Migration Letters

Volume: 20, No: S11 (2024), pp. 424-448

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Analytical Study Of Inclusivity In Design Of University Campuses In Lahore

Madiha Ghafoor[1], Muhammad Taimur Sarwar[2], Saira Naeem[3], Rabia Ahmad Qureshi[4]

Abstract: *Inclusion of people with disabilities in mainstream society of Pakistan is a crucial target that has widely been overlooked. It is now worldwide believed that the exclusion of these people from main social and physical setup is not only because of their disability but because the physical infrastructure does not allow them to participate. One reliable way to bring them into mainstream society is to equip them with quality education. For that matter physical infrastructure of educational institutes should be efficient to accommodate the needs of such user groups satisfactorily. The aim of this exploratory research was to audit the university campuses in Lahore to assess the quality of built environment based upon principles of acce[1]ssibility and inclusivity, and to identify the physical barriers that impede independent accessibility of people. For this purpose, an inclusivity assessment tool was developed specifically for the architectural context of Lahore, Pakistan. The study of the four sample universities in this research clearly identifies the deficiencies in design for inclusivity making it possible for designers to propose design solutions.*

Keywords: *Physical infrastructure, Accessibility and inclusivity, Inclusivity assessment tool.*

Introduction:

Inclusive design approach ensures that the design addresses the needs of as much wide range of users as possible, disregarding their age or abilities. It aims to remove the barriers that create undue effort and separation, and enables everyone to participate equally, confidently and independently in everyday activities. In order for the built environment to be comfortable and personalized for all users, it should accommodate the diversity of experiences of diverse user groups. It has potential to either hinder the participation of people of a certain user group or foster it. Although the inclusive design approach is important for all equality groups, this study will be particularly focused on the needs of people with ambulatory disabilities. The research will involve detailed analysis of selected sample of universities in Lahore on the basis of international standards for inclusive design and identifying major barriers that are restricting diverse users from independently accessing and using the facilities.

[1] School of Architecture and Planning, University of Management and Technology, Lahore, Pakistan.
[1] ORCID: 0000-0002-2306-4846)
[2]Department of Architecture, COMSATS University, Lahore, Pakistan.
[3]School of Architecture and Planning, University of Management and Technology. [4]Department of Architecture, University of Enginering and Technology, Lahore, Pakistan.

Inclusion of people with disabilities in mainstream society of Pakistan is a crucial target that has widely been overlooked over the history. According to the statistics of 1998 census 3,286,630 people i.e. 2.38% of total population in Pakistan suffer from any form of disability, out of which the maximum number of people around 622,025 have ambulatory disabilities. According to the estimates of the United Nations, 15% of the total population of the world suffer from disabilities, out of which 80% reside in developing countries (Hilhorst et al., 2019). The British Council has estimated that approximately 31 million people in Pakistan are living with any form of disability. This alarming situation suggests that we need to take solid measures to provide them access to quality education and skills.

Various organizations working in this regard have suggested that the exclusion of these people from the main social and physical setup is not because of their disability but because the physical infrastructure does not allow them to participate. Unfortunately, the built environment is being designed based upon a preconceived understanding of the abled human body. This results in creation of rigid and stagnant spaces that fit only for a certain user group and cause barriers for all those who do not qualify on this delusion of able bodies. Today, there are numerous poorly designed spaces that are obscure for the people with disabilities (PWD) and elderly people for their participation in society. While designing and managing public infrastructure, it is important to consider the diverse needs of a wider range of users and encourage flexible ways for participation of users. In architecture, this concept of two-way relationship between a user and the built-environment led to the emergence of a globally recognized approach of Inclusive design (ID). It promotes social inclusion by creating inclusive environments that emancipate people from various barriers that restrict their activities and confine their accessibility.

Architecture is a manifestation of the norms of society and it should represent all social groups equally without any discrimination. The experience that a space offers to its users varies according to their cultural backgrounds and physical needs. In order for a space to be comfortable and personalized for all users, it should accommodate the diversity of experiences of different user groups and if it does not accommodate any group, it creates a sense of exclusion and inferiority. In the context of Pakistan, the people with disabilities are highly marginalized with very little consideration to their basic rights. In order for them to be socially and financially stable, higher education can play a very important role. So, it is essential that the physical and pedagogical structure of universities is efficient to accommodate the needs of all such user groups. This will not only help them achieve their goals but will promote the value of social justice and equality. There is a crucial need to assess the physical environment of universities to know about their capability to include the diversity of users.

Methodology:

The research consisted of both qualitative and quantitative approaches to understand barriers in the built environment that prohibit inclusion of people with diverse needs and evaluate the inclusive quality of universities campuses of Lahore. For that matter the major universities of Lahore were categorized in different groups based upon their year of establishment and four universities were selected from the sample pool (Table 1). One building in each campus and the route connecting it to campus entrance point was studied.

