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Well-Being as an Effective Aspect in the Perception of Vital In-between Spaces within Art and Architecture Faculties

Afaq Al-Ramahi [1,*], Aminreza Iranmanesh [2] and Simge Bardak Denerel [1]

[1] Department of Interior Architecture, Near East University, North Cyprus, Mersin 10, 99138 Nicosia, Turkey; simge.bardak@neu.edu.tr
[2] Faculty of Architecture and Fine Arts, Final International University, North Cyprus, Mersin 10, 99320 Kyrenia, Turkey; aminreza.iranmanesh@final.edu.tr
* Correspondence: afaqramahi@gmail.com

Abstract: In recent years, well-being has become an increasingly important consideration integrated with functional aspects in the design of educational spaces due to its significant impact on the built environment. Although the features of educational spaces have been explored in a myriad of studies, the potential of in-between spaces has not been well explored. This paper reveals the significance of in-between spaces in educational buildings beyond their functional use as the fundamental circulation within a building, indicating that they also play a dynamic role through their design as elastic gathering spaces that encourage informal interactions and link users psychologically and visually, which affects their well-being. However, the potential of these spaces is often overlooked compared to the main educational spaces. Additionally, during the design process, there seems to be a tendency to reduce these spaces to a bare minimum, in favor of exploiting larger spaces, which shows that they are regarded as merely connecting points or transitional spaces. The research problem addressed here is the lack of a clear, adequate understanding of the effect of designing in-between spaces on the productivity and well-being of users, as there are no criteria regarding in-between space designs to enhance well-being. The current paper aims to evaluate the reality of the in-between space design within the art and architecture faculties of Jordanian universities according to the perception of faculty members and students based on well-being requirements. Accordingly, a survey was designed to address the 11 key criteria identified in the literature, including (1) physical features and visual appearance; (2) size and design of in-between spaces; (3) circulation and movement space zoning; (4) ergonomics and furnishing; (5) lighting; (6) colors and finishing; (7) acoustics; (8) heating, ventilation, and air conditioning; (9) visual communication and instructional tools; (10) social and cultural spaces; and (11) accessories. The paper utilizes a mixed approach through survey and observation, where the findings are analyzed from three case studies to reveal the dimensions that need to be taken into account and developed to meet the needs of users. The results of the study demonstrate that the specific dimensions of circulation and movement, ergonomics and furnishings, colors and finishing, and accessories must be taken into account to create an interactive environment that advances the educational process and therefore enhances productivity.

Keywords: in-between space; well-being requirements; well-being; vital spaces; educational spaces

Citation: Al-Ramahi, A.; Iranmanesh, A.; Denerel, S.B. Well-Being as an Effective Aspect in the Perception of Vital In-between Spaces within Art and Architecture Faculties. *Buildings* **2023**, *13*, 1467. https://doi.org/10.3390/buildings13061467

Academic Editors: Jose Cabeza-Lainez, Jose-Manuel Almodovar-Melendo and Pablo La Roche

Received: 5 May 2023
Revised: 23 May 2023
Accepted: 31 May 2023
Published: 5 June 2023

1. Introduction

The design of architectural spaces is a complex discourse due to the myriad of factors that need to be taken into account during the process [1]. These factors might be related to subjects such as the functionality of the space, aesthetic appeal, cultural context, environmental impact, and economic feasibility, among others. These factors are inherently interconnected, making the scholarly studies addressing them complex and multidimensional [2]. Thus, the necessity of exploring new approaches is self-evident for the improvement of the design process. For example, spatial organization can have

a significant impact on how people interact with and experience space, as well as on the overall atmosphere and mood of the environment [3].

Conducting research on less explored spaces allows us to better understand the various factors that influence spatial organization as well as the ways in which people interact with and experience different types of spaces. This allows for the better optimization of the utility of these spaces. Among these factors, less attention has been paid to the potential and possibilities regarding in-between spaces in contemporary discourse [4]. This seems to be more critical when exploring educational spaces, as in-between spaces have the potential to be more than mere circulation or leftover spaces [5,6]. In the context of education, in-between spaces (entrance halls, foyers, hallways, and stairs) are often overlooked as design opportunities [5,6]. They are frequently reduced in the design as far as standards will allow since they are seen just as service spaces for a functional need and as a way to connect the spaces. Consequently, these spaces are regarded as merely connecting points or transitional spaces [7].

In-between spaces—such as entrance halls, foyers, hallways, and stairs—which represent the transitional and interstitial spaces between two functional spaces, have been investigated by previous studies concerning interior design and well-being. Some researchers, confined to studying certain aspects of in-between spaces [8], have evolved the theory of in-between places as transitional worlds. Later, the types and properties of in-between spaces in architecture and the characteristics of the active in-between space were determined by Al-Muqaram and Al-Anbaki [9], while Nassar and Elsamaty [10] evaluated the performance of higher education transitional spaces as spaces of interactive utilization. İnan [11] construed the in-between spaces as both material and immaterial spaces. These studies redefined the concept of in-between spaces to become a theoretical tool for the analysis of architecture in connection to its discourse [8,11]. Although numerous studies have addressed the notion of in-between spaces from different angles concerning outdoor spaces and urban environments (e.g., [4,12–15]), the exploration of the characteristics and impact of in-between spaces from the perspective of interior architecture exposes a significant gap in the literature and requires more investigation. What is more, well-being as an effective aspect in the perception of vital in-between spaces within art and architecture faculties and its effect on enhancing users' productivity has been neglected, according to the literature review, which was the motive to tackle this area of research.

Indoor environments, particularly those including features such as furniture, lighting systems, color, accessibility to window views, connection to nature, and other components that are not only functional but also comfortable, adaptable, and aesthetically satisfying with considerable positive effects on the user's well-being, are capable of creating workspaces that can satisfy the needs of the users, hence encouraging efficiency as well as productivity and happiness [16,17]. In general, there is a clear correlation between users' satisfaction and performance efficiency, i.e., the more satisfied users are, the more productive they are. The building environment in which the educational process takes place is one of the key influencing factors. It can affect staff and student productivity through its design and arrangement in terms of users' needs. Human performance is also directly impacted by the indoor environment, and by enhancing it, it is possible to increase worker productivity [18–20].

As a result, one of the main problems regarding interior design is the lack of a clear, adequate understanding of how the design features of in-between spaces affect the productivity and well-being of users, as well as enhance their well-being. There are no standards regarding the capability of an in-between space design to enhance well-being. Therefore, in order to gain a better understanding of the design of these spaces, this paper will utilize a mixed approach to analyze the findings from three samples of faculties of art and architecture in Jordanian universities. This will help reveal the design features that need to be taken into account and developed to meet the needs of students and faculty members in the faculties through using well-being requirements.

The current study proposes a vision for interior in-between spaces that enables the evaluation of their efficiency using a scale based on well-being requirements. These proposed criteria can be subjected to further research to develop the design of interior in-between spaces within the art and architecture faculties of Jordanian universities in line with the needs of users. In addition to qualitative observation, the study employs a quantitative survey conducted in Jordan, which includes three of the biggest public universities and 162 volunteer participants, including both students and faculty members. The findings can assist designers and educational managers in better utilizing and designing interior in-between spaces, both at the design stage and during post-occupancy periods.

2. Literature Review

2.1. The Concept of In-between Spaces

An in-between space is a notion that is used in numerous fields of knowledge and is presented in a variety of ways [4,7,9,12,13]. These spaces are often referred to as an intermediary between two things that is dependent on the surrounding binaries or as an autonomous concept that is impacted by those binaries. The term in-between spaces originated in architecture during the era of Greek architecture. This idea has grown in importance in all architectural designs from the Palladian architecture up to now [21].

The in-between spaces within exterior and interior spaces, which were shown in Palladio's works (entrances, lobbies, corridors, courtyards, staircases, etc.), are highlighted in a book by Krier [21], "Architectural Composition", in a detailed explanation that emphasized their importance in creating an important tension in the space. He demonstrated the need to overlap two spaces and connect them in a way that results in an attractive composition. Krier demonstrated that spaces should be arranged in an order that makes sense to generate spatial and aesthetic links [21].

Wiechel [22] defined the in-between space between destinations as the interstitial space, a space that may serve as both a destination and an interstitial area simultaneously; for instance, a classroom may be the destination and the hallways connecting them might be the interstitial space, or the corridor itself may be the destination and the interstitial space.

According to the activity in these locations, the in-between spaces are elastic settings that may accommodate user presence for short or extended periods of time [23]. In-between spaces are a mixture of interconnected spaces created by the dynamic interaction of barriers and passageways. It is a human-centric design choice to consider the features of these spaces [24]. Moreover, transitional spaces are also considered in-between spaces; this includes the temporary spaces and traffic areas that are essential when designing all private and public buildings [25,26]. Transitional spaces are characterized as a link or connection between two (or more) enclosed spaces, such as corridors, atriums, and stairways [26].

Furthermore, the utility of interior in-between spaces can differ based on the building's needs or the user's requirements. These areas can evolve independently, forming connections that are both visually and functionally advantageous. Understanding the various characteristics of these spaces can make them fascinating areas. In-between spaces offer functional, symbolic, social, and aesthetic value, contributing to the spatial quality of the environment and serving as a foundation for sustainability [27].

2.2. In-between Spaces within the Faculties of Art and Architecture

Within the context of higher education, specifically targeting schools of art and architecture, in-between spaces can be considered as flexible areas between different interior functions that serve multiple purposes in addition to their role as transitional spaces responsible for circulation within the building. Within the context of architecture and art education, these spaces are highlighted in particular, as these educational activities do not often remain bounded by the classroom and extend into the interior in-between spaces of the buildings. They are an essential component of any public building and take up a significant amount of the building's overall space. In-between spaces combine the physical

connection between various functions and buffer space, as well as the dynamic interaction of passages, lobbies, foyers, staircases, and other functions. They are situated in between the faculties' interior spaces [10].

