Individual Use Qualities Being a Part of Social Sustainability on University Campuses

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Abstract

According to sustainability base, it depends on three pillars: Ecological aspect, economic aspect and social aspect. The integration between the three pillars creates the optimum case for the sustainability of the project. University campuses are very huge projects that include a huge amount of resources consumption, in addition to that, it includes a wide spectrum of social relations and interactions. As a hierarchy of social sustainability that this research is based on, it is divided into two parts: One including the pure social interactions between the users together and the other includes the interaction between the user and the physical environment of the campus. The last aspect is the one to be discussed in this research paper. The main objective of this paper is to highlight the different factor of the individual use of a campus that could affect the social sustainability and how these factors have an influence and can be affected by other factors of sustainability on campus. This point includes: Wayfinding, safety and identity or territoriality. The part about wayfinding shows the basic steps and idea for creating the system and the sustainable methods of implementation. Physical and emotional sources of fear or hazard are also discussed. The paper discusses the sources of creating a sense of identity or a feeling of territoriality on campus. The conclusion reaches the main guidelines of sustainability related to the individual use on a university campus.

Introduction

Every landscape differs according to three elements. The physical environment which includes the site, the vegetation, the country and so on. The people who interact on this landscape according to tastes, traditions and social conditions . The third element is the interaction of both which highlights the purpose for which the landscape is made, and this shows the importance of the individual use to show the operation of the landscape. (Dober, Campus landscape functions, forms, features, 2000, p. 3)

"Environment is so significant to human functioning that a person must first construct an understanding of the immediately surrounding environment before he or she can construct a personal identity" (Saari, 2002) The interaction between the user and the environment acts as an added experience since the environment contains the physical and the social setting to the user especially in the type of projects that the end-user (student on a university campus) is in the phase of identity formation and taking the responsibility of himself after his family being responsible for him.

1. Legibility and Wayfinding

Wayfinding is an active process that involves the movement through space, reading surroundings and interacting with this space. Thus the process of wayfinding involves physical, mental , and emotional senses. (Dober, Campus landscape functions, forms, features, 2000, p. 112)

Way finding is represented through the navigability where the user could easily reach his destination even if it is unknown, and depends on three main criteria: First on the user if he can identify his location. Second if the user could find the route to his destination. The third depends on how can the commuter accumulate experience from the process of way finding. (Foltz, 2014)

The first criterion could be assessed through the user's ability to locate where exactly he is, knowing the name of the standing spot or marking it by a unique visible feature. The second criterion is seen through the correct or false choice of the user in choosing the way to move through according to the available guiding signs and directions. The third criterion depends on imageability that is assessed through the availability and proper design of elements of mental map of Kevin Lynch: landmarks, nodes, edges and regions.

There are some principles for effective wayfinding techniques (Foltz, 2014):

- Each part should have a certain identity to separate it from others.
- Landmarks is used to mark way for users and to create memorable points in different areas.
- Provision of well designed clear walkways, having a clear start, middle and end.
- Separate project into different regions different from each other visually.
- Don't provide a lot of way options in order to decrease the possibility of losing the way.
- The provision of maps and signs in the spots of directional decision making.
- Provision of clear sighted in order to perceive the way easily and catch the way identifiers easier.

1.1　The beginning of wayfinding techniques

After the cold war in the 1960s the topics about legibility and way finding started to become more popular as the complexity of urban spaces increased. Some writers as Kevin Lynch and Romedi Passini started to discuss the basics of way finding and its definitions. Kevin Lynch explained that wayfinding is related to the image of the place created according to the sensation and the memory. (Gibson, 2009, pp. 13-14) In the current days it is rare to feel the anxiety resulting from the feeling of getting lost or losing your way due to the presence of maps, street numbers, routes and physical landmarks. On the scale of smaller projects including urban spaces the same way finding criteria has to be applied.

"When people attempt to navigate a place for the first time, they face a series of decisions as they follow a path to their destination. There is a sequential pattern to this way finding process- in effect, a series of questions that people ask themselves along the way. Before starting the design process, the way finding consultant must anticipate visitor patterns, understand that logic, and apply it in the planning phase. Then work can begin on a framework for the way finding design program" (Gibson, 2009, p. 18)

The design of a way finding system depends on three factors: The heads or the controller of the organization, the clients or the users that will be dealing with these spaces and the type of the environment that the system will be designed for.