Table 1. Selected sample of universities

Sr. No.	Name of Institute	Selected Building
1.	University of Engineering & Technology, Lahore (UET)	Faculty of Architecture and Planning
2.	COMSATS University	Department of Electrical Engineering
3.	University of Management & Technology (UMT)	Library Building
4.	University of Punjab (PU)	Department of Electrical Engineering

For analysis, a clear set of guidelines were required over which extent of inclusivity of sample buildings could be measured. The literature review shows that no such guidelines exist in the local building control regulations of Lahore or architecture literature of Pakistan. The building control regulations of primary authorities working in Lahore are just limited to very basic features and do not fully cover the needs of people facing any form of disability. This unavailability of local codes and literature suggested to use international standards and inclusivity guidelines as the basis of this research. The assessment tool for this study was developed using ADAAG (2016) and Levine (2003) as two primary sources. The ADA guidelines audit the key accessibility of design. The compliant to ADA guidelines does not ensure complete inclusivity, so Universal Design Audit Checklist developed by Levine (2003) was also used to fill in the gaps. The findings of the case studies helped to identify the barriers in built environments that impede accessibility and cause exclusion of diverse users. After completing the documentation of the selected case studies the data was analyzed to obtain and an index of inclusivity for each university.

Inclusivity Assessment Method

For the purpose of measuring the extent of inclusivity of sample buildings, building performance assessment approach was adopted. It involves gauging a building's performance against a single criterion or a set of criteria. The inclusive design assessment criteria for this research was developed on the basis of ADAAG guidelines, Universal Design Audit Checklist by Danise Levine in his book "Universal Design New York 2" (Levine, 2003).

In addition to above mentioned sources an extensive literature review was conducted to select design attributes of inclusive built environment that should be assessed in this regard. These design attributes were grouped under different categories. The detailed parameters of each attribute structured the questions for inclusivity assessment criteria.

Design parameters for assessing the inclusivity of built environment

The inclusive assessment tool for this study consisted of five sections devised from the design attributes of an inclusive built environment. Each section includes various design

questions related to detailed parameters. The tool consisted of trichotomous questions with choices of response as yes, no or not applicable. The details of each section are provided in the table 2.

Table 2. Design parameters for assessing the inclusivity of built environment

Sr. No.	Design Aspects	Detailed Parameters
1.	**Approach and parking**	• Pedestrian access points • Accessible parking • Signage with accessible parking
2.	**Circulation**	**Exterior Accessible Route** • Exterior accessible route • Width of passageways • Surface treatments • Drop curb • Ramps • Staircase **Accessible entrance** • Entrance Door • Entrance Foyer **Interior circulation** • Width of corridors • Material and finishes • Turning radii • Vertical circulation • Accessible doors: Door sizes, manoeuvring clearance, handle and lock design. • Manoeuvring clearance in interior spaces
3.	**Accessible toilets**	• Signage • Floor clearance spaces • Doors • Accessible Lavatories • Water closet • Grab bars • Mirrors • Slip and tripping resistant floor

4.	**Access to services and amenities**	• Counters and service desks • Seating spaces • Controls i.e. switch boards, public telephones, etc.
5.	**Signage**	• Size and style of text • Use of pictogram • Mounting height

The questions of the tools have been developed on the basis of all the parameters described above. Each of the parameters has been assigned marks based upon the level of its importance in order to ensure independent use by people with special mobility needs. Out of all these some of the parameters are not applicable to all facilities so they were marked not applicable. In the end the percentage of total obtained marks to the total marks of applicable parameters were calculated that gives a definite quantitative value of the level of inclusivity in each facility.

Results:

The inclusivity assessment tool provided a quantitative result of the state of inclusivity in the studied universities. The tool consisted of a total of 155 questions related to different parameters of the built environment, categorized in five major sections. Each question was allotted certain marks depending upon the extent to which it can impact users' participation. Out of these 155 some parameters were not applicable to some case studies due to variety in the designs and uses of buildings. Therefore, final results were compiled in the form of percentage compliance of the built environment to the parameters of inclusivity assessment tool. The comparison of all sample universities on the basis of these results is discussed below.

Approach and parking

The grading of selected universities with reference to the assessment tool indicates that none of these had designated accessible parking spaces with proper signage and line markings. The only pedestrian entrance in UET has a raised entrance foyer and requires use of multiple steps to enter and exit from it. The steps are finished with polished granite and become slippery after rain. The threshold of the door is 4 ½" high and is unbeveled. The main approach point for the COMSATS campus consists of a shared entrance for both vehicles and pedestrians with no segregation of routes. All of theses campuses has separated parking lots for students and staff. The parking lots for staff are in close proximity to buildings so the students with special needs are also allowed to use these parking spaces. However, none of these spaces is marked as accessible parking spots and no designated accessible route connects them to adjoining buildings. The students' parking lot in UMT is just an unpaved plot across the road with no line markings which becomes quite messy and slippery in rainy weathers. The pedestrian approach points for students in UMT, consist of a series of revolving door lined along boundary walls that cause hindrance for all users who are facing any form of mobility restriction or carrying luggage, hence, they are forced to use the adjacent staff entrance gate. The pedestrian entrance of Punjab University that is in close proximity to the selected building is aligned with road level and does not involve use of any stairs.

