BEHAVIOURAL IMPACT OF INTERIOR LANDSCAPING ON HUMAN PSYCHOLOGY

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ABSTRACT

It is known that landscape has a detrimental effect on the human psychology but to what extent it has not been figured out. The paper focuses on the study of the impact of green space and its effects on human psychology. It emphasizes on the aspects that are effected by incorporating green architecture inside the interior space and to what extent. The paper also deals with the various types of interior landscaping and how it can be integrated within a structure to enhance the spatial experience and create a positive impact on human behavior. The paper concludes with a set of design guidelines that will be useful in designing spaces where interior landscaping is an integral part of spatial design.

Keywords: Green architecture, Human psychology, Interior landscape, spatial experience, spatial design


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1. INTRODUCTION

At times people misconceived that a healthy lifestyle is gained only through physical well-being, rather mental well-being is equally important. Green design ideas always focus on achieving mental calmness and restoration. To establish mental restoration, people seek out centers of meditation and spirituality which are basically termed as retreats. A retreat is a place where one can relax and escape from the hectic schedule of daily life, it is a place where one can reconnect with oneself and create positive impact or change in routine for a healthier and more spiritual enrichment.

The aim of the study is to analyze the effect of interior landscape and design on human behavior and how it will create a serene environment, to understand the application of hardscape and soft-scape within a structure and its impact on the interior as well to understand the dynamism of landscape on the visual and sensory composition of the human senses.
The perception and aesthetic of interior landscape to create a physiological connection between the users and the building is a challenging design aspect which need to be taken care of in case of any spatial design. The architectural features related to landscape directly or indirectly affect the user’s reaction and perception of the environment created due to the adoption of nature to the internal structure and the materials used to create such an environment.

2. LITERATURE REVIEW

1.1. Why does nature within a building have such a huge impact?
Over the years countless number of scientific papers and research papers have been published demonstrating the benefits of interior plants, they tell us how plants can make a major contribution to the health and well-being of people, reduce energy costs and increase productivity and profitability. But the most profound research that has impact is the Sick Building syndrome. “It is a term used to describe situations when people experience acute ailments and discomfort, which seem to be linked to time spent in a particular building. Common symptoms of Sick Building Syndrome, such as itchiness, dry skin, eye and throat irritations, headaches and nausea, seem to be closely related to poor indoor air quality. Often, the presence of volatile organic compounds, mould spores, poor ventilation and badly-adjusted temperatures are blamed.” (Freemam, 2011) (EPA, 2009)The indication is strong: It is clearly evident that buildings with plants are so much better than buildings without. The data proves it. However, what the studies have not convincingly elucidated is why interior landscaping works. Indoor plants are clearly related to improving well-being and health so it seems likely that there must be a psychological reason.

1.2. Advantages of indoor landscaping
Interior plants are recognized with bestowing benefits to buildings and their occupants

- Removing unstable organic compounds from the air
- Reducing the level of carbon dioxide in buildings - the result of photosynthesis where carbon dioxide and water are reacted in the presence of light to produce carbohydrates and release oxygen as a waste product.
- Reduce background noise – plants can absorb, reflect and refract sound, cutting down background noise and echoes.
- Cooling a building - shading and transpiration by plants can reduce indoor air temperatures and reduce the load on air-conditioning systems. (Han, 2008)

There are other benefits that can’t be scientifically proven but have results upon research:

- Stress reduction
- Increased productivity
- Quicker recovery from surgery
- Greater attentiveness
- Reduction in complaints of symptoms associated with sick building syndrome” (Freeman, 2011)

1.3. Elements of interior landscaping
Interior landscape can be broadly classified into two types: Softscape and Hardscape. The softscape comprises of the horticulture elements such as the plants, shrubs, grass and all other plant typologies. The softscape elements for interior landscape have specific requirements for
maintenance and growth such as temperature, water and sunlight. These vary from normal outdoor plants as the environment is different and hence the requirements will vary. Indoor plants should be chosen specifically according to amount of sunlight received as they are kept within the building and ambient sunlight within the building won’t be as much the ambient sunlight present outside. Special care must be maintained to control the temperature within the structure as well and special types of plant that can adjust to the temperature inside should be chosen. Indoor plants usually have low water requirement and require low maintenance but the growth maybe slow and sometimes if special care isn’t noted the plant may expire.

The hardscape elements of interior landscape are those materials that are naturally available such as stone, wood and other man made features that highlight a contrast along with the presence of the softscape. Maintenance and upkeep for the hardscape is much simpler as compared to the softscape.