1.2　Way finding strategies

The strategies of way finding are four, they are based on some urban planning factors: districts, streets, connectors and landmarks as shown in fig 1 . The districts are different parts that can be identified or classified according to a common character that separates these districts as different parts. The streets are linear separators as corridors or pathways. The connectors are considered as different paths that meet at a point or a node. The landmarks are any purely obvious space markers that could be a building or a gate. As soon as the designer identifies these physical elements through the scenario of usage then it is much easier to set a way finding program.

1.3　Process of design

The designer starts by studying the nature with observation and documentation of the spaces and the obstacles that might face the way finding plan. Then comes the study of the circulation patterns of the project users in addition to identifying the corridors, landmarks and gathering points. A strong study of the project plans takes place at this phase. After that comes the phase of interviewing of users which gives the idea of how people perceive the spaces, directions and where are the strength points and weak points. This will clarify the hidden items that only the users could
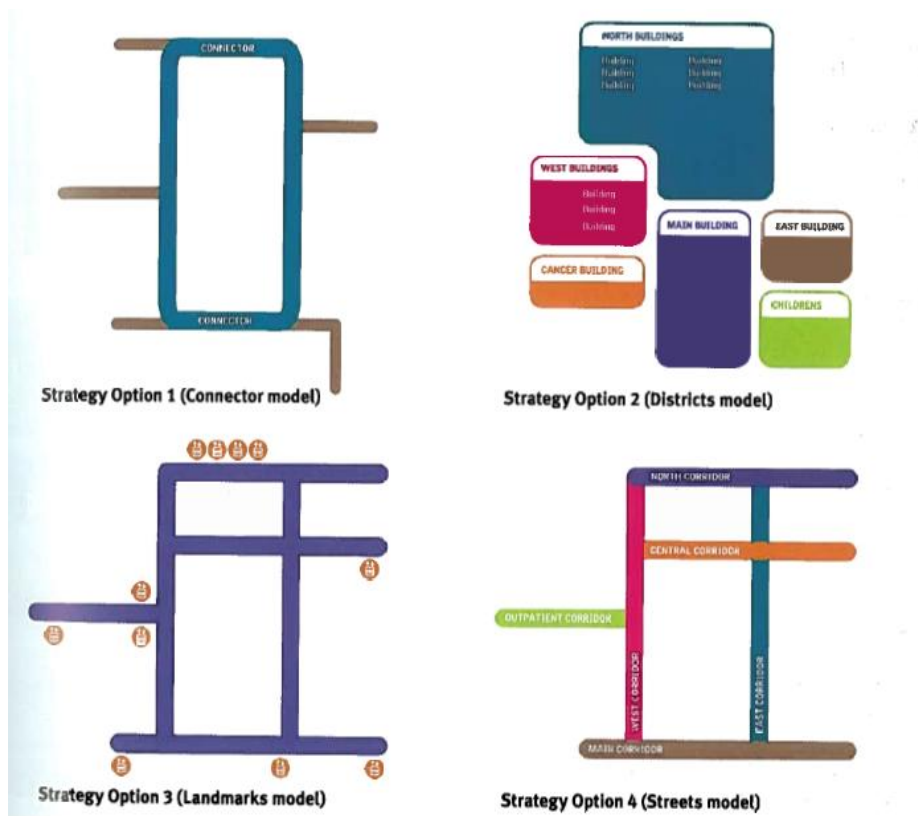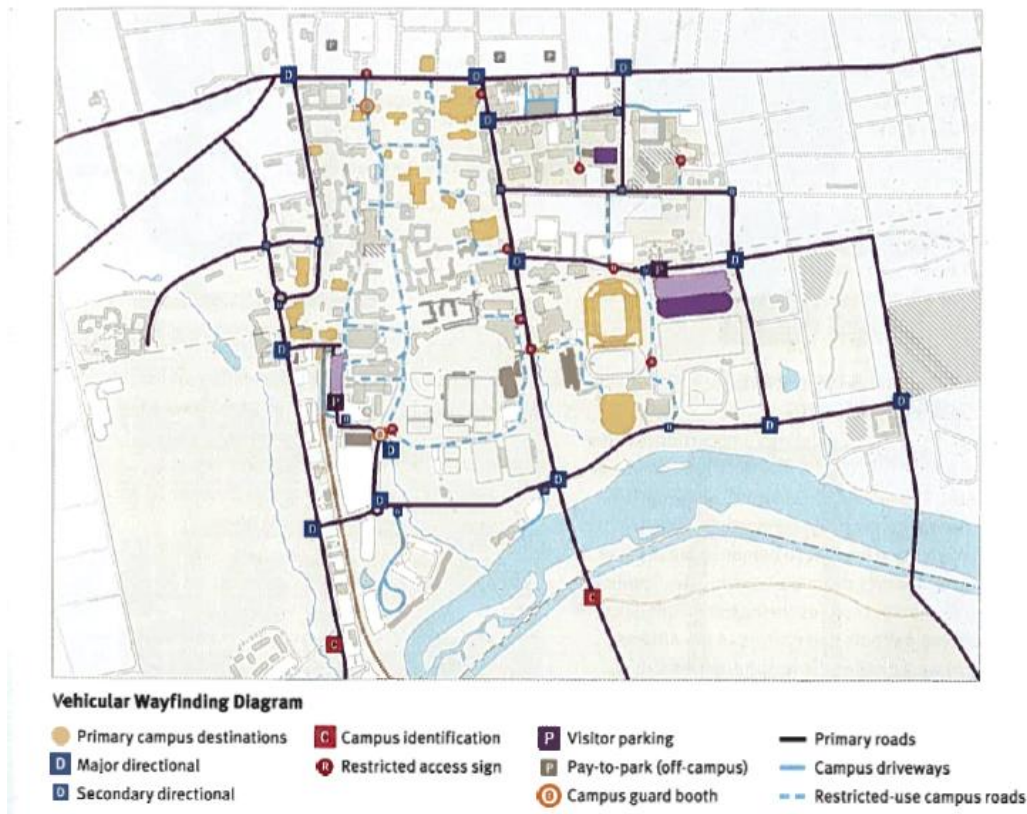
Fig. 1 Diagram showing the different strategies of way finding (based on a hospital project) Source: Gibson, David. Way finding Handbook. P. 45

