Way-finding strategy for Healthcare Environments

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Abstract:

Healthcare environments need to make it easier for way-finding as the most difficult problem a patient face after illness is how to reach his intended destination in order to receive treatment, and the problem is more difficult if the design of the building is complicated, as health care buildings are often. Weak way-finding systems affect users, which leads to confusion, tension, and frustration, where the process of understanding the environment built of important issues and the process of cognition is the problem of way-finding because despite its basic role, it is often ignored when designing health care buildings, and instead of exacerbating the levels of stress and confusion of the users of the building especially the patients, a strategy for way-finding that is properly designed free of stress to ensure that users reach their destination on time without stress.

Therefore, the research aims to provide an effective and successful strategy for way-finding to be a database of the planning and design of healthcare buildings and to make users aware of the environment in a way that helps them meet their different needs and enable them to move successfully within the healthcare environment with the least possible time and effort by providing the necessary information or evidence, thereby transforming the complex and confusing healthcare environment into an easy-to-use and manageable environment.

In order to reach the goal of the research, it relied on the scientific-analytical approach in the study through the study of the theoretical framework. The research problem is based on the study of the concept of cognition and the concept of the system of way-finding and its importance, the process of way-finding and the factors affecting it and the use of the senses in that process, and the components of a good and effective way-finding system, as well as an analytical study complementary to the theoretical study of the emergency hospital at Mansoura University as a sample of the study, and analysis of the current situation of the emergency hospital environment through field visits to reach the results of the study of the current situation, and the proposed work to improve the system of way-finding in it, the study recommended that the members of the design team be aware of the requirements of way-finding and architectural elements and elements of interior design, in addition to having a broad understanding of the signage systems and types.

Keywords:

User Perception – Way-finding System – Components - Healthcare Environments.

1. Introduction:

Ineffective way-finding systems lead to stress, frustration, creating feelings of confusion and disability, and thus harming the health and well-being of health care users, stress caused by confusion can lead to high blood pressure, headaches and fatigue, and can also affect the building financially when time is wasted in way-finding.

The components of way-finding must complement each other to create an effective and clear system to facilitate movement between destinations, also to locate services, control vehicles and pedestrian traffic, clearly identify public employee areas and restricted areas, and help manage the risks that people might be exposed to and provide safety in the workplace. [18]

Research problem: The research problem is determined by the lack of an ideal and effective system for the process of guiding users of health care buildings to reach their desired destination, which negatively affects all users, especially those who visit the building for the first time and causes loss of time and disruption of work and frequent questions, and increase the state of confusion and anxiety they have.

The research aims at: providing an effective and successful strategy for way-finding to be a database of the planning and design of healthcare buildings, and the awareness of users of vacuums in a way that helps them meet their different needs and enable them to navigate successfully within the healthcare environment in the least possible time and effort.

The research hypothesis: "The system of finding the effective way of health care environments is an important aspect in the design of health care buildings, and the awareness of the health care environment and the ability of people to guide themselves through an effective strategy to way-finding promotes healing."

Research methodology: The research built its methodology through the theoretical aspect that was based on the study of the concept of cognition and the concept of the system of way-finding and its importance, the process of way-finding and the factors affecting it and the use of the senses in that process, and the components of the system to find the good and effective road, and then the analytical part of the emergency hospital at Mansoura University as a sample of the study where it is considered the first of its kind in the Arab Republic of Egypt, down to the results of the research and recommendations.

2. The concept of perception

Perception is a state of sensory response of a person towards something beyond himself after his knowledge and understanding and knowing that the extent to which the person understands all the assets in the surrounding environment. [4]

3. The concept of Way-finding.

It is a term that describes the processes that people go through to find their way around the environment, and the Way-finding system is basically a solution to problems and determines the most effective way to guide people through space. [11]

