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**1st INTERNATIONAL
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2022**

“Sustaining the
Resilient, Beautiful and Safe Cities
for a Better Quality of Life”

20 & 21 SEPTEMBER 2022

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“ **Sustaining the Resilient, Beautiful and Safe
Cities for a Better Quality of Life** ”

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Perpustakaan Negara Malaysia

Cataloguing in Publication Data

No e ISBN: 978-967-2776-13-0

Cover Design: Muhammad Falihin Jasmi

Typesetting : Ts Dr Azizah Md Ajis

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EFFECTS OF ACADEMIC GREEN SPACE FOR UNDERGRADUATE STUDENTS

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Abstract

Academic Green Spaces (AGSs) are considered as an integral part of university campuses, and students can enjoy the outdoor spaces in the campus where they congregate, walk, talk, study, and relax. Aside from academic achievement, learning activities are fun yet tiring and will sometimes lead to stress, which then spurs anxiety problems. Therefore, unmanaged, and prolonged anxiety leads to depression. AGS with natural elements (such as vegetation) acts as a supportive environment that can help to reduce stress. The objectives of this research are, i) to analyse the effectiveness of AGS for the undergraduate student's wellbeing and ii) to determine the factors of AGS that suit the undergraduate student's interests. Quantitative methodology was applied using a case study of AGS known as Lala Land located adjacent and accessible to Annex 1 building at UiTM Perak, Seri Iskandar Campus. Close-ended questionnaires were distributed to the 50 undergraduate students (as main users of Annex 1 building and Lala Land) to identify the effect of AGS by assessing the i) physical space, ii) dimensions of "Healthy Academic Greenspace Frameworks" (HAGFs) and iii) qualities of "Perceived Sensory Dimensions" (PSDs). The results have shown that, i) the physical space is located at strategic location with easy accessibility, walkability, and adjacent to students' facilities, accommodation, and indoor learning spaces, ii) HAGF with Symbolic space, Social space and Experienced space dimensions of the therapeutic landscape, where students feel content and reduce mental fatigue and iii) Space quality of PSDs is the most preferred because students are keen to experience spacious green spaces that are free and it is possible to find areas not crossed by roads and lots of trees. These three (3) main factors are suitable to the undergraduate student's interests on AGS and need to be considered during planning and designing a university campus environment.

Keywords: *Undergraduate, Depression, Wellbeing, HAGF and PSD.*

INTRODUCTION

University students are a special group of people in critical transition from adolescence to adulthood and experience the most stressful moments in a person's life, because of their important role for society and country in the future, it is significant to study on their depression problem. (Islam M.A., et al., 2018). Other than social and academic factors that make university students feel stressed, environmental factors also play an important role towards students' wellbeing. A university provides an environment in which students are not only getting formal

education but also informal education, such as personal and social development skills at a significant time in their lives (Abercrombie, et al., 1998). The availability of green space in the living environment can be measured as an important environmental factor that moderates the relationship between stressful life (Berg et al., 2010). According to the attention restoration theory, spending time in nature relieves the stress and mental fatigue caused by “directed attention” (Williams, F. 2016). Greenspace facilitates social interaction, the establishment of stronger community ties, and a sense of achievement (Leyden, 2003).

This research aims to see the interlinkages between Academic Green Space (AGS) and undergraduate students’ wellbeing. Then, the results will be analysed to understand the effectiveness of AGS in the campus and to see how undergraduate students perceive AGS. The outcome of this research perhaps, can be used as a guideline for future development of AGS that suit their interests.