feel. The output that the designer produce after analyzing the different components and interviews is set of maps showing the proposal of different signs that could direct the users and they are separated according to the types of circulations: pedestrian and vehicular as shown in fig. 2&3
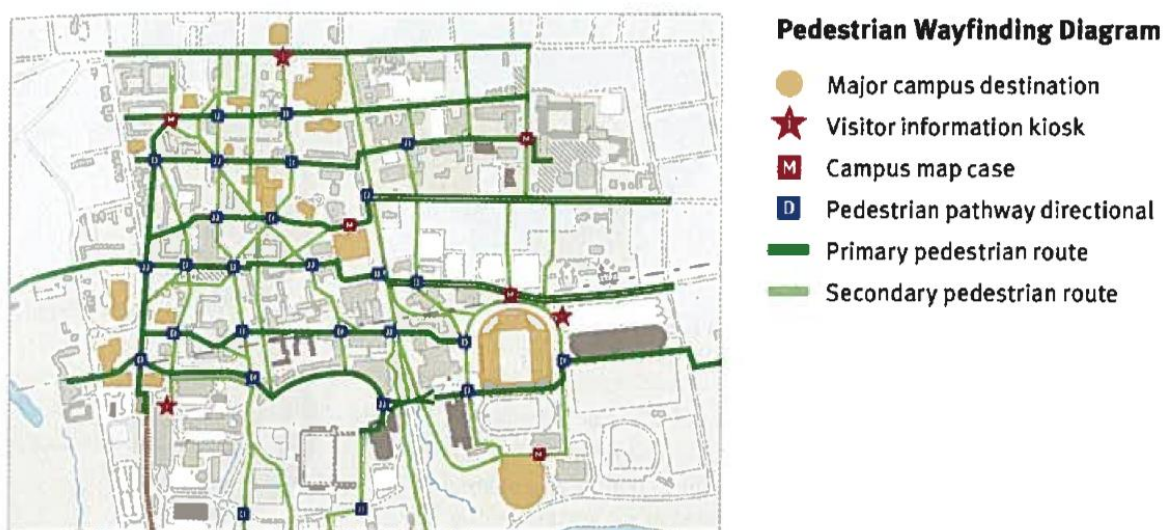
Fig. 2 Vehicular Way finding Diagram for Princeton University

