Yıldız J Art Desg, Vol. 10, No. 1, pp. 33–47, June, 2023

Yıldız Journal of Art and Design
Web page info: https://yjad.yildiz.edu.tr
DOI: 10.47481/yjad.1219117

Orijinal Makale / Original Article

Redirecting movements and recreating environment with visually oriented wayfinding signage system: A case study of fine and applied art building, Olabisi Onabanjo, Ibogun Campus

Görsel odaklı yönlendirme işaret sistemi ile hareketleri yeniden yönlendirme ve çevreyi yeniden oluşturma: güzel ve uygulamalı sanatlar binası, Olabisi Onabanjo, Ibogun kampüsü üzerine bir durum çalışması

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ARTICLE INFO

Article history
Received: 19 January 2023
Accepted: 16 May 2023

Keywords:
Signage, wayfinding, colour psychology, typography, user experience.

Anahtar kelimeler:
İşaretleme, yönlendirme, renk psikolojisi, tipografi, kullanıcı deneyimi.

ABSTRACT

This study focused on redirecting movements and enhancing the aesthetic appeal of an academic environment through the development of a visually-oriented wayfinding system. The paper enunciates the importance of a wayfinding system in identifying places and coordinating human movements in space. People visiting built environments are desirous of accomplishing their aim of visiting such a place within the short possible time and devoid of negative feelings or spatial anxiety. The relevance of a functional wayfinding system in an academic environment where students and staff need to navigate the complex environment without experiencing any spatial stress. The paper explores colour psychology, typography, shape and user experience to develop a wayfinding system for the Fine and Applied Art Building, Olabisi Onabanjo Campus, Ibogun. The research methodology adopted for the study is product development and survey. User perception of the wayfinding system was sampled using an open questionnaire administered to three hundred and thirteen students and staff on campus. The result was analyzed using the Linkert scale criteria. Results outcomes indicated that there is consistency in the interior and exterior signage colours, textual information on the signs is bold and descriptive, wayfinding system accentuates the environmental aesthetics.

ÖZ

Bu çalışma, görsel yönelimli bir yön bulma sisteminin geliştirilmesi yoluyla hareketleri yeniden yönlendirmeye ve akademik bir ortamın estetik çekiciliğini artırmaya odaklandı. Makale, yerleri belirlemede ve boşlukta insan hareketlerini koordine etmede yön bulma sisteminin önemini vurgulamaktadır. İnsanlar, inşa edilmiş ortamları ziyaret ederken, olumsuz duygulardan veya mekânsal kaygılardan arınmış olarak, böyle bir yeri ziyaret etme amacını mümkün

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olan en kısa sürede gerçekleştirmek isterler. Öğrenci ve personelinin herhangi bir mekânsal stres yaşamadan karmaşık çevreyi gezinebilmesi için işlevsel bir yönlendirme sisteminin akademik bir çevredeki önemi üzerinde durulur. Makale, Güzel ve Uygulamalı Sanatlar Binası, Olabisi Onabanjo Kampüsü, Ibogun için bir yönlendirme sistemi geliştirmek için renk psikolojisi, tipografi, şekil ve kullanıcı deneyimini inceler. Çalışmanın araştırma metodolojisi ürün geliştirme ve anket şeklindedir. Yönlendirme sisteminin kullanıcı algısı, kampüsteki 313 öğrenci ve personelden alınan açık uçlu bir anket kullanılarak örneklendi. Sonuç, Linkert ölçeği kriterleri kullanılarak analiz edildi. Sonuçlar, iç ve dış işaretlerin renklerinde tutarlılık olduğunu, işaretlerdeki metinsel bilgilerin cesur ve tanımlayıcı olduğunu, yönlendirme sisteminin çevresel estetiği vurguladığını gösterdi.

Cite this article as: Siyanbola, A. B., Oladesu, J. O., Afolabi, B. E. F., Adeyemi, A. O., & Uzzi, F. (2023). Redirecting movements and recreating environment with visually oriented wayfinding signage system: A case study of fine and applied art building, Olabisi Onabanjo, Ibogun Campus. *Yıldız J Art Desg,* 10(1), 33–47.

INTRODUCTION

When people are in an unfamiliar environment, they look for information that assists in directing them to their destinations usually in form of maps, building directories wall signs using arrows and texts with a description of building features. The inherence of mobility to human existence makes wayfinding a necessary human activity required for survival. However, the creation of the compass enabled humans to direct precisely and promptly explore the world reaching places (Aczel 2001, 25). Bell, S. and Saucier, D. (Bell and Salvier 2004, 251-257) noted that navigation is a complex problem solved by humans and other animals. Historically, the necessity of communication mobility influenced the development of skills and procedures for travel.

Wayfinding is an information system that guides movement in a physical environment and facilitates understanding of built space. Kelvin Lynch, K. (Lynch 1960, 1-194) defined wayfinding as the consistent use and organization of sensory cues from the external environment. Wayfinding is a natural action people engage in their entire lives anytime they transit from one place to another: from the bedroom to the living room, parking space to home entrance, workplace to home, office to the elevator, entrance to the office, walking to a copy machine, departing a building, back to the parking lot, driving to a relaxation spot, back to one's residence (Wang 2005, 1-117). Montello, D. and Freundschuh, S. (Montello and Freundschuh 2005, 61-91) posited that wayfinding indicates cognitive coordination to the distant environment and contains activities such as planning and route choice. Specifically, wayfinding involves the acknowledgement of a place and understanding how to navigate to the destination swiftly and effortlessly as possible (Fewings 2001,177-184). Easy accessibility and navigation in an acquainted or unacquainted environment enhance the functionality of such places. People visiting built environments are desirous of accomplishing their aim of visiting such places within the short possible time and devoid of negative feelings or spatial anxiety. Wayfinding involves finding one's way to a destination in a known and unknown place with the aid of visual cues available in the environment. The process of wayfinding can be categorized into three specific interrelated procedures: decision-making (and the creation of an action plan), decision execution (transformation of a plan into suitable behaviour at the right time and place) and information processing (constituting environmental perception and mental cognition, responsible for the information basis of the two decision-related processes) (Apelt, 2008; Arthur and Passini, 1992)