LITERATURE REVIEW

Functions and Qualities of Green Space

Attention Restoration Theory (ART) by S’ Kaplan proposes that exposure to the natural environment encourages more effortless brain function, thereby allowing it to recover and replenish its directed attention capacity. R. Ulrich used the Stress Reduction Theory (SRT) to explain emotional and physiological reactions to natural spaces where being in an unthreatening natural environment or viewing natural elements (such as vegetation) activates a positive affective response, results in a decrease in stress in individuals, which involves reduced levels of negatively toned feelings and reductions in elevated physiological conditions (such as heart rate and blood pressure) (Foke, A. et al., 2017). These theories are widely used in planning and designing the urban parks with therapeutic landscape concepts in Singapore. Therefore, it is suggested that green space should be accessible within a short distance of local residences, with a noticeable and safe entrance points as well as safe and pleasant access routes (e.g., not having to walk across busy roads or through dangerous areas), (WHO, 2017). The quality of AGS is measured using characteristics such as accessibility, maintenance, absence of litter, safety, and the experienced qualities of green space in terms of allowing relaxation and recreation. These characteristics were described as an important factor in improving mental well-being (Pope et al., 2015). Environmental psychology studies have demonstrated that experienced qualities in green spaces can be subdivided into different “perceived sensory dimensions” (Grahn, P. & Stigsdotter, U. K. 2009). Studies have identified eight main qualities of perceived sensory dimensions (PSDs) that visitors in urban green spaces prefer, that are important for stress reduction (Grahn and Stigsdotter, 2009 & Stigsdotter et al. 2016). The qualities are as follows, i) Serene (peaceful, silent, safe, and secure); ii) Nature (fascination with wild nature and free growing lawn); iii) Rich in species (variety of species of flora and fauna); iv) Space (like entering another world, spacious space, free and lots of trees); v) Prospect (Open space with vistas); vi) Refuge (a sanctuary, a secluded place); vii) Social (a social arena); and viii) Culture (signs of human labour and human values throughout history). Tree cover and canopy density are also contributing to a substantial reduction in the urban heat island effect (Tan et al., 2015).

Significance of Academic Green Space (AGS)

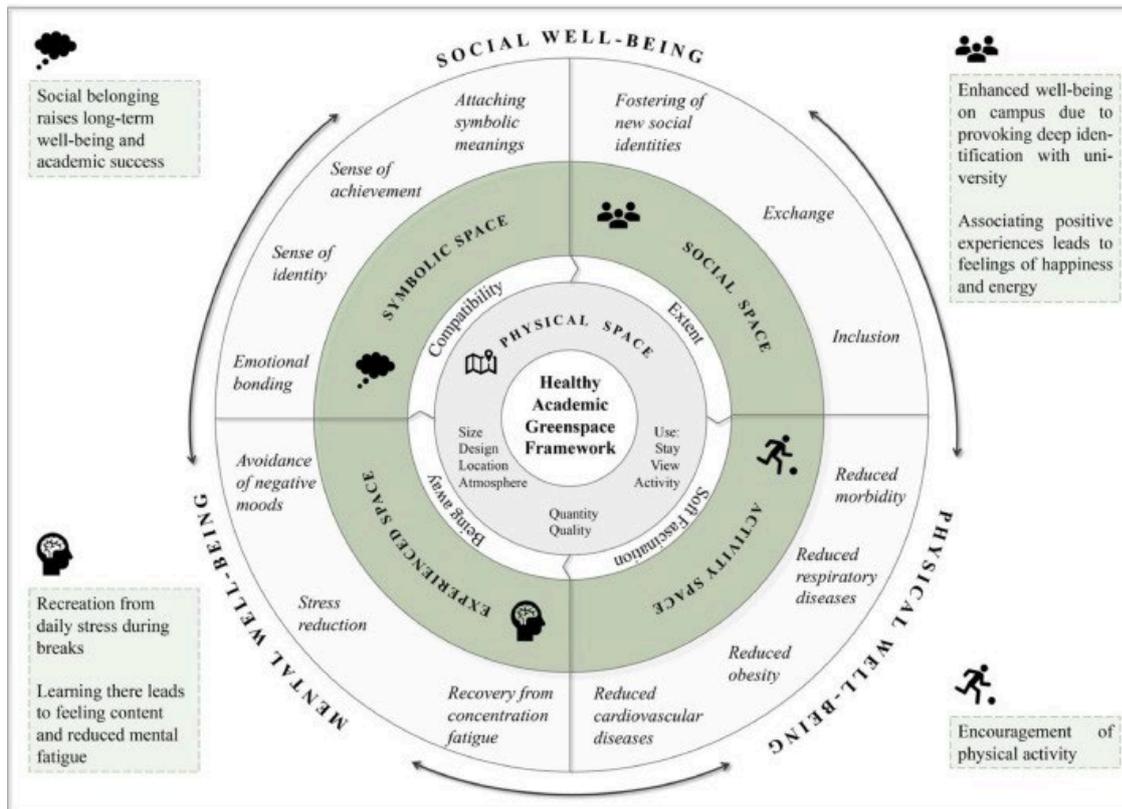
The ties between green space and academic performance, hypothesize that green space can foster performance, and, over time, help reduce such disparities (Browning & Rigolon, 2019). Evidence also shows that access to green space can promote physiological effects such as lower concentrations of cortisol, lower pulse rate and blood pressure, greater parasympathetic nerve activity and lower sympathetic nerve activity (Park et al, 2010). Griffith. J.C suggested that university priorities should include creating an attractive campus.

