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The Impact of Architectural Privacy on the Individuals People with Special Need's Adaptation Buildings

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Abstract- Architectural privacy is the Area to achieve the necessary motor comfort for the activity required to link the user's relationship with the Area and students need it in activities of an individual nature. The privacy limit is located at a distance of 1.20m to provide physical and psychological comfort with the quality of activity performance. This research deals with privacy with the aim of providing a functional architectural environment to improve the student's individual activity and a space that suits all users, whether students with special needs or normal and in normal and critical circumstances such as Coved 19. The research adopted two approaches: the first is the theo×retical inductive approach to determine privacy at the motor and psychological level, and the second is the analytical approach for some models of spaces from schools for the deaf and rearranging them by applying the privacy limit law to suit all normal and special categories in all circumstances and choosing four spaces from each type of individual space according to the rate of movement, few of them such as libraries, Privacy depends on the axis in the design of the space and based on the application of privacy limits, architectural flexibility is proportional to the decrease in student density in an inverse relationship within the limits of 50%/60% , and The student's share of the space increases between 150% and 250% The savings rates after the space are directly proportional to whether the rate of movement in the space or the number of door openings or the wasted distance after applying privacy limits to benefit from them to raise the user's safety rate in the space.

Keywords- *Architectural, Privacy, Impact, Individuals, Special Needs, Adaptation Building's.*

1 . Introduction:

Recently, locally and internationally, and in light of the issuance of the Law on the Rights of Persons with Disabilities and their inclusion in the 2030 Sustainable Development Plan[1,2,3] it has become necessary to provide architectural spaces and movement paths that suit people with disabilities, and this consideration must take into account the special needs of each individual. The Roman architect (Vitruvius) began by establishing a link between space and the human body, and Le Corbusier (1948) applied the golden ratio of the human body[4]. From here, Goldsmith (1983) began his book "Architectural Details" and added wheelchair users to it. In 1981 human positions became for the elderly, Based on this, studies have been conducted that make it necessary to provide a movement path and spaces that suit all categories in buildings, especially educational ones[5,6,7,8,9,10] as social distancing became the norm.[11,12] From this standpoint, it became necessary to provide a movement path and spaces that suit all groups, whether normal or special[13,14] or normal and critical conditions such as Covid 19, to provide physical and psychological comfort, considering the human being a psycho-physical structure. To achieve this, the development of the relationship between the body and space was studied and the places that need privacy in educational buildings and the relationship between human behavior and architecture were identified. The distance of separation was applied Social 1.20 on four models of libraries. [15,16] They were used from schools for the deaf in the Arab Republic of Egypt, analyzed, and the number of students and the share of each student in the space were found, and the results of

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the analysis in the percentages of decrease in the number of students and the percentages of increase in the share of each student in the space and the percentage of savings from the building after applying the social distancing distance and its discussions [11] and comparing it with the traditional design model [13.17] and finding the relationships between them to confirm that applying the social distancing distance is optimal for all groups and for critical circumstances such as Covid-19**.**

2 . The development of the human relationship with space

A . The roman architect (Vitruvius) started putting link between space and human body, The famous architecture Le Corbusier (1948) provided an interesting suggestion, that,the architectural shapes work physiologically and applied the golden ratio to the human body [4]shown in the Figure 1.

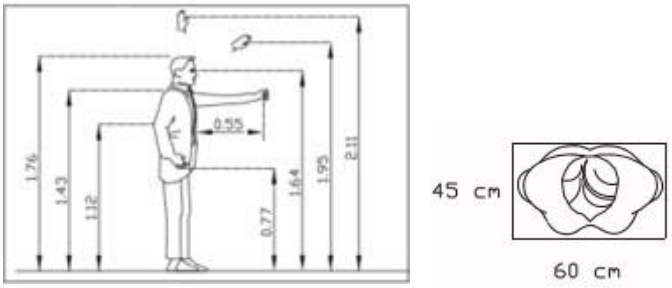


Fig1 : The golden ratio in the human body illustrate patter dimension in rest and simple movement posisions . [4]

B . After that the architects seriously started thinking to divide the users . From this point (Gold Smith) started his book ,architecture detail (1983)' and. [6]added chairs' users . In 1981 the human standers for the elderly and mobility-impaired were included. The idealized model that Le Corbusier assumed disappeared shown in the Figure 2. [4]