source: Gibson, David. Way finding Handbook. P. 43

Vehicular Wayfinding Diagram

- Primary campus destinations
- D Major directional
- D Secondary directional
- C Campus identification
- R Restricted access sign
- P Visitor parking
- P Pay-to-park (off-campus)
- O Campus guard booth
- — Primary roads
- — Campus driveways
- - - Restricted-use campus roads

Fig. 3 Pedestrian Way finding Diagram for Princeton University

source: Gibson, David. Way finding Handbook. P. 43

Different types of signs

There are four types of signs that may be used on the exterior part of the campus which are:

- **Identification signs**:

It is a visual marker that identifies the function of a building, a gateway, entrances and exits of different buildings. It gives the first impression about the visited building. It is the type of sign that shows the transition from one space to the other. It might include the logo of the building as well.

- **Directional signs:**

It gives the user the basic directions to the destination needed to move from one point to the other. It could take the shape of arrows or symbols giving the sense of direction. The message from this type is to facilitate the movement between spaces.

- **Orientation signs:**

It is located mostly at the boundaries of the project, entryways or the basic focal points. It is accompanied by a map for the whole site with a unique highlight showing the position where you are and its location from the whole site.

- **Regulatory signs:**

This type of signs show the regulations of the place (do's and don'ts). This type of signs should be easily and quickly read to perform its role. The message behind these signs should be sent in a friendly polite way as it is directed towards the space users.

1.4 Some criteria for the way finding signs and designs

The quality that the way finding targets is easily reading and moving through the different parts of the campus such as: plazas, pathways, entrances, and different buildings. It is preferable when the style of the signage systems reflect the identity of the place as this factor acts as a branding way for the place. An example for that is the signs used for Yale University, known for the blue color that in fact people see as a reflection for the prestigious position of the university. In addition to that the created typeface called "Yale Street" had an added value. Emulating a contemporary style from the "Collegiate Gothic" with the previous factors served the support of the campus identity through the way finding system used. There are some criteria to provide an efficient way finding system:

- The signs should be located in a strategic position that serves an easy way finding system, and the indicator for that is that every user could reach his destination.
- The signs should be readable and easy to understand. Each sign should be modified according to its use, i.e. The sign seen by a walking person would differ from the other seen by a person using a car.
- The typeface size, weight, and spacing affect that users could read and understand the sign. This also depend upon the distance and the situation that the person will be in while reading the sign, e.g. "The ADA (Americans with Disabilities Act Compliance) defines parameters for selecting typefaces to ensure that they are readable for people with compromised vision. The ADA regulations require letters and numbers on signs to have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:10 and 1:5." (Gibson, 2009, p. 80)
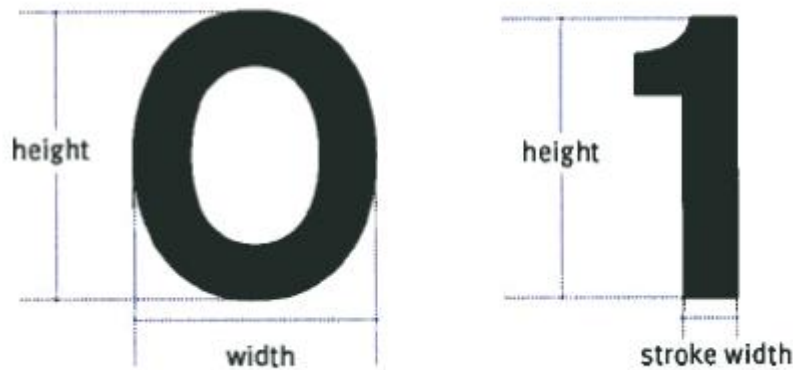
Fig. 4 Showing the numerical figures proportions

source: Gibson, David. Way finding Handbook. P. 80

- The color of text and the background is a very important item that could affect the legibility of the sign. The basic factor that affects this factor is the contrast between the text and the background.
- When a symbol for a sign is very attached to the identity of the project and very unique, this could work as a placemaking factor itself (landmark).
- The designed way finding system has to comply with fire and safety codes.
- In case of large urban projects, the signs are designed and installed in a district of the project until the end users are satisfied and then the system is extended to cover the whole project.