Furthermore, she stated, “Attractively landscaped formal open spaces or habitats left in their natural form, as woods and gorges, help establish a venerable campus identity, stir alumni sentimentalism, create a strong sense of community, and curb escalating campus densities”.

Healthy Academic Greenspace Framework (HAGF) and Therapeutic Landscape Concept

Figure 1 shows, Healthy Academic Greenspace Framework (HAGF) developed by (Völker & Kistemann, 2011 & Foellmer et al, 2020). From the centre to the edge of the circle, the HAGF seeks to advance understanding on how academic greenspace as a physical space with specific material features, such as design, location, or size, is experienced as therapeutic through different types of interaction and allocations of meaning (Foellmer et al, 2020). Social, physical, and mental health are benefiting from the exposure to good green spaces that acted as therapeutic landscape. Therapeutic gardens are outdoor gardens specifically designed based on evidence to meet the physical, psychological, and social needs (Foke et al, 2017), designed to improve health through a healing environment that involves therapeutic settings, therapeutic activities, and provides health benefits to the users. This therapeutic landscape concept in the campus becomes part of the culture in students’ life and can be explored by four (4) dimensions, (dimensions of appropriation extending the therapeutic landscape concept): i) Social space, ii) Activity space, iii) Experienced space and iv) Symbolic space.

Figure 1
Healthy Academic Greenspace Framework (HAGF)



Völker & Kistemann, 2011 & Foellmer et al, (2020).

ISSUES AND PROBLEMS

Stress spurs anxiety problems, therefore unmanaged and prolonged anxiety leads to depression. It is estimated that 20% of adolescents in the Western Pacific Region will experience an anxiety episode in any given year in the future. (Ministry of Health Malaysia, 2020). Among Malaysian undergraduate students, the prevalence of moderate depression was found to be 27.5% and 9.7% found as severe or extremely severe depression. (Islam. M.A. et al., 2018).

Depression can influence a student's lifestyle and can lead them to high-risk behaviour such as self-injurious behaviour and suicidal ideation. This unhealthy phenomenon is worrisome and needs serious attention.

Students are a part of the environment; the health of individuals and the health of the physical and social environment are mutually dependent. People and green spaces are tied by interconnectivities which can be premised in affective and emotional responses and ultimately reflected in people's perceptions of their environment and their articulation (Speake. J. et al., 2013). Green space most strongly protects against mood disorders, depression, neurotic behaviour, and stress-related issues, the study found, signalling that psychological restoration may be the strongest protective mechanism that green space offers (NASA, 2019). The effect of green space is also dose-dependent, meaning those who have longer exposures to green space have greater mental health benefits (NASA, 2019). In addition, the studies on the therapeutic gardens have shown benefits such as the reduction of chronic pain, improvement in attention, lessening of stress, and reduction of falls are now increasingly being recognised as an important aid in healthcare (Foke, A. et al., 2017).

The aim of the study is to find out student perceptions of Academic Green Space (AGS) and the use of AGS within the setting of the university campus environment. The objectives of the study are as below: -

1. To analyse the effectiveness of Academic Green Space (AGS) on undergraduate students' wellbeing.
2. To determine the factors of Academic Green Space (AGS) that suit the undergraduate student's interests

METHODOLOGY

The initial field observation studies were conducted at a selected site within the university campus environment, known as Lala Land by using images from Google Maps 2022 and site photos as seen in Figure 2.

Figure 2

Lala Land as AGS, adjacent to Annex 1 building.



(Google Maps 2022 and Zainal 2022)

Lala Land is situated adjacent to Annex 1 building (as indoor learning spaces mainly for undergraduate students from the architecture department) and is freely accessible, well connected to students' facilities and accommodation areas. Healthy Academic Greenspace Framework (HAGF) analysis was applied to understand on how the physical space of Lala Land with specific features and its location can be benefitted students to experience the therapeutic landscape. Discovered only three (3) dimensions of therapeutic landscape at this place, there are, i) Symbolic space, ii) Social space and iii) Experienced space.