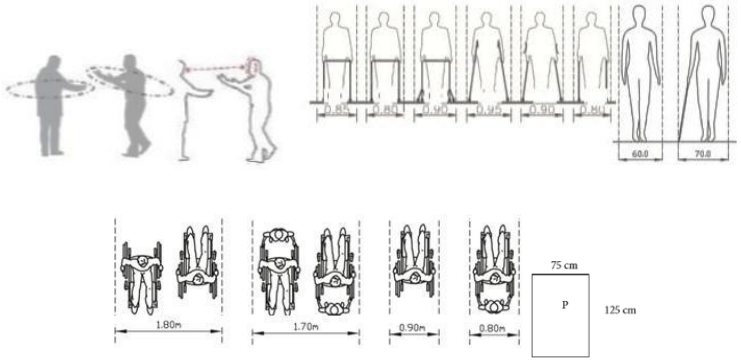


Fig 2 : Changing Le Corbusier's idealized model and Linking between space and the human body . [4]

C . Researchers in the field of environmental psychology shown in the Figure 3 have emphasized the[18] impact of sensory attributes of the environment that based on us. For example, despite references to the integration of senses in the environment, relatively few studies have examined the effects of surrounding signs on people's perceptions, emotions, and/or behaviors shown in the.[19]

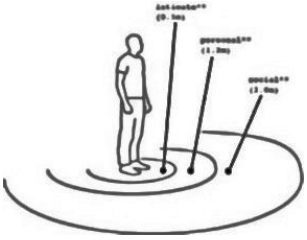


Fig 3 : Illustrate human cycle as a sensory trait. [18]

D. March 11, 2020, the World Health Organization declared COVID-19 a pandemic, which affected not only human health but also all aspects of life, as social distancing became the.[20] normal shown in the Figure 4.

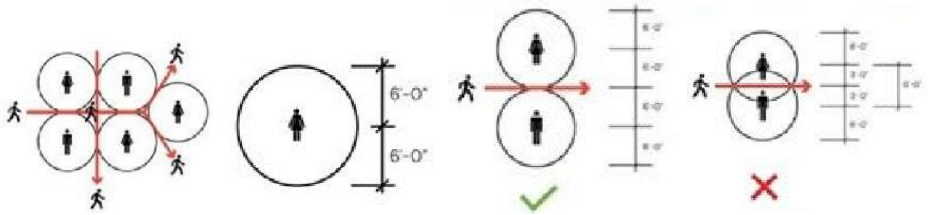


Fig4: Illustrate social distance among people as COVID-19's impact on space . [20]

- From the previous table, architectural privacy can be inferred as follows: the longest dimension of the human body is 60 cm, personal space is 120 cm, social distancing ranges from 100 cm to 120 cm, and the space required for two wheelchairs to pass is 180 cm. Therefore, the boundaries of architectural privacy range from 60 cm to 180 cm- Architectural privacy is defined as the space required for a person to achieve the necessary movement for the desired activity.

Accordingly, the privacy limits law can be inferred.

In case of similarity after the unit in that the possession of the user

$y_a = L - x/(a+x)$, $L = x + y_a(a+x)$

In case of a symmetry after the unit in that the possession of the user

$y_a = L - x - y_b (b+x) \div (a+x)$, $L = x + y_a(a+x) + y_b (b+x)$

L dimension that achieves privacy limits

X Privacy boundary constant = 1.20m

ya, yb Number of units sharing the same dimension

a,b the dimension occupied by the user

3. Elements of Architectural Privacy in Educational Buildings

3-1 .Botanical Elements

A . Selecting suitable plants to enhance accessibility and comfort for People withs pecial needs[21] . Plants elements shown in the Figure 5.

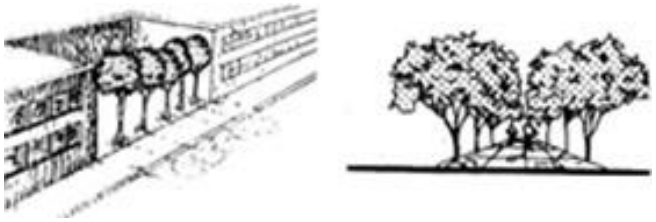


Fig 5 : Illustrate choosing plants to finding sense to direct physically and visually[21].

B. Selecting plants to provide people with special needs with a sense of direction both physically and visually, making it easier to navigate shown in the Figure 6.

C. Providing privacy in public spaces to avoid constant gazes, while ensuring tranquility and enjoying nature shown in the.

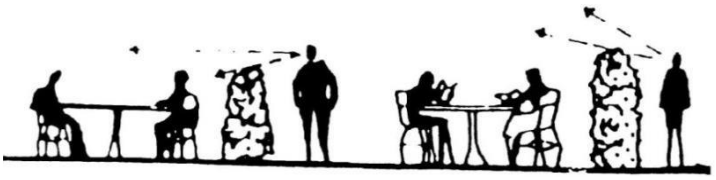


Fig 6 : Illustrate achieving privacy the plants . [21]

3-2 . Paths

A . When determining the width of walkways and roads shown in the figure 9, consideration must be given to being compatible with the density of use. [13] Movement directions must be taken into consideration when designing and determining the width of walkways and roads

B . When determining the widths of corridors and roads, it should also be taken into account that they are related to each of: the number of entrances - the method of service (on one side or on both sides).