1.5 Sustainability linked to wayfinding

Sustainable methods and designs are becoming more popular and clients are more aware about their sustainable choices which affects the consumption of resources and has an economical effect as well. Sustainability needs education to spread its bases and effects but in return it has strong beneficial environmental impact and economical effect as the value of resources increases by time thus the usage of optimum and limited amount of resources will be healthy from the environmental and the economical point of view.

- According to the field of sustainability, the materials used for manufacturing the signs and maps might be of a recycled materials but has to be of a material that is environmentally friendly which uses the minimum amount of clean energy, part of a renewable material, a material that doesn't affect the ecosystem or could be recycled whether upcycled or downcycled. Examples of these materials are: 3form

Ecoresin, Paperstone, EverGreen fabrics, Lightblocks, Alkemi and Plyboo.

- The efficient way finding designer should produce an exact needed number of signs in order reach the optimum usage of the material and at the same time not a less number than needed as it would be of a higher cost to retrofit this shortage.
- Flexibility of components of signs is a good option which gives the opportunity that the sign could be replaced in different positions according to the change of spaces or reused.
- Choosing the position of signs according to the maximum use of natural daylight rather than using artificial lighting.
- Even the sustainability regarding the deconstruction of signs plays an important role in recycling or reusing resources, i.e using bolts and nuts for fixation rather than concrete cast in place or other unrecyclable methods.

2. Safety

Designed spaces should provide users with safety. Safety is divided into two fields: Safety from hazardous elements whether it is noticed or unnoticed i.e. signs next to construction areas, notifying if plants are sprayed with hazardous chemicals, sign indicating crossing areas for pedestrians cutting vehicular routes. All the previous examples are cases that the user should be notified of for the sake of preventing accidents .Secondly, feel of safety by providing an environment that is comfortable for users without the fear of using, staying or approaching the space i.e. dark spaces that give the feeling of being uncomfortable, pathways with high density of vegetation that gives the fear of being isolated, and spaces that are isolated without any public surveillance. All the previous examples show the effect of factors that could only give the emotional and psychological feeling of fear without the tangible factor of hazard.

2.1 Safety through design criteria

The safety measures for all landscape elements should be provided according to the correct design and the idea that all users- disabled or not- could use these elements easily without any hazard or being uncomfortable.

There are different hazards that should be taken into consideration (Deasy & Lasswell, 1985, pp. 38-39):

- **Clearance hazards**:
  It is very important to take into consideration the height that allows the passage of people under any built structure.

- **Object hazards**:
  This include sharp edges or any element that could cause harm i.e. plant, sign post, screws…etc.

- **Collision hazards**:
  Signs and alerts have to be done to prevent any collision between vehicles and pedestrian.
- **Stability hazards:**
  One of the main causes of injuries, could be due to the absence of factors that prevent stumbling due to slippery ground, unclear difference of levels or even the absence of handrails for stairs as a support for old people.

2.2 Safety through individual perception

University campuses are special social cases since they have different age groups with different backgrounds and the stranger-to- stranger relation is more possible which could introduce a sense of emotional fear when the factor of comfort is not present. The presence of huge green and open spaces that could also sometimes have a sort of hiding spaces makes the campus landscape a source of emotional fear unless the design is providing good lighted places with good surveillance. (Nasar, Fisherb, & Grannisa, 1993)

"Perceptions of personal safety, as well as actual safety, influence the extent to which places and spaces are used. The design of streets and places can reduce crime and anti-social behaviors making places and spaces feel safer, which in turn can enhance the physical, mental and social well-being of community members. The presence of pedestrians, the thoughtful design of housing, other buildings and public spaces has the potential to increase natural surveillance, which improves safety and feelings of safety. This is one of the key principles of 'Safer Design' or 'Crime Prevention Through Environmental Design" (Planning Institute of Australia, Canberra; Australian Local Government Association; National Heart Foundation of Australia, 2014)