Wayfinding is a critical component of complex-built places such as campuses, supermarkets, hospitals, hotels, airports and transportation hubs. However, the complexities of structures in academic environments necessitate the need for functional visual elements such as maps, signs, and signages to assist visitors, students and staff to their precise destinations. Huelat, B. (Huelat 2004) observed that the demography of people visiting complex environments like hospitals ranges from the elderly, children, foreigners, newcomers, the physically challenged and others. Apparently, in these complex-built places, efficient wayfinding systems enable a sense of safety, comfort, well-being, and refuge. Ease of use in a high-stressed environment is anchored on the ability to navigate the structures in a short time without experiencing any spatial anxiety or unpleasant feelings. The process of harnessing a wayfinding system can be cognitively multifaceted. People are engaged in multiple tasks while wayfinding. Allen, G. (Allen 1999, 46) classified the tasks involved in wayfinding into the commute, exploration and quest. These tasks are used frequently to accomplish tasks of wayfinding. Commute simply means the movement of people in an unfamiliar or known environment. Allen G (Allen, 1999) explained that efficiency is critical in commuting, when commuter expends more time and effort in wayfinding, they become spatially anxious. Commuters' uncertainty or unfamiliarity with a particular environment leads to exploration. Quest is achieved when a traveller acquires sufficient knowledge of a familiar or an unfamiliar

destination through verbal descriptions, and visual media such as a wayfinding system or map. The development of a wayfinding system starts with the comprehensive study of the environment, the physical features, entrance and exit routes, transition points, offices, landmarks, and others. Environmental information is designed to provide cues in a wayfinding system (Read 2003, 233-239). The signage system provides an outline of a site map, directions, identification, routes and information (Wang 2005, 1-117). This study is aimed at developing a functional wayfinding system for the Department of Fine and Applied Art Building in Olabisi Onabanjo University Ibogun Campus is a two-wing building. The research focuses on prioritizing user experience, human factor, and aesthetics ebbed in design elements such as colour, typography, shape, positioning and visibility to create a user-centric solution tailor-made for an academic environment. The relationship between the user and their interaction with the architecture and graphic components is also considered in this study.

LITERATURE REVIEW

The in-depth understanding of one's environment and surrounding objects often referred to as 'spatial orientation' was emphasized by the neuropsychological literature of the 19th century. The neuropsychology scholars of that era in their studies established a verifiable relationship between cognitive or behavioural discrepancies and the precise focus of neurological impairment (Wang 2005, 1-117). Hunter, S. (Hunter 2010,1-7) in his theory posited that effective wayfinding systems allow users to 1) select their location within a setting, 2) determine the destination, and 3) develop a plan that directs people from their location to their destination (Hunter 2010,1-7). Successful wayfinding systems are made up of a series of identifiers: 1) identification and marking of spaces, 2) grouping spaces and 3) linking and establishing spaces through both architectural and graphic means (Hunter 2010,1-7). Studies in neuropsychology have shown that patients suffering from brain lesions are often incapable of mentally recalling their areas of habitation or recognizing places they are familiar with. Reginald, C. (Reginald 1999, 5-45) posited that mental representation of the immediate spatial information is referred to as a cognitive map. Wayfinding facilitates the connection between spatial image and the cognitive picture to enable the interpretation of information that guide actions.

Lynch's theory of imageability emphasized the components of "identity" and "structure" that constitute the basic factors affecting environmental image (Damayanti and Kossak, 2016, 57-67). Lynch's theory explained that the quality of a city is based on legibility or visibility elements perceived by residents and visitors to the city. The term 'visible' or 'legible', is a visual component implying the studying of mental images because of human memories and denotations Lynch, K. (Lynch 1960,1-194) noted that identity implies a distinction from different objects while the structure is the connection to a whole pattern of other elements which is of emotional value to the viewers. Lynch further explained that the mental image of a place can be strengthened by emblematic components such as a map, a set of constructed instructions, machines giving direction, holding the perceiver; or reshaping the built environment (Wang 2005, 1-117)

''Environmental information plays a central role in the conceptualization of wayfinding; it is fundamental in the making of decisions and decisions plan as well as in their execution (Doğu and Erkip 2002, 25)". Lynch defined city elements with the following terms:

- Paths: the channels along which the observer customarily, occasionally, or potentially moves.
- Edges: the unused linear elements are considered as paths by the observer. They are borders ... edges may be barriers.
- Districts: the medium-to-large sections of the city, conceived of as having two-dimensional the extent ... which are familiar as having some shared, identifying character.
- Nodes: points, the important spots in a city into which an observer can enter, and which are the intensive foci to the destination of the individual.
- Landmarks: another type of point-reference, but in this case, the observer does not enter within them, they are external.

Frank (Frank 2009, 1-8) suggested that people living in dissimilar cultural groups perceive the world differently because the processes and structures of the mind develop in response to the unique experiential and socialization forces to which it is exposed. Montello (Montello 1995, 61-90) provides a contrary submission noting that a reasonable amount of spatial cognition encountered by humans during their development process is essentially the same. Language and culture, however, are not the only human elements that affect wayfinding.

