

Study-related Stress and Campus Design

Adolescents' Perception on Nature, Restoration from Study Related Stress and Campus Landscape Design

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Abstract

This article was started with the intention to contribute more study on designing landscape based on people preferences and ability to perceive nature and natural environment. Specifically, the study is intended for college students under study-related stress and that their ability to get restored is influenced by the way they experience and perception of nature during their adolescent. The question is on how landscape architects help to design campus landscape that contained students under study-related stress? A hypothesis is formulated from literature review on prominent sources about adolescents' perception on nature, restorative effect of nature, study-related stress and campus landscape design. A small survey of online questionnaire was conducted among Dutch students in Wageningen University to support to develop the article to be more firmed. The literature review has revealed that people need to be stimulated early to have restorative aspect to be more effective. However, the questionnaire do not show strong conclusion in supporting the hypothesis. This is due to the common cultural background and cultural landscape of The Netherlands is homogenous.

Keywords: *Adolescents' Perception on Nature, Restorative Effect of Nature, Study-related Stress, Campus Landscape Design*

I. Introduction

As a landscape architect, it is crucial to put people in mind when designing space because people as human beings are the main user of the designed space. Theories and guidelines of landscape design are mainly addressed for people in general. However, there are different age groups of people that have different abilities of perceiving and experiencing their environment. In this case, landscape architects are challenged to investigate different age groups' need and ability of perceiving and experiencing their environment in order to contribute in the design guideline or principle.

This article focus on adolescent, an age group between 10-19 years old that is considered to have a certain phase on brain development and the development of their behaviour (Pediatrics 2009). In several studies, researches have argued about children or young people worldview on environment. Manoli et al (2007) research on modifying and validating new environmental paradigm (NEP) was done on the age group of 10-12 years old while other researchers like Van Petegem et al (2010) continues the research and focus on adolescents' environmental worldview and their personality. Those studies were aimed to better understanding on environmental education for young age. However, no study has been done that specific to the implication of adolescents who have less experience on nature and natural environment.

Study related to stress is one of the major issues in campus building. Stress, tiredness and fatigue are the effects that present after 45 minutes of continuous concentration. Students break every 45-55 minutes after listening lectures or working in front of a computer. During breaks, students go out of the building to walk and sit in open air and some even stay inside and only look at the greens outside their windows. These activities are done in order to relieve from fatigue or to get restored from stress. Rachel Kaplan who wrote an article on the role of nature in working place believes that natural environment can foster many desired outcomes, even if the employee does not spend a great amount of time in natural setting or simply by viewing from window can have positive impact with respect to well-being (Kaplan 1993). Architects and interior designers design campus buildings and rooms with large windows and put plants inside to give the effect of relaxation and calm during their study. While Landscape architects have better dealt with natural outdoor setting. This will encourage their role in helping to restore stress by

designing campus landscape for different childhood background interaction with nature and natural environment.

In this article, I am investigating about the effect of nature and natural landscape experience and preferences during adolescents and post-adolescents with the ability of restoration from study related to stress during college time. As a landscape architect, the question of this research will be to find out on how a campus landscape design helps to restore students from study related to stress. The strategy is to formulate hypotheses and argue them by literature review and simple survey questionnaire spread to several Dutch students in Wageningen University regarding their childhood experience and preferences with nature and natural landscape, and campus landscape around the Forum Building of Wageningen University. In this article I will use knowledge based on literature exploration on prominent sources and research in relation with adolescent's perception on nature, restorative effect of nature and Study-related stress.

1.2 Research Questions

How can landscape architects help to design campus landscape that contained students under study-related stress?

1.3 Method

I reviewed prominent journals and books in the field of environmental psychology which is more specific to restorative effect of nature, the effect of nature in relationship with adolescent cognitive development and study related stress by using full text electronic access and hard copy at the library of Wageningen University and Research Centre. During the review I realized that most of the literature is too general and not specifically related to the topic. Thus, together with my supervisor we decided to have a small survey as a supplement to develop the article to be more firmed. I conducted a free online survey within Dutch and international students in Wageningen University. The target groups of respondents are non-Landscape Architecture students, who will answer general knowledge about nature and natural environment, their mental performance during study and their childhood experiences to find out their ability on perceiving benefit from nature without any interference from a certain theory. The students are mainly Dutch students. However, non-Dutch respondents are also welcome to contribute on the recommendation

for the campus landscape which will be presented at the end of the article. The survey was a questionnaire of 35 questions divided into three themes. The first theme is to group the respondents based on their general information, the second is to look at their holiday landscape influence and nature experience, and the last theme is to look at their opinion on future campus landscape and restorative from stress. To analyse results of the questionnaire, I used the method by grouping answers of each theme and derived conclusions from it.

II. Literature Review

I looked at several sources of literature in relation with the topic. The literature review was done in order to support and develop the basic idea of this article into a hypothesis. In line with the hypothesis, the literature review was also to help in composing proper questions for the questionnaire. From broad field of environmental psychology, I looked at adolescents' perception on nature, restorative effect of nature, study-related stress and campus design.

2.1 Adolescents' Perception on Nature

In the classification of age, National Centre for Health Statistics (NCHS) divides adolescent as early adolescent (10-14 years old) and late adolescents (15-19 years old) (Bell 1993). The ability of a specific age to perceive or experience their environment starts since they were an infant. In this phase of life they get the influence from culture, surrounding environments and the way their parents raised them. However, as they grow older and become a young child, they learn to perceive and understand the environment. Manoli et al (2007) research on modifying and validating new environmental paradigm (NEP) was done on the age group of 10-12 years old while other researchers like Van Petegem et al (2010) continue the research and focus on measuring adolescents' environmental worldview and their personality. Those studies were aimed to better understanding on environmental worldview of adolescent. The environmental awareness is very important for youth as they will grow up to be the decision-makers of the future (Van Petegem and Blieck 2006). Not only of special importance for the continuous of the world but also for their personal benefit.

How does a young child perceive and understand his environment? Tuan (1975) brought up this question and wrote on his book the relationships among space, place and child. Children recognize the environment that is familiar for them; however they cannot or do not name the space just like that. A young child distinguishes between “home” and “outside” as his play areas rather than “my bedroom” and “garden” (Tuan 1975). Parents tell their children where to do what in their home, for instance, when having dinner they have to sit in the dining room or playing soccer outside in the backyard or neighbourhood playground instead of kicking a ball in the living room. Parents also take them to nature and the surroundings, but they do not care nor are aware why trees or rivers are there. What they do know is familiar places where their parents usually take them to play. This is why later when they are much older and being asked about their favourite places the answer will be the places where they had fun and familiar with. Thus, children also need to be stimulated by their senses of a place so that it will stay in their memory.

In the elementary school, those experience and knowledge of the environment expand and are deepened when their teacher asks them to describe pictures of places and landscape. When shown a picture, the older pupil is often able not only to say what it is (village, city, etc.), what it consists of, but also to put the place in its larger geographical context; he describes not only what the people shown in the picture are doing (mowing the lawn, shopping, etc.) but also attempts to explain how the place functions (Tuan, 1975). Children have their own world in their mind that is different from adults. Child’s imagination is tied with activity (Tuan, 1975). Unlike adults, their pure mind is still empty from problems and incidence. Yi Fu Tuan (1974) emphasizes more in explaining children worldview on their surroundings as shown quoted below:

A child, from about seven or eight years old to his early teens, lives in this vivid world much of the time. Unlike toddler, the older child is not tied to proximate objects and surroundings, he is capable of conceptualizing space in its different dimensions; he appreciates subtleties in colour and recognizes harmonies of line and volume. He has much of the adult’s conceptual ability. He can see the landscape as a segment of artfully arranged reality out there”, but he also knows it as an enveloping, penetrating presence, a force.