Then, through the analysis of specific features' qualities, only six (6) qualities of PSDs existed: Social, Prospect, Rich in Species, Serene, Space and Nature. Refuge and Culture of PSDs did not exist because Lala Land is not a secluded place and doesn't have signs of human labour and not a historical place. It is merely outdoor green space in the university campus that connects student from their facilities and indoor learning space. The detail to the qualities of PSDs for Lala Land, as follows: -

1. Social where undergraduate students are able to watch entertainments, exhibitions and visit open air stall
2. Prospect where undergraduate students can experience the open space, well cut grass surfaces and vistas over the surroundings
3. Rich in species where undergraduate students see variety of species of flora and fauna, like monkeys, birds, butterflies, and plants
4. Serene where undergraduate students can feel silent, calm, and possible not to meet too many peoples
5. Space where undergraduate students can experience the spaciousness, free, and possible to find areas not crossed by roads and lots of trees
6. Nature, where undergraduate students experience the nature and free growing lawn.

Ultimately, quantitative methodology was applied to analyse these three (3) factors, i) accessibility and walkability to Lala Land, ii) dimensions of therapeutic landscape concept and ii) the existing qualities of PSDs. Therefore, close ended questionnaires were distributed to the 50 undergraduate students from the Architecture Department as their learning spaces mainly at Annex 1 building adjacent to Lala Land. The questionnaires focus on the architecture student's perceived to physical, mental, and social well-being in relation to the three (3) mentioned factors, the following questions are divided to 3 parts:

1. Part 1 is about student's personal data (sociodemographic and academic profile) and interlinkages of their indoor learning spaces at Annex 1 with Lala Land.
2. Part 2 is about purposes, functions, and potential of Lala Land as AGS that located within university campus environment.
3. Part 3 is about perceived wellbeing throughout studying at UiTM Perak, Seri Iskandar Campus.

RESULTS

The following section summarizes of the results according to the three parts of research questions.

Part 1: Student's Sociodemographic and Academic Profile and Interlinkages of Their Indoor Learning Spaces at Annex 1 with Lala Land

A total of 50 respondents participated in the survey, among them are 23 males and 27 females. The selected respondents are among the undergraduate students (aged 20 to 24 in 2022) from semester one (1) to semester eight (8) of Architecture Department, School of

Architecture, Planning and Surveying, UiTM Perak, Seri Iskandar Campus. Apart from it, 90% of the respondents are single and only 10% mentioned having a relationship.

76% of the respondents agreed that their indoor learning spaces were provided with balcony or wide corridor and only 24% disagreed.

Lala Land can be accessible within a short distance by the respondents, with a noticeable and safe entrance points as well as safe and pleasant access routes. 64% of the respondents estimated the distance of their indoor learning spaces to Lala Land is only between 100-200 meters, 30% respondents estimate between 300-400 meters and only 6% respondents estimate less or 500 meters.

46% of the respondents spent 10-20 hours per week at the Lala Land, 22% spent 21-30 hours per week, 20% spent 31-40 hours per week and only 12% spent 41-50 hours per week.

Part 2: Purposes, Functions and Potential of Lala Land as AGS Within the University Campus.

On a working day, 96% of the respondents spent less than 30 minutes a day at Lala Land and only 4% spent between 1 to 2 hours a day. Quite difference percentages on the weekend which 58% of the respondents spent about 1 hour or less a day and 42% of the respondents did not visit the site at all.

Figure 3 shows the types of activities students spent time at Lala Land, i) 32% of the respondents that are visiting Lala Land are to get benefit from the time spent in nature, ii) 26% are relaxing during breaks or spending their free time, iii) 22% are meeting friends, iv) 10% are doing physical activities for health benefits, v) 6% are being alone and vi) 4% are enjoying the presence of other students.

Figure 3

Activities Spent at Lala Land (Zainal 2022)



Figure 4 shows the purpose of choosing or using Lala Land, i) 76% of the respondents choose to visit Lala Land instead of other green spaces within the campus because of easy accessibility, ii) 10% due to positive association with AGS, iii) 8% due to presence of many students during working days and iv) 6% due to proximity to accommodation and Annex 1 building.