The impact of gender on spatial abilities and wayfinding is an area that has received substantial interest (Linn & Petersen, 1985, 1480). Studies have proven that those differences exist in male and female spatial navigation and performance (Chai & Jacobs 2009, 280; Jonasson, 2005, 811–825), with men usually performing better than women in many spatial activities in wayfinding Lawton, 2010 (Kanakri et al. 2016, 251-236) researched into wayfinding systems in university buildings to establish a significant impact on wellness and performance of the students. The result of the study indicated that signs are more critical for precise mobility in academic buildings with many floors. It can also be inferred from the study that difficulty in wayfinding increase the subjective stress experience. Studies highlight the indicators of an efficient wayfinding system are the ability of the information systems to enable users to determine their location within an environment, acknowledge their destination, and create a way of accessing their destination from their location (Hunter 2010, 1-7). Models

have been developed to determine the functionality and usefulness of wayfinding signages. Downs, R and Stea, D. (Downs and Stea 1973, 79–86) created a framework that appraised the functionality of the wayfinding system. An effective wayfinding system enables users to have an idea of their destination at the inception of the journey as well as establish their arrival at the desired place. Such a wayfinding system gives the users confidence that they are moving in the appropriate direction and enables them to identify their location and orient them within the relevant space. Downs, R. and Stea, D. (Downs and Stea 1973, 79-86) also posited effective wayfinding system enables the target user to have prior knowledge of possible potential hazards such as area and how to safely navigate the place in a situation of an emergency.

The planning of an environment, a building, a park or a city is an integral part of wayfinding. An adequately planned environment enhances understanding of the environment and enables users to coordinate their movement in achieving a sense of orientation. Manning, Jeremy R. Lew, Timothy F. Li, Ningcheng Sekuler, Robert and Kahana, Michael J. (Manning et al. 2014, 1314 - 1330) applied the Magellan model to a cognitive map-based model of human wayfinding. This model is used to measure experience-based improvement in accessing the efficiency of taxi drivers, the respondents were asked to select and deliver passengers virtually. Findings revealed that the respondents learnt the environment priory, routing the environment, the result envisaged that landmarks are mentally visualized. The participants' cognitive maps evolve easily with experience.

Wayfinding challenges have been related to negative physical and psychological effects (Carpman and Grant, 442). Shumaker and Reizenstein (Shumaker and Reizenstein 1982, 179-223) posited that in a healthcare environment, wayfinding problems can cause confusion, frustration, anger, stress, elevated blood pressure, headaches, and fatigue. Wayfinding problems have also been found to negatively affect how people view businesses (e.g., shopping centres and hospitals) and make visitors intrude on staff for help finding their way (Arthur and Passini). While much of the difference in individuals' wayfinding usefulness can be accounted for by factors intrinsic to people (e.g., Kirasic, 2000, 117-134), a growing body of literature shows that environmental factors—such as the complexity of a building's layout (e.g.,

Slone, Burles, Robinson, Levy, and Iaria, 2015, 1032), landmarks (e.g., Davis, Therrien, and West, 2008, 257), and the attributes of corridors (e.g., Vilar, Rebelo, and Noriega, 2014) also play critical roles in the wayfinding process. While a considerable body of literature exists on distinct and separate phenomena associated with wayfinding, no study has collated the available empirical evidence into a single source of knowledge, which prompted the current literature review. This review offers a foundation for future studies and design decisions. For a review of wayfinding theories in interior environments, refer to (Jamshidi and Pati 2020, 12).

Several types of research have been conducted to determine the importance and challenges of wayfinding in an academic environment. Li, R. and Klippel, A. (Li and Klippel 2012, 21-38) conducted library wayfinding studies, identifying limited visibility, layout complexity, and familiarity with the space as essential elements to consider in this setting. In research conducted at Ontario university, 70% of surveyed respondents noted that accessibility and navigation of interiors was the most difficult wayfinding task on campus (Oyelola 2014) Precisely, the location of lecture rooms was cited as the most challenging task students are likely to encounter when wayfinding for classrooms because they crave easy and effective wayfinding devoid of apprehension (Scott-Webber et al. 2000, 16-34). Duran, I. (Duran 2016, 1-22) investigated the relationship between utilized signage types with familiarity and confidence of cognitive maps in academic libraries. The results of the study showed signs are very important when developing wayfinding for multi-layered academic buildings and functional signs reduce time and stress commonly experienced when accessing a high-stressed environment. The structural design of academic buildings is critical in wayfinding. Maina, J. and Audu, M. (Maina and Audu 2016, 1-17) in the analysis of their study titled "Wayfinding in Educational Buildings: A Case Study of the Faculty of Environmental Design, Ahmadu Bello University" enunciated that the cross points of walkways, corridors and the open areas on third-floor upper floors have high visual integration which are physical features chosen by users for wayfinding purposes within an academic complex.

Colours in Wayfinding

Colours are prominent in wayfinding conception and development. Colours identify and give visual appeal to other elements constituting the building blocks of design. Colours are necessary for identification and description to support the audience's understanding of the information Read, M. (Read 2003, 233-9) observed that colour is a visual component that provides environmental information that enhances users' wayfinding abilities. Colour association have a powerful influence on occupants and guests in a space. Psychologically, colours are effective and influential in inducing activities and feelings. Gibson (Gibson 2009, 1-146) noted that colours can help users connect emotionally to a destination. Read, M. (Read 2003, 233-239), in a paper on childcare environments, describes how colours are essential in directing people to their destination, Sheehan, B., Burton, E. and Mitchell, L, (Sheehan et al. 2006, 279), posited that those with special needs, such as dementia patients, have also been shown to be able to find their way easier when colour is used in partnership with signage as a navigating tool. Colour contribution is influential in codifying spaces and helping to create visual memory (Spence et al. 2006, 1-6). Coding of colours in wayfinding

can be efficient in reducing text clustering within a limited space. Symonds, P. (Symonds 2017, 60-80) posited that several competing textual contents in signs lead to information cluttering.