As Tuan's book written on the America's 70's era, today the idea of children worldview on their surroundings might need to be adjusted. Van Petegem et al. (2010) conducted an explorative study on measuring children environmental worldview by comparing New Environmental Paradigm (NEP) designed by Dunlap and Van Liere (1978) and Dunlap et. al (2000) with the latest Environmental Education Initiatives (EEIs) that was specially designed for children and adolescents. They argue that using original or revised NEP scale to study youth environmental worldviews would provide inaccurate results because it was designed for adults, and children have different vocabulary and concept of nature, ecology and the earth. Furthermore they found that, six to eight years old tend to view animals as subservient, non-sentient organisms with no autonomy while ten to twelve recognize animal as having autonomy and feelings. To continue, age thirteen and fifteen understand basic ecological principles and begin to see the emergence of an appreciation of the potential intrinsic value of nature (Eagles & Muffit, 1990 in Van Petegem et. al, 2010).

Evaluating the environmental worldview of adolescent using NEP, the research found that it can be changed by EEIs and it is stable if not subjected to EE. This is due to young people's attitudes are not generally regarded as being very stable (Vaillancourt, 1973 cited in Van Petegem, 2010). However, recent findings from Jhonson and Manoli (2008, cited in Van Petegem, 2010) suggest the worldviews can be considered stable and were mainly pro-environmental. At the end, they concluded that the changes in young people's environmental worldview have common underlying factors which cannot be controlled during the study. Furthermore they mentioned the factors are socio-demographic variables of crude stereotype such as: young, city-dwelling, single-family, well-educated, high-income and politically liberal females who are tend to be more pro-environmentally orientated. Thus, family upbringing is play important role in introducing and educating their children about their surroundings, nature or built.

2.1.1 Nature Deficit Disorder

Discussing about family upbringing, Richard Louv (2009) wrote the US Bestseller book *Last Child in the Wood: Saving Our Children from Nature-Deficit Disorder* to educate parents on how important it is to have their children involved in nature. In his book, he mentions that several studies suggest that thoughtful exposure of youngsters to nature can even be a powerful form of therapy for attention-deficit disorders and other maladies.

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He also refers to one scientist assumption that just as children need good nutrition and adequate sleep, they may very well need contact with nature. Louv refers to Robin Moore, an expert of design of play and learning environment, that natural settings are essential for healthy child development because they stimulate all the senses and integrate informal play with formal learning. Moreover, he says that multisensory experiences in nature help to build “the cognitive constructs necessary for sustained intellectual development, stimulate imagination by supplying the child with the free space and materials for what he calls children’s “architecture and artefacts”.

More on Louv’s book, he shares stories of how different age era of American children used to play in nature. To be short, American children during the ‘baby boomers’ in early 50s enjoyed a kind of free, natural play that seems, in the era of kid pagers, instant messaging, and Nintendo, like a quaint artefact (Louv 2009). To compare, he argues that the way children understand and experience nature today has change radically. Their perception on nature and environment has more to do with global threats such as acid rain or holes in the ozone layer or global warming (Louv 2009). If on the 50s children things nature is their playground, today they see nature is something that needs to be preserved or take care.

Coincidentally, Louv’s popular writing research not only speaking about American context, but also he took example from the Western European environment setting and he described the Netherlands. He put under the title *Green Urbanism: The Western European Example*. He compared that in America people tend to think that true nature can only be found on the pristine, remote extremities of civilization that has less to do with human’s everyday world. While in Western Europe such The Netherlands cities and suburb are becoming more liveable and loveable by protecting and regenerating nature. The development of so called Het Groene Dak (The Green Roof) is incorporated as a communal inner garden car-free zone where children can play safely. In line with the development, facilities and spaces like playground contained forts and sand digging for children to play are rising with special zones and safety procedure. Parents allow their children to play outside because they know that it is safe. This idea of built nature in the Netherlands that makes children perception on nature is somehow different from those in America where such a thinking of allowing children play unsupervised is bizarre and threatening.

2.2 Restorative Effects of Nature

According to Merriam-Webster online dictionary, as a noun, 'Restorative' refers to something that serves to restore to consciousness, vigour, or health. In terms of health, restorative is used to describe condition of human physically and non physical. Restorative can be understood in different way. Other terms of environmental psychology, the term restorative is a state where ones are able to perceive the benefit of nature and return to a normal state of mind. Other explanation on restorative is explained in Design with Nature, by McHarg where he discussed about the relationship between Health and Pathology in which health is seen as synthesis factors of creativity and fitness and where stress exists, pathology will occur. In this notion, *creativity* refers to the raising of matter to higher level of order (MacHarg 1969). McHarg then elaborated that creativity as negentropy through the physical entrapment of energy and fitness is if the earth is fit for life and all of its manifestations, that the surviving and successful organism, species and community are fit for the environment. If fitness and creativity can be combined into the raise level of energy that synchronize with the way of nature works, then my definition of creativity is on the ability be fit with nature and get the benefit from it. Restorative is being able to absorb the energy of nature into a stable state of mind.

In addition to understand about restorative as the benefit from nature, Rebecca Krinke (2005) explained in her article that a "restorative" environment provides measurable physical and/or psychological benefit to human health. She continues with the idea that derived from Ulrich's research that contact with nature, especially vegetation, has measurable restorative effects (Krinke 2005). Furthermore, Krinke tries to use the idea of contemplative landscape and how the research and theory of restorative environment can be useful tools to examine and evaluate. Krinke started by the definition on contemplation as "fixed attention" and contemplative energy that can be directed at anything. To support the definitions she mentioned that synonyms of contemplation include "reflect" and "ponder", highlighting that contemplation is often seen as state or activity where we are more consciously focused on our thoughts – and often implying "higher level" thoughts involved with questions of self, relationships, cosmos-than in our typical day-to-day thinking. Another word she tries to explain also as the synonym of contemplation is meditation, which suggest that contemplation may be an activity or process that seeks inner silence, or freedom from thought.

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In connecting contemplation and restorative space, Krinke suggests that for a setting to be restorative, *it must elicit our fascination*: a state where our attention is intrigued and captured. The Kaplans' category - "soft fascination"- is the described as the best form of fascination to encourage a reflective mood. Watching clouds, the motion leaves, or the play of light is given for examples as soft fascination. In conclusion, restoration from stress or perceptual fatigue should be fostered by settings having stimuli, such as plants, which are low in intensity, and incongruity that reduces and arousal processing efforts (Krinke, 2005 on Ulrich and Parson op. cit., p.95). Second, *a sense of being away* is important to a restorative experience. Being away can refer to a sense of physical separation from your everyday world or a sense of being removed from everyday activities. The third is extended, to described the feeling or quality of being in a different world (physically or perceptually), and yet connected to a larger whole. The setting activity should reveal that there is a more to explore than what is easily visible to the eye. Extent implies *a balance between order and mystery*. The final Kaplans' attribute is *compatibility*; where the environment supports the visitor and doesn't demand and effort in directed attention. A setting where individual feels safe, but not bored, is important. This setting is to capture one's involuntary attention, and diminishes other thoughts and concerns. At last she concludes from Kaplans' that increasingly high quality restorative settings are needed to achieve the highest level of restoration.

Speaking about restorative as the benefit from nature, people perception to nature is different in the way their body connect to the environment. The way it is differentiate is also as the contribution of cultural that divide their world (Tuan, 1975). *Perception* is an activity, a way to reaching out to the world (Tuan, 1974). Moreover, Tuan explained that perception can be stimulated by using the senses, because our tactile senses are very delicate to tell differences in the texture or hardness. In scale of human perception, the way we as human perceiving are not more than our body. In other words, we deal with things that simply surround us, on or day-to-day living. We notice our environment, plants, grass and trees in general that are seen. We would not bother to think of wild nature when we are at home, unless we live in it. It is to say that, what we perceive in our environment is simply what we have been seeing in our daily basis. Seeing, hearing, and smelling, tasting and touching are the basic human senses in a way they communicate with their environment. Among other senses, sight is one of the basic important senses.