Figure 4
Purpose to Choose or Using Lala Land (Zainal 2022)

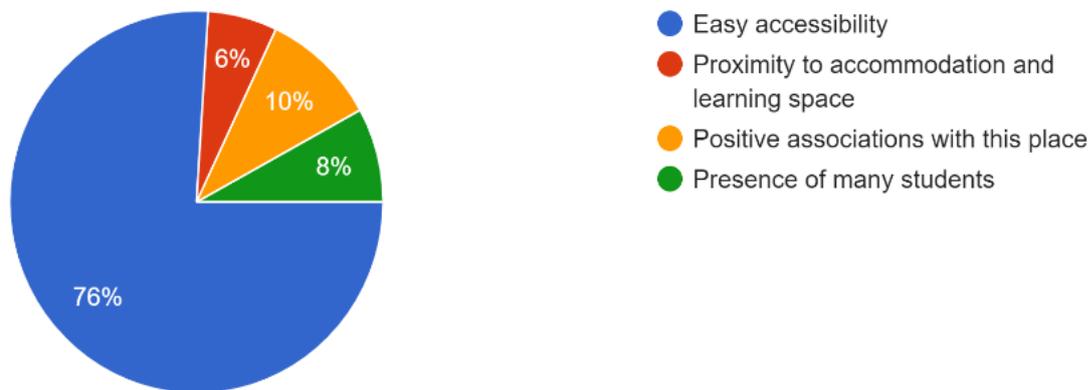


Figure 5 shows the functions and potentials of Lala Land as AGS where. i) 47 number of the respondents agreed that Lala Land portrays the image of UiTM Seri Iskandar Campus as a green campus which is the fundamental element in shaping the image of university, ii) 40 number of respondents agreed that Lala Land makes a considerable contribution towards improving their personal wellbeing and iii) 27 number of respondents agreed that Lala Land is a place for recovery during submission or examination phases.

Figure 5
Functions and Potentials of Lala Land as AGS Within University Campus (Zainal 2022)

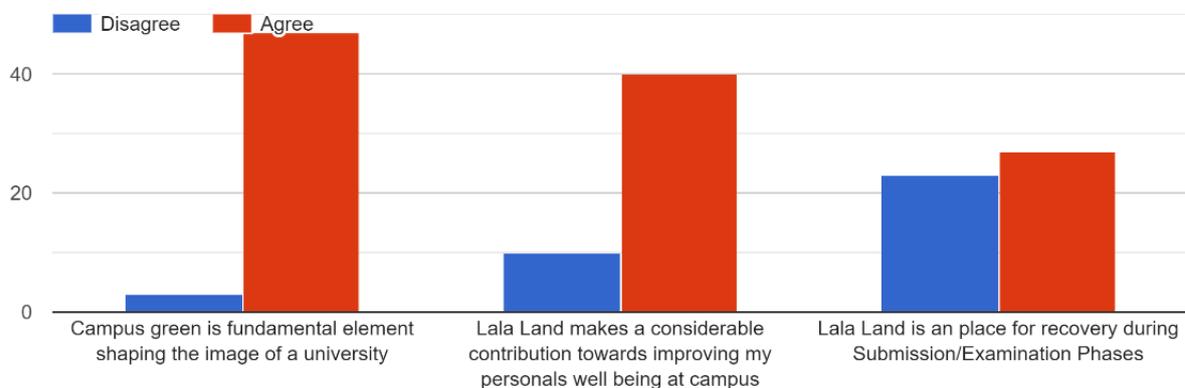
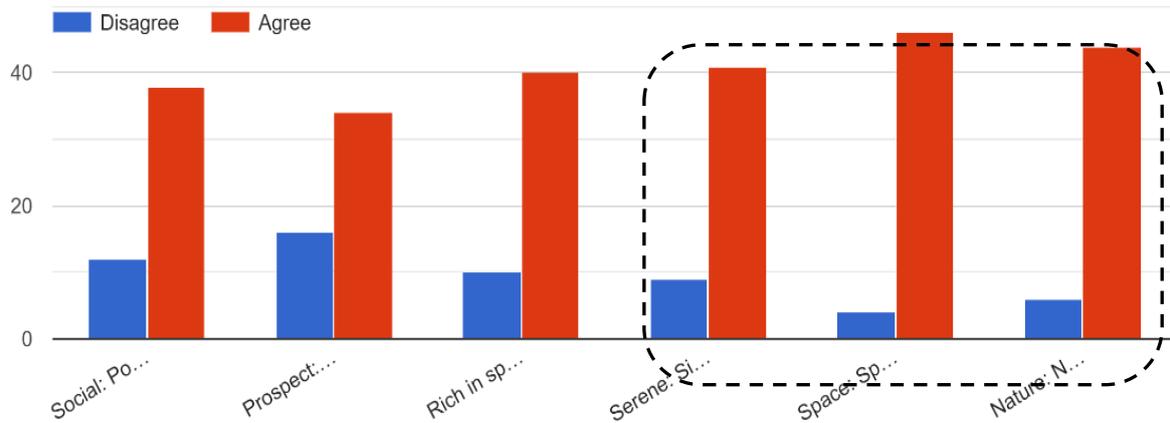


