Phenomenological Evaluation on Wayfinding in Complex Educational Buildings: The Case of ITU Faculty of Architecture

Özlem Çavuş[1]
ORCID NO: 0000-0002-8408-1981[1]

[1] Istanbul Technical University, Graduate School, Department of Informatics, Architectural Design Computing, Istanbul, Turkey

Orientation programs have a significant role in the adaptation of novice students to the faculty building. These programs are mostly prepared by faculty staff or authority figures who have already known the building, so they may not descend to those inexperienced in the faculty. Even if students are informed about the places in these programs, it can still be hard to find places, particularly in complex educational buildings, until they get used to them. Hence, experience-based approaches facilitating wayfinding are needed to cope with the problem. This research aims to reveal the reasons for confusion and reference points students take in wayfinding through phenomenological evaluation of the building. Istanbul Technical University (ITU) Faculty of Architecture is selected as a case study due to its complexity in wayfinding. A head-mounted GoPro is placed to twenty novice students and ten senior students as a control group, and students are asked to find a target point and return to the initial point following the shortest path. The obtained results are then evaluated according to the measuring techniques proposed by Moles (2004) since the measurement needs to answer ill-defined situations obtained from experiences. The visual recordings of participants are compared regarding the architectural mass. Therefore, comparison and equality judgment, contrast or antinomy, and weight coefficient techniques are particularly utilized among the provided techniques. Beyond the expected data, the results of the study provide information about the factors, methods, and priorities that are effective in decision making. This research would contribute to the literature showing how the data set is created based on users' direct experience in wayfinding in complex educational buildings.

Received: 16.01.2021
Accepted: 23.02.2021

Corresponding Author:
cavus19@itu.edu.tr

Çavuş, Ö. (2021). Phenomenological Evaluation on Wayfinding in Complex Educational Buildings: The Case of ITU Faculty of Architecture. JCoDe: Journal of Computational Design, 2(1), 285-312.

Keywords: Wayfinding, Orientation Programs, Phenomenology and Hermeneutics in Wayfinding, Educational Buildings.

Kompleks Eğitim Yapılarında Yön Bulmada Fenomenolojik Bir Değerlendirme: İTÜ Mimarlık Fakültesi Örneği

Özlem Çavuş[1]
ORCID NO: 0000-0002-8408-1981[1]

[1] İstanbul Teknik Üniversitesi, Lisansüstü Eğitim Enstitüsü, Bilişim Anabilim Dalı, Mimari Tasarımda Bilişim, İstanbul, Türkiye

Oryantasyon programları, yeni başlayan öğrencilerin fakülteye adaptasyonunda önemli bir role sahiptir. Fakat bu programlar daha çok fakülte personeli veya binayı önceden deneyimlemiş yetkili kişiler tarafından hazırlanır. Bu nedenle oryantasyon programlarında yerlerin tanıtılma şekli fakülte binasını henüz deneyimlememiş kişilerin seviyesine inemeyebilir. Bu programlar sayesinde öğrenciler yerler hakkında bilgi sahibi olsalar bile fakülteye alışana kadar özellikle yapının kompleksliği arttıkça yön bulmakta zorlanabilirler. Bu yön bulma sorunuyla başa çıkmak adına birincil kullanıcıların doğrudan deneyimine dayalı yaklaşımlara ihtiyaç vardır. Bu araştırmada, bir eğitim yapısının fenomenolojik değerlendirmesi ile öğrencilerin yön bulmada kafa karışıklığının nedenleri ve yön bulmayı kolaylaştıran referans aldıkları noktalarının ortaya çıkarılması amaçlanmıştır. İstanbul Teknik Üniversitesi (İTÜ) Mimarlık Fakültesi binası yön bulmadaki karmaşıklığı nedeniyle örneklem olarak seçilmiştir. 20 yeni başlayan öğrencinin ve kontrol grubu olarak seçilen 10 mezun öğrencinin göz seviyesine gelecek şekilde bir GoPro yerleştirilmiş ve öğrencilerden bir hedef noktayı bulup en kısa yolu izleyerek başlangıç noktasına dönmeleri istenmiştir. Bu deneyimlerden elde edilen sonuçlar hasta tanımlı durumları yansıttığı için Moles (2004) tarafından önerilen ölçüm tekniklere göre değerlendirilmiştir. Katılımcıların görsel kayıtları mimari kütle özelinde karşılaştırılmış, sunulan teknikler arasında karşılaştırma ve eşitlik yargısı, zıtlık ve ağırlık katsayısı kullanılmıştır. Çalışmanın sonuçları beklenen verilerin ötesinde, yön bulmada karar verme hususunda etkin olan faktörler, yöntemler, ve öncelik sıralamaları hakkında da bilgi vermiştir. Bu çalışmanın oryantasyon programları kapsamında kompleks bir eğitim yapısında tanıtılacak yerlerin tanıtım şeklinin belirlenmesinde doğrudan deneyime dayalı bir veri havuzu ortaya koyması açısından literatüre katkısı vardır. Bu çalışmanın literatüre katkısı oryantasyon programları kapsamında kompleks bir eğitim yapısında tanıtım şeklinin belirlenmesinde doğrudan deneyime dayalı bir veri havuzu ortaya koymasıdır.

Anahtar Kelimeler: Yön Bulma, Oryantasyon Programları, Yön Bulmada Fenomenoloji ve Hermenötik, Eğitim Yapıları.

Teslim Tarihi: 16.01.2021
Kabul Tarihi: 23.02.2021

Sorumlu Yazar:
cavus19@itu.edu.tr

Çavuş, Ö. (2021). Kompleks Eğitim Yapılarında Yön Bulmada Fenomenolojik Bir Değerlendirme: İTÜ Mimarlık Fakültesi Örneği. JCoDe: Journal of Computational Design, 2(1), 285-312.

1. INTRODUCTION

An orientation experience impacted freshman persistence mainly by facilitating a student's ability to cope with a new set of social challenges in an unfamiliar environment (Pascarella et al., 1986). In this unfamiliar environment, students try to know other students and school staff and recognize the places and daily routine of the school. They become familiar with the institution removing the scary features of the unknown (Selçuk & Güner, 1999). Therefore, it is essential to properly apply this program to novice students in the first days of school. However, the content of the orientation programs is generally prepared by people working as staff or authoritative figures (Selçuk & Güner, 1999). As they are already familiar with the faculty building, they may not descend to the level of those who are new in the faculty. This top-down application extends the students' adaptation time, closely linked to the building's complexity. An increase in complexity hardens the recognition of places and their daily routine. Particularly, complex buildings pose a difficulty in wayfinding. Understanding how novice students experience a new complex building makes it critical to allow student-participation in orientation programs instead of being only student-centric. Therefore, this research questions reasons for confusion and reference points students take in complex educational buildings to facilitate the adaptation of the students to the unfamiliar building.

The outlined inquiry is investigated in Istanbul Technical University (ITU), the Faculty of Architecture, as a case study, since it is not easy to find the way in the building not only for novice students but also senior ones due to its complexity. Also, implementations of signage consisting of symbols and pictograms to address the location are barely noticeable. Moreover, the building form and layout are so symmetric that they cause confusion in wayfinding. Figure 1 indicates the ground and second floor plans of the faculty with two-story (ITU Faculty of Architecture, 2014). The faculty has a central courtyard, and there are four towers at the corners. Each tower has staircases, elevators, and wet spaces. Not only the physical form of the building but also the symmetric placement of the architectural program makes users difficulties in understanding the floor plan's legibility. For instance, cafeterias with similar plan layouts are located at the corners of the faculty. Furthermore, if it is tried to relate indoor places with the

surrounding buildings to understand the location, the outdoor environment can hardly be perceived from the inside. For example, surrounding high-rise buildings such as Suzer Plaza cannot be perceived from the courtyard. Therefore, students, especially the novice ones, generally find themselves walking around the same place, particularly when they have just started to education.