In the context of this study, in-between spaces refer to public circulation areas (including vertical and horizontal connections), transitional areas, welcome areas, event areas, waiting areas, public gathering areas, and multipurpose areas within the art and architecture faculties which are utilized for various activities. These spaces accommodate walking, talking, studying, watching, and other activities. In architectural faculties, in-between spaces often encompass entrance halls, lobbies, foyers, courtyards, corridors (hallways), and staircases. The current study specifically focuses on interior in-between spaces, while the exploration of exterior spaces with transitional qualities may be considered for future studies

2.3. The Concept of Well-Being

One of the purposes of human activity is to achieve well-being. Philosophers have been interested in well-being since the time of the ancient Greeks, and the idea of well-being has existed for centuries in a variety of fields [28]. The importance of considering people's well-being in their homes, places of employment, and lives, in general, has grown as societies have developed in various aspects. Well-being is defined as what is intrinsically valuable to an individual; this includes positive emotions, happiness, and overall life satisfaction, as well as physical and mental health and sociability [29,30].

Finding a single definition of well-being is challenging, as there is no consensus in the literature about what exactly it means [31]. However, it does involve the presence of pleasure, fulfillment, and positive functioning, as well as the absence of sadness, anxiety, and other negative emotions [32]. Well-being is summed up as having a positive outlook on life and feeling happy [33]. Although they all have rather different interpretations and underlying meanings, the terms "flourishing", "enjoying a good life", "happiness", and "life satisfaction" are occasionally used interchangeably as synonyms for the term "well-being" in certain publications [34].

In the context of this study, well-being is defined as the presence of pleasure, fulfillment, positive emotions, happiness, and overall life satisfaction, as well as physical and mental health and sociability. This means that a person's comfort extends beyond just their physical surroundings, such as well-designed spaces for specific tasks, comfortable furniture, good ergonomics, air quality, and temperature control, to also include their psychological needs, such as their need for social interaction and relationship building. Users benefit substantially from work environments designed with respect for well-being factors as they become more productive, have better memories, and attract new talent in addition to experiencing less stress, along with the fundamental components of the design specifications [35].

2.4. Well-Being and Architectural Space

Throughout history, architects, designers, and planners have contributed to improving living conditions through their work [36]. Examining the works of architects, we can see that they have increasingly prioritized the physical and psychological well-being of individuals through human-centric design [37]. Comfort is a crucial aspect of well-being, and it is not limited to physical comfort such as spaces designed for specific purposes, good ergonomics, air quality, and temperature control, but also mental and social comfort, which is essential for social interaction and engagement with others.

The interior design well-being framework aims to identify the spatial aspects that impact our well-being and assess their relevance. It includes several requirements, such as functional, ergonomic, aesthetic, psychological, social, sensory, and contextual needs, which may vary based on the cultural background of the user. The framework seeks to define these requirements and evaluate how each spatial feature of an interior space meets them [38,39].

2.5. Vital In-between Spaces and Their Impact on the User's Well-Being within the Faculties of Art and Architecture

Educational environments are increasingly striving to enhance student and staff well-being [40]. Given the link between well-being and academic achievement and productivity [41], users greatly benefit from environments created with aspects of well-being in mind; through reduced stress and burnout, they are more productive, have better memories, and are more likely to recruit fresh talent [35].

The notion of peer learning and one-on-one interaction with tutors is a dominant characteristic of the productive learning environment in schools of design and architecture [42,43]. Therefore, an essential aspect that must be taken into account is the distinctive nature of the "learning by doing" method that is used in design education [44,45]. The interactive process of learning is a crucial aspect of architectural design education. By engaging with their instructors, peers, and the built environment, students can gain a deeper understanding of design principles, construction methods, and the impact of architecture on society. This interactive approach to learning also allows for the exchange of ideas, feedback, and collaboration, which are essential for developing creative and innovative solutions to design challenges [46].

From an educational, social, ideological, and epistemological point of view, the design studio setting differs from the typical classroom, where the design studio is a dynamic social environment that encourages students to collaborate with their classmates even outside of class without the presence of their tutors [47]. According to L. Kahn, the hallways would be converted into student-owned classrooms by being made considerably larger and equipped with spaces that looked out into the gardens [48]. They would develop into gathering areas for friends and spaces for student discussions on their works. He affirms that by providing such spaces with a suitable environment rather than just passing through them from class to class, they would transform into a meeting connection and not just a corridor, meaning they would become a location with the potential for self-learning [49].

Research has shown that human perception is the only way we can comprehend the environment around us as it uses the senses of spatial perception, size, color, depth perception, constancy of noises, temperatures, and weights [50]. Students' perceptions and conduct are influenced by the physical environment's designs, including spaces, openings, materials, forms and proportions, colors, and textures [51]. This is especially true for students in art or architecture faculties, where they have the opportunity to express themselves according to their environment. Numerous studies have shown that as people age and are exposed to various surroundings, such as the built environment, social interactions, and the natural world, their perceptive behavior changes. Therefore, one of the key concerns of architectural programming and architectural design performance is the perceptions and behaviors of students in educational spaces, as well as their social interactions and gathering places [39,52,53]. According to Amabile and Kramer [54], people perform better and are more innovative when they have a positive "inner work life", but when it is negative, their productivity suffers. To enhance the positive aspects of work, four components—encouragement, respect, emotional support, and a sense of belonging—can be strengthened. The perception of the importance of work achievement is the key factor affecting inner work life, implying that these variables can influence our well-being in social environments [16].

The physical and emotional environment has a significant impact on future designers' ability and motivation, as well as their academic success (see [55]). Consequentially, education is certainly crucial for one's personal and social development, and the impact of the built environment is particularly important. In this case, investigating the role of in-between spaces in schools of architecture is necessary, as these students will have an impact on the nature of these spaces in the future. Accordingly, their conception of in-between spaces might be impacted by how they experience such spaces during the course of their education.

Thus, it is essential to consider the concept of well-being as a key component to the best user performance, and, as a result, a higher quality of life, in order to promote the well-being of both students and staff for their present and future well-being [38,56]. From all of the above, the importance of considering the well-being of students and teachers while designing their internal work environments (the educational environment) becomes clear. So, to achieve vital in-between spaces, the fulfillment of users' needs, activities, and behaviors should be regarded through the performance of these spaces, knowing that the interactive performance of such spaces can enhance their efficiency and fitness and can create an interactive environment that is invaluable to the educational process [10,22], in order to design more vital well-being spaces that encourage students and their teachers to be creative and increase their productivity.

3. Materials and Methods

3.1. Research Design

This paper utilized a mixed-methods approach that combined both qualitative and quantitative methods to best address the research questions. Qualitative analysis was conducted through observation and walk-throughs, while the quantitative method utilized a post-occupancy evaluation (POE) survey that collected data from students and faculty members regarding their perceptions and experiences in the in-between spaces within the art and architecture faculties. A questionnaire was used to measure the effectiveness of the in-between space design within Jordanian universities' art and architecture faculties, based on the perceptions of faculty members and students, in terms of the well-being requirements necessary for designing a space that enhances user well-being and productivity. The data from both methods provided insight into users' experiences in the space and their need for interior design features that promote well-being.

3.2. Case Studies

The choice of higher education buildings (universities) as the research environment of the study, particularly art and architecture faculties, is valuable because the users of these buildings represent a segment of society that spends most of their time in the educational spaces of the university, particularly students. Leedy and Ormrod [57] suggested that students who are attending a university are in a crucial stage of their lives; accordingly, their daily experiences can significantly shape their understanding of the world around them and their place in society. This study explores the different characteristics of the physical educational environment in three of the biggest public art and architecture faculties in universities in Jordan (Table 1 and Figure 1), as follows.

The in-between spaces in the art and architecture faculties for case studies related to this research include the areas cited as entrance halls, lobbies, foyers, courtyards, corridors (hallways), and staircases, as shown in the figures below (Figure 2A–C).

Following stratified random sampling by using the Steven K. Thompson equation to calculate sample size (see [58]), the population number of each case study was obtained through communication with the Deanship of the Faculty and the student registration office as follows.

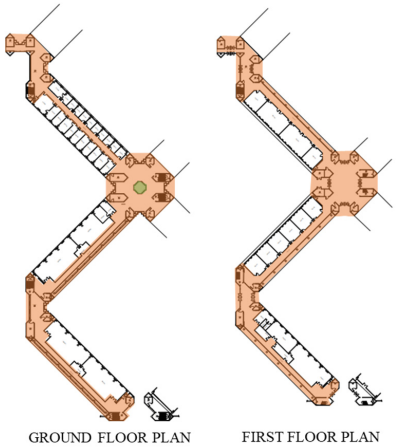
Table 1. General information regarding the three case studies.