C . It is preferable that the doors open inside the space, and in the event that they open on the corridor, the width of the remaining part of the corridor should not be less than 1.2 - 1.5 m..

D . The corridors are distinguished from the adjacent spaces, so they differ from them in the floor finish in terms of texture, shape and color..

E . It is preferable to shade the corridors and roads whenever possiblshown in the

Figure 7.

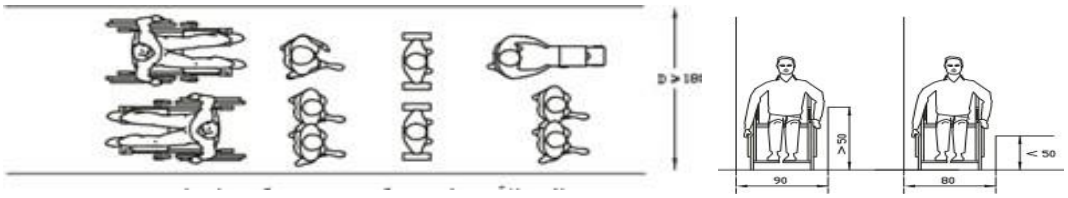


Fig 7: Illustrate the privacy dimensions of movement paths. [13]

3-3 . Bathrooms

A . Toilets are considered one of the essential service elements [22,23]

B . If the space of the corridors - the toilet is not sufficient, the pivot doors can be replaced with folding doors.

C . Adding handles for leaning if their height does not exceed 1.40 m. [14]

D . At least one toilet must be provided for each gender that is suitable for those with mobility problems. Public toilets shown in the Figure 8. [24]

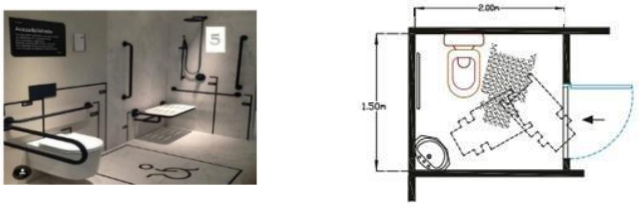


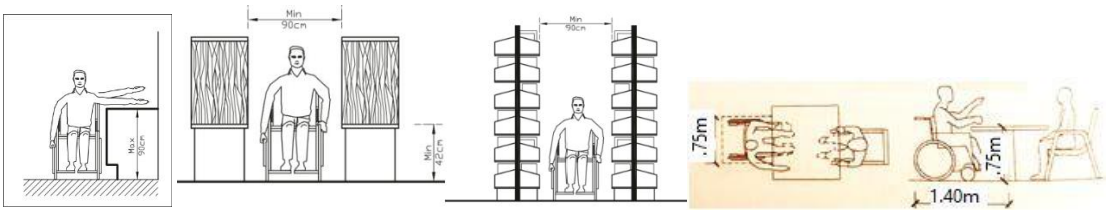
Fig 8 : Some humans with special needs' bathrooms' dimensions to illustrate it's privacy. [24]

3-4 . Library

A . Adequate space must be provided for all students in the library shown in the Figure 9. space, and a space must be left at the reading tables without seats, for the use of wheelchair users at a rate of 10% of the total fixed units. [25]

B . The shelves must have a minimum height within the reach of wheelchair users to achieve ease of.

access, while the maximum height of the shelves is not specified



Borrow and return Books shelters Reading and studying

Fig9 : Human with special needs' movement and siting space to illustrate it's privacy. [25]

3-5 . Restaurant

As for the dining areas, the appropriate sizes and dimensions must be taken into account for arranging the tables in these rooms shown in the Figure 10, leaving a distance of no less than 0.75 m between each seated person and the other so that they can sit easily and comfortably. [26] The dining area should be provided with a window with a low seating area so that its seating area does not rise above the height of the dining table (about 70-80 cm) so that the external views can be seen while eating, taking into account delivering the food from the kitchen to the dining area via a straight line with direct winding lines in it, shortening the distance as much as possible.

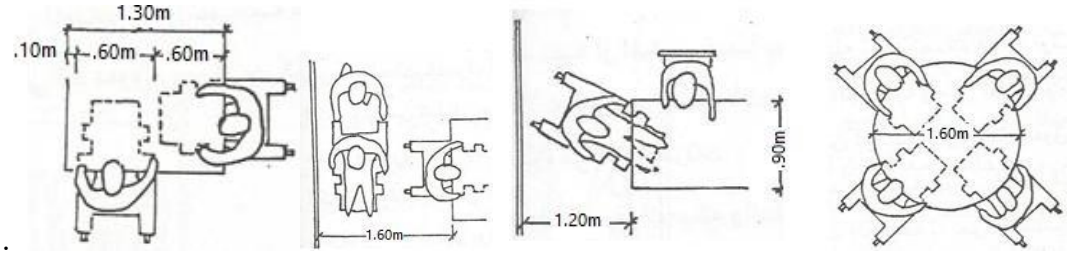


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Fig10 : Siting space and the movement inside restaurant to illustrate it's privacy. [26]