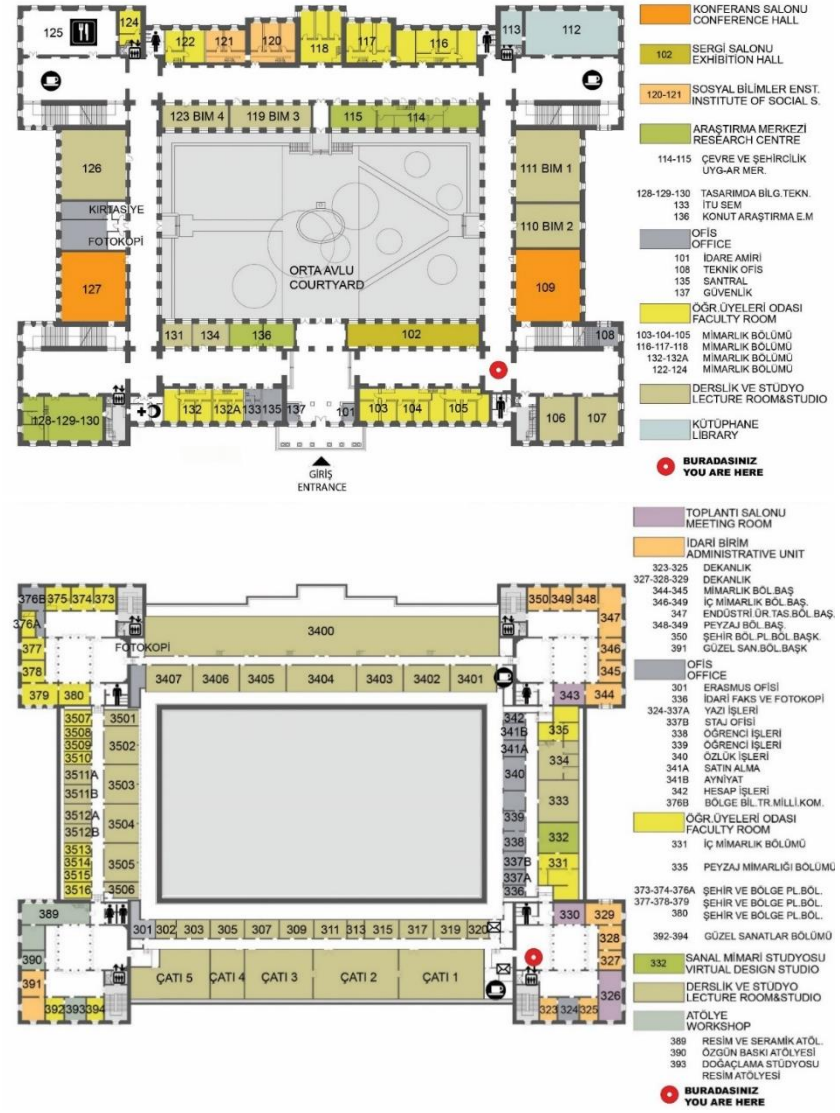


Figure 1: Top: Ground Floor Plan; Bottom: Second Floor Plan (ITU Faculty of Architecture, 2014).

If the the confusing and facilitating factors in wayfinding are known, obtained information can serve as a template for orientation programs to familiarize students with the faculty building in a more effective way. In this regard, phenomenological hermeneutic becomes significant to investigate those reasons since all mentioned constraints force users to

explore the peculiar nature of the place through experiences. Experience-based approaches are significant because art and architecture are constituted in human experience, not in the physical object, as John Dewey indicated in 1931 (cited in Pallasmaa, 2019). In other words, it is not the building's physical existence but how it is perceived and experienced by its users. The focus is indeed on the way the body interacts with the object, producing thought and sense-provoking qualities in the experience of a place. The phenomenological view is, therefore, shifting our emphasis to the experience and the complex interactions of perception, memory, imagination, emotion, and empathic identification, as highlighted by Pallasmaa (2019).

This research aims to reveal hidden factors that cause both confusion and facilitation in wayfinding through the phenomenological examination of the ITU Faculty of Architecture building within the above-stated context. It is twofold research. The former pays attention to participants' direct experience of the target place, while the latter concentrates on interpreting the results obtained from these experiences. In the end, conclusions from the study are discussed together with their limitations and recommendations for future studies.

2. BACKGROUND

Wayfinding is studied in different contexts and scales with distinct measurement tools and techniques. The topic is mainly studied in complex buildings such as hospitals and libraries (Cheng & White, 2018; Hoy, 2016) as well as educational buildings (Azzali & Abdel Sabour, 2018). It is also studied in railway stations, care, attention homes, and cruise ships (Schrom-Feiertag et al., 2016; Tao et al., 2018; Casareale et al., 2017). This study differs from existing studies on educational buildings in terms of its application scale and measurement techniques.

Existing studies concentrate on older adults, patients, customers, impaired people, travelers, and mixed usage (Bosch & Gharaveis, 2017; Cheng & White, 2018; Artman & Wiegand, 2015; Calman, 2017; Swobodzinski & Parker, 2019; Park & Lee, 2016). There are also studies developing digital tools for impaired people resulting in a patent application (Cioffi & Agee, 2015). This study is different from existing studies for students because a head-mounted GoPro takes the

measurement, which is examined from the lens of phenomenology and hermeneutics.

In literature, wayfinding is studied for emergencies such as fire and parking scenarios (Lin et al., 2019; Hoy, 2016). These studies mainly measure mental stress, spatial cognition, social influence, and individual differences (Kanakri et al., 2016; Hund, 2018; Silva et al., 2015; Kuliga et al., 2019). However, in this research, it is questioned the factors facilitating adaptation of students to new faculty environment.

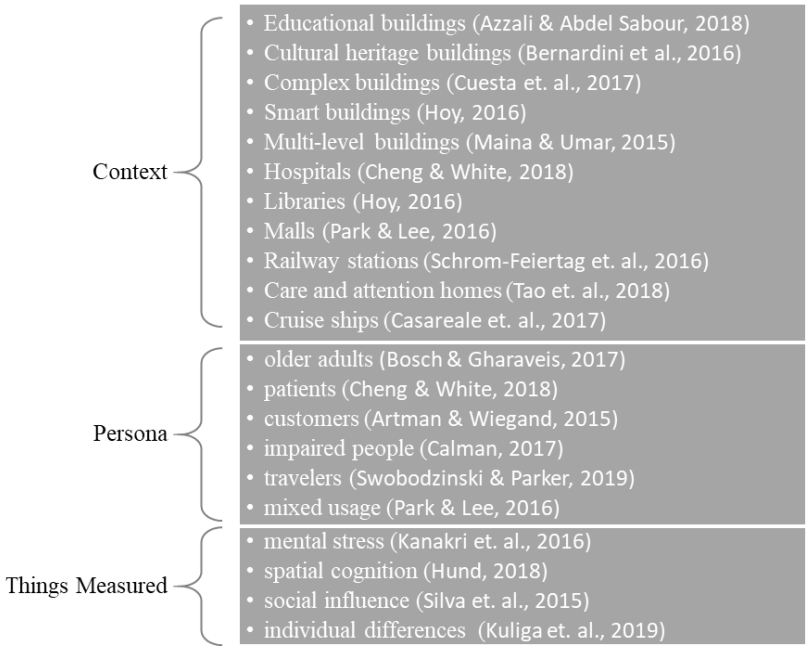


Figure 2: Wayfinding in Literature in regards with Context, Persona, and Things Measured.

All concerns mentioned above regarding existing studies are listed and labeled in **Figure 2**. As briefly indicated, wayfinding is a hot topic studied in different contexts; however, there is no research within the scope of orientation programs regarding phenomenology and hermeneutics. In fact, the subject is discussed through the measurement techniques advocated by Moles (2004), as the research problem is ill-defined due to its ambiguity. Besides, the ITU Faculty of Architecture Building have not been studied in this regard. Therefore, this study has a unique character compared to other studies.

3. METHODOLOGY

The direct experience of participants is based on Husserl's bracketing or phenomenological epoche method. Bracketing demands the existence of the object satisfying the content of the intentional act (Husserl, 1962). The experience of students is recorded with a head-mounted camera. Interpretation of the results obtained from these experiences depends on the techniques advocated by Moles (2004).

Moles (2004) asserts that ambiguity can only be measured with ambiguous criteria, and it needs different approaches from natural sciences. In this way, ill-defined situations can be better defined, and ambiguous situations become more understandable. It is believed that social sciences' measurement techniques are open to quantifiable and empirical methods, and they have distinct techniques. Indeed, these techniques establish the link between the object and the internal state of the subject. Unlike top-down methods, they allow understanding a situation from the main subject's perspective: the participants. These techniques are valuable since factors in wayfinding are to be drawn from the ambiguous recordings of the experiences of the participants. There are two participant groups ~~that are~~ to be compared based on visual similarities and differences of their recordings, so below stated three techniques are selected particularly. These techniques depend on the comparison of elements, and they provide valid criteria for evaluating an architectural mass. They are briefly explained as follows:

- Comparison and equality judgment: the idea of equality of two elements, comparison, and equality judgment, as opposed to idea of inequality.
- Contrast or antinomy: the construction of a dialectical bipolarity. One of the two things is the opposite of the other.
- Weight coefficient: The human mind can attach greater importance to the outcome of any measurement than to the outcome of another measurement, without any special preparation; that is, it imposes a coefficient of significance on one of the two results.