4. The process of Way-finding.

The process of finding a destination is based on environmental information, which is determined by three specific and interrelated cognitive stages respectively (information processing, decision-making, and decision-executing).
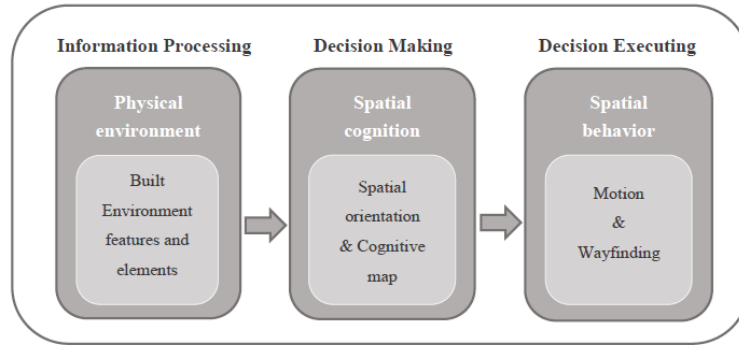
Chart (1) the process of Way-finding. [7]

5. Way-finding factors

A large number of factors affect how easy it is for people to find their way and understand the built environment, as shown by chart 2.
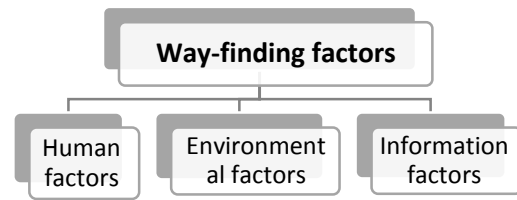

Chart (2) factors influencing finding the road . (Researcher)

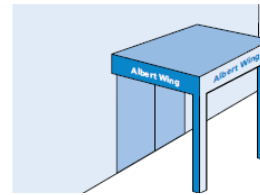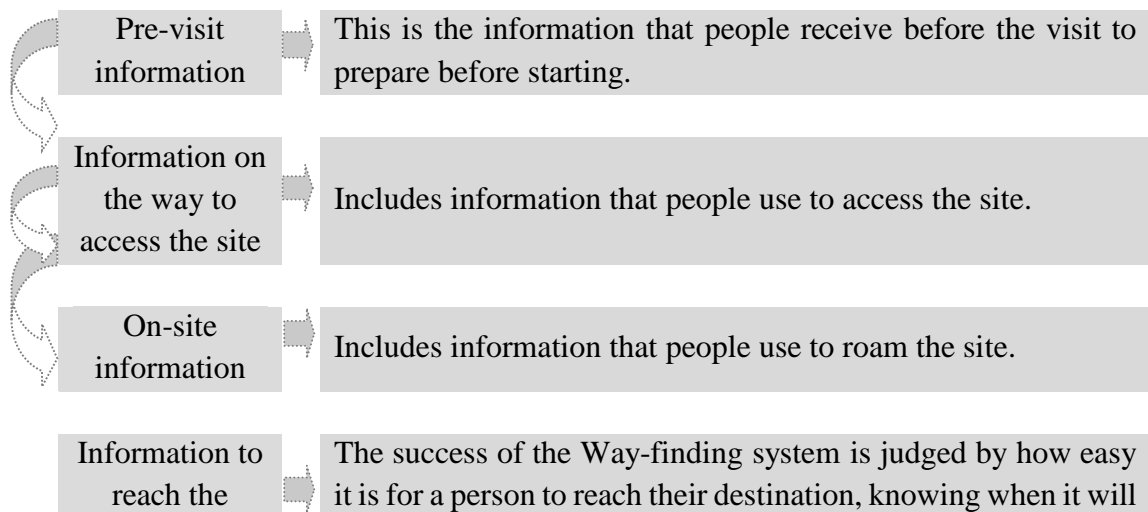**Figure (1) A clear signal was placed in the traffic circle to guide people to the hospital site. [12]**

Figure (2) The ability to see the entrance to the building, with landmarks that people can observe and remember. [13]

5, 1. Information factors.

There are four types of information that enable people to successfully complete all stages of their journey that must be taken into account as part of the Way-finding strategy, as outlined in Chart 3.

Pre-visit information	This is the information that people receive before the visit to prepare before starting.
Information on the way to access the site	Includes information that people use to access the site.
On-site information	Includes information that people use to roam the site.
Information to reach the	The success of the Way-finding system is judged by how easy it is for a person to reach their destination, knowing when it will

desired destination	arrive, and include information that people use to learn how to reach their destination.

Chart (3) types of information that enable people to their Way-finding. [13]

6. Use the senses in the process of Way-finding.

Way-finding is a multisensory task, when a person finds the way to his destination, he uses four of his senses (sight, sound, touch, smell) to varying degrees and sometimes unconsciously. Therefore, the effectiveness of the Way-finding system can be increased through the senses.