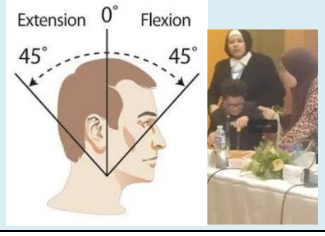
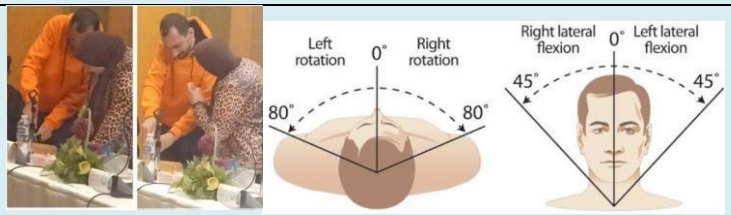
4. Physiological privacy

4-1 . Behavior and privacy architectural relation in general

including its functional efficiency. The requirements for functional design address material needs and play a role in environmental perception by interpreting, storing, organizing, and retrieving information to connect the physical[27] environment with human behavior. contemporary issues, such as COVID-19, are rapidly changing all aspects of society and its relationship with the surrounding environment. It can be said that the physical environment is evolving quickly to meet spatial and temporal needs and ensure psychological and physical safety, thereby creating a space that supports the user's functional activities.

4-2 . Characteristics of human behavior

Human behavior is relatively stable, and also flexible and can be modified or changed shown in the Table (1) [28]

Human behavior is relatively stable,	Human behavior is flexible and can be modified or changed
Vertical head rotation that illustrate it's axial	Horizontal head rotation angels that illustrate it's diagonal
	

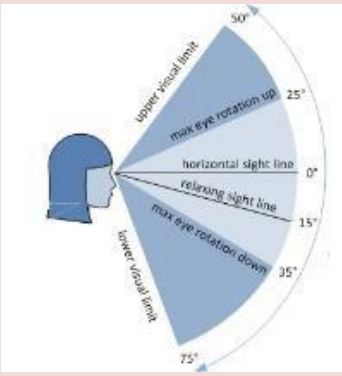
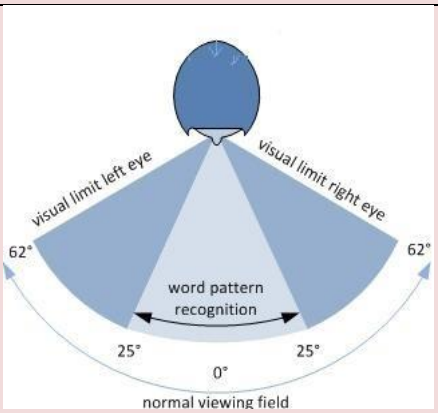
Illustrate vertical eye level to affirm it's axial	Horizontal eye level to affirm it's diagonal
	

Table (1) Shows the difference between adopting the axial position and the diagonal position on performance in space .[28,29,30]

5. Analysis of the extent of presence and the impact of privacy

Some complete models were taken from schools for the deaf [21] and happiness arranged actually under the privacy law to suit all public categories officially, so in the circumstances all four spaces of each type of space with the same character and have an impact on the work rate alone, including famous restaurants such as Chicago workshops. It was measured after applying the privacy limits, the percentage of the influential content, the duration of participation in receiving special cases, and the percentage of increase in the share of each student from the full duration of the need for architectural treatments such as sound insulation or providing thermal comfort, and the percentage of savings after the space after applying the freedom of choice from the savings for Aries equipment, the user safety rate in the entire body