Ranjbar, Fasllija and Aksel (Ranjbar et al. 2016, 1-19) in their study examined the effects of colour-coding on users' wayfinding performance in a virtual Shopping Mall Environment. The experiment was conducted in a virtual environment using two different environments consisting of colour-coded and neutral schemes. The study inferred those spaces having white and grey (Neutral) colours were perceived to be sterile and boring by users, whereas spaces with warm (Red) colours showed a high level of attractiveness. Stone, N. (Stone 2003, 63-78) explained that warm colours nudge people to focus outwards and increase their consciousness, however, cool colours turn people inward and make them concentrate on visual and mental tasks. Cromwell Architects and the students at the University of Minnesota in 2012 found that colour helped 72% of respondents to find remote locations in a pediatric clinic Matheny, S. (Matheny 2021, Online). The floors of some public complex buildings are colour coded with different hues and variations to facilitate a psychological influence on the people. Typically, emergency and lobby areas of hospitals are decorated with intense colours while the ICU units are filled with subtle shades of blue. Educational facilities embrace wall and floor cueing to create a strong visual link to guide new entrants to the school to their appropriate classes (Valsparm 2015). Colour coding effectively enhances navigational behaviour and direct mobility. Symonds in his write-up titled "Colour coding Signage for easier Navigation" explored the importance of colour coding in travel tourism in the following

> "…*Travel is a highly socio-cultural experience in that we by nature must interact with many other people in travel situations. Given the number of people and the range of their cognitive abilities, wayfinding thus needs to be appropriate for all users and colour coding and the general use of colour certainly aids this process. An elderly cruise traveller who has difficulty with their eyesight and reading small lettering might find the colour coding much easier.*" (Symonds 2017, 60-80)

Studies have shown that colour choices are gender-based. Yeung, P. and Wong, W. (Yeung and Wong 2018, 1-49) emphasized that colour preference by gender begins to fade amongst the 18-22 age group and the interest vanishes from age 60, for those between the ages of 8 and 12, there is a significant difference in preference. Yeung, P. and Wong, W. (Yeung and Wong 2018, 1-49) further explained that in a shared space between both genders, a section of the female gender favours warm tone colours (Red-Purple) and (Red-Green). While men have a preference for colours from blue to green.

Typography in Wayfinding

Typography is the style and appearance of textual information. The development of typography for wayfinding is anchored on readability and legibility. Readability and legibility are essential features of typography that enable people to decipher information on wayfinding signage instantly. Frutiger, Helvetica and Arial are extensive fonts in the signage industry (Stuart de Rozario 2021, Online). The United State Transport regulatory body formed a partnership of perceptual psychologists, typeface designers, human factor scientists and highway engineers to develop a typeface referred to as "Clearview" which is a combination of mixed cases (Wei-Yin, 2016). Research showed that the developed font type is more recognizable by drivers of all ages than standard Alphabets (Wei-Yin, 2016). Ralf Herrmann, the designer of Wayfinding Sans carried out wide-ranging field studies in exploring the readability of road signage typeface across different countries around the world. He utilized custom virtual simulation software, which could simulate tough reading situations (distance, fog, halation, positive/negative contrast) (Wei-Yin, 2016). Ralf Herrmann's research showed San Sherif family does not compromise beauty in its legibility and suitability for signage projects globally (Feeter, 2019). According to Feeter (2019), an independent empirical study conducted at the University of Applied Sciences Berlin on various typefaces tested when used on signages indicated Wayfinding Sans Pro (bold extended) is the most suitable for wayfinding, being significantly more legible and also functional than all other styles of the tested typefaces. (Large Format innovation 2021, Online) also emphasized that Sans Serif fonts such as Helvetica, and Verdana are appropriate for wayfinding signs because they are easy to read at a glance.

Usability in Wayfinding design

Usability in design is the user-centeredness and usefulness of a design. Usability is a measure of the efficiency of a definite user in a particular context relating to product/design actualizing a definitive goal effectively and pleasingly (Interaction Design Foundation 2021, Online). The goal of usability is to focus on maximizing user experience. David McQuillan enunciates human psychological desire for easiness and enunciated that usability is about human behaviour. It recognizes that humans are lazy, get emotional, are not interested in putting a lot of effort into and generally prefer things that are easy to do. Usability in wayfinding is the spatial affordance of the system. Effective wayfinding systems should reduce stress and be effortless by being intuitive and navigable. The usability of wayfinding is enhanced by the interface design of the system. Interface design is focused on optimizing human interaction with the system. The essence of user interface design is to facilitate efficient user interaction in a simplified way. Cognitive user psychology is embraced in the conception of wayfinding interface design. In perceptual and cognitive psychology, the understanding of how the human brain

and memory work in harnessing complicated decisions to complete tasks and achieve goals. Users' interests in a product emanate from the perception of the usability, Dillon, A. (Dillon 2006, 453-458) posited that the user of a representation of a goal of an outcome to attain, requiring the use of memory both short term (to handle current information) and long term (to facilitate the planning and interpretation of the system). Information is processed and transformed progressively from the perception of stimulus to the comprehension of the visual cue leading to response which necessitates actionable utilization of information. The physical activity emanating from the decision-making process occurs repetitively as human interaction with the system. Neisser's model of perception explained that the cognitive structure determining the processes of perception, attention and categorization, is a set of anticipatory schemata (Chimir et al. 2005, 1-6). The schema theory observed that the mind consists of organized mental templates of information to enhance perception and information processing. Users are involved in a continuous cycle of information of transformation by exploring a dynamic environment with different spatial information.