1.4. Types of walling systems

**Vertical garden wall:** A vertical garden wall is a type of wall that is both unrestricted and erect or part of the building that can be partially or fully covered in a variety of vegetation. Usually there is a medium of growth such as soil or an inorganic medium that helps sustain the vitality of the wall.

![Figure 1 Type of Indoor Plants](image1.jpg)

![Figure 2 Example of Vertical Garden Wall](image2.jpg)

![Figure 3 Effect of Vertical Wall on Indoor Temperature](image3.jpg)
The walls with greater surface area adopt the method of hydroponics (an innovative method of growing plants in mineral nutrient solutions in water without using soil) (Hoagland, 1884-1949.)

**Figure 4** Schematic Diagram Showing the Installation of the Vertical Green Wall

There are two main types of garden walls: Façade walls and living walls. Façade walls are made of climbing plants or creepers that grow directly on the or individually designed provision for support. Living walls consist of modular panels made out of geo textile or stainless steel containers with a growing medium and vegetation. There are three varieties that can be used for growth support in living walls: Mat media, loose media and structural media.

**Living walls:**

a) **Loose media:** this type of growth support has the soil packed into a bag or shelf and then installed on to the wall. The maintenance of this system requires the shelves and bags to change at least every two year for interior surfaces.

**Figure 5** Example of Diagrams of Loose Media
a. **Mat Media:** Mat media is thin single or multiple layered medium made of foam or jute or other materials that cannot support the root system of a matured plant for more than 3-5 years as the roots may start to penetrate the mat and the water will not be able to pass through the mat. It is ideal for indoor landscaping.

b. **Structural Media:** this type of medium has a modular structure pattern made of out stainless steel that helps the plants to grow along and therefore take its own path whilst maturing. Requires the least maintenance as compared to the other two but the cost of installation is much higher.

1.5. **TYPES OF FLOORING SYSTEM**

The various types of flooring systems that can be used for indoor landscaping apply the combination of both hardscape and softscape. They are: bio tiles, natural carpet tiles, bamboo flooring and exposed stone flooring.
Bio tiles: Bio tile is a hybrid of a carpet and a tile that is made in an all-natural process without any chemicals or harsh substances. The application of this material will affect indoor air quality as it helps remove the volatile inorganic compounds present in the air.

![Bio Tile](image)

Figure 9 Schematic Drawing Showing Making of Bio-Tile

Natural carpet tile: The natural carpet tile is a type of tile that is made of grass that usually is fake or also known as astro turf. This tile gives off the impression of a natural grass like state and can be used aesthetically to design the interior of a space.

![Natural Carpet Tile](image)

Figure 10 Natural Carpet Tile

![Reclaimed Bamboo Flooring](image)

Figure 11 Reclaimed Bamboo Flooring

Bamboo flooring: another natural type of flooring that can be used is bamboo flooring where panels or made out of bamboo which is a very eco-friendly plant and hence is almost hundred percent energy efficient.

Stone flooring: exposed stone flooring is a type of flooring that falls completely under the hardscape elements of landscape design and uses various options available such as granite, laterite etc. to create an aesthetic quality along with the presence of vegetation that appears to create a very natural interior experience.

![Exposed Stone Flooring](image)

Figure 12 Exposed Stone Flooring
2. PSYCHOLOGICAL FACTORS THAT AFFECT HUMAN PERCEPTION OF A SPACE

“There is no doubt whatever about the influence of architecture and structure upon human character and action. We make our buildings and afterwards they make us. They regulate the course of our lives.” Winston Churchill, addressing the English Architectural Association, 1924

![Figure 13 Factors that Affect Human Behaviour](image)

While designing a place in which users will be spending many hours, it is important that architects are involved because they are the creators for developing features influencing human behaviour. In 1950s, research groups began analysing the design of hospitals, particularly psychiatric facilities and how they influence patient behaviour and their medical outcomes. This was the start of formal investigations on how humans interact with their surrounding built environment. In 1960s and 1970s, it evolved into a specific study that is known as environmental psychology. (Anthes, 2009) It can be defined as “the interdisciplinary field of study that focuses on the interplay of individuals and their surroundings.” (Galindo, 2000).

