

## An approach to Environmental Design: Concepts, Theories and Color Planning

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### Abstract

Environmental Design combines multidisciplinary areas, the term has recently been expanded to include ecological issues and sustainability. The research discusses the characteristics, elements, concepts of environmental design and color coordination which are all integrated to improve communication with the viewer. The research problem is the overlap of concepts and lack clarity between the different disciplines common in environmental design. Therefore, this paper attempts to reach the clear definition of each concept of environmental design concepts to determine the area of specialization that is responsible for it, and discusses how the integration between common disciplines affect the design efficiency. . This paper presents some hypotheses through several questions as follows: What are the criteria for efficiency in environmental design? What is the effect of color on design and communication?, what are factors effect on colour planning ? , How does the integration between disciplines affect the efficiency of environmental design? . The methodology of the research follows the descriptive and analytical method through the analysis of some concepts and different models of environmental design. Based on these analyzes, the research found a number of practical observations as follows: Success of the integration between the different disciplines and the clear definitions of concepts are important factors for achieving efficiency in environmental design, Color planning affects the design and human communication. Also colors varies according to environment nature and type of space internally or externally.

**Keywords:** Interdisciplinary-Communication - Environmental Design-Color planning

### الملخص:

يجمع التصميم البيئي بين المناطق متعددة التخصصات ، وقد تم توسيع المصطلح في الأونة الأخيرة ليشمل القضايا البيئية والاستدامة. يناقش البحث خصائص وعناصر التصميم البيئي ويتعامل مع مفاهيم التصميم البيئي وتنسيق الألوان التي تتكامل جميعها لتحسين التواصل مع المشاهد. مشكلة البحث هي تداخل المفهوم وعدم الوضوح بين الاختصاصات المختلفة المشتركة في التصميم البيئي ، لذلك يستعرض البحث أهم المفاهيم والجوانب المتعلقة بإدراك التصميم والتفاعل بين الإنسان والمكان. يحاول البحث الوصول إلى التعريف الواضح لكل مفهوم من مفاهيم التصميم البيئي ويحدد مجال التخصص المسؤول عنه ، كما يهدف البحث إلى تسليط الضوء على التكامل بين التخصصات المتداخلة. يعرض البحث بعض الفرضيات من خلال عدة أسئلة على النحو التالي: ما هي معايير الكفاءة في التصميم البيئي؟ ما هو تأثير اللون على التصميم والتواصل في التصميم البيئي؟ هل تتغير خطة الألوان وفقاً لنوع المساحة سواء الداخلية أو الخارجية؟ كيف يؤثر التكامل بين التخصصات على كفاءة التصميم البيئي؟. تتبع منهجية البحث المنهج الوصفي والتحليلي من خلال تحليل بعض المفاهيم والنماذج المختلفة للتصميم البيئي وبناءً على هذه التحليلات فقد توصل البحث الى عددًا من الملاحظات العملية على النحو التالي : هناك معايير ثابتة لتحديد كفاءة التصميم البيئي, يؤثر تخطيط الألوان على التصميم والتواصل

مع المشاهد كما يختلف تخطيط الألوان وفقاً لنوع المساحة داخلياً وخارجياً يبعث نجاح التكامل بين التخصصات المختلفة والتعريف الواضح للمفاهيم عوامل مهمة في تحقيق الكفاءة في التصميم البيئي .  
**كلمات البحث:** تعدد التخصصات -الاتصالات - التصميم البيئي - تخطيط اللون

## Introduction:

Many problems arise as a result of human interaction with the environment and its elements through different activities and movement around. Environmental design is an ideal solution for these problems. The scope of this work includes many disciplines and considerations depending on the type of problem such as environment and sustainability, raw materials, roads, walls, facades, corridors, cost, integration, enforceability and industry standards. Environmental design also refers to the arts and applied sciences that deal with the creation of the human environment. These areas include architecture, geography, urban planning, architecture and interior design. However, the term the term is now expanded to apply to environmental issues and sustainability. The Designer Frederick Liquor says: Over the past five years, all the customers who have come to us have wanted environmentally friendly designs, and this shows their importance these days". "Anne-Marie Botany, head of the Promotion Agency for Industrial Innovations, says: "At first the environmental design was to use recyclable materials, then the interest in the environment increased, and it became not only materials, as some materials may not be environmentally friendly in themselves".