5-1 . Restaurant's status before and after applying privacy limits

A. Restaurant's status after applying privacy limits y_a =L- x /(a+x)

Restaurant No. 1 Future Association Alexandria Governorate

direction of Area length direction of Area width

ya=12.4-1.20/ 2+1.20 = 3.5 ya=18.8-1.20/ 2.8+1.20 =4.4

Restaurant No. 2 Al Amal School, Ismailia Governorate

direction of Area length direction of Area width

ya= 14-1.20/2+1.2 =3.12 ya=13-1.20/8.1+1.2 =1.26

Restaurant No. 3 Al Amal School, Damietta Governorate

direction of Area length direction of Area width

ya =13.7-1.20/5.1+1.20 =1.9 ya=19.2-1.20/2.9+1.20 =4.3

Restaurant No. 4 Al Amal School Fayoum Governorate

direction of Area length direction of Area width

ya =13.10-1.20/2.4+1.20=3.30 ya =17.9-1.20/4.5+1.20 =2.9

B. Restaurant's status before and after applying privacy limits shown in the Table (2)

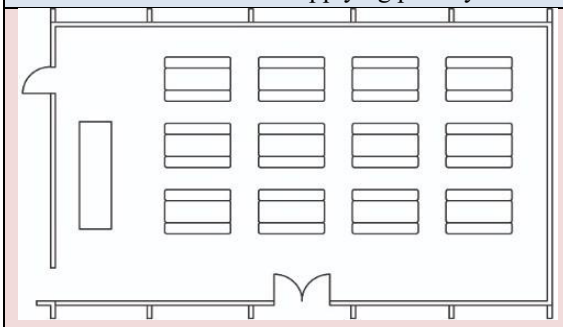
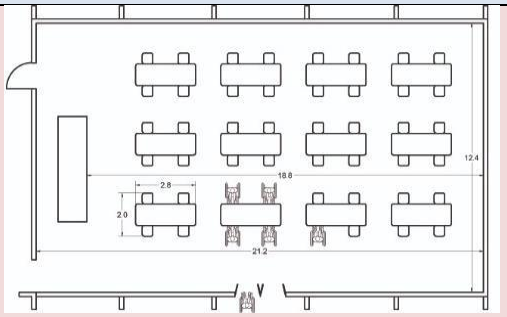
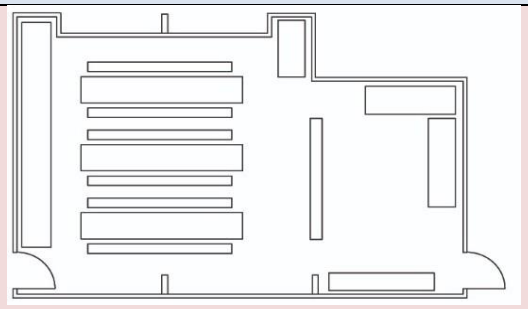
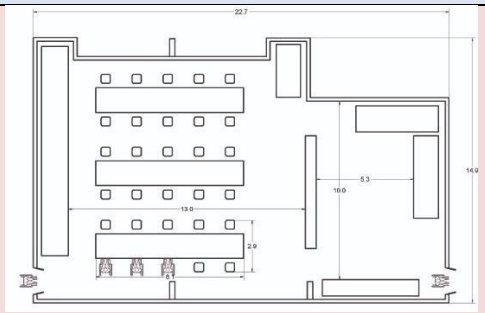
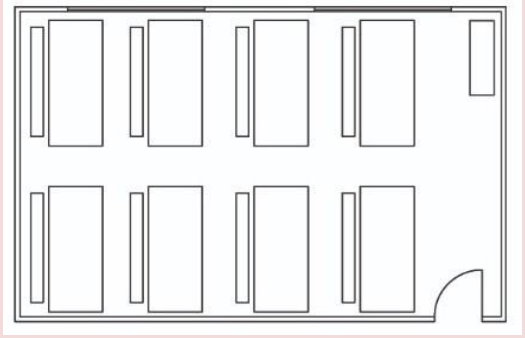
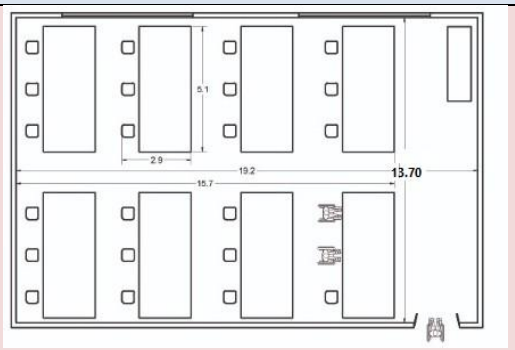
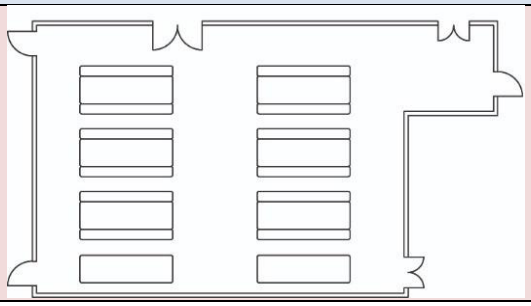
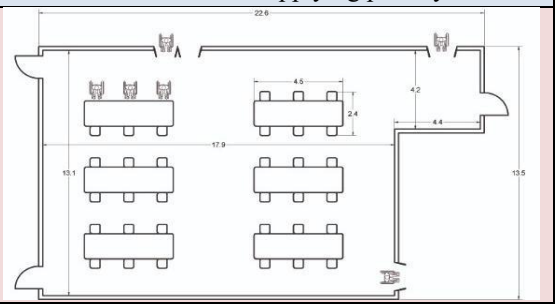
Restaurant No. 1 Future Association Alexandria Governorate	
Restaurant status before applying privacy limits	Restaurant status after applying privacy limits
	