Figure 1. (a) Raised floor of pedestrian entranceway at UET, (b) Common entrance gate and passage for vehicles and pedestrians at COMSATS, (c) Revolving doors of students' entrance at UMT (d) Pedestrian entrance gate

a) b) c) d)

Table 3. Inclusivity percentage of approach and parking

Sr. No.	Name of Institute	Total marks of applicable parameters	Obtained marks	Inclusivity percentage= b/a*100
		a	b	%
1.	University of Engineering & Technology, Lahore.	15	6	40
2.	COMSATS University	15	4	27
3.	University of Management & Technology	15	6	40
4.	University of Punjab	15	7	47

Circulation

Exterior accessible route

There is no specified accessible route to access various facilities in all the selected campuses so the routes connecting the selected building to parking lots and campus approach point were selected for this study. The routes are paved and finished with concrete pavers which can provide quite stable and slip resistant surface if properly installed. However, in UET and PU, the surface is quite uneven at several points along the route. The pavers have been misaligned due to uneven settlement of soil and penetration of tree roots beneath them. The manholes are also not aligned with the walkway surface.

Figure 2. Uneven surface due to misalignment of paver can cause tripping or imbalance of wheelchair

Figure 3. Trees and poles and signboards obstructing the route in UET and PU

The vehicular and pedestrian circulation runs side by side along the route and at some points it merges into a single driveway with no pedestrian pathways at all. The walkways are repeatedly obstructed by trees growing from the center of walkways leaving inadequate space for the users to pass-through. The circulation routes in UET, COMSATS and PU have to pass through different level differences between the road and the walkway and multiple levels of walkway as well (in case of COMSATS). The availability of curb ramps all along the route is random and uncertain. A part of pathway

that may have curb ramp at starting point, ends with a step at end point. The gradient of curb ramps is also not according to the standards. However, in case of UMT, the central pedestrian route connecting all the primary buildings is equipped with curb ramps at all level changes but the gradient of these ramps is not a per standards. To reach that central pedestrian walkway, the users have to cross through the vehicular route and crossing points along the route are not provided with zebra crossing and curb ramps. The surface of the pathway is stable and slip-resistant but it breaks at the entrance point of

the staff parking lot and the crossing point is not properly paved.

a) b) c)

a) Absence of curb ramp at crossing in UET

b) Absence of curb ramp at the rout connecting parking to buildings in COMSATS

c) Semi-paved crossing without curb ramp in UMT

d) Steep gradient and uneven surface of ramp in PU

d) Figure 4 Absence of standard curb ramps

Figure 5. Barrier mapping of the selected exterior route of the universities, (a) UET, (b) COMSATS, (c) UMT, (d) PU

a) b)

c)

d)

Accessible Entrance

All of the selected buildings, other than PU, was provided with any form of accessible entrance. In UET, out of two primary entrances one was provided with ramp and a secondary entrance to Dept. of Architecture was also used as an accessible entrance. In Punjab university and UMT, the primary entrances were accessible to users with different needs, however the gradient of ramps was not as per acceptable standards. All the entrance doors are adequately wide but in UMT the threshold of the main entryway has a change of level of around 1 inch that is not beveled. The doors remain open during working hours of the department so the hardware details do not affect the accessibility of users. None of the two entrances of selected building in COMSATS had any consideration to accessibility.

Figure 6. Details of accessible entrance

Figure 7. Raised thres hold of accessible entrance way

Figure 8. Inaccessible entrance COMSATS university

Figure 9. Handrail and surface treatment of ramp

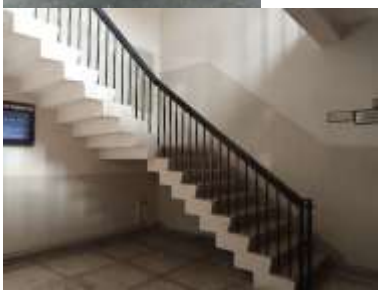
Interior circulation

In sample building, the interior spaces are highly legible and easy to locate as there are wide linear corridors running as the prime circulation routes throughout the building. In UET and PU, the central courtyards attempt to provide visual and physical permeability between most of the interior spaces. However, the floor level difference between courtyard and corridor makes the former inaccessible for most of the diverse users.