7. Components of a Good Way-finding System

They are the components that contribute to the process of managing the environment built within the environmental vacuum of healthcare buildings, as described in chart (4). [10]
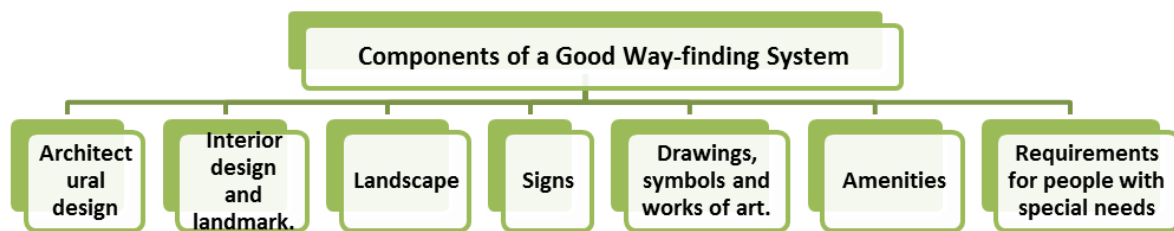
Chart (4) components of good Way-finding system. (the Researcher)

7, 1. Architectural design.

Entrances must be marked and architecturally clear, such as the appearance of the entrance or the use of colors and other architectural features, with signs and banners on the entrances in the direction of movement versus movement as shown in figure (3). [13]
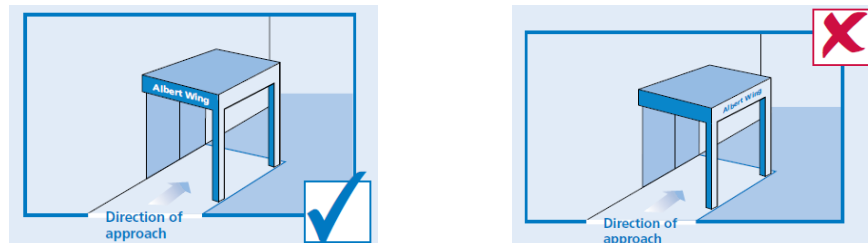

Figure (3) The clarity of the entrance to the building is architecturally prominent, with an explanation of how to place the signs on the entrance.
[13]

7, 2. Interior design and landmark.

- The purpose of the interior design is to create a differentiation between the areas and spaces within them, and to organize the orientation. [18]
- Provide the distinctive features in the decision points to be visual signals that contribute to well way-finding and reducing confusion. [1]

7, 3. Landscape

Landscape elements can contribute to the formation and composition of the entire site, make the building visually accessible, and the landscape can also provide unforgettable features to determine the path. [18]

7, 4. Signs

Banners play a key role in any way-finding system, and the signs can be divided into several types, as shown in table 1:
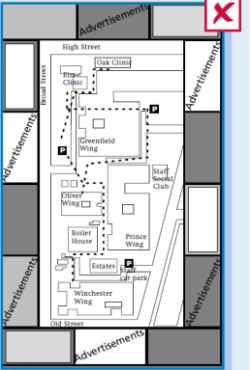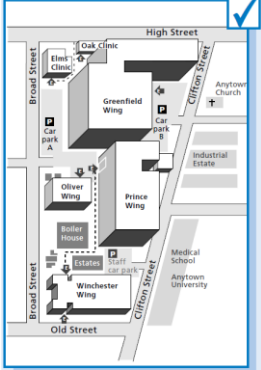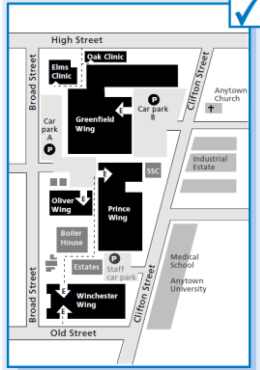
Table (1) Ttypes of signs. (the Researcher) [18]

Ttypes of signs	Marks classified according to the job.	▪ Routing: These are signs that give the user an overview of the vacuum or location. ▪ Direction: These tags provide specific paths or directions required to guide people to specific destinations. ▪ Identification: These marks confirm the identity, name or function of the vacuum. ▪ Legal signs: This category includes mandatory marks required by regulations and laws. ▪ Vehicle traffic flow signals and parking control signs, both on and off site. ▪ Various marks relating to staff procedures and operational issues.
	Markers classified by physical characteristics.	Tags can be categorized by the way they are installed: - Self-support - wall mounted - hanging
	In addition to previous ratings, the following features can help describe tags: **-** The sign can display information on only one side or two sides. - Indoor, lighted from the outside or not lit. - Dynamic or static.	