Figure 6 shows the existing six (6) qualities of PSDs, where i) 46 number of respondents agreed with Space due to spacious space, free and possible to find areas not crossed by roads and lots of trees, ii) 44 number of respondents agreed with Nature due to free growing lawn, iii) 41 number of respondents agreed with Serene due to silence, calm, and the possibility not to meet with too many people, iv) 40 number of respondents agreed with Rich in Species due to the presence of animals (monkey, birds, and butterfly) and plants, v) 38 number of respondents agreed with Social due to possibility to watch entertainment, exhibitions and visit open space and vi) 34 number of respondents agreed with Prospect due to plane, well cut grass surfaces and vistas over the surroundings.

Figure 6
The Existed Six (6) Qualities of PSDs (Zainal 2022)



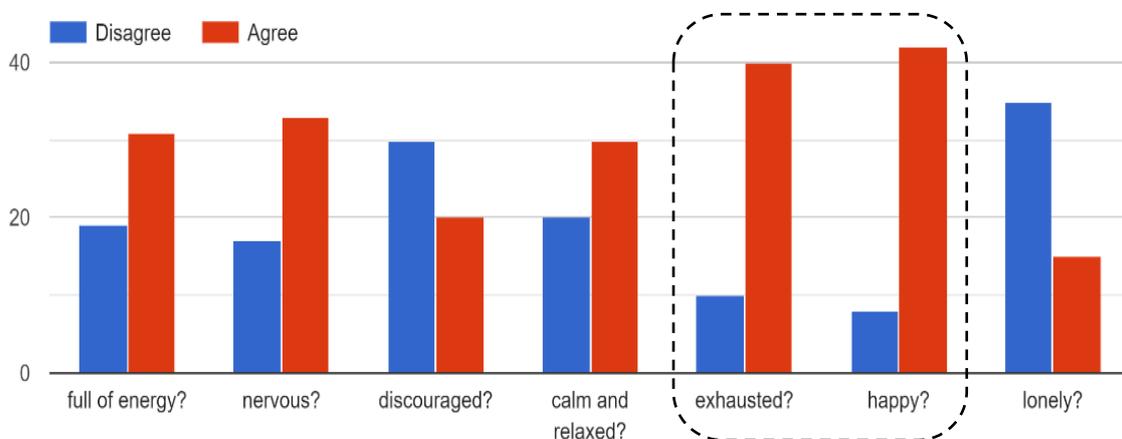
Part 3: Students Perceived Wellbeing Throughout Studying at UiTM Perak, Seri Iskandar Campus

In general, 96% of respondents are content with their life with only 4% of respondents not satisfied. Family and leisure activities are the main areas contributing to respondents' wellbeing. The second area is the areas of studying at UiTM Seri Iskandar Campus and the respondents' accommodation. The third area are sport, financial and relationship.

Unfortunately, it is found that 40 number of the respondents are also suffering from time pressure, 37 number of the respondents suffering from heavy course loads, 31 number of the respondents suffering from concentration difficulties and 30 number of the respondents suffering inner restlessness. Their stress level related to their study was increased by 26% during the submission or examination phase and reduced by 10% during the semester break.

Figure 7 shows respondents' feeling while studying in university, where i) 42 number of the respondents are happy studying in UiTM Seri Iskandar while ii) 40 number of the respondents are exhausted. These show that learning activities are enjoyable yet tiring.