In interface design, the psychology of colour influences emotion and the user's perception. Research has proven that "emotion is a necessary part of life, affecting how people feel, their behaviour, and thinking (Norman 2004, 1-272). Aesthetics leverage-positive user experience and enhances the functionality of interface design. The mood and tone of the interface colours have a psychological/physiological impact on the audience. The human memory associate's certain experiences with colours. Colours determine the usefulness of design interfaces.

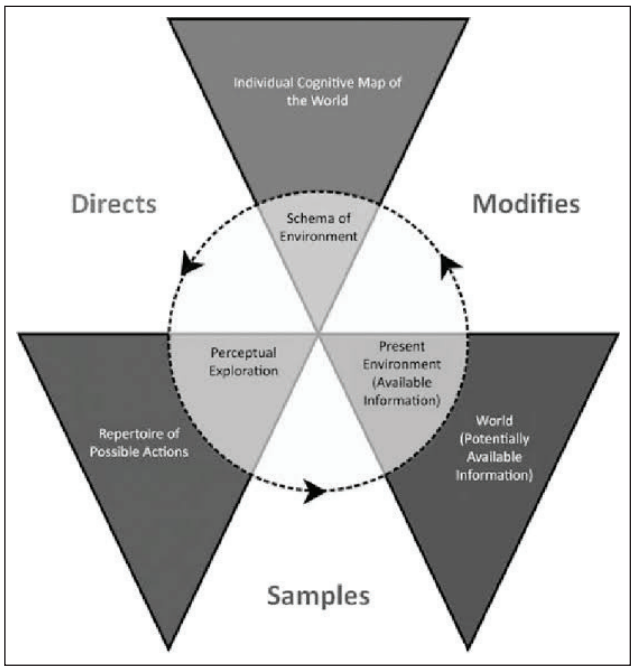

Figure 1. Neisser model of perception Neisser's Cycle of Perception: Formal Representation and (Source: Chimir 2005, 106-111).

Harmonious and contrasting colours are often utilized in wayfinding interface design. Moreno, L (Moreno 2021, Online) emphasized that contrasting colour create dynamism in the interface, harmonious colours enables logical interface design and **colour scales minimizes the cognitive load**. Efficient user interface design facilitates seamless user orientation of a physical environment. The design process must synergize functionality and visual aesthetics in actualizing a system that is not only operational but also usable and responsive to the user's needs (Wang 2005, 1-117) posited that a positive wayfinding experience should be functional - effective, efficient, pleasurable and enjoyable to the users.

Emotion and Wayfinding

The importance of emotions in determining a human state of mind has attracted the attention of psychologists, product designers and the field of human-computer interaction. Studies have shown that "emotion is a necessary part of life, affecting how you feel, how you behave, and how you think" (Norman 2004). Aesthetically pleasing objects stimulate human subconsciousness and enhance performance at work. Wayfinding is multi-sensorial, it requires the use of cognitive and emotional dimensions. Gartner, G (Gartner 2010, 61-65) posited that the emotional significance of a particular space can enhance its remembrance and increase the accuracy of direction decisions. However, works of literature have focused on understanding the cognitive representations of perception in a spatial environment through cognitive maps. Wang, Y (Wang 2005, 1-117). explained most studies on the emotion of wayfinding delve much into the negative emotions such as stress, anxiety, fear, and anger and the influence of well-planned enhancing wayfinding devoid of negative emotions.

The conceptualization and implementation of wayfinding solutions should be hinged on resonating positive emotions which create experiential feelings in the mind of the users. Experience design in wayfinding explores human-centred approaches to connecting elements of the built environment with the people to maximize intuitive pleasurable navigation. The conceptualization and implementation of wayfinding solutions should be hinged on resonating positive emotions which create experiential feelings in the mind of the users. Experience design in wayfinding explores human-centred approaches to connecting elements of the built environment with the people to maximize intuitive pleasurable navigation.

Wayfinding Language

Wayfinding designers are consistently faced with the challenges of providing information for multilingual audiences. International airports such as Denver Airport handle over one hundred thousand passengers daily. A large chunk of these passengers speaks different languages. However,

wayfinding signages in transit hubs should cater for the diverse target audience. Symonds, P. (Symonds 2022, Online) posited that colour coding is a way of solving the challenges associated with multiple languages. Colours and visual identification of a national flag can be used to steer towards specific language signs and information. Colour coding is achieved by adorning the walls or floors of different areas in different colours. (Helvacıoğlu and Olguntürk, 2011). The cognitive processes are easily activated when the audience can correlate the colours. Darken, R. and Peterson, B. (Darken and Peterson 2002, 410-419) posited that wayfinding is also considered to be a mental process in creating a cognitive representation of the perceived environment by utilizing spatial characteristics. Icons and pictographs can reduce semantic challenges in wayfinding design for multilingual audiences. Internationally recognized symbols are often utilized by designers to communicate effectively. Most standard pictographs listed in the International Standard Organization are meaningful signs (Symonds 2022, Online). The use of pictographs and colour-coded texts aids cognitive experience irrespective of language backgrounds.

Research Methodology

The research methodology adopted in this paper is product development and survey. The Department of Fine and Applied Art Building in Olabisi Onabanjo University Ibogun Campus is a two-wing building (see fig. 2). This building houses the Head of Department Office, Lecturer's offices, Gallery, Photo studio and others. The multi-purpose usage of this building necessitated the development of a wayfinding signage system that enhances the visibility and functionality of the building.

Research Design

This study adopts the five phases of ADDIE design framework (Analysis, Design, Development, implementation and Evaluation) in the wayfinding system production work flow. The framework is discussed in relative to project work flow as follows:

Analysis

The analysis is centred on identifying and labelling the designated offices in the academic building. Each of the offices to be designated was identified, numbered and tagged with the created dummy signs. Dramatic roundish shape and cutout extended numbering of the exterior and interior signs were anchored on creativity which typifies the Department of Fine and Applied Art. Similarly, the colour interplay on the signs was conceived to reflect vibrant colour use which reinforces the specificity of the colour theory. Colours theory, shape, typography and legibility are the fundamental elements of art. The conceptualization and design of the wayfinding project are driven by aesthetics, psychology and functionality.