The findings are represented by cognitive maps. Harley (1987) defines maps as mediators between an inner mental world and an outer

physical world, thus as fundamental tools helping the human mind make sense of its universe at various scales.

The case study is conducted by two groups which are twenty junior and ten senior students. Junior participants have started the education for at most two months, while the senior ones are graduate students who have studied in the same faculty for at least four years. The second group is indeed a control group. The courtyard is one of the most dominant places in the building, so it is selected as a starting point. Room 390 is selected as a target point because its location is one of the most challenging parts of the building. This part belongs to the administrative unit of other departments where students were unlikely to be there before. Also, it is on the second floor, so students must use vertical circulation. All participants are asked to find room 390 starting from the central courtyard and returning to the starting point. They are requested to follow the shortest path possible without consulting anyone. No more information is given.

The experience of the students is recorded with a head-mounted GoPro, which is placed by the author (researcher). It is an action camera allowing people to capture real-time scenes. In fact, the captured recordings indicate reflections of experiences which are employed simultaneously with the experience. It is significant because reflect-in-action answers how the professional does action and that action generate an effect in the situation, and this effect is feedback for the professional to reaffirm, modify or reframe his approach and continue his "conversation with the situation" through a new move (Ferreira, 2017). The experience is also recorded on the way back, as it aims to reveal what participants can remember for expressing and organizing fragmented elements in their minds to understand what has happened and draw lessons from experience. It is called reflect-on-action, an activity of reconstruction of an experience, based on what we can remember about it after the auction has finished (Ferreira, 2017).

4. CASE STUDY

Participants are asked to find the target point and return to the initial point following the shortest distance. Experiences are firstly explained based on the views captured by GoPro. The captured locations of these recordings are indicated on a key plan. The results are then discussed

in terms of the reasons for confusion in wayfinding and reference points they take.

4.1 The Results obtained by Novice Students

In the faculty building, the courtyard has four entries located symmetrically. In the first move from the courtyard (Figure 3), students prefer the closest entrance to the student elevator when they pass from the courtyard to the interior. Some students have not hesitated in finding the exact location of the student elevator. The others, however, follow main staircases, as they have not preliminary information about the student elevator.

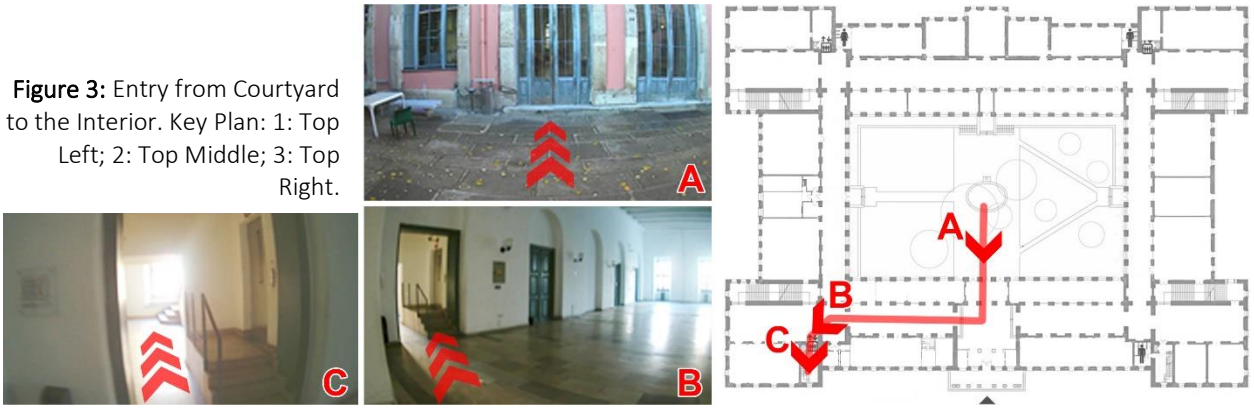


Figure 3: Entry from Courtyard to the Interior. Key Plan: 1: Top Left; 2: Top Middle; 3: Top Right.

In addition to student elevators, students seek the signages. In case there are people in the same direction as the participant, participants prefer to follow those people. Although some notice the signages, they still prefer following the person in front of them instead of looking at the signages. However, this person is followed only if he/she is moving in the same direction as the participant. Otherwise, they do not choose the door where people are coming out. That is, they prefer to follow those who are in the same direction (Figure 4). One of the participants starts to follow a staff who is in the same direction as him. Then, he notices other students who are also in the same direction and stops following the staff and continues following the students.

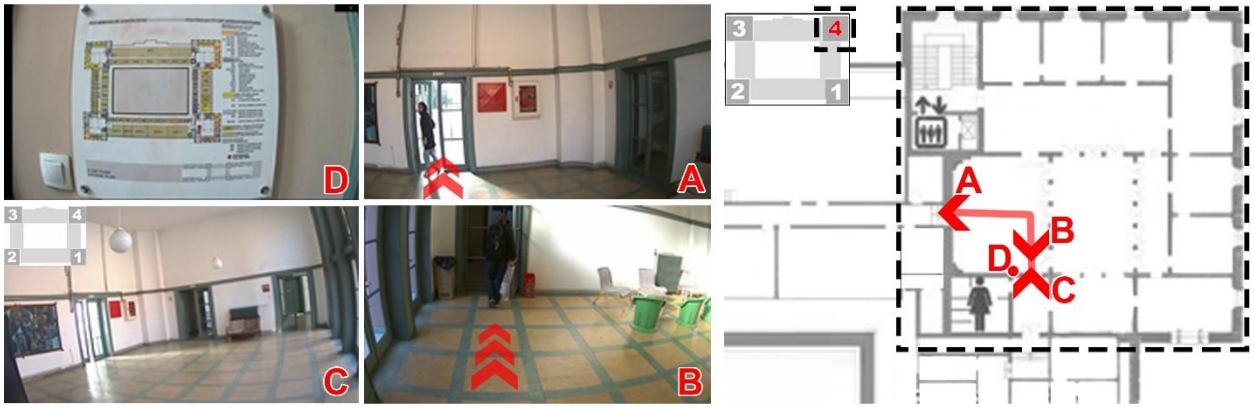


Figure 4: A: Third Person coming out of the Door. B: Third Person is moving in the Same Direction with the Participant. C: Waiting Area at the Corner of the Second Floor. Top left of C: Diagrammatic Plan of the Second Floor Showing Towers. D: Plan Schemes on the Walls.

Many participants have preliminary information, including units such as elevators, doors, and corridors. After realizing that these units do not work, for instance, the student elevator does not function, the door is closed, or the corridor is a dead end, they begin to think about it. It is quite similar to the hammer example suggested by Heidegger (1996). Someone who nails a wall does not think about the nail until it is broken, or the user finds out his/her mistake.

Adjacent doors not having consecutive numbers in the same corridor cause confusion. However, students label the corridors with room numbers like 3400s and 320s, as plan schemas they utilized to find out their location are prepared accordingly. The room numbers at the corridors' endpoints also become significant since students examine endpoints to decide whether they should enter the corridor. Because the corridors on the second floor have a central layout that does not confront the façade, corridors cannot be associated with the outside of the building nor open spaces in the faculty. In this sense, corridors are categorized according to neighboring relations with the units they contact. If these units give an idea of its function via physical components such as roof classes with transparent walls and student works in the corridors, this situation starts to identify the corridors.

The adjacent room numbers are not consecutive, and some of them were deleted or fixed to a different place. Thus, room numbers become another confusing factor.

Moreover, the symmetry of the building causes similar places to be generalized as if they have the same characteristics. Although categorizing according to similarity features seems more

straightforward to find direction, they can be confusing factors simultaneously. For example, most of the floor plan schemas are placed on the walls at each staircase entrance, but some of the schemes are hanged on the walls in the waiting area (Figure 4D). Moreover, temporarily placement of the elements in front of the schemas, such as exhibition units, make schemas challenging to be detected. In addition to the plan schemas, not all the fire escapes in the four corners connect the ground and the second floor. The fire escapes on the entrance façade connect these two floors, yet the others connect only the first and the second floor.

Plan schemas are important factors in wayfinding but finding directions by looking at these diagrams takes place at the end of the ranking of decision making. When these schemas are examined, right and left-hand sides of the schemas may not be distinguished, especially in nodes such as the waiting area (Figure 4C). Everywhere in nodes seems symmetrical and uniform.

Participants turn their heads up and down only in vertical circulation. Having a queue in front of the elevator, especially during lunch time, narrows the passage to the staircase next to the elevator (Figure 5A).