"Amenity and safety of spaces are accomplished through creating a desirable view where buildings' opening overlook to provide good surveillance of the street and the activity within, thus producing a safe space." (Newman & Kenworthy, 1999)

In general space user tends to mix between prospect (ability to see, and to get a good view of the space for interaction) and refuge (possibility of privacy and being hidden from the surrounding people) (Appleton, 1975). In case of crime, these concepts are used to the extremes where the criminal is highly hidden and having a detailed overview of the space where attack will take place. Even limiting the possibility of escape provides a higher state of control for the criminal. Thus, a

mixture of light, surveillance and possible means of escape routes are essential for providing emotional safety. Herzog and Kropscott in 2004 highlighted that the lack of defining landmarks, and low level of ease of movement gives a negative predictor of perceived danger.

At some spots as parks , crime rates are less than other public and private areas but at the same time the provision of well designed shrubs and trees that prevents isolation is always preferred by different users to feel safe, although there are no factors that could lead to crime. Another mean to cover this emotional factor is to encourage and inspire activity and intensity of use. (Burgess, 1994)

There is a margin between providing general safety through fences and boundaries and reaching a limit of isolation that could lead to the change from a defensible space to a defensive design that could make a crime easier to commit. (Thompson I. H., 2000, p. 147)

Other elements of infrastructure as signs, lighting systems, seats, shade and shelters increases the possibility of usage and accordingly social interaction which decreases the chance of psychological fear of place.

A case of crime was committed in San Francisco College in the daylight due the presence of a stairway hidden by a big shrubbery that made this spot somehow hidden or isolated. The same accident was repeated and the college took responsibility due to the delay to cut off this shrubbery to provide surveillance or to provide any mean of alert for people passing from this part. (Nasar, Fisherb, & Grannisa, Proximate Physical Cues to Fear of Crime, 1993)

There are some consideration to be taken care of to enhance an emotionally safe space:

- Design different pedestrian pathways overlooking different spaces to provide surveillance and the same for buildings and car parks and preventing any isolated spaces.
- Providing clear sightlines and good lighting for different pathways and ensure that vegetation is pruned to prevent any blockage of sightlines and provide surveillance.
- Different security systems and surveillance as cameras, security points should be applied to different spaces in order to make the users secured when using different spaces on campus.
- Design spaces in a way that provides variety of uses to enhance the social presence for a long time to give the feeling of security.
- Decrease the use of underpasses that prevents the natural surveillance.
- Locating bus stops at spots separated from blocking fences or walls that could prevent the natural surveillance.

According to (Nasar, Fisherb, & Grannisa, Proximate Physical Cues to Fear of Crime, 1993) any object higher than 45cm (shrub, wall,…etc.), wall of minimum 1.8 m^2, and trees of trunks (branches are included in case of evergreen

trees) over 91cm are considered as a hiding obstacle. A distance of 4.5m from any obstacle is considered enough distance to deal with any threatening situation of fear. This dimension was based on testing through three females moving at night and indicating comfortable distances of feeling secure. This distance also complies with proxemics indicating 3.6 as enough distance for evasive action.

3. Territoriality and identity

From the different place-making tools, four of them are applied to the case of campuses: Style, materials, landscapes and landmarks. Any campus that could be worth remembering as a design should one or more of these elements. The essence of a university campus giving it a certain identity is based on both the institutional factor that the university is presenting and the image that is formed in the mind from interacting with this place. "You try to arrange architecture and landscape, new and old, on the site so as to serve and symbolize the goals and objectives of the institution" (Dober, Heritage, Identity and Campus Design, 2008)

As an example for that is the usage of bricks in different forms on Duke University Campus as a style unifier. The effect of previous factors should act on vision, symbolism and aesthetics as the three dimensions for superior results for identity of campus. (Dober, Campus Design, 1992, p. 14&112)