Name	Abbreviation	Public/Private	Faculty Selected	Established Date	Population
University of Jordan	UJ	Public	Faculty of Art and Design	2002	520
University of Science and Technology	JUST	Public	Faculty of Architecture and Design	1986	375
Hashemite University	HU	Public	Faculty of Architecture	2006	282

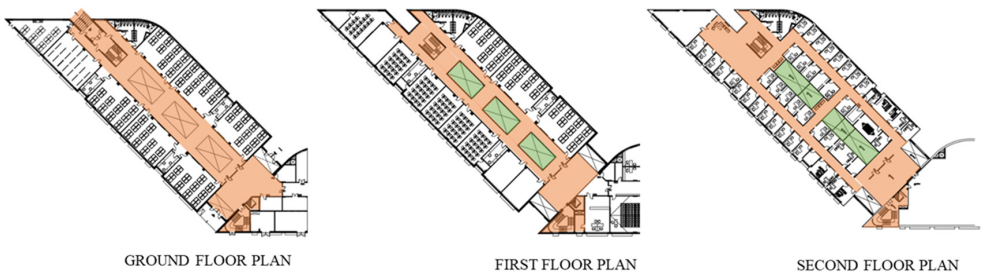
(**A**) (**B**) (**C**)

Figure 1. Case studies from Jordanian universities, (**A**) UJ, (**B**) JUST, and (**C**) HU.

(**A**)



(**B**)



(**C**)

Figure 2. (**A**) The in-between spaces in the University of Science and Technology (UJ). (**B**) The in-between spaces in the University of Science and Technology (JUST). (**C**) The in-between spaces in Hashemite University (HU).

3.3. Materials

A qualitative study was conducted to see closely the reality of the in-between spaces, according to well-being requirements, within the faculties of art and architecture using observation tools, walkthroughs (field visits), and observing the space to obtain data that the questionnaire could not provide, such as photos taken using specialized imaging devices to enhance the discussion of the results of the study. The physical educational environment of the universities was documented after reviewing the results of the questionnaire directly through pictures and the researcher's observation.

A set of 43 questions was derived from the design features and grouped into eleven dimensions according to the eight well-being requirements. The aim was to determine if taking well-being requirements into account in the design process can lead to better productivity and that an increase in productivity is related to the users' satisfaction with the design of the in-between spaces; therefore, the greater the users' satisfaction with the design of the place, the higher their productivity and performance within this space. Thus, the results of the survey and the participants' answers about the reality of the state of the in-between spaces are a measure of productivity in this study. The eleven dimensions included (1) physical features and visual appearance; (2) size and design of in-between spaces; (3) circulation and movement space zoning; (4) ergonomics and furnishing; (5) lighting; (6) colors and finishing; (7) acoustics; (8) heating, ventilation, and air conditioning; (9) visual communication and instructional tools; (10) social and cultural spaces; and (11) accessories. A Likert scale which contained five response options was used to answer the questions. The choices ranged from 'strongly agree' to 'strongly disagree', so that the researcher could obtain a holistic view of people's opinions and their level of agreement.

The survey was conducted through online Google Forms, and participants were volunteers. The use of this type of questionnaire is essential for collecting data more efficiently and saving the time and effort of the researcher. The questions were clear, and some were modified for clarity. The questionnaire was developed after obtaining permission from the Near East University's ethics committee to ensure the validity of the scale.

The tool was applied to a group of thirty faculty members and students from outside the study sample in order to ensure the stability of the questionnaire. The stability coefficient was extracted using the "Alpha Cronbach" coefficient (see [59]) for the total score of the scale of the reality of the in-between space design within the art and architecture faculties in Jordanian universities according to the perception of faculty members and students based on well-being requirements, it was 0.95, and the Cronbach's alpha coefficient for dimensions ranged between 0.70 and 0.85, which shows that the scale has an acceptable level of stability [60].

After obtaining the necessary permissions from the Near East University and the Ministry of Higher Education in Jordan, the survey was administered. The survey was conducted with the aid of the administrative bodies of the three schools. The link to the questionnaire was distributed along with a letter outlining the objectives of the study, thanking the participants in advance, stating the expectations for their involvement and the right of all participants not to answer any particular question or to withdraw from the study at any time, and assuring them that their responses would be kept private and used only for scientific research. The research's participants, including the teaching staff and students at the Jordanian universities that were included in the study (Table 2), were then given the questionnaire. Table 3 illustrates the questionnaire's ultimate structure.

Table 2. Sampling information, where *N*: The population size, *n*: The actual sample size.

Universities	UJ	JUST	HU	Total
Total	520	375	282	$N = 1177$
Percentage %	44.2%	31.8%	24.0%	100%
Ideal sample size calculated	64	46	34	$n = 144$
Actual sample size	76	52	34	$n = 162$

Table 3. Structure of the questionnaire (dimensions, questions, and requirements).

Dimensions	Questions	Requirement
Physical features and visual appearance	1. The faculty's main entrance is clear and contributes to the building's outstanding appearance. 2. Appropriateness of surrounding natural views with the faculty's internal environment through the windows and doors access that reach the gardens and green areas. 3. Appropriateness of the faculty's surrounding outdoor spaces for architectural educational activities.	Connection to context
Size and design of in-between spaces	1. The sizes of in-between spaces within the faculty are proportional to the number of users. 2. The in-between spaces inside the faculty are characterized by high flexibility (reconfiguration) to implement activities and diverse educational requirements demanded by the educational process. 3. The faculty's in-between spaces give the users privacy and independence (e.g., each student has his private place to complete his work) personal space. 4. The ceiling heights are proportionate to the size of in-between spaces inside the faculty that convey a feeling of comfort and affinity to the place. 5. The in-between spaces are designed to meet the needs of the disabled (providing space for the wheelchair and the person accompanying him in the space).	Functional, ergonomic, and psychological requirements
Circulation and movement space zoning	1. The corridors between classrooms and instructional places are adequate. 2. The corridors were designed with considering the movement of users within the space during times of crowding. 3. Directions for corridors within the faculty are clear, and there is easy access to other locations and amenities. 4. The staircases are sufficient and have an adequate design for vertical movement within the faculty. 5. The elevators are sufficient and have an adequate design for vertical movement within the faculty. 6. The in-between spaces provide ease of movement for the disabled between classrooms and other spaces within the faculty.	Functional and ergonomic requirements
Ergonomics and furnishing	1. The furniture in the foyers and corridors within the faculty provides is quite comfortable. 2. The in-between spaces within the faculty provide a suitable seating layout and arrangement for individual and group use. 3. The furniture within the in-between spaces of the faculty which can be adjusted to meet the user's sitting style and body mechanics is appropriate for the human body and its requirements. 4. The seats in the in-between spaces within the faculty are designed to be used for long periods of time.	Functional, ergonomic, and social requirements

Table 3. *Cont.*

Dimensions	Questions	Requirement
Lighting	1. The in-between spaces inside the faculty receive an adequate amount of natural daylight through the openings (doors and windows). 2. Within in-between spaces, enough levels of lighting (natural and artificial) are accessible for the entire day's activities. 3. There is the ability to adjust illumination levels to fit activities within the in-between spaces inside the faculty without the assistance of professionals. 4. There is the ability to regulate the direct and indirect glow (glare) within the faculty's in-between spaces. 5. Within the faculty's in-between spaces, there is proper distribution of lighting units considering their influence on colors.	Functional, sensory, and psychological requirements
Color and finishing	1. The psychological influence of colors on users is considered in the design of the in-between spaces inside the faculty. 2. Within the in-between spaces of the faculty, appropriate colors are used for the ceiling, walls, and floors which are coordinated with other design components such as furniture and curtains. 3. Non-reflective hues were chosen in the foyers and other in-between spaces, where juries and gallery events take place, where colors have an impact on the entire lighting inside the faculty.	Aesthetic, Social, and psychological requirements
Acoustics	1. The efficacy of acoustic noise isolation was considered in the design of the in-between spaces inside the faculty to decrease noise resulting from the congestion of users. 2. There is an appropriate separation between the classrooms and in-between spaces within the faculty, where diverse activities are conducted. 3. The floor coverings serve to relieve the noise created by users while moving through corridors and foyers.	Sensory and functional requirements
Heating, ventilation, and air conditioning	1. The in-between spaces inside the faculty considered the quality of natural ventilation, and the possibility of ventilation without being disturbed, by noise and exterior air currents, by providing appropriate windows in terms of size and orientation. 2. The in-between spaces have the ability to manage and modify the temperature within the faculty, through aids for the prevention of temperature swings. 3. The in-between spaces maintain a comfortable temperature within the faculty.	Sensory, functional, and psychological requirements
Visual communication and instructional tools	1. The in-between areas inside the faculty, have the availability of electrical points (sources) for the devices used for various activities by the users (students and staff). 2. The in-between spaces inside the faculty have the availability of required communication lines as well as an Internet connection. 3. Presentation boards for projects and other activities of various sizes are acceptable and appropriate for use in the faculty's in-between spaces.	Functional, psychological, and social requirements
Social and cultural spaces	1. The in-between spaces within the faculty are suitable and perfect for the social activities of architecture and design students. 2. The design of in-between spaces inside the faculty enhance social life and interaction among students and faculty members through the use of appropriate gathering areas. 3. In the faculty's in-between areas, there are many appropriate solo and group places for students and employees.	Social, psychological, and functional requirements

Table 3. *Cont.*

Dimensions	Questions	Requirement
Accessories	1. The indicative signs are clear in recognizing the circulation throughout the faculty's various in-between spaces. 2. The in-between spaces within the faculty have efficient signs that identify classrooms and other interior places, as well as their design compatibility. 3. The placements, colors, and sizes of the announcement boards in the faculty's in-between places are appropriate. 4. The in-between spaces within the faculty have adequate areas to display students' works and their scientific and artistic productions, as well as their creative achievements. 5. Indoor natural decorative plants and water spaces are available in the in-between spaces within the faculty to offer aesthetic and physiological impacts to the interior spaces.	Functional, psychological, social, and aesthetic requirements

3.4. Results

The data gleaned from this study indicate that the general mean of the total score was moderate, with 41% of the responses being satisfied (a mean of 2.9), and the levels of the total domains are within the average levels according to the quality standards that were used in this study. The mean scores for the eleven dimensions ranged from 2.12 to 3.38, which indicates low levels of satisfaction with four dimensions in the following ascending sequence: ergonomics and furnishing, with only 19.78 percent of the responses indicating satisfaction and a mean of 2.12, indicating a very low level; accessories with 20.22 percent and a mean of 2.22; colors and finishing with 21.7 percent and a mean of 2.25; and circulation and movement space zoning with 22.3 percent and a mean of 2.28; however, a moderate attitude towards the other seven dimensions was evident in the responses, with more than half of the participants indicating satisfaction.