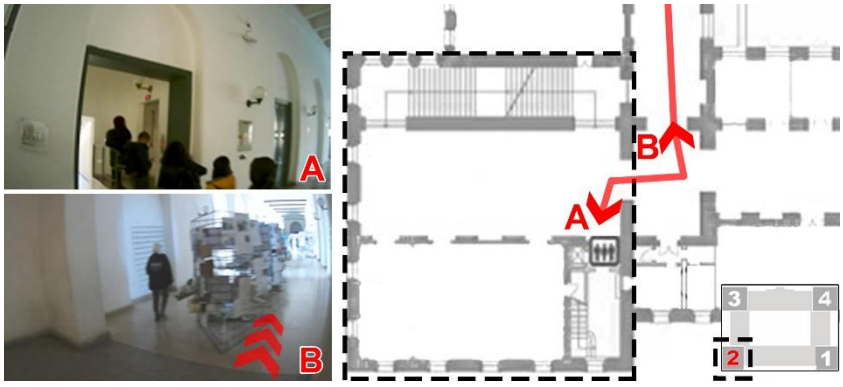


Figure 5: A: Queue in front of the Elevator. B: Wireframe Exhibition Elements Changing the Circulation.

As stated, the building has a central plan and horizontal circulation facing with the courtyard or passing through the center, so participants try to orient themselves based on this central courtyard. For instance, they look at the courtyard and orient themselves according to the length of the edges of the courtyard plan and its facade. A similar orientation is performed based on open spaces on the second floor in addition to the courtyard. Because of this central schema, participants loop around the yard and open spaces. Even if they have other

alternatives in decision-making, they tend to complete this cycle. For example, they initially choose the option which does not break the cycle. If there are two alternatives, they prefer the one maintaining the existing direction. When this direction terminates, they prefer the nearest alternative to the current direction.

The arrangement of temporary elements such as exhibition stands changes the current circulation affecting the orientation of people. These elements serve as a separator but do not provide a sharp separation since they are made up of wire panels (Figure 5B). Hence, they provide permeability between the spaces they divide unless there are a lot of works hanged on them.

Too many visual elements such as posters in the corridors cause the signages to be perceived as posters. Moreover, student works exhibited in the halls narrow the transition area and block the natural light from penetrating (Figure 6). Therefore, long narrow corridors are not preferred.

Figure 6: Student Works exhibited in the Corridor.

Doors also play a significant role in guiding the circulation of the participants. For instance, some of the doors connect two corridors: a capillary and a main artery. These capillary corridors can be perceived only if the door is open. Even if there are nameplates on the doors, they still do not attract attention (Figure 7).

Figure 7: A: Door Opening to a Corridor. B: The Corridor.

Also, doors opening to staircases and doors of the faculty staff or wet spaces are similar in appearance. This similarity causes confusion as well, even for the participants who know the location of staircases before. It seems as if there is a toilet instead of a staircase because it can hardly be perceived from a certain distance (**Figure 8**).

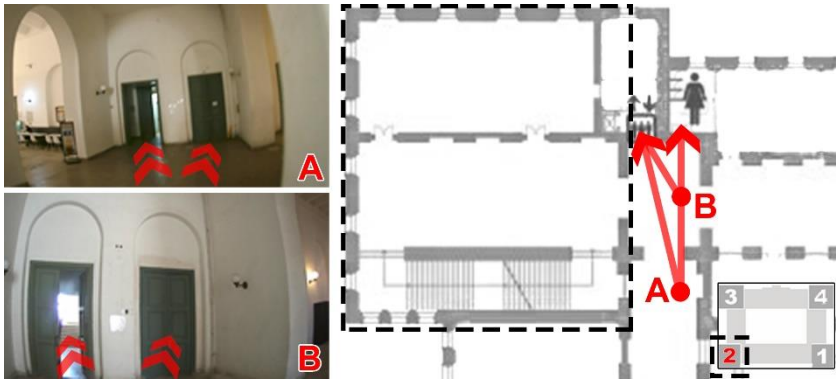


Figure 8: Doors opening to Fire Escape and Toilets.

Visibility is, therefore, an essential point for the perception of the space. Transparent spaces like the courtyard, permeable display units, and architectural elements such as light facilitate finding the location of space since they indicate the presence of a place. For example, a participant looking for room 390 could not realize the presence of the space from its standing position in the waiting area, even though he checked the plan schemes. It is because room 390 is connected to the waiting area by an L-type corridor, and this corridor is not visible from the entry point of the waiting area because it does not directly connect to the waiting room. Instead, it is connected with a door, which suppresses the perception of the corridor. Furthermore, natural or artificial light does not penetrate the waiting area, although there is a

transparent door connecting the waiting room and the hall. The other doors opening to the waiting area are solid walls.

On the other side, the presence of room 390 is perceived from the adjacent waiting area at which is the intersection of the corridors, as this area has a transparent wall facing towards room 390. Still, how to reach there cannot be understood by many participants. One of the participants looked at the door handle and attempted to hold it, but he did not even if the door is open (**Figure 9**). Instead, he chose to wander from the inside. There were no people in the open space.

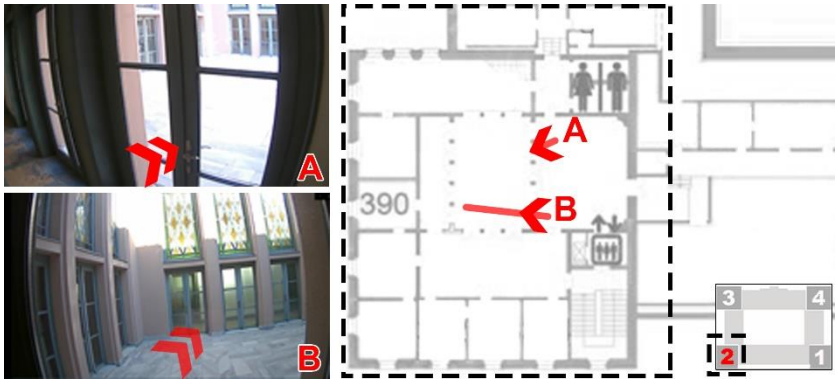


Figure 9: Transparent Wall Facing towards the Room 390.

Lots of participants try to find the entrance of room 390 in the ceramic workshop, which is next to room 390. Nonetheless, there is no passage from the workshop, even though they share the same wall.

Another example of visibility is that a participant climbing to the first floor from the main staircase could not see a fire escape that connects the first and the second floor. There is a transparent tube where students study (**Figure 10**). The tube narrows the circulation path and divides into two. The fire escape becomes invisible for a person following this narrow path. Moreover, the door of the fire escape is next to the door of the women's toilet. These two adjacent doors are the same in appearance. Furthermore, when getting closer to these doors, only the sign of the woman toilet and the presence of a door next to the toilet become noticeable. In fact, woman and man toilets are not located next to each other. At the end of the corridor, the participant chooses to continue the opposite corridor, although he or she knows the staircases' location.

Figure 10: Transparent Tube where Students Study.

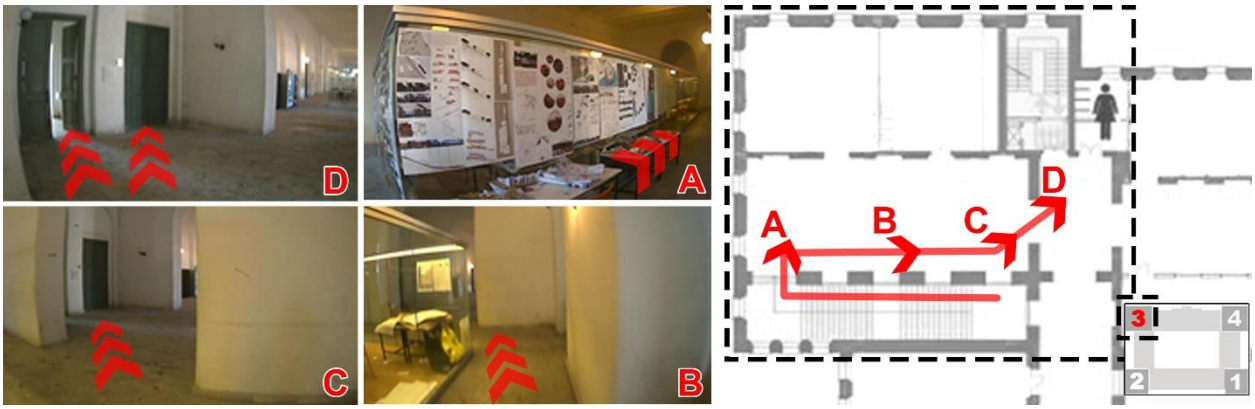
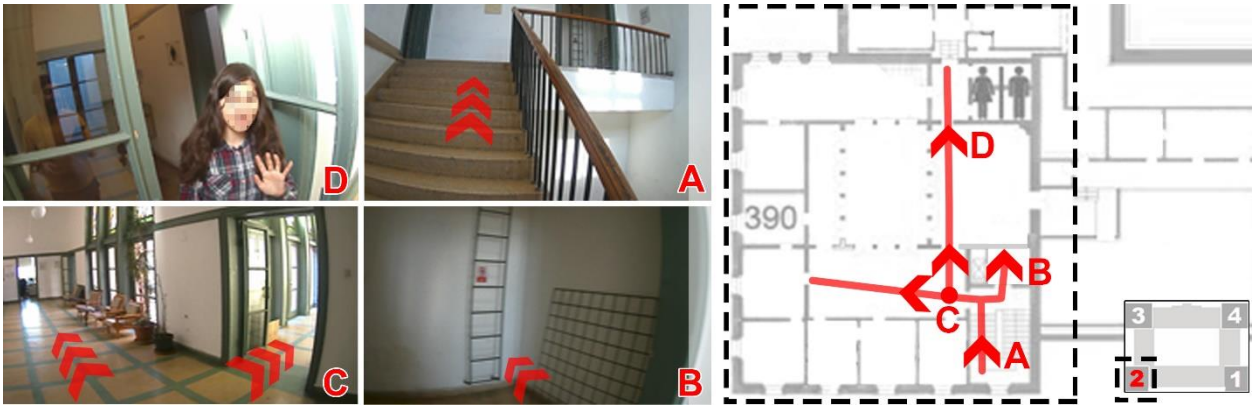