Restaurant No. 2 Al Amal School, Ismailia Governorate	
Restaurant status before applying privacy limits	Restaurant status after applying privacy limits
	
Restaurant No. 3 Al Amal School, Damietta Governorate	
Restaurant status before applying privacy limits	Restaurant status after applying privacy limits
	
Restaurant No. 4 Al Amal School Fayoum Governorate	
Restaurant status before applying privacy limits	Restaurant status after applying privacy limits
	

Table No. (2) shows the status of Restaurant's spaces before and after applying privacy limits (researcher's work)

5-2. Analyzes of Restaurants space's spaces after applying privacy

A . Each student's share of space before applying privacy in limits square meters = Space allocated to provide student privacy boundaries in square

meters / Number of students before privacy limits were applied limits. shown in the Table (3)

B . Each student's share of space after applying privacy in limits square meters = Space allocated to provide student privacy boundaries in square meters / Number of students after privacy limits were applied. limits shown in the Table (3)

Restaurant	Dimensions of the space allocated to provide student privacy boundaries in square meters	Space allocated to provide student privacy boundaries in square meters	Number of students before privacy limits were applied	Number of students after applying privacy limits	Each student's share of space before applying privacy limits in square meters	Each student's share of space after applying privacy limits in square meters
1	12.4×18.8	233.1	120	48	1.94	4.85
2	14×13	182	72	30	2.52	6
3	12.4×19.2	238	56	24	4.25	9.92
4	13.10×17.9	234	72	36	3.9	6.5

Table No. (3) shows analyzes of Restaurant's spaces after applying privacy limits (researcher's work)

6. Results

6-1 . Student density and each student's share of aere

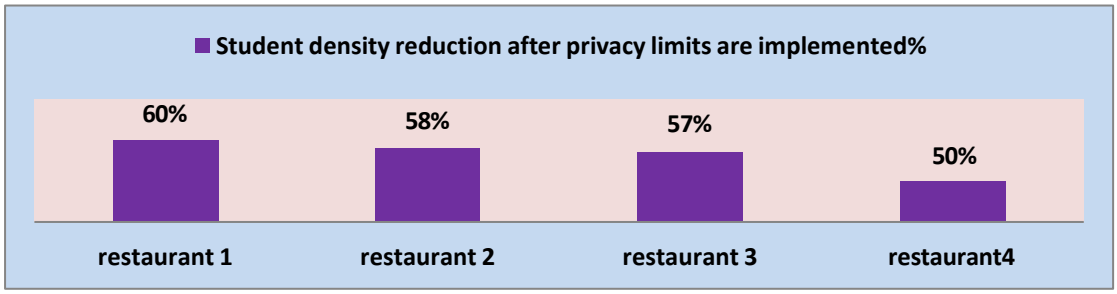
A . Student density reduction after privacy limits are implemented % = 100 –(Number of students after applying privacy limits/ Number of students before privacy limits were applied×100)

shown in the Table (4)

B . Percentage increase in space share per student after applying%=100-(Each student's share of space before applying privacy in limits square meters/ Each student's share of space after applying privacy limits in×100)

square meter shown in the Table (4) .

Restaurant	Student density reduction after privacy limits are implemented	Percentage increase in space share per student after applying privacy limits
1	60%	250%
2	58%	238%
3	57%	233%
4	50%	166.66%



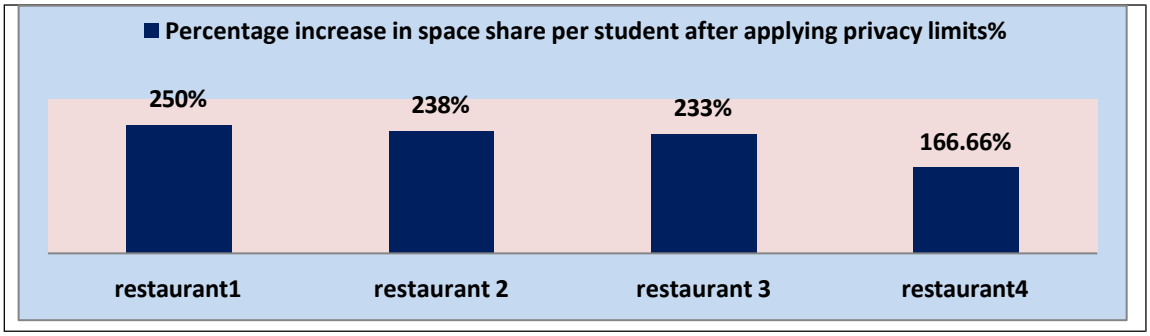


Table No. (4) Student density reduction and Percentage increase in space share per student after applying privacy limits. (researcher's work)

6-2 . Rate of increase in length and width

A . dimension that achieves privacy limits $L=x+y_a(a+x)$ achieves privacy limits.

