1:Quotation4 (d1:q4).

7.4. Visual quality

Visual quality is the main variable that give various impact on emotions, image and perceptions. Scholar agreed that viewing nature is associated with reduction of stress (*Li and Sullivan, 2016*). This is supported by (*Kaufman and Lohr, 2004*) in the Atlas.ti© through Document3:Quotation1 (d3:q1). Level of nature is reported differently for different setting. In the context of this study, formal and manicured garden-style are more preferred rather than bushes and natural forest. Figure 1 show the finding by (*Yılmaz et al., 2018*) in the Atlas.ti© through Document2:Quotation4 (d2:q4). Additionally, the planting composition often impact the image of places. *Speake et al. (2013)* result shown in the Atlas.ti© through Document5:Quotation4 (d5:q4).

Fig-1. Network of main codings and quotations from the literature findings, using Atlas.ti© version 8.



8. Conclusion

This literature review highlights that properties of plants itself must influence planting composition, and sensitive use of principles which become fundamental in spatial design. The essential landscape in campus space has been discussed as the first impression when students enter the school. Furthermore, the above literature review has explored the contribution of campus landscape can help to enhance students' performance by enhancing positive emotion, stress recovery, improve memory capacities and mental health. However, it is found that the literature is currently lacking in a study of preferred planting composition which influences the viewers' preference. Thus, this survey hopes to provide opportunities for the improvement of visual assessment relation to vegetation on campus. Result mentioned from literature; different setting has different planting composition. As a conclusion, planting composition in campus landscape design should be an emerging field in landscape visual assessment. It integrates fundamental elements and sense of place as well as enhancing visual appearance.

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