Design (Prototyping)

Thumbnail sketches were developed as the design blueprint for the directional wayfinding system (fig. 3). Sketches were done in stages before the final shape and model outlook were achieved. The dummy of the main wayfinding systems and the designated signs were created (See fig. 4). Each of the offices was labelled and tagged accordingly (See fig. 5) (See fig. 6). Computer-generated digital wireframes were created and dimensioned according to the specified measurements (See fig. 7 and fig. 8). Colours were added to the digital wireframes (See fig. 9).

Figure 2. A fullview of the Fine and Applied Art Department Building (© Siyanbola Afeez 17/12/2021).

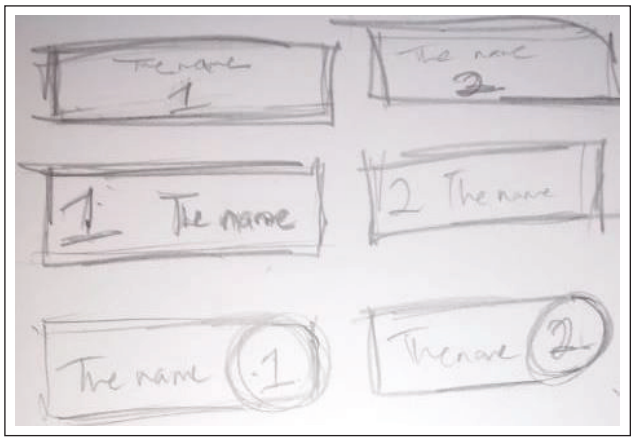

Figure 3. Iteration sketches of the main wayfinding system (© Siyanbola Afeez 15/11/2021).

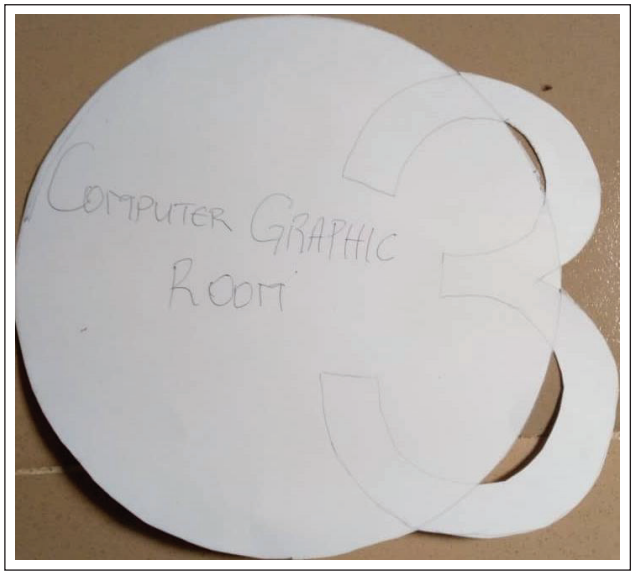

Figure 4. Mockup model of number tags (© Siyanbola Afeez 15/11/2021).

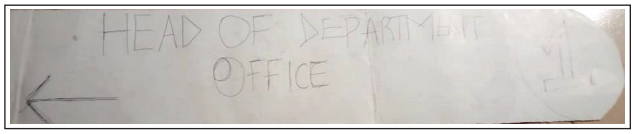

Figure 5. Sectional mockup model of the signage system (© Siyanbola Afeez 15/11/2021).

Development

The numberings were done sequentially in descending order (See fig. 10). Exterior and interior systems were synchronized basically with colour coding. However, the interior signs contain the designated office names for easy identification. The information was printed on self-adhesive vinyl material using a large format printing machine.

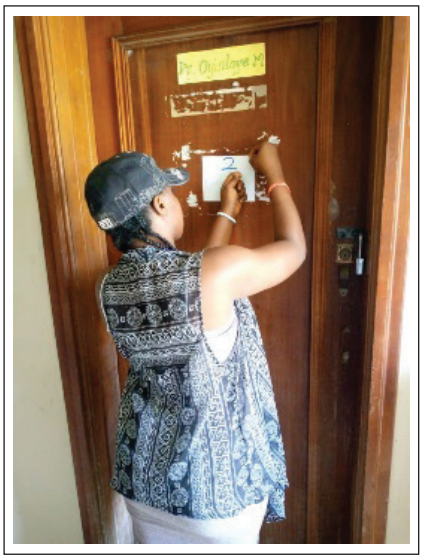

Figure 6. Tagging of Doors with designated numbers (© Siyanbola Afeez 17/11/2021).