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Traditionally, all other senses are depending on their sight to see the world before the other senses react. Compare to eyes, ears are less precise to capture detailed information of the surroundings. Most of human being neglect this part of sensory, they don't realise that olfactory has also contributed in building or bringing up old memories. To understand a person's environmental preferences, we may need to examine his biological heritage, upbringing, education, job and physical surroundings. The concepts of "culture" and environment" overlap as do the concept of "man" and "nature" (Litton 1974).

2.3 Study-related Stress

Commonly, we use or hear the word stress without knowing its exact meaning. The term 'stress' refers to the difficulties experienced by individuals as a result of perceived challenges (Mechanic 1962). Moreover, David Mechanic introduced the concept of stress in his book *Student under Stress*. He explained that the term stress has not been clearly defined in social science research but when using the word, social scientist used interchangeably to mean anxiety, depression, and difficulty, and hence its scope and applicability remain elusive. Studying is one of the activities that may cause stress and this creates the term study-related stress.

Matsuoka (2010) studies about student performance and high school landscapes where he revealed high school students have great need for restorative and stress-reducing environments (Matsuoka 2010). The stress is as the causes of school work load and the competition that student face in the college application (Mundy, 2005; Ramirez, 2009; US Department of Education, 2005 as cited in Matsuoka, 2010). Slightly different from Matsuoka, my research is intended to college students which have different pattern of study, goal and age based. Speaking about study-related stress, college students have stress and mental fatigue due a condition before facing the exam or under assignment deadline. However, they have stress not only before exam or while doing assignments but also during lecture. Common research mentioned that students are able to concentrate during lecture for 45-55 minutes. More than range of time, *durability* are lesser and causing mental fatigue. Herzog et al cited on the Kaplans about Attention Restorative Theory (ART) that intensive or prolonged use of directed attention, the kind that requires effort, leads to the fatigue of the mechanisms that serve it (Kaplan and Kaplan 1989; Herzog, Colleen et al. 2002). Research on mental restoration has focused on the role of the

environment, and especially the natural environment. Such settings have been shown to reduce both stress and directed attention fatigue (DAF) (Hartig & Evans, 1993). (Kaplan 2001)

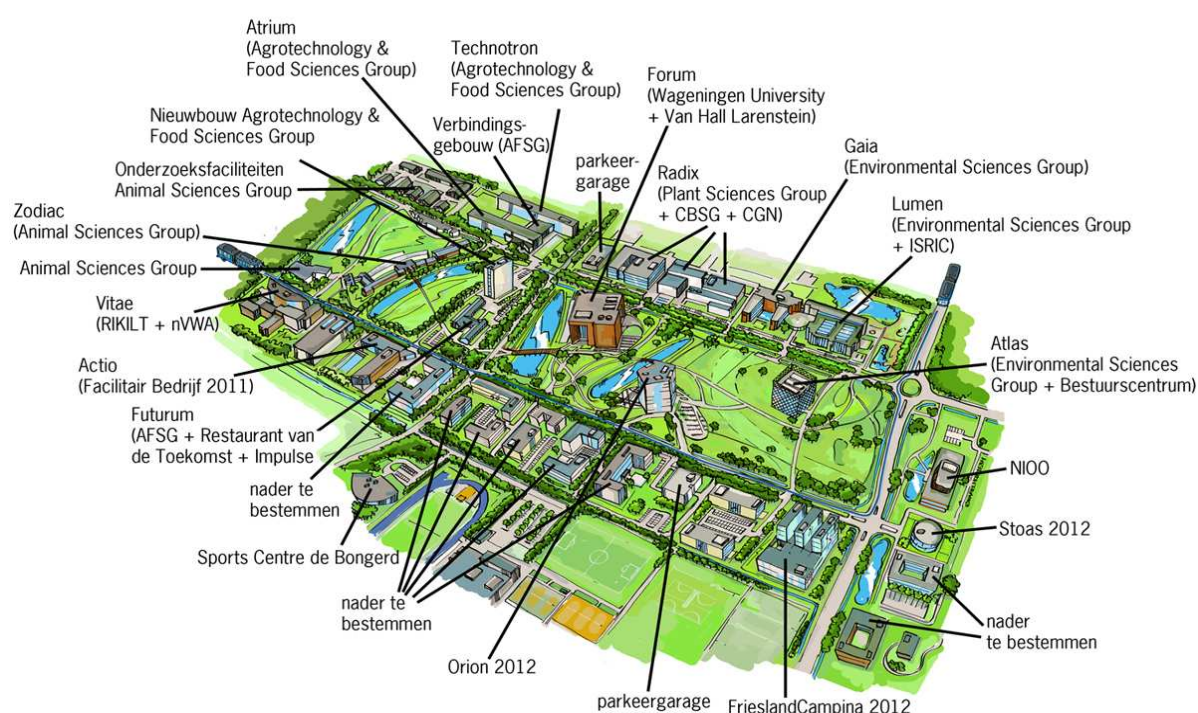
2.4 Campus Landscape Design

‘Campus’ is derived from Latin word which refers to "a field". Gradually, campus came to mean the entire property, comprising the aggregation of buildings and grounds (Balmori et al., 1985 cited in (Helsper 1988)). Other than physical meaning, the word campus also suggesting the spirit of a school, as embodied in its architecture and landscape (Turner, 1984). "Campus" summarizes the unique physical character of the American university but it is also a reflection of the school's idealism, identity and sense of community. Summarizing: "the campus reveals the power that a physical environment can possess as the embodiment of an institution's character" (Turner, 1984, p.305 in Helsper, 1988). The use of the words "campus planning" in America has a long and full history. "planning" can mean different things, ranging from the design of a single building to the creation of a comprehensive master plan; being general as well as specific, concerned with immediate requirements as well as long -range considerations, covering the campus and its environment as well as specific buildings and open sites, implementing today's educational goals while at the same time encouraging new objectives (Helsper 1988).

A campus landscape is a unique landscape type (Helsper, 1988). A physical campus, today, develops into a miniature of a city which is described in the support of facilities such as circulation and parking, campus land use, open space and recreation and economic and community development (University of Massachusetts Amherst, 1993). This complex of facilities is integrated and has to provide an environment for students to study and also to chill out at the same time.

2.4.1 Wageningen University Campus setting

Wageningen University and Research Centre campus setting is scattered in most part of Wageningen city. However, since last few years the campus activities are concentrated in the street of *Droevendaalsesteeg*. As mentioned in the website, Wageningen campus is a green oasis where the grasslands, shrubbery and forested areas are part of the ecological connection zones to the *Veluwezoom* and the *Binnenveld*. There are three main landscape elements; Greenery, Water and Mammals and birds that enrich the campus. In this research, the selected location to be the case is the landscape around Forum Building as one of the building complex in Droevendaalsesteeg.



Source: http://www.wageningencampus.wur.nl/UK/campus_overview/

The main building called 'Forum' is located in the centre of the landscape where it is surrounded by greenery and water element of artificial lake. The landscape offers various options of sitting places such as, on the grass field, artificial stones, concrete bench, and stairs on the bridge deck. However, due to long term development, most of the landscape setting is still open for new building construction. Thus, not much vegetation planted due to future planning.