Figure 11: A: Wall-mounted Ladder. C: Waiting Area. D: Other People: Friends.

When participants come up from the fire escape to the second floor, they encounter two entrances: an elevator and a waiting room. A wall-mounted ladder at the elevator entrance is visible, so they suppose that the wall-mounted stair is the continuation of the fire escape (**Figure 11A and 11B**). Moreover, the elevator is not visible when climbing to the fire escape, so it can be perceived as if it is not there.



The second floor's waiting areas become a landmark in wayfinding because they are stop points connecting multiple units. These areas facilitate wayfinding, but also, they are confusing because there are adjacent waiting areas that are similar in size and appearance. Hence, waiting halls in the center of the towers (**Figure 11C**) create a perception that they are in the adjacent waiting area at the intersection of the corridors.

Room 390 was unknown for each participant. Therefore, they prefer to follow the alternative ways they do not know or have not experienced when they must make a choice. Nonetheless, all participants seek room

390 on the second floor except for only one participant. The room numbers on the second floor are labeled with numbers starting from 3. The participant does not estimate that room 390 is on the second-floor loop around the corridors on each floor before going upstairs.

Apart from the building's physical factors, another factor in wayfinding is other people such as authority figures and friends. Participants do not prefer to enter administrative units and hesitate to encounter instructors. One of the participants, for example, notice an instructor and immediately change her direction. Unlike the authoritative figures, friends may play an attractive role. For example, some of the participants encounter their friends (**Figure 11D**). Then, they change their way, although they are so close to the exit to finish the given task as short as possible.

Once the first step, which is finding the target point, is accomplished, there are also factors obtained on the way back. The reason to ask participants to return to the initial point is due to the desire to measure their reflection on action. Indeed, it is intended to understand how they use what is experienced during reflection in action.

Accordingly, they come down following the nearest staircase or the route from which they came. Some of the participants confuse the route they previously followed. For example, two fire escapes do not reach the ground floor. They connect the first and the second floors. At this point, they seek the main staircase connecting the first and the ground floor. Although the main staircase is on the right-hand side and next to the fire escape, they do not prefer it. On the left-hand side, there is a transparent tube in the corridor, which is an obstacle as well. The participant chooses to follow the road across. It was brighter, and

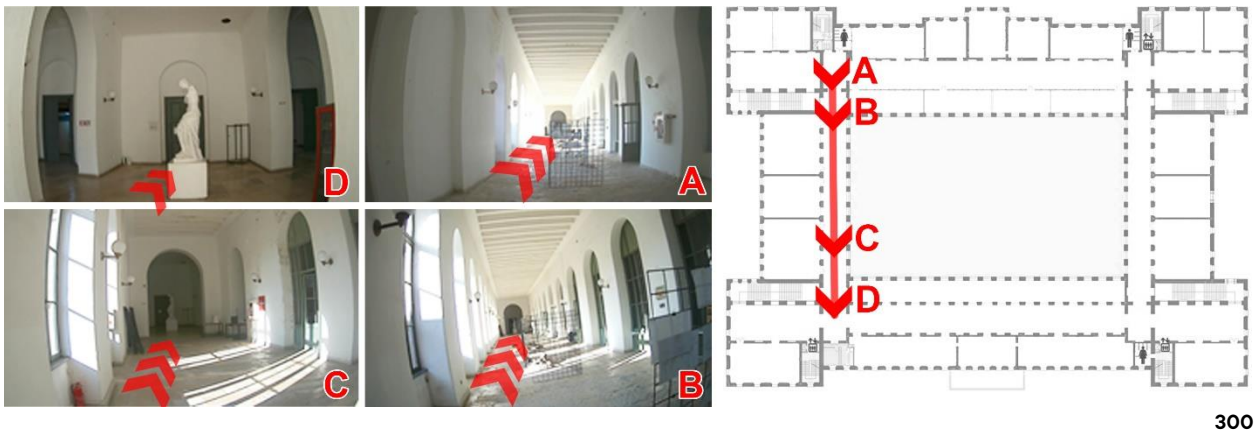


Figure 12: Getting Closer to the Venus Sculpture.

the statue of Venus was remarkable (Figure 12). Getting closer to the corridor, the participant sees the main staircase and exit sign. He directs to the exit sign to find the fire escape. Realizing that the fire escape was not there, he notices another exit sign on the wall, smaller in size. Then, he discovers the fire escape. As it is seen, the signages should be placed considering people coming from all axes. Otherwise, it confuses. It is particularly critical for emergencies.

Walls on the main staircases have niches on the ground floor (Figure 13), yet only some of them are fully open. Hence, the presence of a stair may not be seen by people passing through the corridors around the central courtyard. Nonetheless, the space where the stair starts, is wide enough and taking natural sunlight, so it is luminous. Therefore, this point attracts attention.

Figure 13: Niches on the Wall.

4.2 Evaluation of the Results Obtained from Experiences

The previous title explains and interprets the results obtained from the direct experiences of the participants. These results are represented with cognitive maps from the lens of the measurement techniques, as mentioned before. They are indeed evaluated in terms of the concerns listed below. At the beginning of the research, it was intended to bracket only reasons of confusion and facilitation, yet it is encountered other factors as an unexpected result of the study. These results, which are obtained on-action, are stated below:

- Landmarks in wayfinding;
- Order in path selection in terms of signages and pictograms;
- Type of categorization in wayfinding;
- Confusing components and factors in wayfinding;

- Confusing factors in wayfinding;
- Decision making in path selection and wayfinding based on measurement techniques by Moles (2004).
- Decision making in wayfinding based on measurement techniques by Moles (2004).

According to Freeman (2011), understanding cannot be conceived as fixing of meaning but how the meaning is generated and transformed. One needs an attitude open enough to let unexpected meanings emerge to discover meanings in the data (Giorgi, 2011; Lopez & Willis, 2004). All these intended and unintended factors are evaluated on cognitive maps, respectively (Figure 14, 15, 16, 17, 18, 19, and Table 1).