3.1 Placemaking by buildings and building elements

As defined in the dictionary, landmarks are prominent features that identify a locale. There are five landmarking techniques which includes: Buildings, architectural elements, monuments, color and special spaces. Some landmarks are designed to be identified and standing out others start to acquire their properties from usage, special occasions or historical background. The same visually, some landmarks are eye catching due to its grand or unique shape while others could be unique according to their strange appearance that the eye couldn't ignore them. (Dober, Campus Design, 1992, pp. 13-14)

As an example for a landmark as a building, the academic building in Fisk University (Fig. 53) shows the value of an old two storey brick building that holds history in itself since the whole site of the university is considered National Historic Site. Fisk University was known to be a university for black people. The academic building was known to be a library that was designed by two earliest America's black architects- Moses and Calvin McKissick- and currently contains historical paper with the university functions. The building is awaiting the third renewal process to sustain its value creating a special sense of place. (Dober, Campus Design, 1992, p. 18)

Fig. 5 Academic building of Fisk University (Fisk University History, 2014)

Another example for buildings as landmarks creating a sense of place is the case of the University of Vermont. Three buildings on campus give the sense of continuity of the architecture of the building with the change in the internal usage keeping the same architectural style from outside. Billings building (Fig. 8) which was converted from a library into a student center without any change from the outside. The same for William's building (Fig. 7) which was converted from a science building into a building of arts and anthropology keeping the same gothic architectural style. And Ira Allen Chapel (Fig. 6) which was changed from a religious building into a concert and lecture hall. (Dober, Campus Design, 1992, p. 18)

Fig. 6 William building on Vermont University Campus

Fig. 7 Ira Allen building on Vermont University Campus

Fig. 8 Billings building on University of Vermont Campus

Other buildings are not of a monumental scale but owns their place-making factor through their historical background. An example for that is the Manasseh Cutler Hall (Fig. 55) on Ohio University Campus. It is known for being the oldest college building in the Old Northwest, and it is named after the minister of New England who wrote the charters of the university. (Dober, Campus Design, 1992, p. 22)


Fig. 9 Manasseh Cutler Hall in Ohio University (Athens Campus: map & tour, 2014)

Different building elements, when are very obvious and eye catching are abstracted and used as logos for the campuses which accordingly become landmarks that the campus could be identified with. Examples for that are: Restored towers of Northwest Missouri State University, the spire of Mc Donough hall in Saint Joseph College, steps of Lowe Library in Columbia University (Fig. 56), Tower of University of California in Santa Barbara (Fig. 57) known as the tallest tower in Santa Barbara .

Fig. 10 Steps of Lowe library in Columbia University
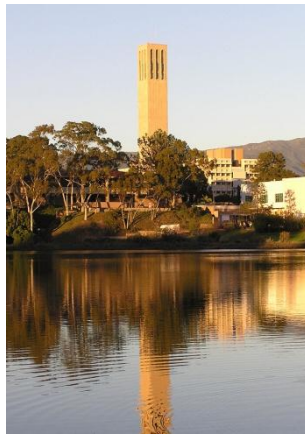
Fig. 11 Tower of University of California in Santa Barbara

Colors play a great role on campus, some colors widely used on campus are associated with creating a clear identity or landmark for the campus. Example for that is the purple color for New York University (Fig. 58) . The color takes place in some architectural elements , banners, and even garments for graduation and athletic events . The red color of Muhlenberg College (Fig. 59) is another example for how can color create a campus landmark. (Dober, Campus Design, 1992, p. 34)

Fig. 12 The purple color of New York University

Fig. 13 The crimson color of Muhlenberg College

3.2 Landmarks from landscape elements

Different landscape elements are constant including: Rocks, plants, water, terrain, and man-made structures. There is no change in these basic elements and alone they can't create a landmark or a place making factor. The composition of these elements creates the landmark. The good design gives a clear and unique landmark and acts as an edge between authentic and artificial design. A successful landscape that has a mark has to be like a code that is unique. These codes could be changed during time according to the different time settings. The site arrangement plays an important role and the relation between elements acting as foreground or background. The different designs have to keep the time factor in mind and how different elements may be affected by time. Different unique landscape elements not only become landmark for the campus but also could become a representing logo for the university.