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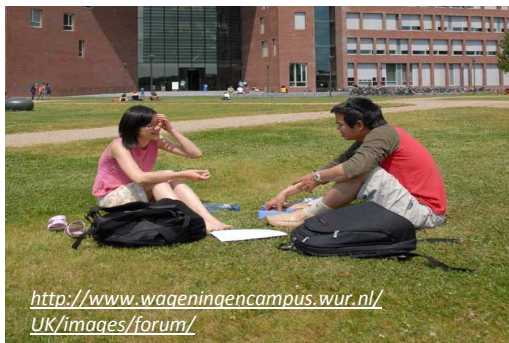
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a. Water Element: Artificial lake



b. Sitting Places: Artificial Stone



c. Grass Field



d. Sitting Places: Stairs bridge deck

III. Research Framing (Hypothesis)

From the literature review I formulate a hypothesis and summary of keywords as guidance in composing questions for the questionnaire. When I started the research, during the discussion with Paul Roncken there were three points that need to be proofed as the foundation in formulating the hypothesis. First, we suspect that people need to be stimulated early (during adolescent) in their responses towards nature and natural environments for a restorative aspect to be effective. Secondly, to speculate on the 'repairs' necessary in case adolescents did not receive sufficient stimulation and therefore lack of an inherent restorative ability, related to nature or natural features. Third is how, as landscape architects, we can help to repair such gaps by a specific campus design. Thus, the hypothesis of the article is:

University students need to be stimulated early (during adolescents) in their responses towards nature and natural environments for a restorative aspect to be effective in dealing with study-related stress.

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Table 1: Keywords as guidance for questions of the Questionnaire

Literature Review	Keywords
Adolescents' Perception of Nature	<ul style="list-style-type: none">• Recognize the environment that is familiar• Favourite places• Child's imagination is tied with activity• socio-demographic
Restorative Effect of Nature	<ul style="list-style-type: none">• Able to absorb the energy of nature into a stable state of mind.• Synonyms of contemplation include "reflect" and "ponder"• Meditation seeks inner silence, or freedom from thought.• a setting to be restorative, <i>it must elicit our fascination</i> (e.g Watching clouds, the motion leaves, or the play of light).• a sense of being away• a balance between order and mystery• compatibility• perception can be stimulated by using the senses
Study-related Stress	<ul style="list-style-type: none">• Common research mentioned that students are able to concentrate during lecture for 45-55 minutes

IV. Questionnaires and Result

4.1 Questionnaire

The questionnaire was made based on literature study to support and in trying to prove the hypothesis. From the literature review, it is found that a study about people preference and experience on nature are considerably personal. Regarding perception and experience, the questions are also formulated based on respondents' senses as human being. The questionnaire is created in order to see respondents' preference and experience by providing some questions related to their childhood background, holiday landscape preferences, and favourite outdoor activities and during activities in the campus.

Setting up a survey will provide a quantitative or numeric description of trends, attitudes, or opinion of population by studying the sample of that population (Creswell, 2009). This survey will see the preference and experience individually and from the data analysis a conclusion will be derived to support the main research.

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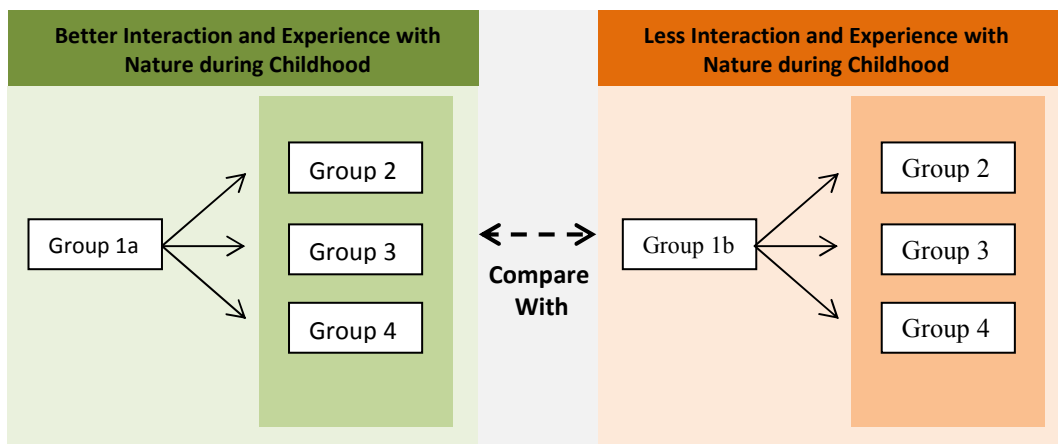
Main objective of this survey is to prove the research hypothesis as one of the ways besides literature review by looking at some trends among Dutch students in Wageningen University. The trends will be seen as tendency of students having study-related stress, beneficial effect of nature in the campus, childhood experiential background with nature and their landscape preferences.

The groupings of the answers are explained as follows:

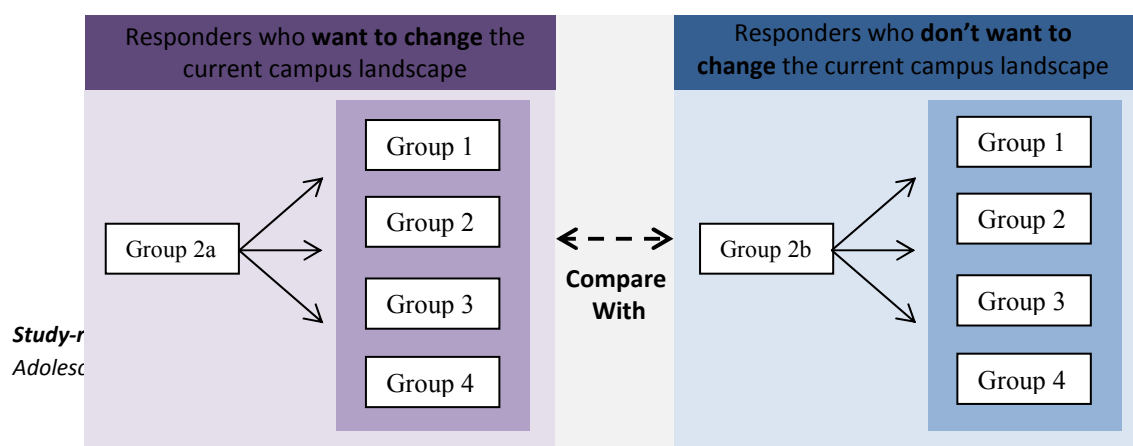
1. Group 1a: Better interaction with nature (real nature) during childhood;
2. Group 1b: Less Interaction and Experience with Nature during Childhood;
3. Group 2a: Respondents who want to change the current campus landscape;
4. Group 2b: Respondents who don't want to change the current campus landscape;
5. Group 3a: Better Coping with Stress during;
6. Group 3b: Less Coping with Stress during Study;
7. Group 4a: Nature holiday activities and landscape preferences;
8. Group 4b: Non-natural holiday activities and landscape preferences.

To derive conclusion, each group will be compared to each other, with the charts shown as follows:

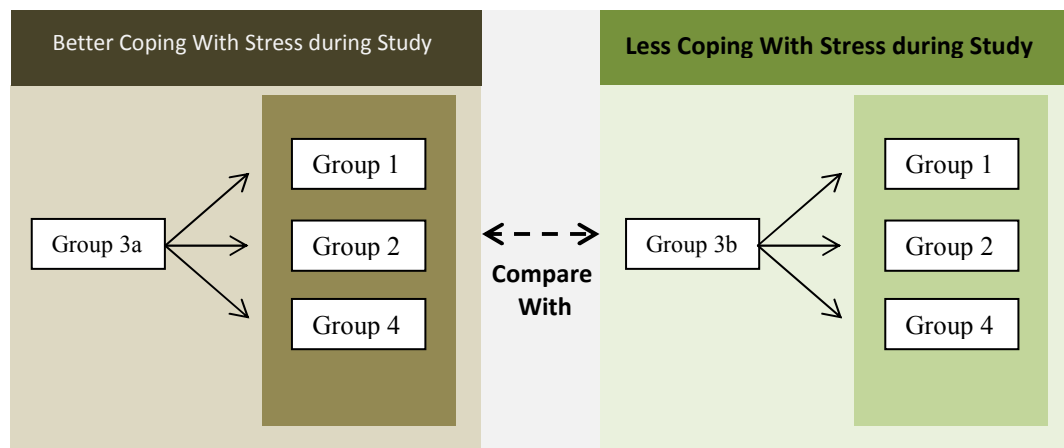
Comparison 1



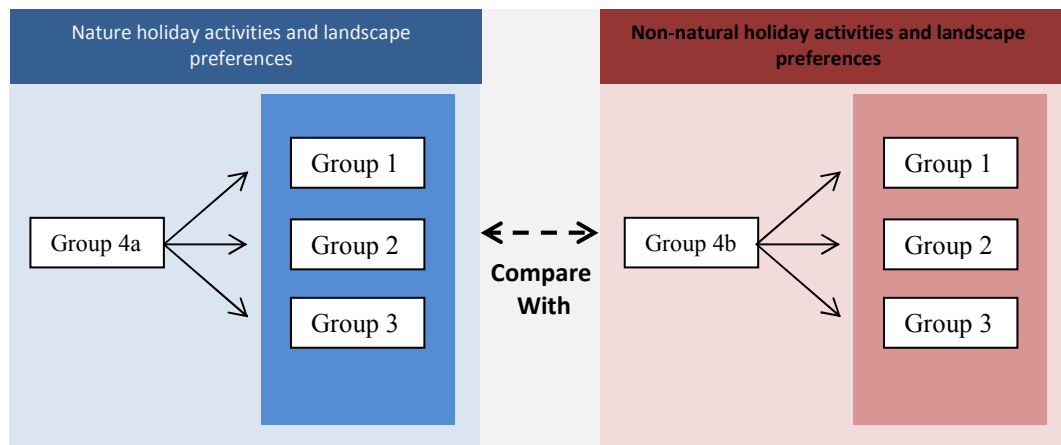
Comparison 2



Comparison 3



Comparison 4



4.2 Results

The online survey was conducted by using www.freeonlinesurvey.com. The survey was spreads among students in Wageningen University through sending link to their emails. For about 3 weeks, I received in total 74 respondents in which 50 are Dutch Students, 17 non-Dutch and 7 empty sheets (see table 2.).

Table 2: Number of Responders

No	Category	Respondents
A	Dutch	50
1	Female	22
2	Male	24
B	Non-Dutch	17
C	No Answers	3
	Total Respondents	70

For this article I only analyse Dutch respondents by looking at their answers and analysed them based on the grouping at the comparison charts. Respondent's answers are various; the trends are not showing significant numbers. This might due to the homogeneous background of the socio-cultural, socio-demographic and the culture of the landscape. To be more detail on the explanation of the results, I present analysis of each chart comparison below.

Analysis Comparison 1

This chart compares groups of students with better interaction and experience with nature during their childhood and those who have less. The trend of the survey's result shows that students who had nature area as their favourite childhood outdoor place and activities also show interest in nature like landscape in their campus. They prefer to sit in the grass or to choose to sit nearby a tree if they want to feel relax. When scaling up the elements in the landscape, they chose grass, clouds and plants as the top three elements they prefer to have in the campus landscape. When asked about elements that make them feel relax, they chose sitting on the grass and looking at greenery. In this part of the answers, the students with better childhood experiences and interaction with nature show better way in coping with stress. It is proven by their endurance during lecture in which most of them said they stand for 55 minutes or more in a lecture. In handling with stress they answered that by looking at the greenery through the windows help them to feel better and others chose to walk around the landscape to help them to get restored. To be concluded, this part of the result shows positive effect on their individual preferences on nature that might have relation with their childhood outdoor place preferences and better experience with nature where those memories are still printed in their mind. Furthermore, childhood nature experience affected in the better way of coping with stress and perceiving the effect of nature can be a stress relieve.

Analysis Comparison 2

The second chart compares respondents' who wants to change their campus landscape and the ones who don't. Students who have the idea to wanting to change the campus landscape have almost similar childhood activities after school; play in their home's back yard or in the public playground. While during the weekend, most of them stay at home to play games or watching TV and playing at the neighbourhood's playground. Although most of them prefer to stay inside, actually their parents allow them to play in nearby nature areas. They were

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living in a neighbourhood with less nature area. Asked about the campus landscape, the respondents' response that the landscape is okay and they prefer to spend time there to hang out with friends in the middle of the grass field. Scaling the element in the landscape is as follows: Grass, clouds, plants and water; and the facilities as follows: sitting places-open grass field-water related. They think the campus landscape is very helpful to help them relax. Most of them said that the grass field reminds them of their childhood memory. In conclusion, the campus landscape has most likely fulfilled their need to and expectation about nature. However, the ones who want to change or improve their campus landscape have highest expectation about nature. Some due by the cause of their childhood nature experience, although the results don't show significantly.

Analysis Comparison 3

This chart comparison shows the respondent's better coping with stress during study and the ones who have less. The respondents who endure for more than 45 minutes during lecture shows significant level of involvement with nature during their childhood. They also prefer to be away in such walking path or enjoy sitting on the grass field. However, students who have less coping with stress prefer to hang-out with friends during lecture break, to sit in the open grass field, liking the elements of grass and plants more than others, prefer to have more sitting places, like to watch wildlife and said looking at greens is helpful to feel relax. In conclusion, this comparison also does not show answers significantly different. The ones who have less coping with stress actually have the common childhood involvement with nature. However, I assume that there are other factor that influencing their answers such as biophysical condition.

Analysis Comparison 4

The last chart compares groups of the respondents who have nature holiday activities and landscape preferences with those who prefer non-nature ones. A significant answer shows, those who prefer urban tour or city sightseeing as their holiday preferences have the same backgrounds of living in less greenery zone during their childhood. However, compare to their endurance during lectures they do still able to cope for 45-55 minutes. Those prefer nature for holiday has less outdoor activities, although they are also able to cope with stress during lecture and prefer to talk with friends and sitting outside. I conclude that with the same cultural landscape background, Dutch students will almost have same interest for holiday or landscape preferences.

Study-related Stress and Campus Design

Adolescents' Perception on Nature, Restoration from Study Related Stress and Campus Landscape Design

V. Conclusion

The first idea to write this article is I suspect that students need to be stimulated early (during adolescents) in their responses towards nature and natural environments for a restorative aspect to be effective during their college time. The second hypothesis is to speculate on the 'repairs' necessary in case adolescents did not receive sufficient stimulation and therefore lack of an inherent restorative ability, related to nature or natural features. The third step is to question the role of how as a landscape architects, we can help to repair such gaps by a specific campus design.

From the study, I derived three main conclusions. First, it is true that a way to get restored is to be able to perceive the benefit of nature. In addition, there are possibilities that the ability to restore from stress and mental fatigue are depending on the way we experience and involve with nature, despite our cultural and biological background. The second, it is true that adolescents have a certain Environmental Worldview which is necessary for them to be stimulated early because during adolescents is the phase when human learns to understand their environment deeper by actively involve. The third conclusion derived from the small test of questionnaire that I conducted among Dutch students, the result showed that it is still *homogenous*. The reasons are might be possible because of the same cultural background or the same type of landscape where they are brought up. It can also be that the environmental education has been part of the educational curriculum in their school.

The third question, how a landscape architect help to design campus landscape contained students with less restorative ability. With this study as an initial finding, it will be very useful to develop design that answers the needs of different restorative ability. However, further research needs to be conducted in depth by experiments of students with the landscape elements. Thus, architects have to be more aware and concern on these experiential and perceptions on nature issues.

VI. Discussion

This study is intended to contribute suggestions for the role of landscape architects in designing a landscape for people where in this case the focus is for students under stress in campus landscape. Methods, focus and elaboration of this research are merely to stimulate new ideas and inspirations for further research. Due to limitations of time, this literature

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research that covered broad range of topic on environmental psychology and landscape design need to be elaborated in focus. Furthermore, it would be very useful to enrich this research by doing in depth experiments and interview with bigger participants. Landscape architects students and practitioners are encouraged to do detail experiments with planning and design of a campus with a restorative landscape.