**STATEMENT OF THE PROBLEM:** The overlap of concepts and lack of clarity between the different common disciplines in environmental design make it difficult to answer this question: who is responsible for what?

**THE OBJECTIVES:** The research attempts to reach the clear definition of each concept of environmental design and to shed light on the development of the strategic plan of design to achieve the integration of common disciplines.

**METHODOLOGY:** the research follows the descriptive and analytical method through the analysis of some concepts and different models of environmental design.

## 1. THEORETICAL FRAMEWORK:

### Concept of environmental design and color coordination:

According to the definition of Sim van der Ryan and Stuart Kwan, environmental design is "any form of design that limits the destructive effects of the environment by integrating it into life processes." (Van der Ryn S, Cowan S1996), concerned with the environment surrounding , how to be a suitable environment for human activity, ranging in size from buildings and gardens, green spaces to neighborhoods, community and supporting infrastructure, such as roads and highways (See figure 1,2,3,4). Environmental design is defined as the physical and building environment in which people live and work. (University of Buffalo, 2014-2015).



Figure 1



Figure 2



Figure 3

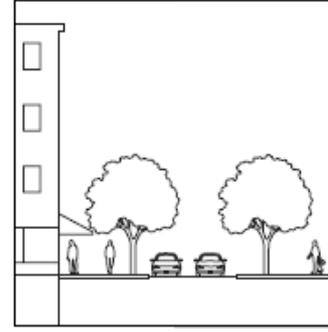


Figure 4

Environmental design can also refer to the applied arts and sciences deal with the creation of the human- environment. In terms of a larger scope environmental design includes for the industrial design of products: innovative automobiles, wind-electricity generators, solar-electric equipment, and other kinds of equipment could serve as examples. Currently, the term has expanded to apply to ecological and sustainability issues ("Environmental design." Definitions.net. STANDS4, n.d.). Environmental design involves several specialized fields such as landscape architecture , urban planning , color coordination of environment , civil engineering and construction. It is a wide area that includes solving problems of traffic paths, road directions, facades, achieving sustainability, color coordination of spaces internally or externally, as well as communication between man and place through agronomics measurements, environmental graphic design, considerations for signage, road signs and symbols.

For each specialized field one person is responsible for its performance efficiently and perhaps interferes with another specialty, but it is not the basis. Moreover, when trying to assess and access to a specific definition and one clear specialization of each concept, For each specialized field one person is responsible for its performance efficiently and perhaps interferes with another specialty, but it is not the basis, and when trying to assess and access to a specific definition and one clear specialization of each concept, there were some areas overlap in its nature, such as the design of traffic paths , direction of roads and facades design , the responsible person is an architect, civil and above all of that the applied designer who is responsible for creating first module which is an important step to develop the full perception and solutions to initial problem through Prototype. The relationship between environmental and interdisciplinary design is analyzed in the framework of research relating to a definition study. Therefore, it is important to generate clear definitions of interdisciplinary which deal with different problems, particularly from the point of view of the integration of common disciplines. Finally, a number of considerations are offered about the challenges facing interdisciplinary research in environmental design.

**Civil engineering and construction:**

Civil engineering is a branch of engineering specializes in the construction process, putting the bases of final design and supervising its construction. Civil engineering is a science that is divided into many disciplines, including construction of buildings, bridges, roads, gardens and irrigation, factories and companies.



**Landscape architecture:**

Landscape architecture is the comprehensive discipline of land analysis, planning, design, management, preservation, and structures to achieve environmental, social-behavioral, or aesthetic outcomes (Sir Geoffrey Jellicoe). The principles of landscape architecture are the public safety, health, wellbeing, and protection of the land resources (see figures 6,7,8).



Figure 5



Figure 6



Figure 7

Landscape architecture plays an important role in the formation of new cities, regions and neighborhoods in addition to addressing related problems in urban areas. On a large scale, the work of the landscape architect is between the planner and the architect, first is working with the planner, then preparing the area and designing the open areas such as parks and green infrastructure planning provision, also site planning; water management; visual resource management; after that comes the role of architect who must respond to all recommendations of the landscape architect when designing the buildings.