Figure 7
Respondents' Feelings, While Studying in UiTM Seri Iskandar (Zainal 2022)



DISCUSSION AND ANALYSIS

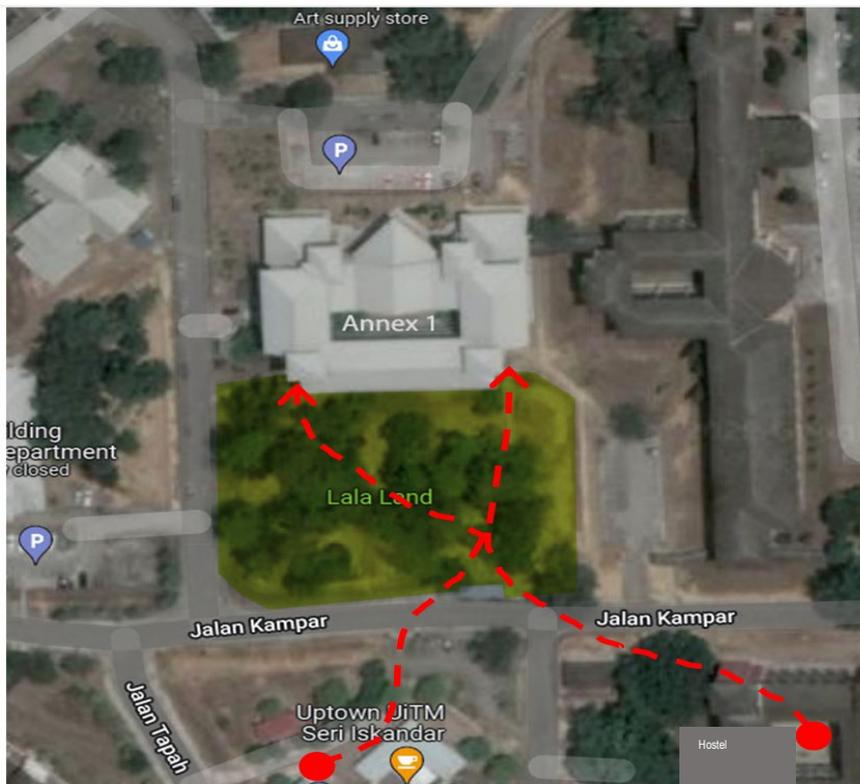
The following section summarizes the findings according to the research's results.

Physical Space with Easy Accessibility

The physical space of Lala Land can be measured by i) its specific features like its natural atmosphere, matured trees, free growing lawn, and the size of land is approximately double of Annex 1 building (if roughly measured on Google Maps) and ii) its location is easy accessibility because a total of 82% students agreed to use Lala Land due to easy accessibility and proximity to their accommodation and learning space, also total of 94% students estimated the distance of their indoor learning spaces to Lala Land is between 100-400 meters. Thus, making Lala Land set within comfortable walking distance, Olson, J. suggested about 400 meters of distance consists of approximately 5 minutes walking. It is shows that Lala Land laid on the strategic route from students' accommodation and student's facilities to their learning space as seen in Figure 8.

Figure 8

Strategic Routes from Students' Accommodation and Facilities to Annex 1



(Google Maps, 2022)

HAGF with Therapeutic Dimensions

As the physical space of Lala Land contained specific features like natural atmosphere, matured trees, free growing lawn, and spacious size of land, shows Lala Land has appropriation dimensions to be extended to therapeutic landscape concept. There are three (3) dimensions, discovered on Lala Land as follows: -

- i. Symbolic space: 94% or 47 number of the students agreed that the Lala Land portrays the image of life at UiTM Seri Iskandar Campus as a green campus that

is a fundamental element in shaping the image of university. Furthermore, Lala Land makes a considerable contribution towards improving students' personal wellbeing. The place also indirectly creates a sense of identity and emotional bonding between the university and students.

- ii. Social space: On a working day, 96% of the students spend less than 30 minutes a day at Lala Land with a total of 52% of them are doing variety of social activities like i) relaxing during breaks, ii) meeting friends, and iii) enjoying the presence of other students. These show that there is an extent of communication between students and the healing outdoor environment although within the short period of time.
- iii. Experienced space: 80% or 40 number of students agreed that Lala Land makes a considerable contribution towards improving their personals wellbeing and some of qualities of PSDs may contribute to the experienced space of therapeutic dimension. With 92% or 46 number of students agreed with Space quality due to spaciousness, free and possible to find areas not crossed by roads and lots of trees then followed by Nature and Serene qualities. Combination of these dimension and qualities, potentially will create fascinating green space for undergraduate students for them feel content and reduced mental fatigue.