VII. Recommendation

In the questionnaire, responders were asked to scale their favourite landscape elements in around Forum building and also their input of improvement for the landscape. The lists below are concluded based on the same type of answers given by the responders.

Table 3: Recommendation for Landscape Development in Wageningen University Campus

A. Landscape Elements Preference
<ul style="list-style-type: none"> ▪ Plants ▪ Grass ▪ Water ▪ Rock
B. Input for the Landscape Improvement
<ul style="list-style-type: none"> ▪ More trees to protect against the wind ▪ More rocks to sit on and larger grass fields ▪ Creating more open view in between new buildings construction ▪ Special Walking route for a temporary hideaway ▪ A small forest ▪ More natural and hilly landscape ▪ Direct connection for bikes and walkers from Forum Building to <i>De Bongerd</i> sport centre, with a bridge over the small stream. ▪ Build a fountain around the Forum Building landscape ▪ The design of the buildings is too fancy architectural and industrial style.

Reference

- Bell, N. J., Ed. (1993). Adolescent Risk Taking. California, SAGE Publications.
- Helsper, H. (1988). Campus Planning and Design in the United States. Center for Built Environment Studies School of Architecture and Planning Denver, University of Colorado at Denver.
- Herzog, T. R., P. M. Colleen, et al. (2002). "Assessing the restorative components of environments." Journal of Environmental Psychology **23**: 159–170.
- Kaplan, R. and S. Kaplan (1989). The experience of nature. Cambridge, Cambridge University Press.
- Kaplan, S. (1993). "The museum as a restorative environment." Environment and behaviour **25**: 725-742.
- Kaplan, S. (2001). "Meditation, Restoration and the Management of Mental Fatigue." Environment and Behavior **33**: 480–506.
- Krinke, R., Ed. (2005). Contemporary Landscape Contemplation. New York, Routledge.
- Litton, R. B. (1974). Water and Landscape. New York, Water Information Center, Inc.
- Louv, R. (2009). Last Child in the Woods. London, Atlantic Books.
- MacHarg, I. L. (1969). Design with nature. New York, Natural History Press.
- Matsuoka, R. H. (2010). "Student Performance and High School Landscape: Examining the links." Landscape and Urban Planning **97**: 273-282.
- Mechanic, D. (1962). Students under stress. New York, The Free Press of Glencoe.
- Pediatrics, A. A. o. (2009). "Promoting Child Development." Bright Futures: Guidelines for Health Supervision on Infants, children and adolescents. Retrieved 7th of December, 2011.
- Tuan, Y.-F. (1975). Space and Place, The perspective of experience. London, Edward Arnold (Publisher) Ltd.
- Van Petegem, P. and A. Blieck (2006). "The environmental worldview of children: a cross-cultural perspective." Environmental Education Research **12**(5): 625-635.

Nature Experiences and Preferences



Thank you for taking the 10-15 minutes of your time to fill in this questionnaire.

This survey is created for the purpose of my minor thesis research about **personal nature experiences and preferences** during your childhood and also during your activities in the campus. The survey is mainly intended for Dutch students in Wageningen University and Van Hall Larenstein, but I'm also welcoming non Dutch students to fill in this questionnaire.

Your answers will be completely anonymous.

A. General Information

1) What is your gender?

Female

Male

2) How old are you?

18-20 years old

21-25 years old

26-30 years old

Other (Please Specify):

3) What is your current study program?

Bachelor (BSc)

Master (MSc)

Doctoral (Phd)

4) What is your nationality?

Dutch

Non Dutch

B. General Information on nature experiences and preferences

5) Where are you right now?

In my room/at home

In the campus

Other (Please Specify):

6) What is your most favourite type of activity in your spare time?	
Doing sports	
Hiking	
Gardening	
Watching TV or movies	
Playing multimedia games	
Playing musical instruments	
Other (Please Specify):	

7) Do you like reading books? <i>(If your answer is "Yes" answer the question no 8, if your answer is "No" please continue to question no 9)</i>	
Yes	
No	

8) What is your favourite reading's genre?	
Fiction	
Non Fiction	

9) In holiday season, what type of landscape do you prefer?	
beach	
mountain	
garden landscape	
imaginative landscape (e.g. games, movies, books,.. etc.)	
city trips	
Other (Please Specify):	

10) If you have given a choice, where do you prefer to live/stay?	
in a dense urban area	
in a village like	
in a rural area	
close by nature area	

Which type of landscape do you prefer?
--



11) Choose one out of the pictures above:

a	
b	
c	
d	

12) How would you prefer nature to be? Nature is..

A park like	
A vast savannah	
A river basin	
Mountainous	
Clouds	
Active Volcano	

13) When was the last time you did outdoor activities (e.g. hiking in the forest, cycling, camping,... etc.)?

Yesterday	
Few days ago	
Last week	
Last month	
Other (Please Specify):	

14) How often do you do and an outdoor activity in a month?	
Everyday	
Once a week	
Twice a week	
Once a month	
Other (Please Specify):	

15) How do you scale the following sensations (your current feeling/condition)?					
	1 None	2 .	3 Fine	4 .	5 Very
Focus					
Fatigue					
Physical well being					

C. Childhood Memory (during age 10 - 15)

16) What was your favourite childhood outdoor place?	
My house's back yard	
A nearby forest/nature	
Farming areas	
Neighbourhood playground	
Public space (e.g. park, open square,.. etc.)	
Other (Please Specify):	

17) How did you spend time after school?	
Playing multimedia games or watching TV	
Playing musical instruments	
Reading books	
In the playground or in the backyard	
In the woods or river closer to the neighbourhood	
Other (Please Specify):	

18) How did you spend your time in the weekend with your parents?	
Fishing	

Gardening	
Cycling	
Stay at home	
Visiting friends/family	
Other (Please Specify):	

19) Did your parents allow you to play outside in a nearby natural area?	
Yes	
No	

20) How would you describe your childhood house neighbourhood?	
An area without nature	
An area with less nature	
An area with a lot of nature	

D. During your activities in the campus
--

21) How often you feel stress or mental fatigue (tiredness) during classes/lectures?					
	Never	.	Sometimes	.	All the time

22) How long do you endure to stay in a lecture?	
25 minutes	
45 minutes	
55 minutes	
More than 55 minutes	

23) How do you prefer to spend your time during lecture break?	
just sitting in the class	
talking with friends	
drinking coffee and looking outside through window	
walking around the campus landscape	
Other (Please Specify):	

24) If you feel stress during study days, how do you prefer to spend your time during lunch?	
walking around the campus landscape	

sitting outside with friends/by myself	
having lunch at home	
listening to music/playing games	
Other (Please Specify):	

25) During lecture, when you feel mental fatigue (tiredness), does looking out to the greens through the windows help you to feel better?

	Not help at all	.	Sometimes	.	Very helpful
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E. Campus Landscape (the landscape around the Forum Building)

26) How do you like your current campus landscape?

	I don't like it	.	It's okay	.	I like it very much
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27) What kind of activity that you want to do in your campus landscape?

Playing frisbee or football	
Sitting on the grass	
Walking in a special route path	
Hang out with friends	
Other:	

28) Where do you prefer to sit when you want to feel relax?

on a bench next to the lake	
in the middle of the grass field	
on a big stone behind the plants	
nearby a tree	
Other:	

29) What kind of landscape elements do you prefer to have in your campus landscape?
(please scale 1 as the most preferable and 6 as the least preferable)

Water	
Plants	
Rock/Stones	
Grass	
Sand	

Clouds/Open view	
------------------	--

30) What kind of facilities do you prefer to have in your campus landscape? *(please scale 1 as the most preferable and 6 as the least preferable)*

sitting places	
water related (e.g. bridge, fountain,.. etc.)	
open grass field	
special route for walking	
sport facilities (e.g. basketball field, skateboard track,.. etc.)	
special park pavilion	

31) What makes you relax when you are in the campus landscape?