There are many aspects that go into the environmental psychology of a specific built environment. The most important aspect is the psychological aspect because this is what we aim to provide for. The psychology of the human should be such that they think the space is effective. Other aspects are the physical environment which is the aspect that will be studied in this paper. Another aspect is the culture and social activities of the people. This typically is due to the location of the people or the type of culture they follow. For example, Europeans use streets and pathways as a social space and are filled with cafes and performances. However, Indians use streets as means of transport and do not carry out any social activities in this aspect as much as the Europeans do. This is a social and cultural aspect.

This field of study, being quite recently introduced, is still growing and most people are only now realizing its importance. The science of environmental psychology can influence people so intensely that some studies believe that it can help create positive atmospheres enough to help users in declining health. The architecture and surroundings of a place has thus, proved too directly and indirectly affect the psychology and behavior of humans. An environment-behavior study in architecture is a contemporary approach to the traditional human purposes of architecture. Instead of building for the basic purpose of shelter, protection and privacy, people are becoming aware of the greater aspects of architecture.

The main psychological determinants affecting human perception of a space in terms of landscape may slightly differ to the normal standards. When talking about landscape we take...
into consideration the 5 senses and how each of them perceive various combinations of sight, sound and smell through the use of colour application, bringing in natural sounds, stress level alteration and other things.

2.1. **Colour**
Color is one major aspect in the interior environment because different colors create and enhance emotions and moods. It is necessary to pinpoint what colors and textures can help create a balance and not become overwhelming to the senses. A well-executed color palette can enhance the experience of the space.

![Colour Wheels Depicting the Warm and Cool Tones](image)

- The blue colour is a soothing and calming colour which is said to help lower heart rate.
- Greens are a natural colour for balance, the calmness of the blue colour, and creative enhancing colour of yellow are combined in these tones of green to provide for holistic development.
- Light yellow tones are also considered to be neutral colors which can balance out all other emotions.
- Oranges, peaches and light pinks support high amounts of activity. However, too much of this colour can over stimulate and should be balanced out with cooler tones.

2.2. **Sounds and Smells:**
These senses may not have immediate impact on the perception but over time it has been proven that exposure to calming smells and sounds can affect behavior. For example, when the smell of hot food wafts through a building, every person in that building will have thought about the food at least once and immediately think about eating thanks to the influence of the smell. Same goes with nature, the smell of nature and its surrounding such as the smell of fresh rain, soil and flowers gives a sense of peace and tranquility to its user.
The same goes for sound, calming sounds like that of birds chirping or the sound of running water helps transport a person from the environment that they are in such as a noisy workplace to a thought of a peaceful evening spent outside.

2.3. **Stress:**
Stress is another psychological factor that can be altered by its surroundings. Place a stressed person into a room free from all that is causing him stress such as the workplace or home and in an environment which is calm and quiet and creates a very relaxing state, we can notice and immediate change in the stress level and this helps not only eradicate stress but also balance it out whenever necessary such as create a stress free environment or at least attempt to through the integration of interior landscape.

3. **PRIMARY SURVEY:**
A survey was conducted to a sample of 50 people targeting no specific age group or gender. The survey attempts to take this study to a more personal level with one on one interaction with people and trying understand their perception of spaces through a series of questions.

<table>
<thead>
<tr>
<th><strong>Objective</strong></th>
<th><strong>Results</strong></th>
<th><strong>Inference</strong></th>
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<tbody>
<tr>
<td>To establish to sex ratio of the survey to eliminate bias.</td>
<td><img src="image" alt="Gender Distribution" /></td>
<td>The relevance of the study focus on a specific gender so there is no bias.</td>
</tr>
<tr>
<td>To determine the target audience that should be focused on during the study</td>
<td><img src="image" alt="Age Distribution" /></td>
<td>The focused target audience was varied across various age groups and the results from the survey are as intended.</td>
</tr>
</tbody>
</table>
To identify the preference of the public in terms of what appeals to them more.

<table>
<thead>
<tr>
<th>What space appeals to you more?</th>
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<tbody>
<tr>
<td><img src="image1" alt="Option 1" /></td>
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<tr>
<td>52.9%</td>
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</table>

This shows us that the public prefers the interior landscaping more than the one devoid of plants.

<table>
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<th>Pick one option.</th>
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<tbody>
<tr>
<td><img src="image3" alt="Option 1" /></td>
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<tr>
<td>45.8%</td>
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The result of the survey conducted has preference towards the wall covered in green plants. Hence the majority of the public is drawn to the green wall as opposed to the green painted wall.

To understand the human perception towards green, whether they are more drawn towards a green painted wall or a green wall with plants.