Sometimes when the site is having a unique geographical feature, it can be used in favor of creating an identity for the campus landscape and enhances place-making. As an example, Minot State university that used the natural features related to glaciers and ice features to give a vernacular and unique identity to the campus. Coulees that are formed from glacial flood water in addition to the buildings have defined different paths and social areas on campus. Glacial erratic (Fig. 14) are utilized as sculptures, sign foundations, benches and other site amenities. Eskers, moraines and potholes, and ice drags are other different natural features that can be utilized when developing the shape, pattern and topography of campus outdoor spaces. (The Clark Enersen Partners, 2008, pp. 7-9)

Fig. 14 Glacial Erratics used over the campus landscape (The Clark Enersen Partners, 2008, p. 4&9)

Also spots with unique sculptures or artwork that could be related to the environment gives a defined identity to the campus as in the case of Minot State University campus (Fig. 15) when the designer made use of sculptures resembling icebergs that suits the surrounding environment. (The Clark Enersen Partners, 2008, p. 24)

Places with ceremonial values on campus could also add value to the identity of the campus. A flagpole, formal entrance, main round-about…etc. All these elements could be unique and identify the campus when they are linked to historical occasions or ceremonial events. These factors could lead those scenes to be logos for the university or even the mind image that people could link the campus to.

Fig. 15 The integration of icebergs as sculpture with the landscape design elements (The Clark Enersen Partners, 2008, p. 36)

Outdoor art elements are becoming more popular. It is either pure artistic elements or related to the university. In some cases the grouping of these artistic elements outdoor creates an open outdoor museum or art figures are uniquely placed having a certain value or history for the campus. From the known examples are: The heroic scale monuments in MIT, the abstracted sculpture that decorates the

lawn behind the oldest building in Princeton University, and smile provoking scissors in Arizona State University. (Dober, Campus Design, 1992, p. 201)

3.3 Style being a factor of place making

Style of different elements on campus is the generation of different forms creating a vocabulary that is normalized and repeated according to design and the materials used. The style is less tangible than other elements and has a visual and aesthetical impact. The style of a campus acts as indicator of the institutional presence. (Dober, Campus Design, 1992, p. 39)

There are different types of styles of campuses:

- **Monoform:** It is the campus that has one style that is unified and normalized over the whole campus. As Princeton University (collegiate gothic style), Scarborough College (contemporary style).

- **Metamorphic:** It is the campus that has an abstracted style from an original one that is adapted to the time and the available craftsmanship. Duke University West Campus and Stanford University are examples of this style type.

- **Mosaics:** It is the campus that is composed of different styles together without having a unique defined style. Bowdoin College is an example for this type.

4. Conclusion

The output of this field of sustainability targets the ease of use and the continuity of success of the used and planned systems to perform efficiently for the users.

Wayfinding:

- The user should easily locate himself, reach his destination and experience a unique movement that could give an unforgettable navigability that keeps a memorable image in mind.

- The designer should focus on the legibility of nodes, landmarks, districts and pathways or connectors.

- Minimizing the available options for navigation makes the system precise and easy.

- Users, decision makers and the environment are the three poles that have a great input in designing the wayfinding system.

- For the efficiency of the system, several factors have to be considered:

  - Selection of position of signs.
  - Readability of signs and compatibility with codes.
  - Relevance with safety and fire measures.

- Elements of wayfinding complying with environmental and economical sustainability:

  - Recycled and bio-based materials to be used to manufacture signs' components.
  - Applying the disassembly concept for the change or the reuse of the system's elements.
  - Making use of daylight for lighting the signs better than electrical consumption.

Safety:

- Physical hazards have to be taken into consideration from the design initiation.
- Surveillance, lighting and suitable dimensions of shrubbery or trees are from the main factors for the creation of a safe place emotionally.
- The balance between the prospect and the refuge is the source of giving the feeling of safety.
- Activation of spaces through social interactions provides a good feeling of safety.

Identity:

It is the definition of the image of the entity in minds and what would identify this institution if it passed through the mind. Several elements could enhance the composition of this image: (Unique or historical buildings- special style- landscape elements- architectural landmarks- colors- used materials). The designer's role is to create through his designs the needed clear image for the user to perceive and keep in the mind

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