	Less	.	Sometimes	.	Most
looking at the greenary (e.g. trees or other plants,.. etc.)					
listening to the sound of the water flow					
watching the wildlife (e.g birds, ducks,.. etc.) and surroundings (e.g. flowers,.. etc.)					
sitting in the grass field					
taste good food					

32) Do you think nature area in your campus landscape will help you to release from stress?

I don't care	
Sometimes	
Yes, it's helpful	
No, it's not helpful	
Other (Please Specify):	

33) If you could recall, which part of the campus landscape that reminds you with your childhood memory?

--

34) Do you want to change something in your campus landscape?
(If your answer is "Yes" answer the question no 35, if your answer is "No" you have finished the questionnaire)



No, I don't want to change anything	
Yes, I want to change something	

35) If you have the chance to design your campus landscape, what do you have in mind for your future campus landscape?
(e.g. I want to have a small forest, or I want to have a little zoo,.. etc.)







Results for: Nature Experiences and Preferences



1) What is your gender?

		Percentage	Responses
Female		44.4	28
Male		55.6	35
Total responses:			63

2) How old are you?

		Percentage	Responses
18-20 years old		27.7	18
21-25 years old		47.7	31
26-30 years old		23.1	15
Other		1.5	1
Total responses:			65



3) What is your current study program?

		Percentage	Responses
Bachelor (BSc)		37.3	25
Master (MSc)		62.7	42
Doctoral (Phd)		0.0	0
Total responses:			67






4) What is your nationality?

		Percentage	Responses
Dutch		75.8	50
Non Dutch		24.2	16
Total responses:			66

5) Where are you right now?



		Percentage	Responses
In my room/at home		73.1	49
In the campus		26.9	18
Other		0.0	0
Total responses:			67

6) What is your most favourite type of activity in your spare time?

		Percentage	Responses
Doing sports		34.3	23
Hiking		3.0	2
Gardening		1.5	1
Watching TV or movies		16.4	11
Playing multimedia games		10.4	7

Playing musical instruments		9.0	6
Other		25.4	17
		Total responses:	67






7) Do you like reading books? (If your answer is "Yes" answer the question no 8, if your answer is "No" please continue to question no 9)

		Percentage	Responses
Yes		80.6	54
No		19.4	13
		Total responses:	67





8) What is your favourite reading's genre?

		Percentage	Responses
Fiction		70.4	38
Non Fiction		29.6	16
		Total responses:	54





9) In holiday season, what type of landscape do you prefer?

		Percentage	Responses
beach		17.9	12
mountain		47.8	32
garden landscape		7.5	5
imaginative landscape (e.g. games, movies, books,.. etc.)		0.0	0
city trips		16.4	11
Other		10.4	7
		Total responses:	67

10) If you have given a choice, where do you prefer to live/stay?

		Percentage	Responses
in a dense urban area		10.4	7
in a village like		34.3	23
in a rural area		9.0	6
close by nature area		46.3	31
		Total responses:	67

11) Choose one out of the pictures above:

		Percentage	Responses
a		1.5	1
b		15.2	10
c		21.2	14
d		62.1	41
		Total responses:	66

12) How would you prefer nature to be? Nature is..

Percentage Responses

A park like		14.3	9
A vast savannah		11.1	7
A river basin		27.0	17
Mountainous		41.3	26
Clouds		6.3	4
Active Volcano		0.0	0
Total responses:		63	

13) When was the last time you did outdoor activities (e.g. hiking in the forest, cycling, camping,.. etc.)?

		Percentage	Responses
Yesterday		27.0	17
Few days ago		20.6	13
Last week		19.0	12
Last month		28.6	18
Other		4.8	3
Total responses:		63	

14) How often do you do and an outdoor activity in a month?

		Percentage	Responses
Everyday		9.5	6
Once a week		30.2	19
Twice a week		20.6	13
Once a month		30.2	19
Other		9.5	6
Total responses:		63	

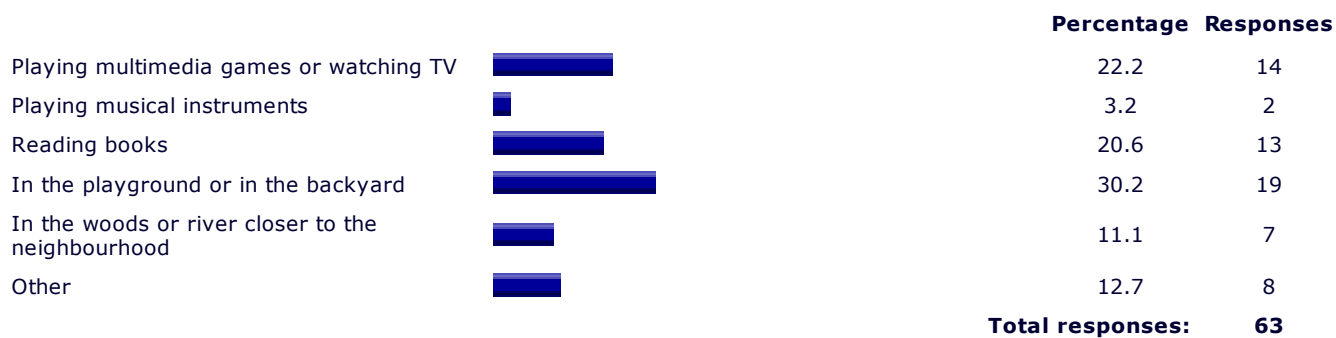
15) How do you scale the following sensations (your current feeling/condition)?

	1 None	2 .	3 Fine	4 .	5 Very	Responses	Average Score
Focus	1 (1.59%)	11 (17.46%)	26 (41.27%)	21 (33.33%)	4 (6.35%)	63	3.25 / 5 (65.00%)
Fatigue	11 (17.46%)	16 (25.40%)	18 (28.57%)	13 (20.63%)	5 (7.94%)	63	2.76 / 5 (55.20%)
Physical well being	0 (0.00%)	7 (11.11%)	20 (31.75%)	25 (39.68%)	11 (17.46%)	63	3.63 / 5 (72.60%)
							3.21 / 5 (64.27%)

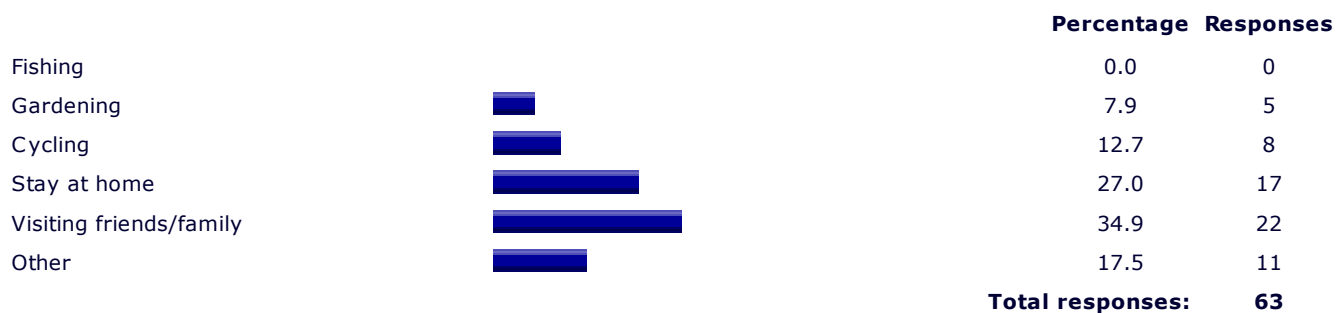
16) What was your favourite childhood outdoor place?

		Percentage	Responses
My house's back yard		33.3	21
A nearby forest/nature		31.7	20
Farming areas		7.9	5
Neighbourhood playground		15.9	10
Public space (e.g. park, open square,.. etc.)		9.5	6
Other		1.6	1
Total responses:		63	

17) How did you spend time after school?