The mean values pertaining to the views on the reality of the in-between space design within the art and architecture faculties in Jordanian universities according to the perception of faculty members and students based on well-being requirements are presented in Table 4 and Figure 3.

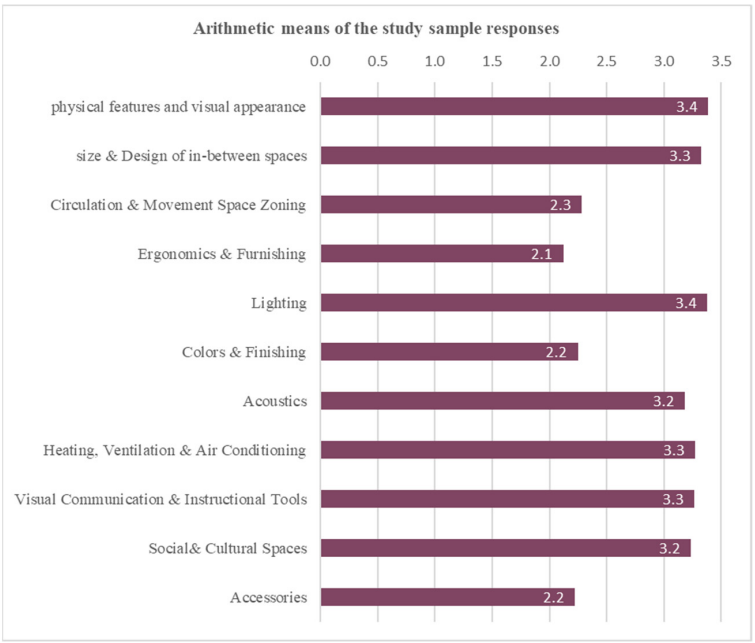


Figure 3. The means of the study sample responses.

Table 4. Descriptive statistics for the views of the sample on the eleven dimensions of the design features.

Dimensions	Number of Questions	Mean	Std. Deviation	Satisfaction %	Level
Physical features and visual appearance	3	3.38	0.90	55%	→
Size and design of in-between spaces	5	3.33	0.75	54.32%	→
Circulation and movement space zoning	6	2.28	1.26	22.3%	↓
Ergonomics and furnishing	4	2.12	1.24	19.78%	↓
Lighting	5	3.38	0.75	54.14%	→
Colors and finishing	3	2.25	1.05	21.7%	↓
Acoustics	3	3.18	0.89	47.03%	→
Heating, ventilation, and air conditioning	3	3.27	0.89	51.1%	→
Visual communication and instructional tools	3	3.26	0.88	52.27%	→
Social and cultural spaces	3	3.24	0.89	49.2%	→
Accessories	5	2.22	1.23	20.22%	↓
Average	# 43	2.90	0.98	41%	→

A comparative analysis was conducted to identify which dimensions have a low percentage according to the sample's satisfaction with the reality of the in-between space design within their faculties (see Figure 4).

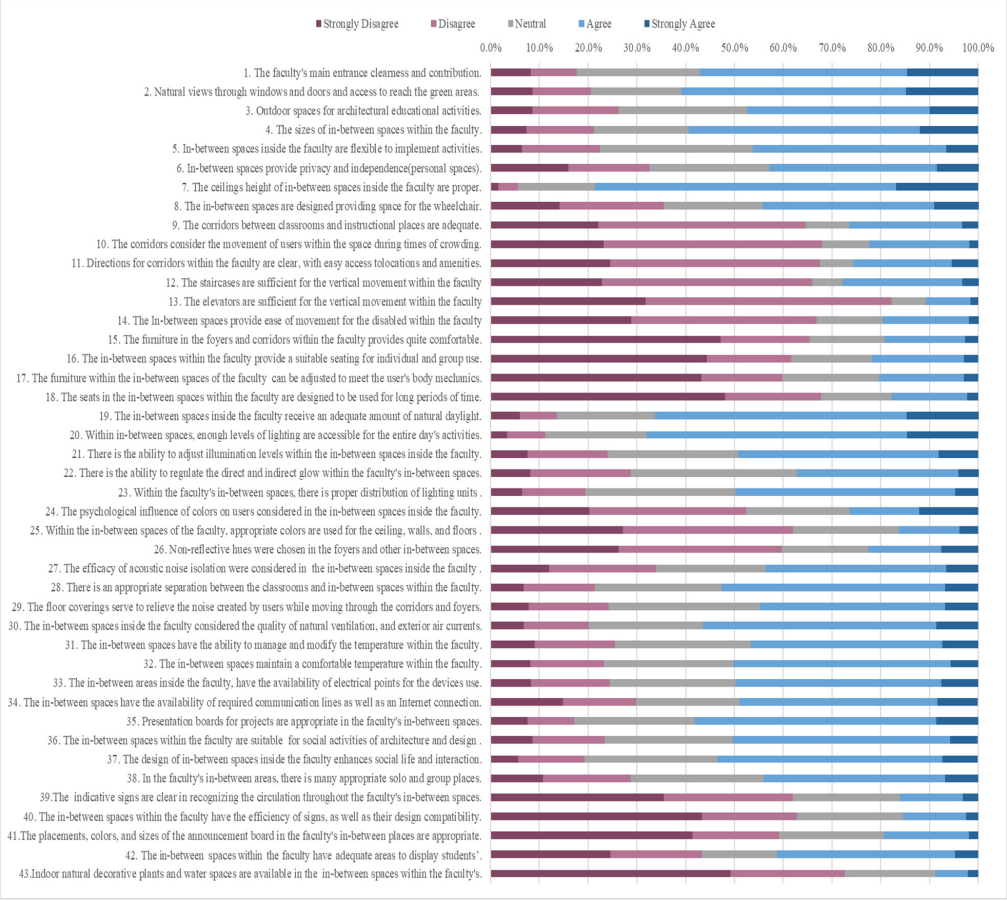


Figure 4. Breakdown of the responses related to the survey questions, see Table 3 (the structure of the questionnaire).

Similar results were gleaned from the observation, where the researcher noticed that the in-between spaces within the case studies lacked the same design features that received the lowest satisfaction rates from the participants, as shown in the discussion below.

4. Findings and Discussion

4.1. Physical Features and Visual Appearance

This aspect of the study is concerned with the need for contextual connection, which is the design factor that distinguishes buildings by considering their location and relationship with the surrounding environment. This includes factors such as orientation, entrances, openings, neighboring buildings, and natural features. The distinctiveness and appeal of a location are tied to these qualities. By establishing a strong connection with the context, people develop a sense of attachment to a place, which leads to a feeling of comfort and is a significant predictor of social well-being [61–63]. The conditions of spaces in higher education institutes seem to be influential on students' preferences to use them adequately [64]. In this regard, an interior space becomes the facilitator of emerging possibilities.

As shown in Table 4 and Figure 3, the majority (M 3.38) perceived that the physical features and visual appearance of their faculty were acceptable; more than half (55%) of the responses expressed positive attitudes in this dimension.

There was 60.9 percent satisfaction with the "appropriateness of surrounding natural views with the faculty's internal environment through the windows and doors that access the gardens and green areas". However, less than half (47.4%) of the responses were satisfied with the "appropriateness of the faculty's surrounding outdoor spaces for architectural educational activities". However, this dimension, in general, obtained the highest level of satisfaction according to the student and faculty members' perceptions.

4.2. Size and Design of In-between Spaces

This dimension of the study is related to functional, ergonomic, and psychological requirements. These requirements are used to create spatial solutions that facilitate human activity. For instance, the functional needs in multifunctional spaces must be satisfied by utilizing an adaptive plan that enables the same space to be used for numerous purposes at various times with a flexible approach [39,64].

As shown in Table 4 and Figure 3, more than half (54.32%) of the responses expressed positive attitudes in the dimension of "size and design of in-between spaces", with a mean of 3.33. There was 78.60% satisfaction with the question, "The in-between spaces inside the faculty are characterized by high flexibility (reconfiguration) to implement activities and diverse educational requirements that are demanded by the educational process".

However, less than half (43.00%) of the responses were satisfied with the question "The faculty's in-between spaces give the users privacy and independence (e.g., students have their own private place to complete their work) in their personal space". However, this dimension, in general, obtained the second-highest level of satisfaction according to the student and faculty members' perceptions.

4.3. Lighting

People experience a sense of well-being in daylight and sunshine on an emotional level. By utilizing lighting patterns with different degrees of illumination, we may create specific emotions, including relaxation, activity, warmth, and coolness [65]. Light has a physiological impact on people; for example, natural light can help patients recover and pupils perform better. Our bodies have a built-in sensitivity to external light levels and features. The amount and type of light have an impact on the secretion of two hormones, melatonin and serotonin. These hormones regulate our circadian rhythms, which are the natural cycles that govern our sleep and wakefulness patterns [66]. Artificial illumination, on the other hand, is heavily influenced by inhabitants' demands based on their tastes and activities. Electric lighting needs to be flexible and under individual control [39,67,68].

In this case, the majority (M 3.38) perceived that the lighting of their faculty was acceptable; more than half (54.14%) of the responses expressed positive attitudes in this dimension (Table 4 and Figure 3).