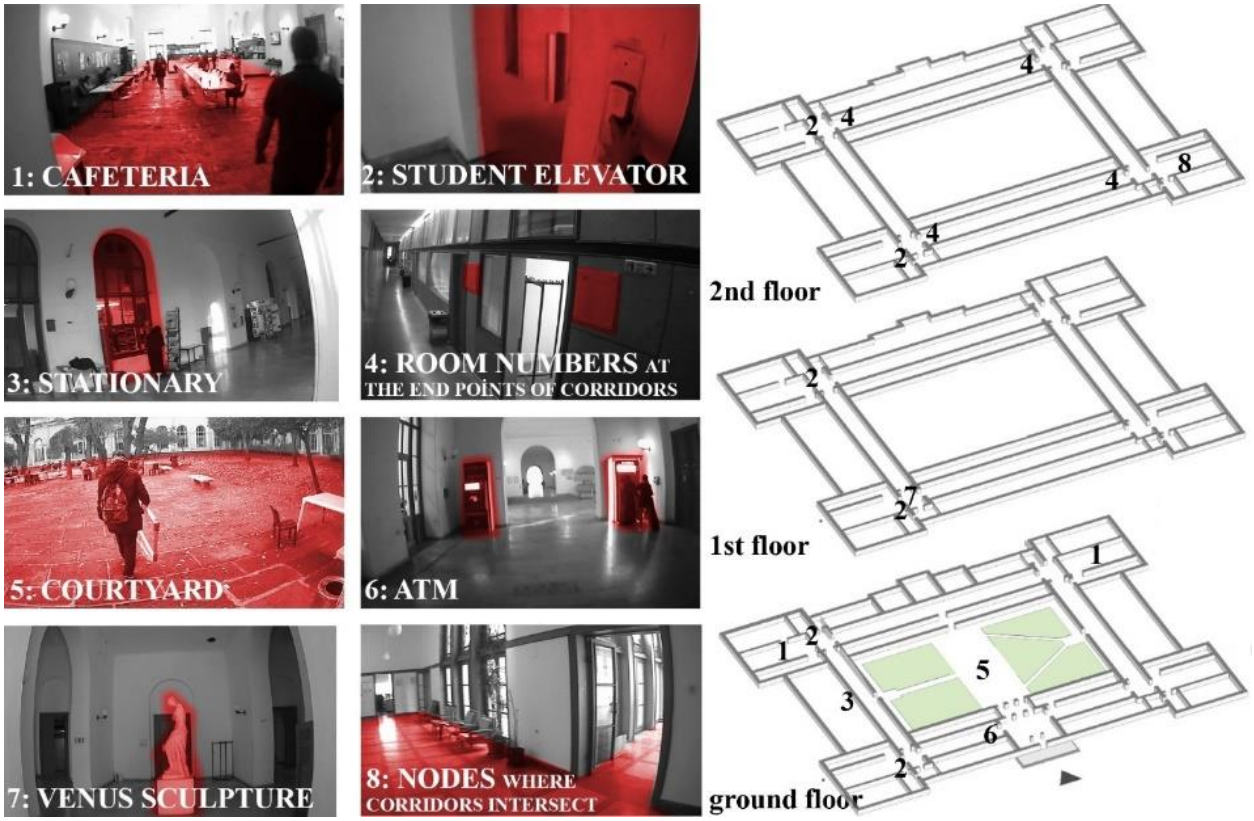


Figure 14: Landmarks in Wayfinding (developed by the author).

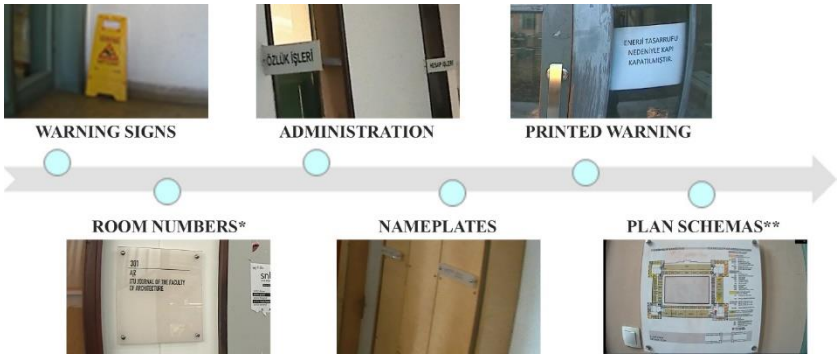


Figure 15: Order in Path Selection in terms of Signages and Pictograms: from more to less preferred (developed by the author). (* Participants are conditioned due to the explanation for the given task. They are asked to find the room 390.) (** If it is not a priori information for a participant.).

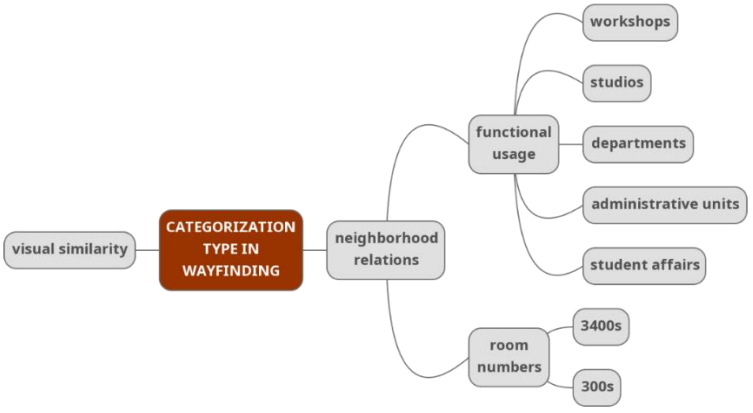


Figure 16: Type of Categorization in Wayfinding (developed by the author).

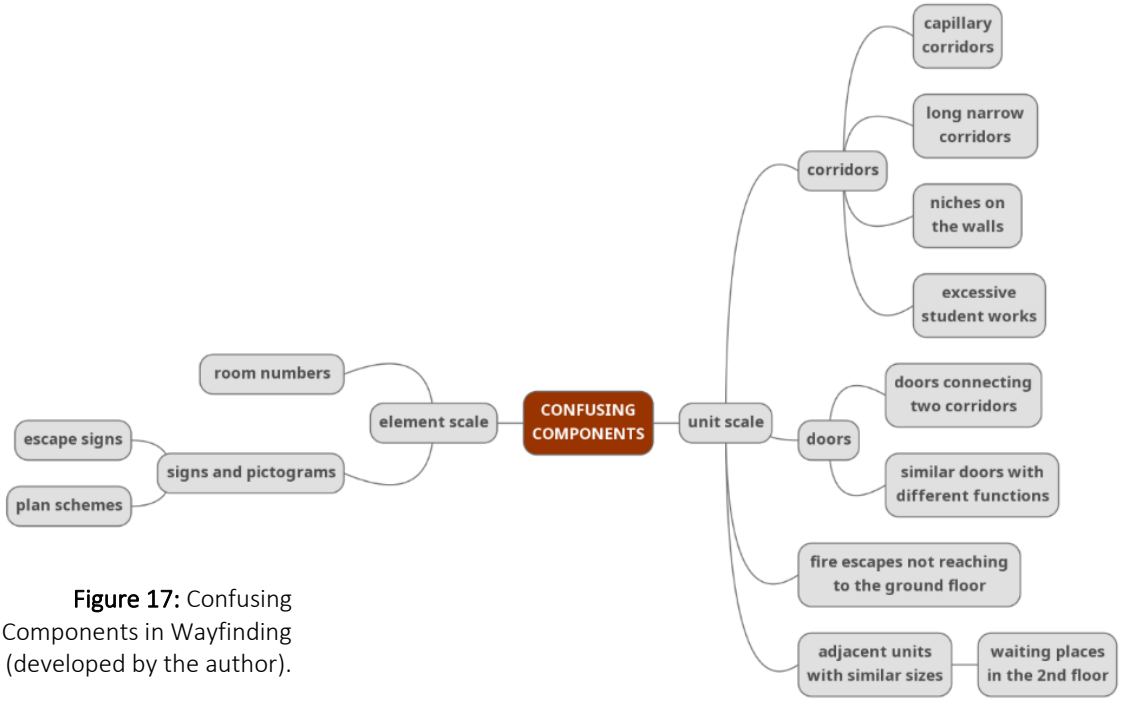


Figure 17: Confusing Components in Wayfinding (developed by the author).