B . increase in length and width = the length and widthof the Area- L.

C. rate of increase in length and width=(increase in length and width /the length and widthof the Area)×100.

Restaurant No. 1 Future Association Alexandria Governorate

	rate of increase in length	rate of increase in width
A	L=1.2+3(2+1.2)=10.8	L=1.2+4(2.8+1.2) =17.2
B	12.4-10.8=1.6	18.80-17.2=1.6
C	(1.6/12.4)×100 =12.9%	(1.6/18.8)×100=8.5%

Restaurant No. 2 Al Amal School, Ismailia Governorate

	rate of increase in length	rate of increase in width
A	L=1.2+3(2.9+1.2)=13.5	L=1.2+1(8.1+1.2)= 10.5
B	14-13.5=.5	13-10.5=2.5
C	(.5/14)×100=3.5%	(2.5/13) ×100=19.3%

Restaurant No. 3 Al Amal School, Damietta Governorate

	rate of increase in length	rate of increase in width
A	L=1.2+2(5.1+1.2)=13.7	L=1.2+4(2.9+1.2)=14.4
B	13.7-13.7=0	19.2-17.6=4.8=1.6
C	(0/.12.4)×100=0%	(1.6/19.2) ×100=8.33%

Restaurant No. 4 Al Amal School Fayoum Governorate

	rate of increase in length	rate of increase in width
A	L=1.2+3(2.4+1.2)=12	L=1.2+2(4.5+1.2)=12.6
B	13.10-12=1.10	17.9-12.6=5.3
C	(1.10/13.10)×100=8.39%	(5.3/17.9) ×100=29.6%

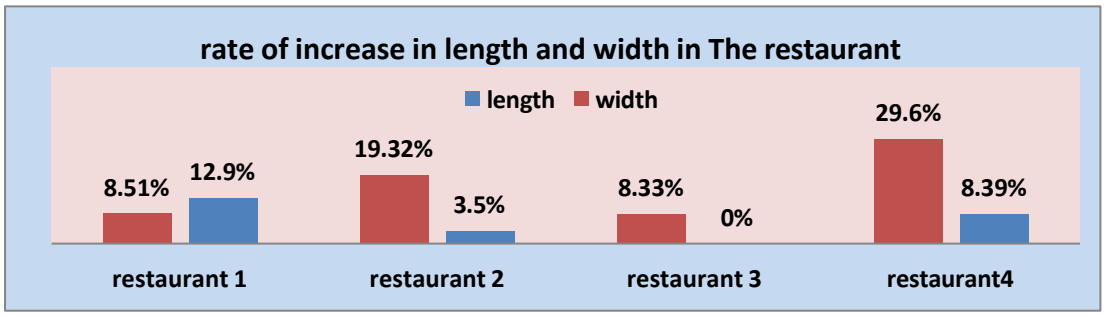


Fig11: rate of increase in length and width in The restaurant. (researcher's work)

7. Discuss the Results

A . Student density decreases by[17] 50%/60% after applying architectural privacy.

B . Students' share of space ranges between 150%/250% after applying architectural privacy.

C. The savings ratios after the void are directly proportional to the .wasted distance after applying the privacy limit.

D. Agreement of applying architectural privacy in restaurants of schools for people with special needs. [26] with the Egyptian Code for Special Needs 2015[13] and the design by applying social distancing in critical circumstances such as Coved-19.[11]

8. Conclusion.

A. The definition of architectural privacy is the distance required for a person to achieve the necessary movement for the required activity, with a privacy limit of 1.20 m, and is achieved by the equation (ya =L- x /(a+x), L=x+ya(a+x).

B. The quality of individual performance is achieved by relying on the axis in the design.

C. The application of privacy limits in the design is appropriate for all special and normal categories and in critical conditions such as Covid 19 .

9. Recommendation

A . The importance of holding seminars and conferences to raise scientific awareness about people with special needs in all sciences in general.

B . The necessity of conducting specialized psychological and physiological studies and linking them to architectural spaces according to the use of each space

C . The importance of exploiting modern technology in building materials science to serve people with special needs.

D . Applying the privacy boundaries law to make the space more flexible for the user in critical circumstances such as Covid-19 and integrating people with special needs into building design.

E . Benefit from the savings in space dimensions after applying the privacy limits law to be safer for the user.

10. References

[1] National Council for Disability Affairs, Egypt, "Disability and the Sustainable Development Goals" , Hans Seidel Foundation, January 2020.

[2] https://www.un-ilibrary.oeg/economic-and-social-development/disability-and-development-report-2018_a0b1b1d1-en.