There was 68 percent satisfaction with the question "Within in-between spaces, enough levels of lighting (which includes both natural and artificial lighting) are accessible for the entire day's activities". The lowest percentage (37.3%) of satisfaction in this dimension was for the question "There is the ability to regulate the direct and indirect glow (glare) within the faculty's in-between spaces". However, this dimension, in general, obtained the highest level of satisfaction according to student and faculty members' perceptions.

4.4. Acoustics

An essential aspect of designing living spaces is managing noise, as it can interfere with activities, communication, relaxation, and concentration. The quality of the acoustic environment can be assessed by evaluating the presence of desirable sounds and the absence of undesirable ones. This is a sensory requirement that has a significant positive effect on overall well-being [39].

As shown in Table 4 and Figure 3, 47.03% of the responses expressed positive attitudes in the dimension of "Acoustics," "with a mean of 3.18. There was 52.60% satisfaction with the question, "There is an appropriate separation between the classrooms and in-between spaces within the faculty, where diverse activities are conducted". However, less than half (44.80%) of the responses were satisfied with the question "The floor coverings serve to relieve the noise created by users while moving through the corridors and foyers", and 43.7% of the responses were satisfied with the question "The efficacy of acoustic noise isolation was considered in the design of the in-between spaces inside the faculty to decrease noise resulting from the congestion of users". However, this dimension in general obtained a moderate level of satisfaction, according to the student and faculty members' perceptions.

4.5. Heating, Ventilation, and Air Conditioning

Thermal factors influence our bodies' function, productivity, and mood and are linked to higher health risks when one is exposed to temperatures about 25 degrees above room temperature. In a similar vein, excessive cold directly impacts health and well-being [69]. Numerous variables, such as ventilation, humidity, and the effects of materials, affect the quality of the air [70]. Various studies have demonstrated the significance of air quality for academic performance, student behavior, and workplace productivity [39,71–74].

As shown in Table 4 and Figure 3, more than half (51.1%) of the responses expressed positive attitudes in the dimension of "Heating, Ventilation, and Air Conditioning", with a mean of 3.27. There was 56.50% satisfaction with the question, "The in-between spaces inside the faculty considered the quality of natural ventilation and the possibility of ventilation without being disturbed by noise and exterior air currents by providing appropriate windows in terms of size and orientation", 50.20% of the responses were satisfied with the question "The in-between spaces maintain a comfortable temperature within the faculty", and 46.6% of the responses were satisfied with the question "The in-between spaces have the ability to manage and modify the temperature within the faculty through aids in the prevention of temperature swings". However, this dimension in general obtained a moderate level of satisfaction, according to the student and faculty members' perceptions.

4.6. Visual Communication and Instructional Tools

This dimension of the study is related to the functional, psychological, and social requirements of well-being. As shown in Table 4 and Figure 3, more than half (52.27%) of the responses expressed positive attitudes in the dimension of "Visual Communication and Instructional Tools", with a mean of 3.26. There was 58.1% satisfaction with the question, "Presentation boards for projects and other activities of various sizes are acceptable and appropriate for use in the faculty's in-between spaces", 49.8% of the responses were satisfied

with the question "The in-between areas inside the faculty have the availability of electrical points (sources) for the devices used for various activities by the users (students and staff)", and 48.9% of the responses were satisfied with the question "The in-between spaces inside the faculty have the availability of required communication lines as well as an Internet connection". Therefore, this dimension in general obtained a moderate level of satisfaction, according to the student and faculty members' perceptions.

4.7. Social and Cultural Spaces

This dimension of the study is related to the social, functional, and psychological requirements of well-being. Social gatherings can benefit from collective activities that improve the beneficial effects of coming together and sharing; besides contributing to a more vibrant environment, buildings should offer everyone the opportunity for desired levels of social interactions [38,75,76].

The well-being of a person is correlated with the well-being of others and the interactions between individuals and groups since people live in communities. Our actions that promote social well-being are directly impacted by spatial features, although they may not seem to be tied to space. The layout of our buildings and communities can encourage beneficial social connections. Buildings ought to provide the opportunity for everyone to connect socially at the level that they find most comfortable by balancing public, semi-public, and private areas [39,40,77,78].

As shown in Table 4 and Figure 3, 49.20% of the responses expressed positive attitudes in the dimension of "Social and Cultural Spaces", with a mean of 3.24. There was 53.40% satisfaction with the question, "The design of in-between spaces inside the faculty enhances social life and interaction among students and faculty members through the use of appropriate gathering areas", 50.20% of the responses were satisfied with the question "The in-between spaces within the faculty are suitable and perfect for social activities of architecture and design students", and 44.00% of the responses were satisfied with the question "In the faculty's in-between areas, there are many appropriate solo and group places for students and employees". Therefore, this dimension in general obtained a moderate level of satisfaction, according to the student and faculty members' perceptions.

4.8. Circulation and Movement Space Zoning

In this dimension, the responses of dissatisfaction were evident. According to Table 4 and Figure 3, only 22.3% of the participants were satisfied with the circulation and movement space in their faculties, with a mean of 2.28. The most satisfied responses are from Hashemite University, with a mean of 2.6, which is a low level of satisfaction, followed by the University of Sciences and Technology with a mean of 2.2, and the University of Jordan with the lowest level of satisfaction with a mean of 1.7, as shown in Table 5 and Figure 5.

As shown in Figure 6, almost 27.90% of the respondents felt that the staircases were sufficient and had an adequate design for vertical movement within the faculty. A total of 26.5% of the responses agreed that the corridors between classrooms and instructional places were adequate and 25.7% agreed that the directions for corridors within the faculty are clear and that there is easy access to other locations and amenities. Less than a quarter of the responses were satisfied with the questions, "The corridors were designed with consideration for the movement of users within the space during times of crowding", and "The in-between spaces provide ease of movement for the disabled between classrooms and other spaces within the faculty". While only 10.7% felt that the elevators were sufficient and had an adequate design for vertical movement within the faculty, based on these results, it is clear that more attention should be paid to the dimension "circulation and movement space zoning" while designing the in-between spaces within the faculties of art and architecture.

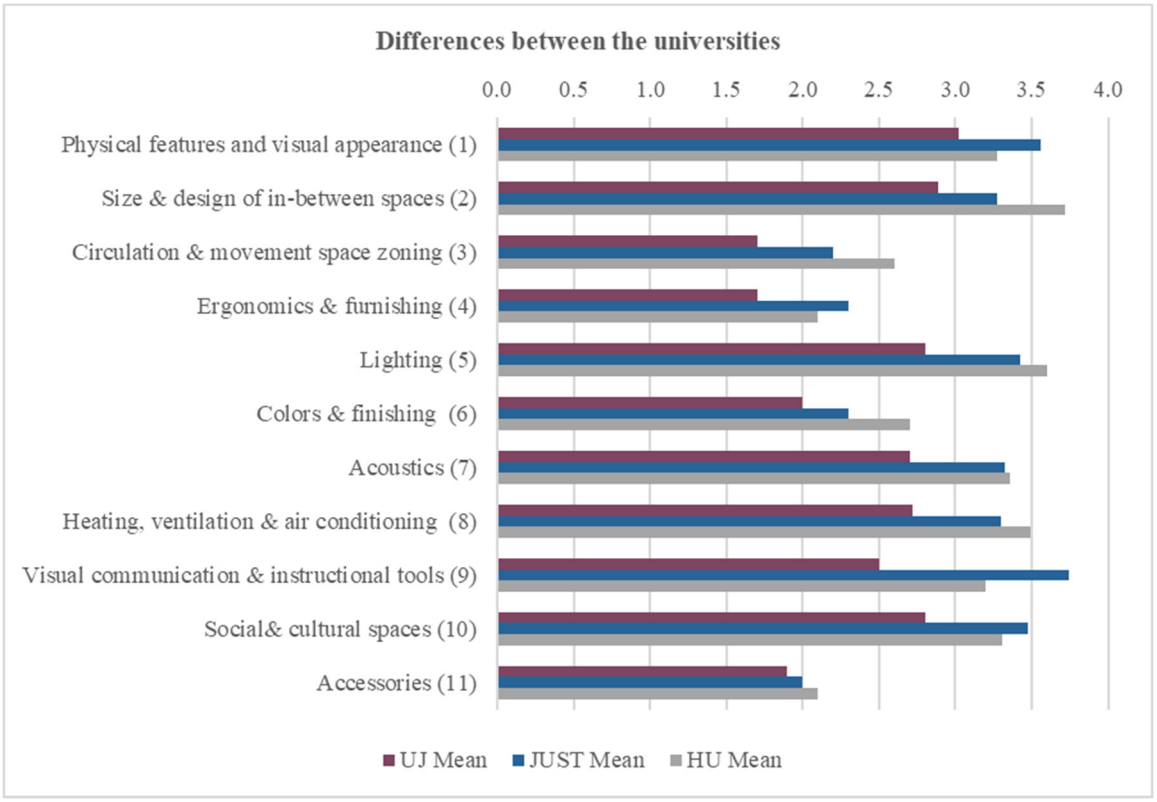


Figure 5. Differences between the three Jordanian Universities.