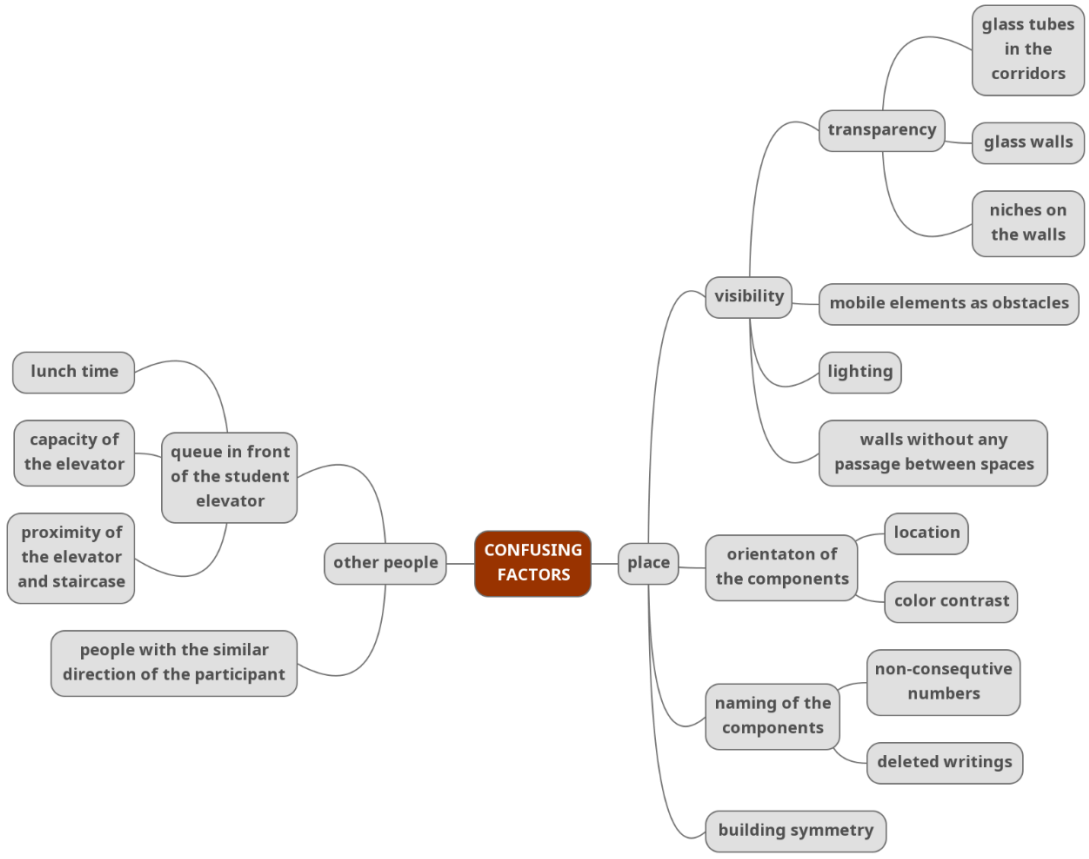


Figure 18: Confusing Factors in Wayfinding (developed by the author).

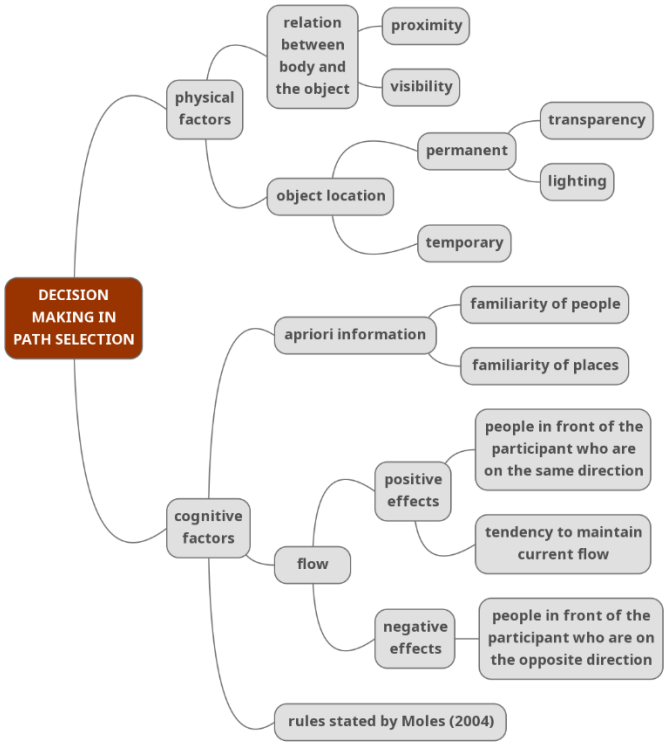


Figure 19: Decision Making in Path Selection (developed by the author).

CRITERIA		EXAMPLES IN WAYFINDING
Name	Definition	
Comparison and equality judgment	The idea of equality of two elements, comparison, and equality judgment, as opposed to idea of inequality	When choosing one of the similar doors
Contrast or antinomy	One of the two things are the opposite of the other. Construction of a dialectical bipolarity	Contrast with the background of the text of the signs
Just noticeable difference	A difference can be perceived as quantitative only if the second of the two variables exceeds the first to a certain extent.	The small size difference between the signages at close intervals
Similarity	The reasoning here is: "A looks like B. I don't know what angle / point it looks like, but it does; at least it looks more like C".	Symmetric plan layout makes participants to generalize similar parts as if they are same. Or grouping corridors based on their function.
Integration or cumulation	The ability to add a measured quantity on a particular scale to another size measured on the same scale on another occasion through the mind.	Encoding parts as a whole in plan schemas
Coefficient of significance	The human mind can attach greater importance to the outcome of any measurement than to the outcome of another measurement, without any special preparation; that is, it imposes a coefficient of significance on one of the two results.	Starting to follow the student while following the staff in front of the participant. Here, student have greater coefficient.
Periodicity	This concept is referred to by various names (rhythm, periodicity, etc.); by math, it means repeating equal elements at equal intervals.	Consecutive room numbers of adjacent rooms and the location of vertical circulation at corners.
Function	The reasoning here is: "If I know one variable, I can know another variable from an x, y graph."	If there is a fire escape in all four corners, I can reach to the ground floor going to any corner of the building.

Table 1: Decision Making in Wayfinding based on Measurement Techniques by Moles (2004) (developed by the author).

5. CONCLUSION

This research shows how one can improve the methodology for orientation programs from the lens of students experiencing the building. It represents a method with a bottom-up approach. It reveals landmarks in wayfinding, the order in path selection regarding signages and pictograms, type of categorization, confusing components, and confusing factors in wayfinding, decision making in path selection, and decision making in wayfinding based on measurement techniques by Moles (2004). Following a similar methodology served by this research, people responsible for the orientation programs can better understand what students need. In this way, they can descend to freshmen's level,

so more attention should be paid to the experience-based approaches when organizing these programs. General conclusions from the case study and its limitations together with recommendations for future studies are discussed, respectively.

5.1 Conclusions from the Case Study

Today, signages and pictograms are widely used in wayfinding. For instance, in hospitals, the implementation of signages consisting of symbols and pictograms led to better patient outcomes and increased staff satisfaction (Potter, 2017). However, this research reveals that the use of signages in the ITU Faculty of Architecture is less preferred among the other alternatives during decision making in path selection. Even if participants notice the signages which they have already known, participants represent different behavioral tendencies. Architectural studios mostly have visual outputs such as student works, exhibitions, and workshops. All these visual images are indeed stimulus suppressing the noticeability of signages to some extent. Hence, we should not deeply rely on signage architecture in this regard.

Physical implementations as precautions to facilitate wayfinding can be applied to nodes such as common places such as waiting spaces where two corridors intersect. This research shows that these places are confusing yet can become a landmark at the same time. For instance, the place where there is the Venus sculpture becomes a landmark, but the ill-implementation of signages makes the place confusing. These nodes should be well-designed. Also, doors can be grouped and labeled based on the function they serve. In fact, it should be paid attention to the fire doors since they are critical for emergency evacuation. In case of an emergency, staircases not reaching the ground floor are crucial.

In wayfinding applications, surrounding people should be considered as well. This study shows that people have a tendency to follow a person who is in the same direction as the participant. Although participants notice the plan schemes prepared for wayfinding, they prefer to follow the person in front of them. There is a judgment criterion in choosing the person based on familiarity. The presence of a familiar person has affected decision-making in wayfinding. When participants notice authoritative figures or their friends, they attempted to extend their way.

Lastly, it is observed that decision-making in wayfinding closely links with the techniques by Moles (2004). It highlights the possibility to measure ambiguous situations in social sciences to be translated to a computational design environment. Since the researcher's judgments are not arbitrary, reasons can be measured to some extent. However, there are many possibilities in formalizing these reasons behind our decisions. Natural minds are open systems, yet what is the definition of open in this context? Can artificial minds inquire these possibilities based on phenomenological hermeneutic?

5.2 Limitations

The case study between the two groups reveals similar results. It should be conducted with 20 students who have not been to the ITU Faculty of Architecture since they lack a priori information regarding the building itself. Also, the case study is limited to visual data. It is not recorded any audio and not measured the sense of tactile and smell. However, we experience a place with all of the senses. For instance, the day of the case study performed was cold. This may affect participants' choices. Similarly, weekends or weekdays may affect the selections. Participants have experienced it at once. It can be extended to different time periods or different seasons, as the weather conditions may influence participants' choices. The experimentation is performed during the day, so artificial lighting is not also considered. However, students can stand until midnight, especially during design project courses, and insufficient lighting can lead to challenges in wayfinding. Especially in the first days of school, the unfamiliar building may seem scary. Moreover, the faculty building hardly allows to perceive surrounding environment from the interior, so it is mainly focused on the inside.