Signage placement site, as shown in table 2**:**

Table (2) Signage placement site. (the Researcher).

Signage placement	Signs to enter the site	▪ Place external signs directing cars to the drop-off areas of people in the desired place and also to the parking lot, as shown in figures (4,5). [17] ▪ Place external signs directing cars to the drop-off areas of people in the desired place and also to the parking lot, as shown in figures (4,5). [17] ▪ External markings must be tamper-resistant and weather resistant. Pedestrian site signs must be distinct from vehicle signs to avoid confusion, as shown in figure (6). [11]

<table>
<tr>
<td rowspan="3" style="writing-mode: vertical">Follow the Signage placement site</td>
<td></td>
<td colspan="3">

Figure (4) an example of an external sign directed to enter the site. [18]

Figure (5) Medway - Car Park gantry signs. [15]

Figure (6) is an example of an external gesture located at a decision point directed at the parking lot and entrances to the building. [18]
</td>
</tr>
</table>

		The way maps are designed, drawn, copied and the information they contain affects clarity and understanding of the map, as shown in figure (7). An external sign must be placed at the entrance to the emergency department to distinguish it from other entrances, and must be clear and readable for off-site traffic, as shown in figure (8). Pedestrian signs must be designed at the eye level, as shown in figure (9). [13]

Entrance signs

Here there is no visual discrimination and the paths and entrances are not clearly defined.

The 3D graphic shows differences in the height of the building while avoiding withholding important information.

Visually differentiates between buildings, roads, walkways and parking lots with clearly illustrated entrances and appearances.

Figure (7) shows how models of how maps work on the site and illustrate them. [13]

Figure (8) is an example of the signs of the entrance to the emergency department. [18]

Figure (9) site map at East Surrey Hospital. [15]
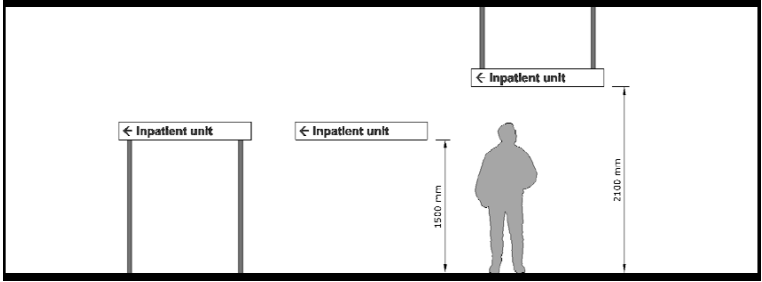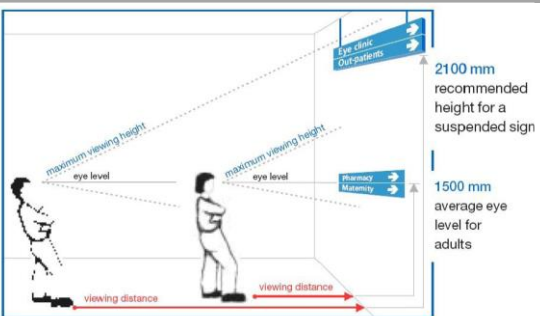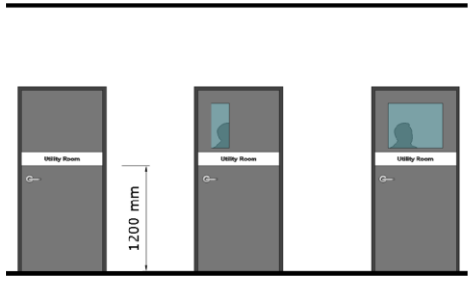
Follow the Signage placement site	**Internal signs**	The main map of the building is the main point of routing information when entering the building. The electronic board can be used to contain large amounts of information and only display what the user needs to accommodate, search, or scroll through the guide to find its destination, as shown in figure (10). [18]
		A guide board should be placed in the elevator lobby to help the person identify the floor before entering the elevator, and another copy of the manual must be found inside the elevator to confirm the information, as shown in figures (11,12). [18]
		▪ Internal banners should be placed directing users to different sections, as shown in figure (13). [17] ▪ Section Entry Banners: Signage must be placed to advertise the entry point of the section, and the writing can be combined with graphics. ▪ Directional signs within sections: Direct users within the section, as shown in figure (14). [18]