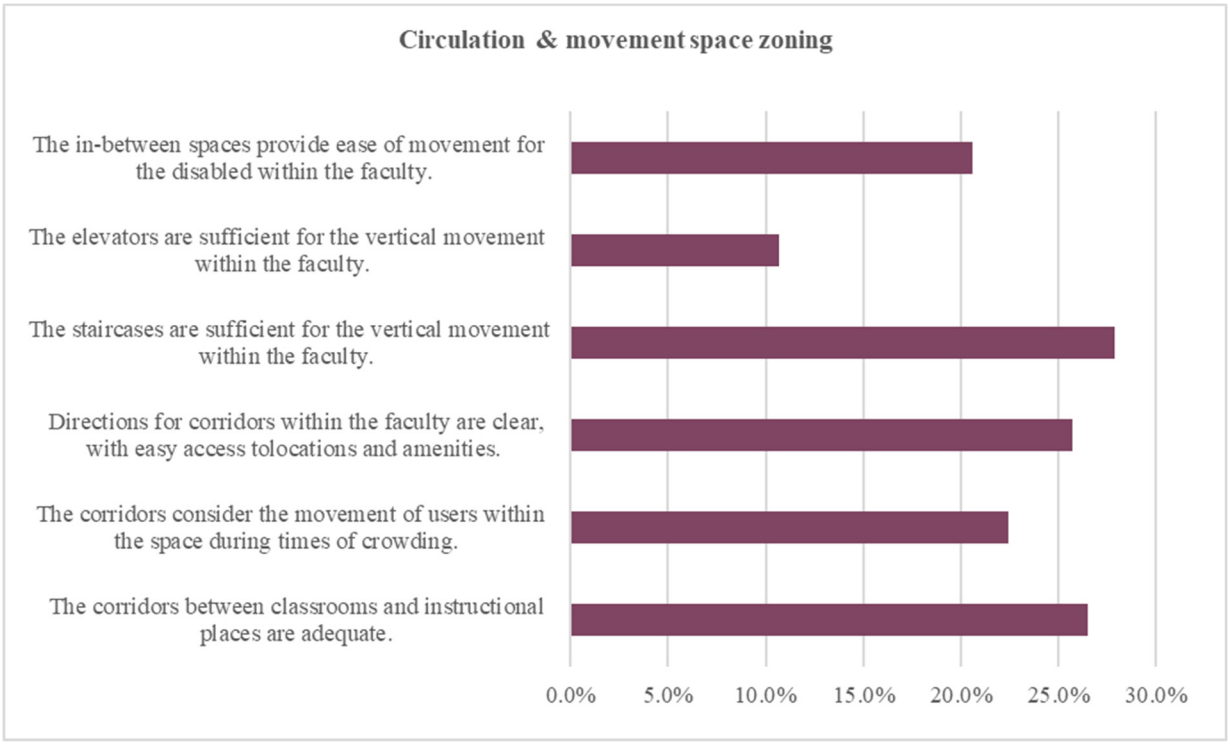


Figure 6. Percentage of satisfaction with the circulation and movement space zoning questions.

Table 5. The difference between the arithmetic means of the three Jordanian Universities.

University	Mean	Physical Features and Visual Appearance (1)	Size and Design of In-between Spaces (2)	Circulation and Movement Space Zoning (3)	Ergonomics and Furnishing (4)	Lighting (5)	Colors and Finishing (6)	Acoustics (7)	Heating, V\Ventilation, and Air Conditioning (8)	Visual Communication and Instructional Tools (9)	Social and Cultural Spaces (10)	Accessories (11)
UJ	Mean	3.0	2.9	1.7	1.7	2.8	2.0	2.7	2.7	2.5	2.8	1.9
JUST	Mean	3.6	3.3	2.2	2.3	3.4	2.3	3.3	3.3	3.7	3.5	2.0
HU	Mean	3.3	3.7	2.6	2.1	3.6	2.7	3.4	3.5	3.2	3.3	2.1

4.9. Ergonomics and Furnishing

As interior design seeks to explore how the environment surrounding the human body affects both its cognitive and physical aspects, it places a significant emphasis on ergonomics [38,39,79–81]. Ergonomic requirements refer to how individuals interact with their surroundings and how these interactions aid in performing specific tasks. While cognitive ergonomics examines thought processes and the interactions between people and their environment, physical ergonomics pertains to physical activities and primarily addresses human anthropometric, anatomical, biomechanical, and psychological aspects [82,83]. In this sense, ergonomic requirements are necessary; it is important to take into account the suitability of all equipment and its effectiveness in carrying out human tasks while keeping health and safety in mind, according to Koningsveld, et al. [84].

Faculty members and students expressed the most unhappiness with this dimension, giving it the lowest satisfaction rating. According to Table 4 and Figure 3, only 19.78% of the participants felt that their faculties' ergonomics and furnishing met their needs, with a mean of 2.12. According to Table 5 and Figure 5, the University of Sciences and Technology provided the most satisfied responses in relation to this dimension, with a mean of 2.3, a low level of satisfaction, followed by the Hashemite University with a mean of 2.1, and the University of Jordan with the lowest level of satisfaction and a mean of 1.7.

As shown in Figure 7, only 21.8% of the participants agreed that the in-between spaces within the faculty provided a suitable seating layout and arrangement for individual and group use. A total of 20.4% of the respondents agreed that the furniture within the in-between spaces of the faculty, which can be adjusted to meet the user's sitting style and body mechanics, is appropriate for the human body and its requirements. The question, "The furniture in the foyers and corridors within the faculty is quite comfortable" received almost 19.2% of the responses, indicating satisfaction. Only 17.7% thought that the seats in the in-between spaces within the faculty were designed to be used for long periods of time. Similar conclusions were drawn from the researcher's observations, where the in-between spaces lacked the necessary furnishings that users require. The faculty's foyers and corridors are ideal for both individual and group activities, yet they lack any furniture that would meet users' needs, except for a few chairs and tables placed in several spaces between faculty levels, as indicated in Figure 8A–C. Based on these findings, it is evident that while developing in-between spaces within faculties of art and architecture, greater consideration should be given to the dimension of "Ergonomics and Furnishing." The in-between spaces need to be appropriately furnished to enable students to collaborate outside of class as they wait for lectures or discuss study-related issues.

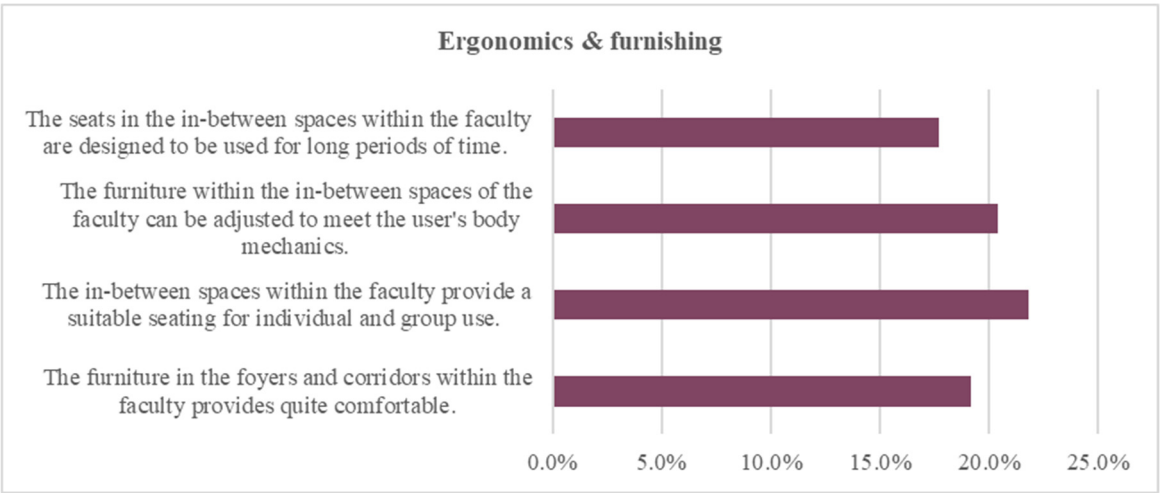


Figure 7. Percentage of satisfaction with the ergonomics and furnishing questions.

Figure 8. (**A**) Some in-between spaces within the University of Jordan showing a lack of furnishing (Source: the researchers). (**B**) Some in-between spaces within the University of Sciences and Technology showing a lack of furnishing (Source: the researchers). (**C**) Some in-between spaces within Hashemite University showing a lack of furnishing (Source: the researchers).

4.10. Colors and Finishing

This dimension of the study is related to the aesthetic and psychological requirements of well-being. In terms of interior architectural design, aesthetics are crucial to users' emotional satisfaction. These design characteristics go beyond functional and structural considerations and are linked to the unique way the design communicates with the human senses [85,86]. It is closely related to the human spirit and satisfaction. The interest in the harmony and integrity of each component appeals to the human senses and enhances well-being in relation to the spatial aspect. The form and texture of the furniture and accessories, as well as the color of the walls and flooring, all contribute to the aesthetic

identity of the space and impact how people perceive, feel, and behave—both consciously and subconsciously.

Depending on the environment, furnishings, and features, aesthetic needs have an impact on how people feel. People require sensory stimulation identical to that found in the natural world, as well as a setting that is engaging and visually beautiful, in order to be well. The main factors that express aesthetics (shape, texture, color, and light) are used by designers to represent the aesthetics of a certain environment. Surfaces possess distinct textures, ranging from flat or bumpy to shiny or unpolished and smooth or rough. Users' memories of tactile experiences with similar surfaces influence their sensitivity to textural contrast, which directly affects their mental state. The perception of color is one of the most significant influences on the psychological mood among spatial variables. By capitalizing on these potential architectural qualities, humans can create an "effective environment" [39,86].

This dimension of the study is one of the four that received the least satisfaction from the participants in the questionnaire. According to Table 4 and Figure 3, only 21.70% of the participants felt that their faculties' color and finishing met their needs. Hashemite University provided the most satisfied responses in relation to this dimension, with a mean of 2.7, a low level of satisfaction, followed by the University of Sciences and Technology with a mean of 2.3, and the University of Jordan with the lowest level of satisfaction and a mean of 2.0 (Table 5 and Figure 5).