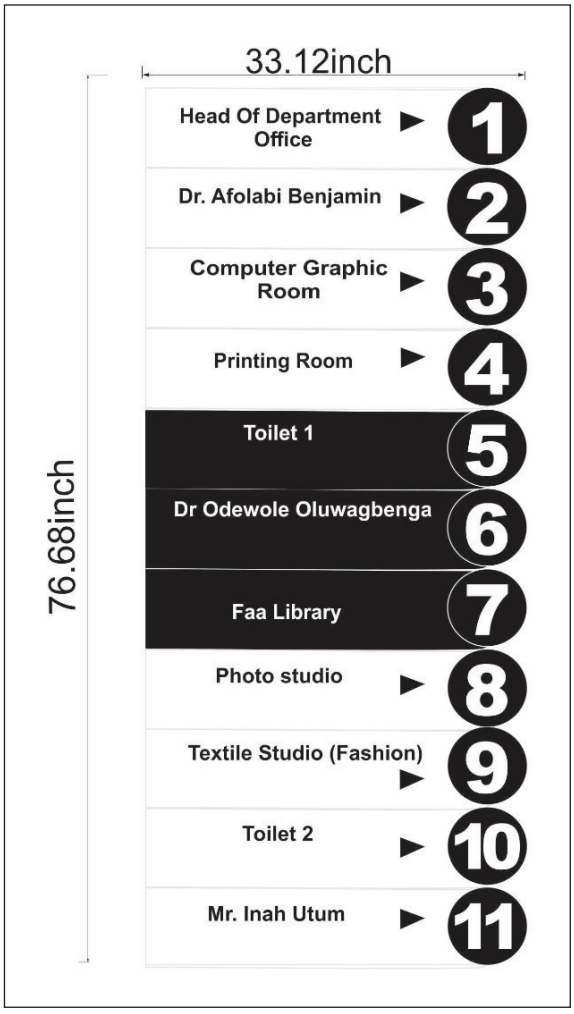

Figure 7. Dimensioning of the Exterior Wayfinding System (© Siyanbola Afeez 17/11/2021).

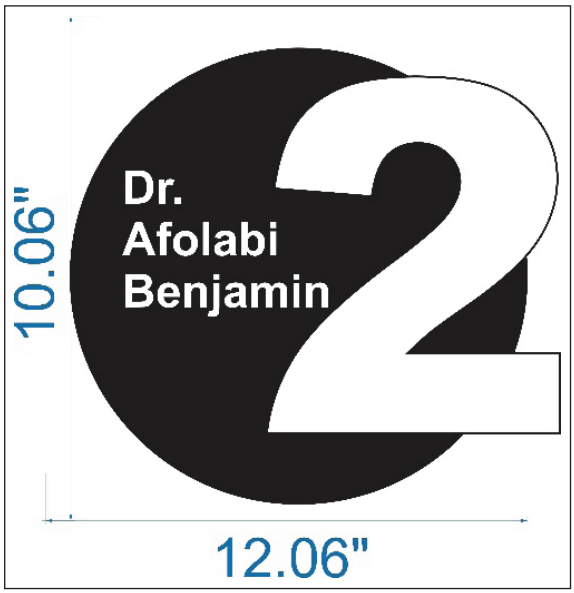

Figure 8. Dimensioning of the Interior Signs (© Siyanbola Afeez 17/11/2021).

Implementation

The prints were pasted on a heat-resistant non-ignitable board known as Arco Board (See fig 11). Cutting of the board into required shapes and dimensions was achieved with the aid of a french saw (See fig. 12). Interior signs identifying the designated offices are mounted (See fig.13) at 1200mm (Arthur and Passini, 1992) height above the floor for easy visibility to the different classes of pedestrians. The wayfinding system was amount evaluation (Statistical Analysis).

Evaluation (Statistical Analysis)

The opinions of users constituting three hundred and thirteen (313) students and academic staff on campus were sampled to evaluate the usability and effectiveness of the developed wayfinding system. The closed questionnaire was used in gathering data from the respondents. The developed questionnaire uses Likert Scale formats of Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. Raw data was analyzed using the mean. The nominal scores were based on the Likert scale model: Strongly

Figure 9. Computer generated designs of the wayfinding System (© Siyanbola Afeez 21/11/2021).

Figure 10. Computer generated graphic design of the number tags with designated names (© Siyanbola Afeez 21/11/2021).

Figure 11. Pasting of Prints on Arco Board (© Siyanbola Afeez 17/11/2021).

Figure 12. Cutting of board into required shape (© Siyanbola Afeez 19/11/2021).

Figure 13. Mounted Exterior Wayfinding System for Wing A (© Siyanbola Afeez 17/11/2021).

Figure 14. Mounted Exterior Wayfinding System for Wing B (© Siyanbola Afeez 17/11/2021).

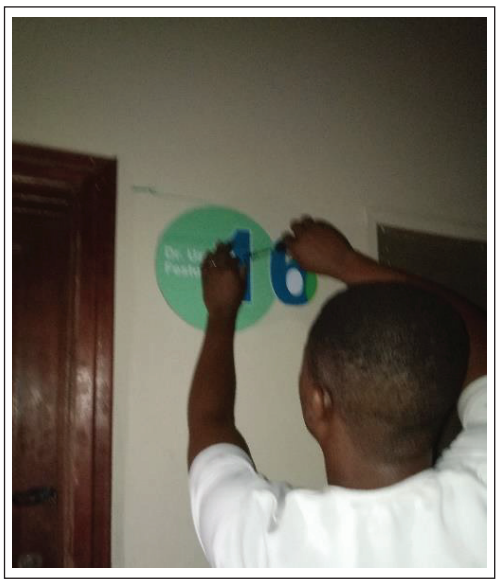

Figure 15. Fixing of the Designated Interior Signs (© Siyanbola Afeez 17/11/2021).

Figure 16. Mounted the Interior Signs (© Siyanbola Afeez 17/11/2021).

Agree =5, Agree=4, Undecided=3, Disagree=2 and Strongly Disagree=1. These were calculated as 5+4+3+2+1 =15/5 =3 (Likert Scale Criterion). The score of each item was added and the arithmetic mean was calculated for each item. The mean is equated with the Likert Scale criterion above (Adepeko 2016, 1-196; Angyol 2015, 1-100). If the mean is equal to or above (greater than) the Likert criterion (3.0) then the item is accepted and if the mean is lower than the Likert Scale criterion of (3.0) then the item is rejected. The outcome of the survey is shown in Table 1 below.