Figure (10) is an example of an electronic guide board. [18]

Figure (11) Example of a guide board in the elevator lobby of Royal North Shore Hospital, Australia. [23]

Figure (12) is an example of a map in the elevator lobby. [3]

Figure (13) example of directional signs between sections. [18]

Figure (14) example of directional signs within sections. [18]

Follow the internal signs

Identification signs: This sign declares the identity of the room, as shown in figure (15).

Sign Notes: It is a brief and important message and is often addressed to employees, as shown in figure (16).

General information tags:
Mandatory signs for the public safety of the user, health and safety in the workplace and emergency safety, as shown in figure (17).

		Figure (15) is an example of room signs. [18]	Figure (16) example of signs notes. [18]	Figure (17) example of a mandatory signs in East Surrey Hospital. [15]
Follow Signage placement site	**Signs heights**	Wall-mounted and stand-alone signs must be placed between 120 cm and 160 cm above ground level, hanging signs between 210 cm and 300 cm above ground level for signs that can be seen from long distances, as shown in figures (18), (19), (20). [18]		
		Figure (18) The recommended heights of wall-mounted signs and hanging signs. [18]		
	Follow the Signs heights	Figure (19) of the recommended heights for signs.[13]		Figure (20) height of the recommended door sign. [18]

Colors strategy in signs, which is as shown in table (3):

Table (3) shows the colours strategy in signs. (the Researcher) [11]

The colours strategy in signs	Pure red. (with white text)	It is the primary colour for use in all emergency external road signs, as shown in figure (21).	Figure (21) use red with white text.
	White (red text)	It is used at key locations within the emergency department including vacuum numbers, clinical areas, as shown in figure (22).	
	Blue	This is used in small quantities as a reference for parking in the hospital, and for use of toilets, as shown in figure (23).	
	Green (with grey text)	It is used with non-clinical information markers inside waiting rooms.	
	Grey	It is used in most internal banners of text and symbols, as shown in figure (24).	
	Green	Most internal direction identification information and banners for address blocks are used with the	

	address word reversed in white, as shown in figure (24).	**Interview Room** Figure (22) use white in red text.
Light green	This is used as a background on some tags, as shown in figure (24).	
World standard tags: Toilet codes, disabled accessibility, fire exits and fire equipment are all international symbols and colours.		

Figure (24) use green, gray and light green.

Figure (23) use blue.

7, 5.   Drawings, symbols and works of art.

Figure (25) this mark shows the person the presence of stairs without reading the word, and therefore the mark informs the user about stairs. [12]

7, 6.   Amenities.

Way-finding systems benefit from technological and digital developments that have become part of our daily lives and support new capabilities of the environment and make us see the environment around us differently, technologies can be used to communicate and interact with the environment.

Figure (26) shows HUD display, smart phone applications. [9]

8.   Analytical study of the emergency hospital at Mansoura University.

Mansoura University Emergency Hospital was selected as a sample for study.

8, 1.   Analysis of the current state of the emergency hospital environment.

Figure (27) A perspective snapshot of the emergency hospital. [25]

Figure (28) is a horizontal projection of the first Plan. [26]

The emergency hospital was established at Mansoura University on an area of 5000 m^2 in 1991, the hospital building consists of the ground floor and seven floors:

First floor: Contains the main reception, as shown in figure (28) consisting of: 8 detection rooms - 2 treatment rooms - gypsum room and accessories - room for the treatment of minor initial surgeries with 2 beds - room for the treatment of toxicology - first recovery room - radiology wing - operating suite - pharmacy. [25]

Architectural design.

- There is only one main road to reach the hospital building, as shown in figure (29) road congestion which hinders the movement of ambulances to reach the hospital.

- The design of the pedestrian path and the path of the cars is short because the area open to the entrance is small, as shown in figures (30), (31).

- Distinguish the main entrance through different colours, with banners placed on the entrance, as shown in figure (32).