As seen in Figure 9, only 26.3% of the participants agreed that the psychological influence of colors on users was considered in the design of the in-between spaces inside the faculty. A total of 22.5% of the replies agreed that non-reflective hues were chosen in the foyers and other in-between spaces, where juries and gallery events take place, where colors have an impact on the entire lighting inside the faculty. The question, "Within the in-between spaces of the faculty, appropriate colors are used for the ceiling, walls, and floors, which are coordinated with other design components such as furniture and curtains", received almost 16.5% of the satisfied comments. Similar conclusions were reached from the researcher's observation, where the researcher observed that the effect of colors and finishes on the users of the space was ignored during the design of the case study in-between spaces. The interspaces inside the universities lacked colors and finishes that have a positive, stimulating effect on the students and users of the space, as the majority of spaces are traditional in design, except for some colors being used on the walls of some spaces, as indicated in Figure 10A–C. Based on these findings, it is obvious that while developing the in-between space within the faculties of art and architecture, greater consideration should be given to the dimension "Color and Finishing".

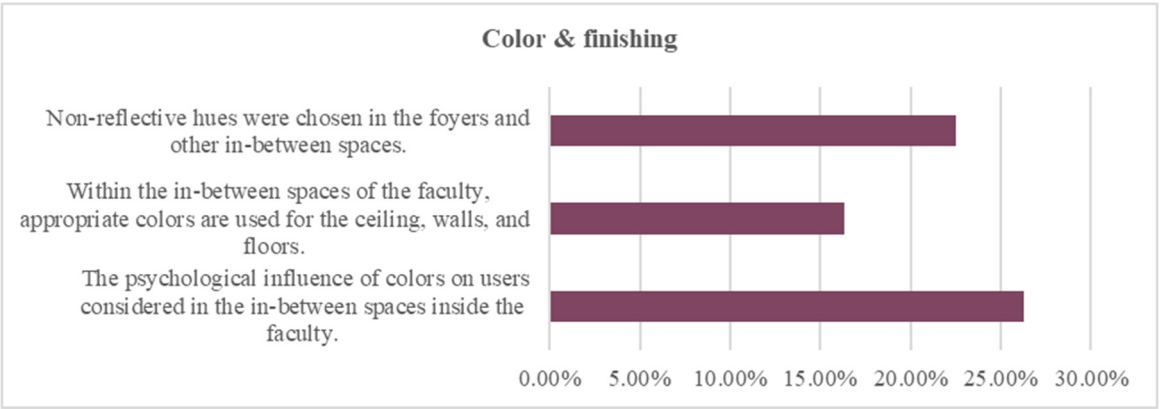


Figure 9. Percentage of satisfaction with the color and finishing questions.

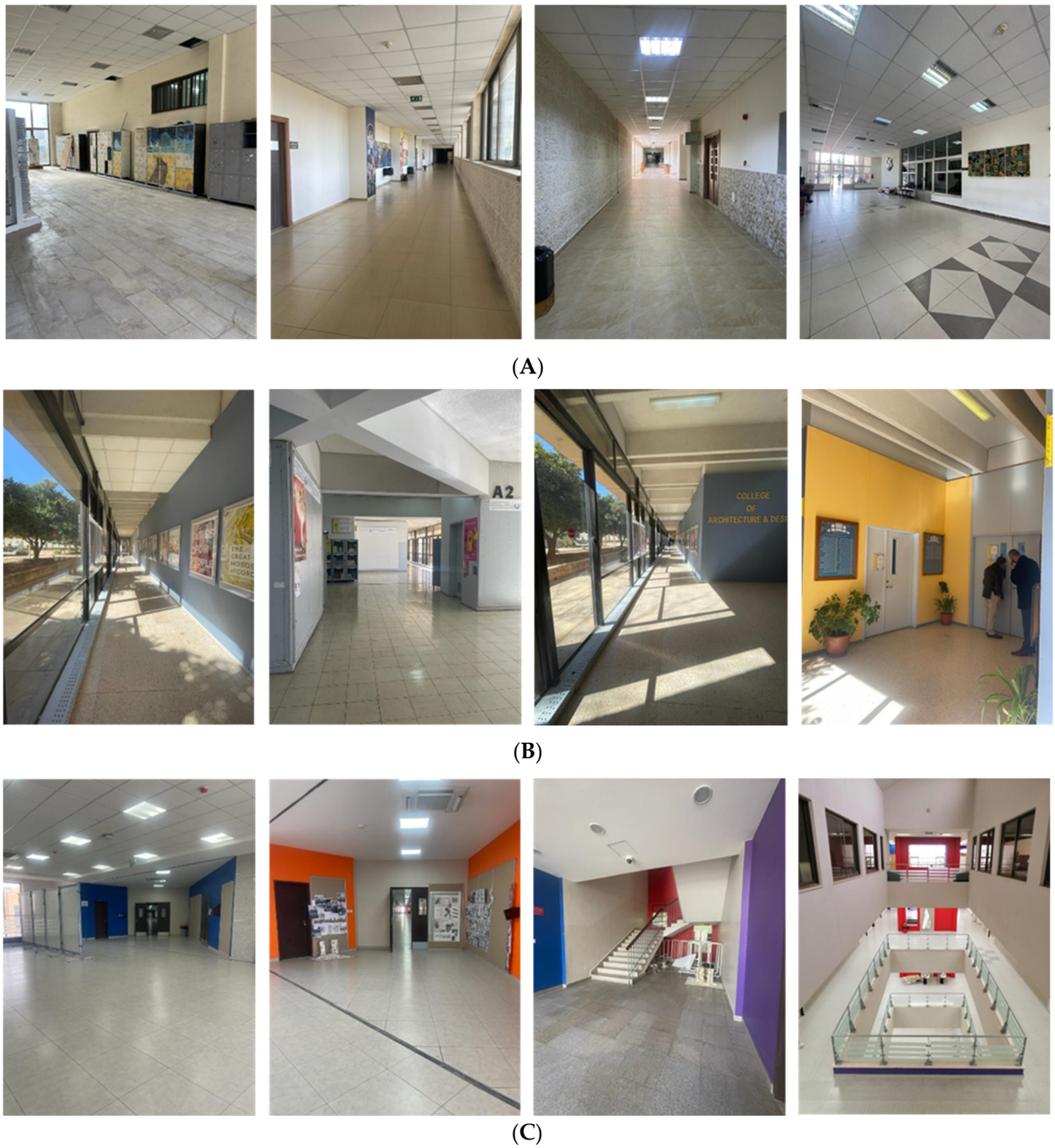


Figure 10. (**A**). Some in-between spaces within the University of Jordan showing colors and finishing (Source: the researchers). (**B**). Some in-between spaces within the University of Sciences and Technology showing colors and finishing (Source: the researchers). (**C**). Some in-between spaces within Hashemite University showing colors and finishing (Source: the researchers).

4.11. Accessories

This dimension of the study is related to the functional, ergonomic, psychological, and aesthetic requirements of well-being.

This dimension of the study is one of the four that received the least satisfaction from the participants in the questionnaire. It came second in unsatisfaction, where, according to Table 4 and Figure 3, only 20.22% of the participants felt that their faculties' accessories met their needs, with a mean of 2.22. According to Table 5 and Figure 5, Hashemite University provided the most satisfied responses in relation to this dimension, with a mean of 2.1, a

low level of satisfaction, followed by the University of Sciences and Technology with a mean of 2.0, and the University of Jordan with the lowest level of satisfaction and a mean of 1.9.

As seen in Figure 11, less than half (41.5%) of the participants agreed that the in-between spaces within the faculty have adequate areas to display students' works and their scientific and artistic productions, as well as their creative achievements. A total of 19.3% of the replies agreed that the placements, colors, and sizes of the announcement boards in the faculty's in-between places are appropriate. Only 16.10% thought that the indicative signs were clear in recognizing the circulation. In addition, the question "The in-between spaces within the faculty have the efficiency of signs that identify classrooms and other interior places, as well as their design compatibility", received almost 15.4% of satisfied comments. However, it is very important to consider the organization and communication of our dynamic relationship with space and the environment, where wayfinding involves utilizing signs, paths, and environmental information to make it easy for people to identify destinations. The process of using spatial and environmental information to navigate to a destination in the built environment and experience a site without confusion is of utmost importance. Architectural settings offer a number of cues that help individuals find their way around unfamiliar areas, such as signage, which can be confusing if it is inconsistent [87,88]. With 8.8% of participant satisfaction, the question "Indoor natural decorative plants and water spaces are available in the in-between spaces within the faculty to offer aesthetic and physiological impacts to the interior spaces" had the lowest level of satisfaction in this dimension, indicating that contact with nature should be taken into account in studies on well-being and space. Natural environmental elements in the workplace enhance worker motivation and performance [89,90]. According to Onay and Minucciani [39], being in touch with nature improves one's quality of life and gives one a greater sense of place.