[3] httpssustainbledevelopment/ar/energy/.

[4] Rabih Muhammad Nadhir Al-Hurstaani, "Elements of Architectural Design and Construction", Dar Qabas, 2018, pp. 28-31.e.g., Mehrabian & Russell, 1974, for an influential early volume detailing this approach.

[5] Wesam gaber, "Design of Vocational Rehabilitation Buildings for People with Special Needs," Master of Industrial Education, Department of Civil and Architectural Constructions, Suez University, 2018, p165-180..

[6] Jihan Mohamed Ibra, "Determining the Security and Safety Factor in Schools for the

Visually Impaired," Faculty of Engineering, Helwan University, PhD Thesis, 2007.
[7] Silva Simonson, "Measuring Advanced Accessibility for Students with Disabilities in Public Universities" Master's Thesis, Faculty of Engineering, Department of Construction Management, Mentes Claros State University, Brazil, 2012.
[8] Lamia Abu Ahmed Sayed Abdel Latif "Some modern technological trends in interior design and furniture in educational buildings for integration schools" Researcher, Faculty of Applied Arts, Helwan University, Heritage and Design Magazine, June 2022.
[9] Mayar Abdel Fattah Khorshid "The impact of the novel coronavirus on the future of office workplace design" Assistant Professor, Department of Architecture, Higher Institute of Engineering and Technology, Menoufia "International Conference on Visions of Future Cities, May 2022.
[10] Tawfik Geberel, Architectural strategy for classrooms for students with intellectual disabilities in primary schools in relation to space and environment, Ain Shams Engineering Journal, December issue (2021), p. 821–835.
[11] Heba Mohamed Ahmed Abdou, Richtecterle Roll Taha Ashfaq Inkles For Shield And If Disappears In Nurses, Journal of Engineering Sciences, Assiut University, Faculty of Engineering Vol. 48 No. 3 May 2020 PP. 520–537.
[12] Mohamed Abdelfadeel Alsaber, "Using Windcatcher in Residential Multistory Buildings as a Tool for Educing COVID-19 Infection" Master discussion of Industrial Education, Department of Civil and Architectural Constructions, Suez University, 2024.
[13] The Egyptian Code for the Design of External Spaces and Buildings for the Use of the Disabled, Code No. 601, Second Edition, Ministry of Housing, Arab Republic of Egypt, 2015 Edition, pp. 10-11.
[14] Housing and Building Research Center, "The Egyptian Code for the Design of External Spaces and Buildings for the Use of the Disabled," Egyptian Book. House, 2003, pp. 20-22.
[15] Saeed Ali Khattab, "Architectural Design of Educational Buildings", Dar Al-Kitab for Publishing and Distribution, 2007, pp. 167-195.
[16] General Authority for Educational Buildings "Design Standards for Special Needs Education Schools.
[17] Rabih Muhammad Nadhir Al-Hurstaani, "Elements of Architectural Design and Construction", Dar Qabas, 2018, pp. 251-265.
[18] Duaa Abdel Latif, International Conference on Special Education "Sexual Education to Protect Our Children", Conference Hall, Faculty of Medicine, Alexandria University, October 14, 2022.
[19] Mattila, A. S., & Wirtz, J. (2001). Congruency of scent and music as a driver of instore evaluations and behavior. Journal of Retailing, 77, 273–289.
[20] Islam Ghonimi , "Assessing the Role of Urban Design in achieving Social Distance and Coping Urban Behaviour in Four Types of Neighbourhoods in Greater Region", Journal of Architecture,Arts and Humanities, May 2022 .
[21] Megrez, W " landscaping in urban space " M-sc thesis, cairo university, 1983.
[22] Whybrow, S. (2006). Design Considerations for Accessibility. Retrieved from ascon:https://ascon.info/wpcontent/uploads/2018/05/acces sibility.pdf.
[23] https://www.1civil.com/egyptian-code - 601.
[24] Center for Accessible environments. "Designing for Accessibility ". 1999. P31.
[25] Muhammad Majid Abbas Khalousi, "Architectural Design of Buildings for People with Special Needs," Dar Al-Maaref Al-Masryia, 2011, p.133.
[26] Yahya Al-Waziri, "Introduction to Designing Buildings for the Disabled," United Technical Press, 1996, pp. 86-88.
[27] Layali Muhammad Abdel Halim, "The Impact of Architectural and Urban Design of the Residential Environment on Human Behavior," Arab Journal of Scientific Publishing, March 2, 2022.
[28] Jinmu Zhang , Jinbiao Yan "Refining the Potential exposure index for the assessment of Residential Privacy : a three - dimensional" Journal of Asian Architecture and Building Engineering ,
[29] 25 Jun 2022 p 1458 – 1475. https://tuna.voicemod.net/sound/4ff8c50a.
[30] https://www.nickadcockgolf.com.