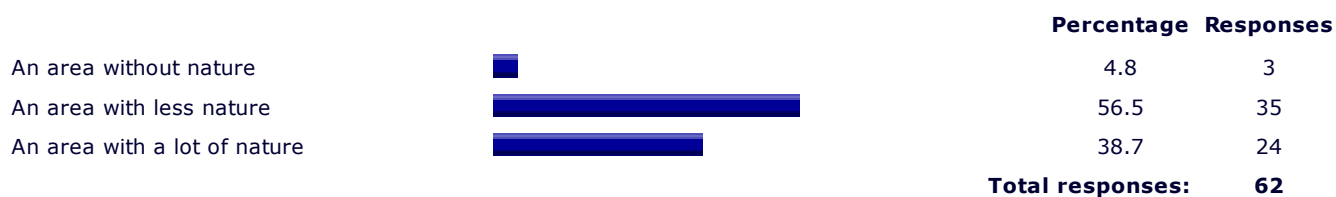
18) How did you spend your time in the weekend with your parents?



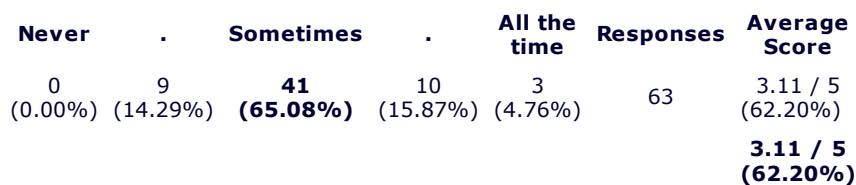
19) Did your parents allow you to play outside in a nearby natural area?



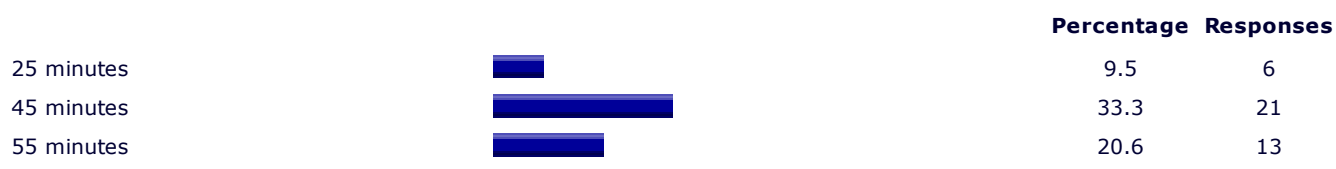
20) How would you describe your childhood house neighbourhood?



21) How often you feel stress or mental fatigue (tiredness) during classes/lectures?



22) How long do you endure to stay in a lecture?








More than 55 minutes






36.5 23

Total responses: 63

23) How do you prefer to spend your time during lecture break?

		Percentage	Responses
just sitting in the class		6.3	4
talking with friends		55.6	35
drinking coffee and looking outside through window		23.8	15
walking around the campus landscape		11.1	7
Other		3.2	2
		Total responses:	63

24) If you feel stress during study days, how do you prefer to spend your time during lunch?

		Percentage	Responses
walking around the campus landscape		14.3	9
sitting outside with friends/by myself		44.4	28
having lunch at home		25.4	16
listening to music/playing games		12.7	8
Other		3.2	2
		Total responses:	63






25) During lecture, when you feel mental fatigue (tiredness), does looking out to the greens through the windows help you to feel better?

Not help at all	Sometimes	Very helpful	Responses	Average Score
9 (14.29%)	20 (31.75%)	14 (22.22%)	63	3.16 / 5 (63.20%)
10 (15.87%)	10 (15.87%)			3.16 / 5 (63.20%)






26) How do you like your current campus landscape?

I don't like it	It's okay	I like it very much	Responses	Average Score
3 (4.76%)	39 (61.90%)	3 (4.76%)	63	3.10 / 5 (62.00%)
6 (9.52%)	12 (19.05%)			3.10 / 5 (62.00%)







27) What kind of activity that you want to do in your campus landscape?

		Percentage	Responses
Playing frisbee or football		4.8	3
Sitting on the grass		39.7	25
Walking in a special route path		12.7	8
Hang out with friends		41.3	26
Other		1.6	1
		Total responses:	63







28) Where do you prefer to sit when you want to feel relax?

		Percentage	Responses
on a bench next to the lake		12.7	8
in the middle of the grass field		36.5	23
on a big stone behind the plants		20.6	13
nearby a tree		20.6	13
Other		9.5	6
Total responses:			63

29) What kind of landscape elements do you prefer to have in your campus landscape?
(please scale 1 as the most preferable and 6 as the least preferable)

		Average Score	Responses
Water		3.13 / 6	62
Plants		2.65 / 6	63
Rock/Stones		4.02 / 6	62
Grass		2.65 / 6	63
Sand		5.13 / 6	63
Clouds/Open view		3.37 / 6	63
		3.37 / 6	

30) What kind of facilities do you prefer to have in your campus landscape? (please scale 1 as the most preferable and 6 as the least preferable)






		Average Score	Responses
sitting places		2.39 / 6	62
water related (e.g. bridge, fountain,.. etc.)		2.87 / 6	62
open grass field		2.52 / 6	62
special route for walking		4.05 / 6	63
sport facilities (e.g. basketball field, skateboard track,.. etc.)		4.61 / 6	62
special park pavilion		4.55 / 6	62
		4.55 / 6	

31) What makes you relax when you are in the campus landscape?

	Less	.	Sometimes	.	Most	Responses	Average Score
looking at the greenary (e.g. trees or other plants,.. etc.)	1 (1.59%)	6 (9.52%)	23 (36.51%)	22 (34.92%)	11 (17.46%)	63	3.57 / 5 (71.40%)
listening to the sound of the water flow	7 (11.29%)	7 (11.29%)	16 (25.81%)	22 (35.48%)	10 (16.13%)	62	3.34 / 5 (66.80%)
watching the wildlife (e.g birds, ducks,.. etc.) and surroundings (e.g. flowers,.. etc.)	6 (9.84%)	4 (6.56%)	12 (19.67%)	24 (39.34%)	15 (24.59%)	61	3.62 / 5 (72.40%)
sitting in the grass field	0 (0.00%)	4 (6.35%)	22 (34.92%)	30 (47.62%)	7 (11.11%)	63	3.63 / 5 (72.60%)
taste good food	5 (7.94%)	14 (22.22%)	19 (30.16%)	18 (28.57%)	7 (11.11%)	63	3.13 / 5 (62.60%)
							3.46 / 5 (69.15%)

32) Do you think nature area in your campus landscape will help you to release from stress?

000000.

		Percentage	Responses
I don't care		3.2	2
Sometimes		33.9	21
Yes, it's helpful		59.7	37
No, it's not helpful		1.6	1
Other		1.6	1
Total responses:			62



33) If you could recall, which part of the campus landscape that reminds you with your childhood memory?

(The last five responses are given)

- **Next to atlass Building and field next to Digraff**
- **the grass field**
- **The lake**
- **the lake and the ducks**
- **Grass fields.**

34) Do you want to change something in your campus landscape?

(If your answer is "Yes" answer the question no 35, if your answer is "No" you have finished the questionnaire)

		Percentage	Responses
No, I don't want to change anything		40.3	25
Yes, I want to change something		59.7	37
Total responses:			62

35) If you have the chance to design your campus landscape, what do you have in mind for your future campus landscape?

(e.g. I want to have a small forest, or I want to have a little zoo,.. etc.)

(The last five responses are given)

- **Having flowers will make it beautiful even if they are artificial,look at the Rose next to Forum building,its beautiful**
- **I want to have playground like swinging**
- **nothing**
- **I would like to have a fountain in the forum landscape**
- **More trees, more rocks to sit on and larger grass fields, creating a more open view.**