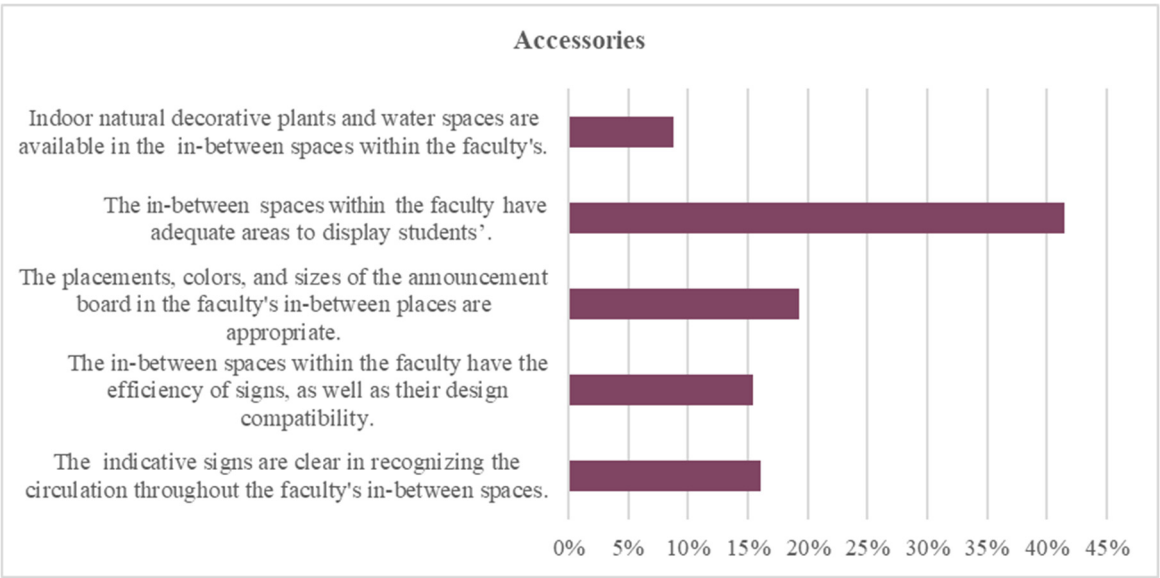


Figure 11. Percentage of satisfaction with the accessories questions.

Similar conclusions were reached from the researcher's observation, where the researcher observed that the spaces in between the faculties of art and architecture lack natural elements, which have a positive impact on enhancing the well-being of users. In addition, the faculty buildings at Hashemite University and the University of Jordan lack appropriate indicative signs, as indicated in Figure 12A–C. Based on these findings, it is obvious that while developing the in-between space within the faculties of art and architecture, greater consideration should be given to the natural elements and the usage

of the hanging signs to be more clear about the directions and the spaces they will lead the users to.

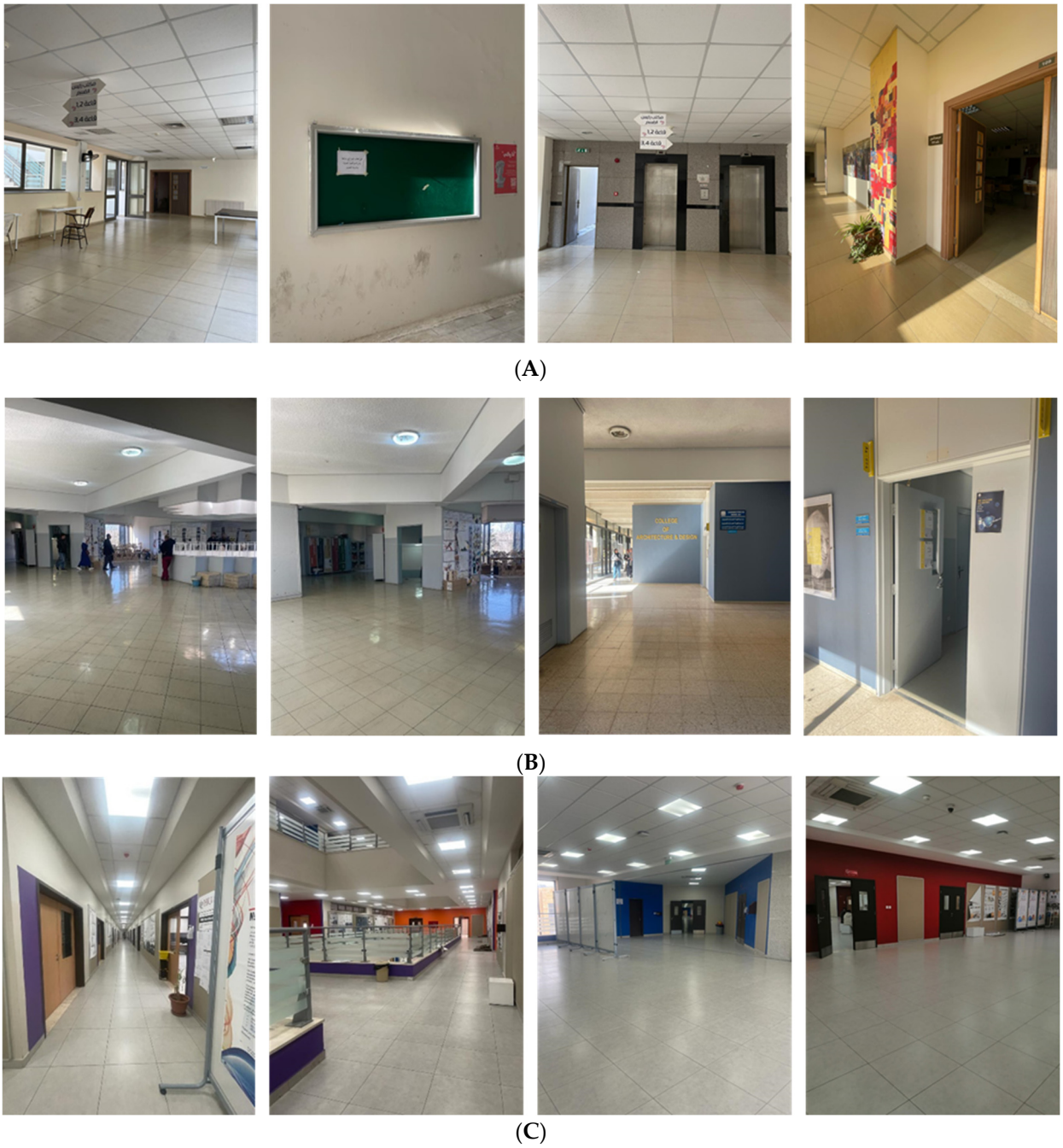


Figure 12. (**A**). Some in-between spaces within the University of Jordan showing accessories (signs, natural elements, announcement board, etc.) (Source: the researchers). (**B**) Some in-between spaces within the University of Sciences and Technology showing accessories (signs, natural elements, announcement board, etc.) (Source: the researchers). (**C**). Some in-between spaces within Hashemite University showing accessories (signs, natural elements, announcement board, etc.) (Source: the researchers).

5. Conclusions

The study's evaluation scale can be summarized into eleven different categories related to well-being requirements (physical features and visual appearance; size and design of in-between spaces; circulation and movement space zoning; ergonomics and furnishing;

lighting; colors and finishing; acoustics; heating, ventilation, and air conditioning; visual communication and instructional tools; social and cultural spaces; and accessories).

The mixed-methods approach used in this study has the benefit of permitting a better understanding of the in-between spaces within the faculties of art and architecture. This study included a limited sample, where the data is only from Jordan, specifically the faculties of art and architecture. However, the results of this study can be broadly applied to different higher educational facilities, specifically faculties of art and architecture.

The following findings on the in-between spaces within the faculties of art and architecture in Jordan and how to upgrade them to be vital spaces that promote the well-being and productivity of the users have been obtained:

- In accordance with the study's categories, it was revealed that four dimensions (circulation and movement, ergonomics and furnishings, colors and finishing, and accessories), particularly the furniture, natural elements, and signage, were overlooked while designing these spaces, and they must be taken into account in order to create an interactive environment that advances the educational process and therefore enhances productivity. Moreover, some features may be present in the design of the in-between spaces, but they are not appropriately implemented to meet the demands of both faculty members and students.
- The in-between spaces should be designed not only according to standards to adjust necessary activities such as users' flow, movement, and waiting for lectures but also in consideration of users' demands as it is an essential component of the design and development of such spaces in order to create vital spaces to interact and to connect, and for activities that require social interactions, such as working, resting, pausing, or viewing, which allows students and staff members to use these areas for a variety of activities during their free time.
- Providing well-being requirements as significant design criteria within these spaces by the architects and designers contributes to the development, vitality, and overall performance of such spaces.
- Additionally, faculty members should utilize these spaces for learning activities and set up group work to further engage them in such spaces.
- Thus, future studies must pay greater attention to educational spaces and how they relate to well-being in social and interpersonal contexts. This study suggested a vision for in-between spaces that enables the evaluation of their efficiency using a scale based on requirements for well-being.

Lastly, it is important to acknowledge the limitations of the current study regarding the typology of in-between spaces. Firstly, the investigation did not encompass exterior in-between spaces such as balconies, yards, and connection bridges. This decision was made to maintain uniformity in thermal comfort, climate control, and lighting across the case studies. Future research can build upon these findings by including the examination of exterior in-between spaces. Secondly, given the broad scope of well-being as a concept, further studies are needed to explore it from different perspectives. Finally, this paper focused specifically on students of art and architecture due to their regular use of in-between spaces. Future studies could involve students from other disciplines and different age groups to enhance the understanding of the role of in-between spaces in promoting well-being within an educational environment

Author Contributions: Conceptualization, A.A.-R.; methodology, A.A.-R. and A.I.; formal analysis, A.A.-R.; resources, A.A.-R.; data curation, A.A.-R.; writing—original draft preparation, A.A.-R., A.I. and S.B.D.; writing—review and editing, A.A.-R., A.I. and S.B.D.; visualization, A.A.-R.; supervision, S.B.D. and A.I. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The data can be made available by the corresponding author upon reasonable request.

Acknowledgments: The authors would like to extend their gratitude to Zeynep Onur for her invaluable insight into the design of this study.

Conflicts of Interest: The authors declare no conflict of interest.

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