Therapeutic Benefits from Lala Land

Convincing percentages and numbers on the analysis to the physical space, dimensions of therapeutic concept in HAGF and qualities of PSDs. Lala Land offers opportunity for student to experience the therapeutic or healing environments in the campus that potentially become part of the culture in students' life, and this provides tremendous benefits to the students, as referred to Table 1.

Table 1

Benefits of Therapeutic's Dimensions to Undergraduate Students, (Zainal, 2022)

Therapeutic's Dimensions	Benefits
Symbolic Space	Green campus image and sense of belongings to the higher education space.
Social Space	Positive experiences lead to happiness and enhance well-being.
Experienced Space	Feeling content and reduce mental fatigue.

Interlinkages Between Therapeutic Dimensions and the Qualities of PSDs

Students enjoyed the existed six (6) qualities of PSDs on Lala Land; the qualities of PSDs should become a tool of benchmark to the therapeutic garden as healing aid. There are connections between therapeutic dimension and the six (6) qualities of PSDs as listed in the Table 2.

Table 2*Interlinkages Between Therapeutic Dimensions and the Existed Six (6) Qualities of PSDs*

Therapeutic's Dimensions	Benefits	Quality of PSDs	Effects
Symbolic Space	Green campus image and sense of belongings to the high education space.	Prospect – open space with vista Rich in Species– variety of species of flora and fauna	Positive happy life.
Social Space	Positive experiences lead to happiness and enhance well-being.	Social – social arena with possible to watch entertainments, exhibitions and visit open air stall	Positive happy life.
Experienced Space	Feeling content and reduce mental fatigue.	Space - spaciousness, free, and possible to find areas not crossed by roads and lots of trees Nature - nature and free growing lawn. Serene - silent, calm, and possible not to meet too many peoples	Being away and to interact with nature and friends can reduce mental fatigue. Close interaction with plants (soft landscape) can revive the energy. Being away and contemplates to nature can forget about the stressful life.

*(Zainal, 2022)***Implication of Lala Land as AGS Within University Environment**

Lala Land has significant implications to undergraduate student's wellbeing because students' emotional reaction to natural spaces where being in a natural environment that embraces, i) therapeutic dimensions with qualities and ii) viewing natural elements (flora, fauna, and vista), will activate a positive affective response. This results in a decrease of stress in individuals, which involves reduced levels of negatively toned feelings and reductions in elevated physiological conditions especially during learning time. Lala Land has the potential to be developed as therapeutic garden as it can provide the effects of a holistic (mental, social, and physical) healing space.

CONCLUSION AND RECOMMENDATIONS

From the discussions, it was suggested that three (3) main factors that suit the undergraduate student's interests and these factors need to be considered during planning and design phases. The factors are: -

- i. Strategic location with easy accessibility, walkability and adjacent to students' facilities, accommodation, and indoor learning spaces.
- ii. HAGF with Symbolic space, Social space and Experienced space dimensions of therapeutic landscape concept, where students feeling content and reduce mental fatigue.

- iii. The Space quality of PSDs is the most preferred because students are keen to experience spacious green spaces that are free and possible to find areas not crossed by roads and lots of trees.

However, a few improvements need to be made onto Social space dimension of therapeutic landscape, where this space should have more activities that can attract undergraduate students to spend more time at Lala Land.

Interlinkages between therapeutic dimensions and the qualities of PSDs can be developed as guidelines or check list for future research. These can be used as tool for planning and designing a green space within university campus environment. The check list suggested to be used during preliminary and conceptual design phase to ensure the qualities of PSDs are well implemented, and then therapeutic landscape can be functioned as healing aids are achievable.

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Tarikh : 20 Januari 2023

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Cawangan Perak



Tuan,

**PERMOHONAN KELULUSAN MEMUAT NAIK PENERBITAN UiTM CAWANGAN PERAK
MELALUI REPOSITORI INSTITUSI UiTM (IR)**

Perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pihak kami ingin memohon kelulusan tuan untuk mengimbas (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.

3. Tujuan permohonan ini adalah bagi membolehkan akses yang lebih meluas oleh pengguna perpustakaan terhadap semua maklumat yang terkandung di dalam penerbitan melalui laman Web PTAR UiTM Cawangan Perak.

Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

“BERKHIDMAT UNTUK NEGARA”

Saya yang menjalankan amanah,

SITI BASRIYAH SHAIK BAHARUDIN
Timbalan Ketua Pustakawan

nar

Setuju.

27.1.2023

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