The corresponding accuracy of colour coding in the signs enhances the efficiency of the wayfinding system (Mean=4.3). The interior sign becomes functional in the context of the exterior colour designation. Colour in any exterior must be considered in the context of its surroundings. This finding buttresses the position of Read, M. (Read 2003, 233-239) that colours enhance users' wayfinding abilities. Studies have also shown that users who are unfamiliar with a colour-coded environment have a strong sense of direction as compared to noncolor-coded environments (Evans et al. 1980, 1-6). The visual semantic of colours makes users experience a particular emotion and facilitate the understanding of the textual information. The textual information on the signs is bold and descriptive (Mean=3.75). The background colours significantly contrast the textual information on the signs. In achieving a uniform standardised set of signs devoid of ambiguities, Arial bold fonts are used across the developed wayfinding system. The textual information is simple and intuitive. Proactive Design (Proactive Design 2021, Online) posited that signage texts should be concise and easy to read. The ambience of the Fine Art Department building in Ibogun is accentuated by the installed wayfinding system (Mean=4.3). The design and implementation of the exterior and interior wayfinding signage stimulate a sensorial experience in users of the building. The directional wayfinding signage leverages an aesthetically driven user experience design. Research has proven that humans work better with aesthetically pleasing objects (Norman 2004, 1-272). Consideration of aesthetics in wayfinding design help user finds their way with ease and pleasure (Wang 2005, 1-117). The use of colours of different gradients and saturation enhance the appeal of wayfinding (Mean=3.8). Colours connect the users to the anticipated destination emotionally. Spence, I., Wong, P., Rusan, M. and Rastegar, N. (Spence et al. 2006, 1-6) observed that colour contribution is influential in

Table 1. Analysis Table

S/N	Questions	Strongly Agree	Agree	Undecided	Dis-Agree	Strongly Disagree	Mean	Remark
1	Consistency in the interior and exterior colours on the signs enhance the functionality of the wayfinding signage.	144 (46.0%)	147 (46.9%)	22 (7.1%)			4.3	Accepted
2	The textual information on the signs is bold and descriptive.	50 (15.9%)	135 (43.1%)	128 (40.9%)			3.75	Accepted
3	The wayfinding system accentuate the environmental aesthetics.	173 (55.3%)	96 (13.9%)	16 (5.1%)	28 (8.9%)	_	4.3	Accepted
4	Use of colours of different gradients makes the wayfinding system appealing	105 (33.5%)	123 (39.2%)	30 (9.58%)	34 (10.9%)	21 (6.7%)	3.8	Accepted
5	The shape of the exterior and the interior signs enhances the efficiency of the wayfinding system	181 (57.8%)	117 (37.3%)	7 (2.2%)	5 (1.6%)	3 (0.9%)	4.6	Accepted
6	The positioning of the interior and exterior signs makes it visible to all users	64 (20.4%)	99 (31.6%)	56 (17.9%)	23 (7.3%)	71 (22.7%)	3.1	Accepted

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codifying spaces and helping to create a visual memory. The application of analogous and complementary colours in the wayfinding interface design creates harmony and contrast. Colours are emotive and persuasive in influencing actions and feelings. The readability and legibility of textual information in wayfinding signages are enabled by good use of harmonious and contrasting colours. Wang, Y. (Wang 2005, 1-117) posited that the efficiency of wayfinding signage is anchored on legibility, readability or accessibility. The shape of the exterior and the interior signs enhances the efficiency of the wayfinding system (Mean=4.6). Dramatic shapes of signs appeal to the consciousness of the users. Interesting signage shapes create enthusiasm and capture the attention of visitors who are not familiar with the environment. People often find satisfaction in design solutions that combines refined graphic design sensibilities, precise engineering and unique appearance. The combination of roundish and square edges in the exterior signs of the developed wayfinding system supports usability while the roundish interior signs with cutout numbers facilitate the noticeability of the signs. Visibility is a key component of efficient interior signs. Positioning of the interior and exterior signs makes it visible to all users (Mean=3.1). The mounting of the sign was guided by a specification of Arthur and Passini (Arthur and Passini 1992). The interior signs were mounted above eye level to enable their visibility to different categories of users and forestall possible human contact that can lead to damage to the signs.

Contribution to Knowledge

This study prioritized ergonomics factors in optimizing real users' needs in wayfinding. The study has proven that human interactions with spaces are heightened by interesting sensational shapes of wayfinding systems and the vibrant integration of colours. Cognitive psychology and design sensibilities played a fundamental role in the conception and developmental workflow of the developed wayfinding system. The Strong contrast between the information and the background colour is critical in enabling visibility and easy comprehension in environmental information design. The study has also shown that the hierarchical relationship in information on the wayfinding system helps in directing the user's eyes and facilitates coordinated understanding of spatial information.

CONCLUSION

A Wayfinding system is an integral component of a functional environment. This study reinforces the importance of an effective wayfinding signage system in an academic environment to increase effective wayfinding and reduce staff and student frustration. Movements in an environment should be coordinated and guided to create a positive enjoyable experience in the mind of visitors and residents of such an environment. Effective wayfinding reduces confusion and anxiety normally experienced when navigating a complex space. Spatial affordance is critical in an academic environment where wayfinding is multi-sensorial for students, staff and visitors. The development of an effective wayfinding system for such an environment requires the knowledge of psychology, colour, and planning to achieve the desired goals. The typography resonates with consistency and legibility while the colours on the texts sufficiently contrast the background colours to enhance readability. Academic environments characterized by an intuitive pathway, clear wayfinding information with easy-to-read graphics leverage a distinct sense of place that enhances the well-being and performance of the people in such environment.

Ethics: There are no ethical issues with the publication of this manuscript.

Peer-review: Externally peer-reviewed.

Conflict of Interest: The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Financial Disclosure: The author declared that this study has received no financial support.

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