5.3 Recommendations for Future Studies

The scope of the study can be extended to different types of users to develop better scenarios for orientation programs. These users can be the ones as indicated as follows:

- Students
  - Undergraduate and graduate-level students
  - Foreign and native students
  - Students from different departments such as architecture and industrial design

- Instructors
- Staff such as cleaning staff
- Security guards
- Short term users such as cargo staff and people coming for a specific activity like conferences

This study is conducted to serve as a template for orientation programs, yet a similar approach can be utilized for different purposes, such as emergency evacuation in educational buildings. It can also be searched whether there is an order in path selection from the perspective of both social and cognitive sciences. Lastly, simulation programs for wayfinding can ignore architectural elements such as light. Besides, they are insufficient in terms of human behavior and perception. In this sense, can these concerns be integrated into these programs? Can the techniques offered by Moles (2004) be combined with these readymade programs? In other words, how can it be possible to implement measurement techniques of uncertain sciences into simulation programs which are based on the explanation?

Acknowledgements

The author conducts this research during the course named MBL 611 Phenomenology and Hermeneutics in Computational Design at Istanbul Technical University, Architectural Design Computing Graduate Program. The author would like to thank Assistant Professor Ethem Gürer and the participants for their valuable contributions.

References

Artman, A., & Wiegand, C. (2015). *U.S. Patent Application No. 13/978,577.*

Azzali, S., & Abdel Sabour, E. (2018). The wayfinding in educational modular buildings: the case of the male engineering building at Qatar University. *Advances in Civil Engineering, 2018*(1), 1-10. https://doi.org/10.1155/2018/6076021

Bernardini, G., D'Orazio, M., & Quagliarini, E. (2016). Improving human safety in cultural heritage buildings: experiments on effectiveness of wayfinding systems in a theatre. *TEMA: Technology, Engineering, Materials and Architecture, 2*(1), 57-67. https://doi.org/10.17410/tema.v2i1.90

Bosch, S. J., & Gharaveis, A. (2017). Flying solo: A review of the literature on wayfinding for older adults experiencing visual or cognitive decline. *Applied Ergonomics, 58*, 327-333. https://doi.org/10.1016/j.apergo.2016.07.010

Calman, M. A., Thomas, S. S., Ross, E. S., Lee, J., Fang, Z., Mulholland, J., ... & Tan, N. (2017). *U.S. Patent No. 9,582,826*. Washington, DC: U.S. Patent and Trademark Office.

Casareale, C., Bernardini, G., Bartolucci, A., Marincioni, F., & D'Orazio, M. (2017). Cruise ships like buildings: Wayfinding solutions to improve emergency evacuation. *Building Simulation*, *10*(6), 989-1003. https://doi.org/10.1007/s12273-017-0381-0

Chan, M. (2017). Have you been oriented? an analysis of new student orientation and e-orientation programs at us community colleges. *College and University, 92*(2), 12-25.

Chan, Z. C., Fung, Y. L., & Chien, W. T. (2013). Bracketing in phenomenology: Only undertaken in the data collection and analysis process. *The Qualitative Report, 18*(30), 1-9. https://doi.org/10.46743/2160-3715/2013.1486

Cheng, A. C., & White, J. (2018). Using Wayfinding Data to Understand Patient Travel Within a Medical Center. *American Medical Informatics Association (AMIA) Annual Symposium Proceedings,* 1216-1223.

Cioffi, J., & Agee, P. (2015). *U.S. Patent Application No. 14/533,519.*

Cuesta, A., Abreu, O., Balboa, A., & Alvear, D. (2017). Real-time evacuation route selection methodology for complex buildings. *Fire Safety Journal, 91*, 947-954. https://doi.org/10.1016/j.firesaf.2017.04.011

De Cock, L., Ooms, K., Van de Weghe, N., & De Maeyer, P. (2019). Linking perception to decision point complexity for adaptive indoor wayfinding support. *Abstracts of the ICA, 1.*

Ferreira, S. (2017). Reflecting in and on Action.

Freeman, M. (2011). Validity in dialogic encounters with hermeneutic truths. *Qualitative Inquiry, 17*, 543-551. https://doi.org/10.1177/1077800411409887

Harley, J. B. (1987). The map and the development of the history of cartography. In, J. B. Harley & David Woodward (eds.). *The History of Cartography. Volume 1: Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*. University of Chicago Press.

He, Q., McNamara, T. P., Bodenheimer, B., & Klippel, A. (2019). Acquisition and transfer of spatial knowledge during wayfinding. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 45*(8), 1364-1386. https://doi.org/10.1037/xlm0000654

Heidegger, M. (1996). *Being and Time.* (Trans. Joan Stambaugh). State University of New York Press.

Hoy, M. B. (2016). Smart buildings: an introduction to the library of the future. *Medical Reference Services Quarterly, 35*(3), 326-331. https://doi.org/10.1080/02763869.2016.1189787

Hund, A. (2018). Understanding Direction Giving in the Service of Wayfinding on a University Quad. In *CogSci.* https://cogsci.mindmodeling.org/2018/papers/0606/0606.pdf

Husserl, E. (1962). *Ideas: General introduction to pure phenomenology* (Trans. W.R. Gibson). Collier Books.

Istanbul Technical University Faculty of Architecture (2014). *Floor Plans*. http://mim.itu.edu.tr/kat-planlari/

Kanakri, S., Schott, M., Mitchell, A., Mohammad, H., Etters, M., & Palme, N. (2016). Wayfinding systems in educational environments. *Environment and Ecology Research, 4*(5), 251-256. https://doi.org/10.13189/eer.2016.040503

Kuliga, S. F., Nelligan, B., Dalton, R. C., Marchette, S., Shelton, A. L., Carlson, L., & Hölscher, C. (2019). Exploring individual differences and building complexity in wayfinding: The Case of the Seattle Central Library. *Environment and Behavior, 51*(5), 622-665. https://doi.org/10.1177%2F0013916519836149

Lin, J., Cao, L., & Li, N. (2019). Assessing the influence of repeated exposures and mental stress on human wayfinding performance in indoor environments using virtual reality technology. *Advanced Engineering Informatics, 39*, 53-61. https://doi.org/10.1016/j.aei.2018.11.007

Maina, J. J., & Umar, B. O. (2015). Wayfinding in Multi-Level Buildings: A Study of the Senate Building, Ahmadu Bello University. In *Procs, 6th West Africa Built Environment Research (WABER) Conference* (Vol. 2), 1227-1241.

Moles, A. A., Rohmer, E., & Bilgin, N. (2004*). Belirsizin bilimleri: insan bilimleri için yeni bir epistemoloji.* Yapı Kredi Press.

Park, M., & Lee, H. (2016). A COEX mall Case study on the Correlation between circulation system and Environmental elements for a better

wayfinding design in mixed-use buildings. *Korean Institute of Interior Design Journal, 25*(1), 151-162. https://doi.org/10.14774/JKIID.2016.25.1.151

Pascarella, E. T., Terenzini, P. T., & Wolfle, L. M. (1986). Orientation to college and freshman year persistence/withdrawal decisions. *The Journal of Higher Education, 57*(2), 155-175. https://doi.org/10.1080/00221546.1986.11778760

Potter, J. S. (2017). Best Practices for wayfinding in a hospital setting. http://hdl.handle.net/1794/22565

Richter, K. F. (2015). Indoor wayfinding tools. *Encyclopedia of GIS, 1-8.* https://doi.org/10.1007/978-3-319-23519-6_1622-1

Schrom-Feiertag, H., Stubenschrott, M., Regal, G., Schrammel, J., & Settgast, V. (2016). Using cognitive agent-based simulation for the evaluation of indoor wayfinding systems. *arXiv preprint arXiv:1611.02459.*

Selçuk, Z., & Güner, U. P. D. N. (1999). Örnek Bir oriyantasyon programı. *Kuram ve Uygulamada Eğitim Yönetimi, 19*(19), 443-454. https://dergipark.org.tr/en/pub/kuey/issue/10377/126990

Silva, C., Rebelo, F., Vilar, E., & Noriega, P. (2015). Preliminary study about social influence over wayfinding decisions. *Procedia Manufacturing, 3*, 5920-5926. https://doi.org/10.1016/j.promfg.2015.07.905

Swobodzinski, M., & Parker, A. T. (2019). A comprehensive examination of electronic wayfinding technology for visually impaired travelers in an urban environment. (Report No. NITC-RR-1177). https://nitc.trec.pdx.edu/research/project/1177

Tao, Y., Gou, Z., Lau, S. S. Y., Lu, Y., & Fu, J. (2018). Legibility of floor plans and wayfinding satisfaction of residents in Care and Attention homes in Hong Kong. *Australasian journal on ageing, 37*(4), E139-E143. https://doi.org/10.1111/ajag.12574

Vilar, E., Noriega, P., Rebelo, F., Galrão, I., Semedo, D., & Graça, N. (2019). Exploratory study to investigate the influence of a third person on an individual emergency wayfinding decision. *International Conference on Applied Human Factors and Ergonomics*, 452-461. Springer.