Figure 8



Figure 9



Figure 10

The designations of this specialization have been applied over time to reach "Environment Architecture" as a comprehensive name for all aspects of the functional, environmental and aesthetic fields (see figures 9,10,11). the profession includes areas such as: urban planning, urban design, site planning, environmental restoration, and parks design. There are many professions involved in this field: agricultural engineers, architects, civil engineers and the person who works in this field is called environmental architect or landscape architect.

### Landscape design:

Landscape design is an independent profession, a design, an art tradition, practiced by landscape designers, combining nature and culture. In contemporary practice, landscape design bridges the space between landscape architecture and garden design, Landscape design focuses on both the integrated master landscape planning of the specific garden design of landscape elements and plants within it (see figures 11,12,13,14).



Figure 11 <sup>1</sup>



Figure 12 <sup>2</sup>



Figure 13 <sup>3</sup>



Figure 14

### Urban planning:

It is a broad science that combines several natural, social, economic and engineering variables in order to guide the growth of the city, and address its problems to serve its residents and provide them with the requirements of urban life. In other words, urban planning aims at drawing the future picture of the shape and size of the city by identifying suitable areas for new cities that will be expanded to accommodate social, economic and political changes. Architecture and urban planning are based on geometrical standards. If the architecture is concerned with the level of one building and the direct location, we find that planning works at the level of neighborhoods and regions. The planner works in conjunction with architects, engineers, landscape architects, and other design professionals to ensure that the development of environmental, social, and economic issues is directly affected by construction. This leads to an important question: What is the planner's role in whole building design? The architect, who is designing a whole building design perspective, is looking simultaneously at functional aspects, and how they might relate to the site conditions such as sun /wind /view orientation (Ethan Solomon, March 2016). In addition, the planning includes many disciplines that are concerned with various aspects of the built environment, such as housing, transport, economic development, protection of natural resources, land planning and community development (see figures 15,16).

<sup>1</sup> Rehabilitation du champ de fore Treffort-Cuisiat (France), 2006, <http://www.publicspace.org/en/orks/e090-rehabilitation-du-champ-de-foire>.

<sup>2</sup> 4 Avenue Flyover Public Space, Space under the 4 Avenue Flyover is being reimagined as a vibrant pedestrian corridor, <https://engage.calgary.ca/flyover?redirect=/flyover>

<sup>3</sup> <https://www.yjc.ir/fa/news/5698485>



Figure 15

Figure 16<sup>4</sup>

### Urban Design:

It is the science and art that deals with (spaces, paths, intersections, fields, buildings, green spaces). It can determine the nature of the area and personality of the place, and achieve communication between the building and the surrounding space. It is also interested in beauty through the formation of the physical environment with different dimensions and covers the physical, and it has multiple interests. As a science and art, it exceeds the level of one building as in architectural design and it is lower than the level of the city as a whole as in urban planning.



Figure 17



Figure 18

Grassed or vegetated swales, Piekenhoef housing estate, the Netherlands (Royal Harkening, CC-BY)<sup>5</sup>

Urban Design is a stage that mediates planning and architecture. Urban design has an importance stems from the fulfillment of human needs and demands, whether they are functional, aesthetic or spiritual (see figures 17, 18).

**Functional importance:** It is concerned with the coordination of architecture, linking its components and providing the physical elements necessary for the space in its function of brushes and lighting.

**Aesthetic importance:** It is also interested in improving the external environment of man, whether it is a built or natural environment to achieve the visual pleasure of users to achieve the visual pleasure of users. It is concerned with the coordination of architecture, linking its components and providing the physical elements necessary for the space in its function of setting and lighting (Egyptian Engineer, 2012). Urban design elements include: 1- Roads 2- Path 3-Edges 4-Districts 5- Landmark.

<sup>4</sup> boulevard street, <http://www.jdland.com/dc/seblvd.com>

<sup>5</sup> <https://ocw.tudelft.nl/course-readings/water-sensitive-urban-design/>

Now it is remaining an important question to clarify the differentiations of concepts, what is Relationship of urban design to urban planning? Urban design adds a factor in city planning, which is the visual factor. The visual component is sometimes called the visual archeology. Most architects believe that the landscape of the city depends on architecture but it depends on urban design. Enter with the urban and social part to determine the shape of the city, in terms of densities and the formation of spaces (Watson, 2004 ),

### **Color coordination of environment:**

Color coordination for environmental field and visual determinants such as entrances and exits of cities, planning gardens coordination, general squares, movement paths, spaces, roads, with following up their implementation (see figures 20,19).