- There are stairs and elevators just north of the entrance, but it is unclear during entry, as shown in figure (33).

- Three reception desks, information and medical registration in the entrance were placed in clear places, as shown in figures (33) , (34).

Interior design and landmarks.

- Interior design elements are not well designed, we find that the lighting of the stairs is not good as shown in figure (33), using only one type in the floors, the colours are not employed in the floors.

- There are no distinctive features in all the spaces of the building.

Figure (29) A field photo of the researcher showing the main road in front of the hospital.

Figure (30) A field image of the researcher showing the main entrance to the first round directly.

Figure (31) A field photo of the researcher shows Ramp cars climbing for the first round reception, with a ladder available for people to climb.

Figure (32) A field photo of the researcher showing the main entrance.

Figure (33) A field photo of the researcher showing the area of stairs and elevators from the entrance, as shown by the reception.

Figure (34) A field photo of the researcher showing the information office.

Signs.

- There are no external signs on the main street directed to the hospital, there is only above the main gate the name of the hospital, as shown in figure (27).

- There are signs on the entrances to the building, as shown in figure (32).

- There are no maps of the site or the building from the inside, but there is only a panel classifying the cases treated in the hospital hanging from the entrance, as shown in figure (35).

- There is no guide board or maps of the elevator lobby or inside the elevator, as shown in figure (36).

- Place directional signs to guide the users of the building, as shown in figure (37), but they are unclear from far, as English was used with some signs and most hospital users do not know English.

- Put some signs in front of one of the stairs to guide users, as shown in figure (38), but this is not available in other stairs.

Figure (35) A field image of the researcher shows that there are no maps at the entrance to the building, but there is a guide board to classify the cases being treated.

Figure (36) A field photo of the researcher showing the elevator lobby.

Figure (37) A field image of the researcher showing directional signs.

Figure (38) A field photo of the researcher showing the signs in front of the stairs.

- There are no signs to enter the departments in the hospital at the entrance points of the sections, as shown in figure (39).

- There are identification signs announcing the identity of the rooms in the sections, as shown in figures (40, 41), but most of them are small and can only be read in front of the sign, as shown in figure (40).

Figure (39) A field picture of the researcher showing the entrances to one of the sections.
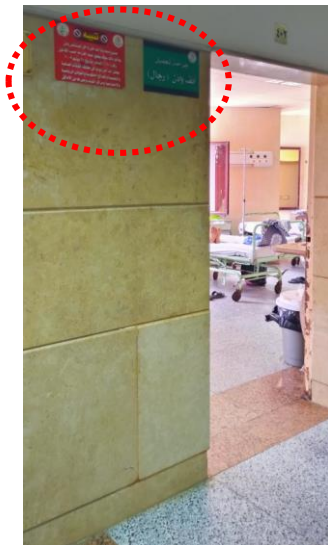
Figure (40) A field photo of the researcher showing a sign introducing the patients' rooms to the residence.

Figure (41) A field photo of the researcher showing a sign of identification inside the reception section.

Figure (42) A field photo of the researcher showing mandatory signs.

- There are mandatory signs and banners showing prohibited activities, as shown in figure (42) in most spaces of the hospital, but all of them are small in size that can only be seen directly in front of them, as shown in figures (42, 43, 44).

- Choose red with white or yellow text with escape exit signs, warning signs, as shown in figures (42, 44).

- Choose blue with white text with toilet signs, as shown in figure (45).

Figure (43) A field image of the researcher showing mandatory signs for emergency safety, and how difficult it is to be clear.

Figure (44) A field image of the researcher showing the size of the signs, and how difficult they are to be clear.

Figure (45) A field photo of the researcher showing the toilet sign.

.Drawings, symbols and works of art

- The writing and illustrations of the peace sign and the toilet were combined only, as shown in figures (42, 45).
- There are no works or paintings in all spaces, as shown in figure (46), but the plant element was used only in front of the administrative section and in front of the main reception outside, as shown in figures (32, 47).

Figure (46) A field photo of the researcher showing the residence corridor.

.Amenities

- None of the modern technologies have been used in the hospital's road finding systems.

Means of helping to find the way for people with special needs.

- There are no means of assistance for people with special needs, except for the presence of an automated call for the main reception only, as shown in figure (34).