<table>
<thead>
<tr>
<th>Do you like the integration of green spaces within a building?</th>
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<tbody>
<tr>
<td><img src="image5" alt="Option 1" /></td>
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<tr>
<td>Do you like the integration of green spaces within a building?</td>
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To determine what type of wall the public would prefer in a quiet place.

What type of walling system do you prefer in a tranquil place?

To establish whether the users would prefer the sound running water within a quiet place.

The results show a majority for the integration of green spaces.

The results conclude that majority of the public prefers the green wall.

Majority of the public likes the sound of running water as it provides a calming effect.
To determine what type of flooring is preferred by the general public

<table>
<thead>
<tr>
<th>What type of flooring gives a calming impact</th>
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<tr>
<td>![Option 1 and Option 2 images]</td>
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</table>

Just as the previous results have displayed, majority of the public prefers the green option.

DATA ANALYSIS:
From the data that has been collected an analysis can be drawn to create the guidelines necessary to create a good indoor landscape that positively affect the human psychology. The results from this survey conclude that there is a relationship that exists between users and their perception of spaces considering scenarios.

4. DESIGN GUIDELINES:
There are 8 main key features that can be drawn from the study which can be taken further as design guidelines which designing any public space where interior landscaping is an integral part of design.

1. Creating the feel of nature indoors
Considering the variety of vegetation in nature a similar balance must be created indoors to facilitate the absolute feeling of relaxation within a space. Hence careful care must be taken in selecting the plants and ensure that they are well suited in an indoor setting and at the same time must ensure maximum aesthetic value.

2. Creating a view
Just because there is landscape inside the structure doesn’t mean that the exterior must be ignored as well. Careful care must be taken while designing to integrate both the interior and exterior to highlight the horizon outside and create a sense of peace and comfort as the user gazes outside. It also generates a feeling of security.

3. Use light and shade to create interest
The use of light can help increase the vibrancy of the environment but enhancing the hues present. Interesting forms can be developed by playing with light and this will generate more curiosity if applied right. Light has always been associated with warmth so playing with during the designing of a space will help generate a positive response. The gentle use of shadow that plays along the vegetation will also generate interest and create a sense of wonder.
4. Use of natural materials
The use of natural materials that are locally available give a sense of comfort because it reduces the impact of man-made items present in the surrounding and subconsciously alters our mind into passive relief. Natural materials also have their own sense of attraction that immediately creates a sense of comfort in the surrounding. Using local materials also gives a very local feel to the users like sense of peacefulness.

5. Refuge, shelter, privacy
Indoor landscaping can be used to create buffer spaces and as a means of segregation but in a non-permanent manner so it creates a sense of flexibility that provides security to the user. It can be used to provide shelter and refuge through the use of pergolas and other semi-permanent installations.

6. Water
The provision of water bodies within the structure provides an interesting feature that users are always drawn towards. It is the natural tendency for man to turn towards a reflective surface and hence the same logic can be applied to this. It also provides a cooling comfort which helps the overall temperature of the building.

7. Natural scents and odours
The provision of indoor landscape helps provide a natural scent throughout the building and stimulates the sensory smell that helps creates an experience that enriches the user. The subtle hint at the smell stimulus helps the user acknowledge the space for its unique smell and associates that to a natural environment.

8. Use of colour
The use of color through the variety of landscape elements helps create a balance in the structure and helps create a unique character that can be associated to the place. Color palettes can be designed and adjusted according to the requirement of the space.

5. CONCLUSION
From the research conducted, it is established that there is a resilient bond or linkage between human behavior and indoor landscaping, to the extent that the user experience of the space can be altered to enhance and optimize it. These features are the alteration of the 3 main sensory stimuli of the human body that is sight, smell, touch and these the affect behavioral determinants of the space. These determinants consist of color, light, materials, sound, views and water. Each of these factors affects human behavior in any environment but is preferably used to relax the mind and body and need to be designed coherently to augment or nurture these spaces.

In the modern world, people are getting adjusted to fast going, technology induced lives and lifestyles are changing. In order to keep up with this consistent evolvement of regime such ideas should be a part of an architect’s thought process in the preliminary stage of any design. There should spaces where people can come and take a break from their fast paced lives and sit and meditate upon themselves. Modern spaces should be rationally designed to be linked with the new generation. These behavioral determinants should be manipulated in such ways to harmonize with the needs of modern spaces to design enhanced spaces in the future. This will help improve the experience of any and every user (regardless of age), which in turn can help their life in a broader sense.
REFERENCES