Figure 19 <sup>6</sup>



Figure 20

### **Environment Graphic Design:**

The scope of environmental graphic design, includes many disciplines as landscape, industrial design, graphic design, interior, all of that concerned with visual concepts of wayfinding, communicating identity and information, which shaping the idea of connect people to place (see figure 21).

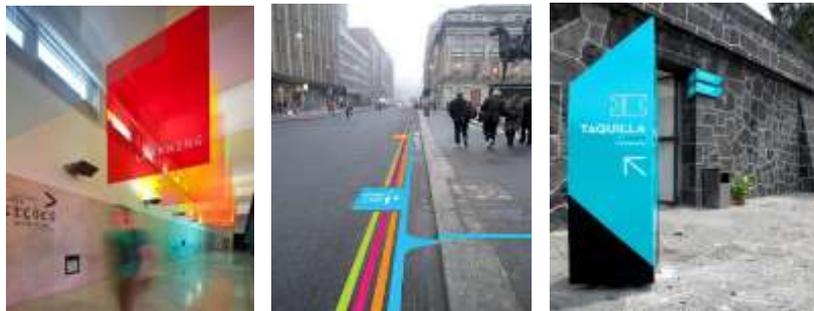


Figure 21 <sup>7</sup>

### **Models and theories of environmental design:**

Environmental planning and environmental design differ in scale. For instance, the scale of environmental design could be a street, a building, a car, a household appliance, etc. These things can be “designed” for the environment. The scale of environmental planning is usually affecting a large number of people. It uses processes like Environmental Impact Assessment studies to understand the relationships between natural and human systems, so that

<sup>6</sup> <http://www.academiclup.com/v3/index.php/tabs/item/141-bahce>

<sup>7</sup> <https://segd.org/article/what-environmental-graphic-design-egd>

environmental degradation can be mitigated as much as reasonably possible. Environmental designers have to consider aesthetics as well as functionality of their product see figures 22,23 and 24 .



Figure 22



Figure 23



Figure 24

The paper discusses in this section the division of environmental design theories, according to the models of some projects and concludes that environmental design depends on several theories and trends of design, all concerned with achieving communication and environmental benefits for humans. The theories of environmental design are summarized as follows:

1. **The descriptive theory**, in which the design concentrates on the environment of the product (the environment in which the design is planned). ). Also, the design is concerned with achieving communication; preserving the environment and rationalizing energy to achieve the concepts of environmental sustainability (see figures 25, 26 and 27)..
2. **The design theory of the product**, in which the design cares about users, their values and their beliefs and solve human problems through living places and everything around him in the place, see figures 28, 29 ,30, 31 (Mostafa, 2011).



Figure 25



Figure 26



Figure 27

**Models of sustainable environmental design**

**Descriptive theory concerned with design of the product environment**



Figure 28



Figure 29



Figure 30

Solving human problems through living places and all it surrounds.  
Theory of product design in which users are concerned with their values and beliefs

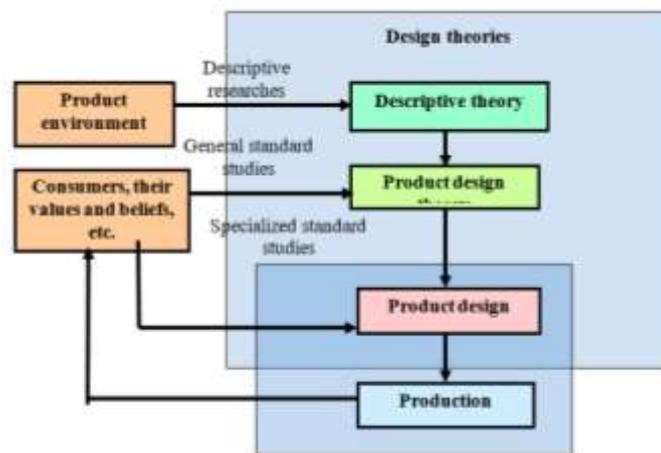


Figure 31 (Mostafa, 2011)



Figure 32



Figure 33

### Color planning framework:

Effects of Colors in Terms of Psychology, whereas effect of colors is relatively subjective and it differs in different persons thus some of color effects have a unique concept throughout the world. The colors locating within spectrum of colors in red zone are characterized as warm colors and this range varies from warm emotions to sense of anger. The colors in range of

blue spectrum are called cold colors including blue, purple, and green. These colors are usually comfortable but sometimes may cause sadness and indifference sense in mind (Laleh Khodakhah Jeedi, 2016). When planning colors for an environmental design, designer have to consider the color issues within certain colors, or a collection of colors which can elicit different emotional responses from individuals see figures 34,35,36 ,37 <sup>8</sup>.