Figure (47) A field image of the researcher showing the plant element used in front of the administrative department.

8, 2. Results of the study of the current state of the emergency hospital environment.

As a result of the theoretical study, and analysis of the current situation of the emergency hospital environment at Mansoura University, as we already find that the system of way-finding is not applied adequately, it is required to focus on guiding strategies to improve the process of way-finding and modifying it in the building to suit the requirements of all users.

8, 3. Some proposals to improve the process of finding the road for the environment of the emergency hospital at Mansoura University.

The following is a table (4) outlining some proposals to improve the process of way-finding for the emergency hospital environment at Mansoura University.

Table (4) outlines some proposals to improve the process of way-finding for the emergency hospital environment at Mansoura University. (the Researcher)	
Proposals to improve the signage system.	**Proposals to improve the steering system using amenities.**
- Replace small banners with large banners that can be easily seen and the size of the line should be clear and visible, and the use of Arabic next to English with all banners. - Use banners with 70% contrasting with their background, hang them or place them so that they can be seen in the range of 60 degrees. - Placing external signs directing cars to the drop-off areas in front of the hospital and allocating an area to prevent congestion. - Placing banners after the main entrance gate directs the user to the entrances to the building. - Develop a master map of the building or an electronic guide board at the entrances of the building, as well as the lobby of the elevators, at an altitude of not more than 160 cm above the ground level. Place banners in front of sections showing the name of the section.	- Use interactive touch screens that can be used by all users. - Make an application on smartphones, users can use it on their own phones. - Provide wearable displays for the visually impaired.
	Proposals to improve means of assistance to people with special needs.
Proposals to improve the system of symbols and works of art.	- Providing banners that issue voice information at decision-making points in the back of elevators. - Provide braille directional signs. - Provide the level of lighting with all the blanks, especially the ladder, and the information office. - Recruiting or training an information officer who can use sign language. - Provide paper maps with the information desk to explain to the user.
- Combine writing, illustrations or diagrams with banners. The use and diversity of works of art with movement paths, at all decision-making points.	

9. Summary and Results.

▪ Way-finding system must be taken into account when designing and planning healthcare buildings and being part of the design process.

▪ The integration of the elements and components of the way-finding system contributes to the ease of understanding and awareness of users of the environment of healthcare buildings, reduces confusion among patients, and thus promotes healing and gives a sense of control.

▪ The elements and components of the way-finding system must be compatible with the public's ability to absorb them.

▪ When choosing the location of the hospital in the first place, it must be chosen so that it is in contact with the main road networks and public transport stations, and ensure that the main entrances are not obstructed.

▪ When designing the hospital, the pedestrian path to reach the buildings must be as short as possible, distinguishing the entrances and clarity of the buildings, and the clarity of horizontal and vertical movement paths inside and outside the building.

- Use the features of decision points, and use colors, lighting, and finishing materials when designing internal spaces to support the process of way-finding.
- The signage system must be well planned, placed with the right locations and heights that can be easily seen, and be easy to read free of any obstacles, and in a unified design language based on the local character of the site and the identity of the building, and illuminated it during the darkness.
- The use of works of art in the environment of healthcare buildings supports the process of way-finding.
- Take advantage of modern technological developments in way-finding systems which increase interaction with the environment and make it easy, clear, and easily accessible anywhere.
- Taking into account the means to help way-finding for people with special needs and their requirements.
- The research presented the strategy of a way-finding system for healthcare environments.

10.Recommendations.

- The research recommends the need to pay attention to providing the elements and components of the way-finding system in an orderly and integrated way that suits the needs of all users of healthcare buildings, in order to contribute to the process of better understanding and clarity of its environment and thus facilitate guidance and movement.
- Members of the design team should be aware of the requirements and components of way-finding, architectural elements, and interior design elements, and have a comprehensive understanding of signage systems and their types.
- Focus on guiding way-finding strategies to improve the road find system and modify it with existing healthcare buildings to suit the requirements of all users.
- Research recommends the importance of using modern technologies and virtual reality as a research tool in way-finding.
- The research recommends the establishment of a board specialized in reviewing the strategy of way-finding in healthcare buildings, and reviewing new projects before start-up or when developing existing projects.
- The need to discuss the search system on the road with many different people who use the building, in order to see if they can understand the system, in order to ensure the most effective use.

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