Figure 34



Figure 35



Figure 36



Figure 37

### Effect of colors on design and communication in environmental design:

Adopting a successful color planning is the first and most important step in starting a design of environment, whenever internal or external (see figure 38, 39 and 40). These figures shows the differentiation between the color planning of different types of space, internal and external, and the white color had chosen in a “landmark” design, which is a part of an open space design, light blue background of sky’s color at the background of the whole scene. Colors may have different or contradictory connotations in different cultures. For example, many different peoples and cultures see white as a symbol of purity and joy, while white is a symbol of mourning and sadness among the Chinese.



Figure 38



Figure 39



Figure 40

<sup>8</sup> <https://www.pinterest.com/edcurrer/hospital-graphic-design/>

As shown in figures 39 and 40, a design of colored stripes on the ground and wall to help visitors to find their way around. In figure 40, yellow color has been used, the designer uses the power of the yellow color to attract the viewer inside a large white internal space - (It seems as the designer says: look down a stair there!). Despite of using a warm red color in Fig. 39, the message to the viewer was different. The red stripes are on the floor and on the stairs to show the direction of upstairs, while the background of the scene painted with shades of gray



Figure 41



Figure 42



Figure 43



Figure 44

Figures 41, 42, 43 and 44 are another example of using yellow color but this time in an external space. Here the yellow color expresses energy and enthusiasm, and is associated with happiness and sunrise when it used externally, and it is a color of hope, fill the design with a sense of joy and happiness. Because of the brightness of this color, it is sometimes used in hazard and warning signals see Fig.43.



Figure 45



Figure 46

On the contrary, in Fig.46, the green color is balanced and harmonious, so it is in the middle of the colors spectrum and a neutral color between warm and cold. Green represents optimism and neutrality and symbolizes grace, paradise, growth and life. It represents the energy inputs of the human body according to energy science. In Fig.46, the green color painted a big circle on the ground that used as a track for bicycles. Green color evokes in the memory the exuberant exteriors decorated with flowers, trees and plants, and it should be in the form of natural colors and be distributed around the place. From all of that, it was noted that all the examples have at least one color in common and color schemes are compatible with similar degrees of value and intensity contrasts. As gray is giving a form of hidden elegance without being too conservative, the effect of gray depends largely on the shadow color that will be using, for example, mixing gray with yellow color, especially if there is something in the area with different shades of brown. But when combining the shade of gray with white color, it will not be very bright and it can create a clean and refreshing appearance. However, if too many gray areas used, the design will become boring and create a dull environment (see Fig. 42, 43 and 46). This comparison considered the best answer to this question, "Does the color plan change according to the type of space whether internal or external?" the answer is yes, of course it differs.

### **What are the criteria for efficiency in environmental design?**

- Sustainable design, site sustainability.
- The design should include the factors of human comfort, well-being while preserving the environment and energy resources.
- The integration of common disciplines in environmental design such as architectural, planner and designer increases the efficiency of design without a chance of mistake. The nature of materials used in the design have to be environmentally friendly.
- Quality of the internal environment.
- Innovation in design.,

### **Recommendations:**

- Caring about ending overlap and similarities in the concepts related to the field of environmental design works on the sequence, analysis and explanation of concepts and disciplines, thus achieving integration between them.
- The need to study the effect of colors on environmental design and the difference between internal and external to facilitate its application as a result of many projects.
- The concept of sustainable environmental design should be deepened to achieve human comfort and the well-being of design as well as to preserve the environment and its resources and conserve energy.

### **Results:**

- There are fixed criteria to determine the efficiency of environmental design.
- Color planning affects the design and communication with the viewer.
- Color planning varies according to the type of space internally and externally.

- Success of integration between the different disciplines and the clear definition of concepts are important factors in achieving efficiency of the design.

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