Figure 10. Inaccessible jury hall in UET,

Figure 11. Central Inaccessible courtyard in PU,

Figure 12. Staircase in Electrical Engg. Dept. COMSATS without slip resistant strip



Vertical circulation is one of the most crucial problems in most of the studied buildings. Other than UMT, none of the building has any provision of elevator of access ramp reaching to the upper levels which makes all the upper floor levels completely inaccessible for diverse users. Staircases in all buildings are not provided with an anti-slip strip.

All of the single panel doors are more than 32inches and allow easy maneuvering of wheelchair through them. Some of the double panel doors opening width of one panel is only 2' to 2'-6" and second panel remains locked through a latch provided at the top of panel higher than recommended height of 48 inches.

The libraries in UMT and PU are quite spacious but the bookshelves aligned with wall terminate at dead ends only 30 inches wide instead of 60 inches that cause trouble for users in wheelchair in making 180 degree turns. Similarly, the tables are closely spaced with less than 36inches space between chairs. The rest of the interior spaces in all sample buildings have moveable furniture layout that can be rearranged according to the requirements.

Figure 13. No turning radius at the end of aisle

Figure 14. Inadequate clearance space between reading tables in library

Figure 15. Floor plans of library showing insufficient manoeuvring turning clearances

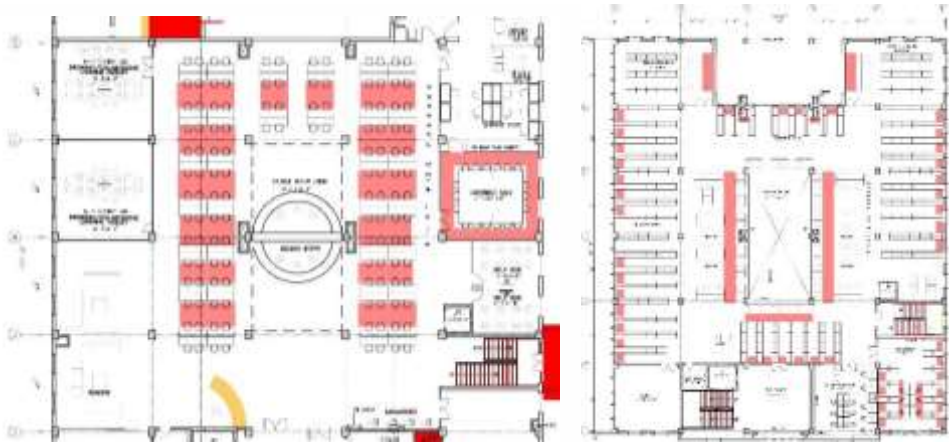


Table 3. Inclusivity percentage of circulation

Sr. No.	Name of Institute	Total marks of applicable parameters	Obtained marks of parameters that were followed	Inclusivity percentage= b/a*100
		a	b	%
1.	University of Engineering & Technology, Lahore.	90	42.5	47
2.	COMSATS University	86	34	40
3.	University of Management & Technology	87	61	70
4.	University of Punjab	87	49	56

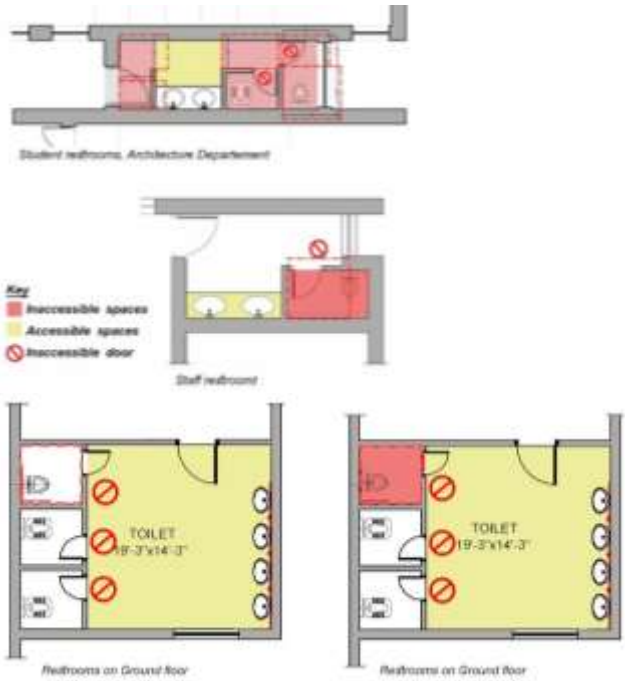
Toilet rooms

None of the selected facility has designated accessible toilets so public toilets were studied for this research. In UET, the layout of the toilets is too congested for wheelchairs to maneuver in. There is not enough clearance space between the door and the privacy wall. The internal circulation aisles are 2'-3" wide in spite of standard 3'-0". The mirror is provided over the lavatory at a height of 50 inches that cannot be used by people using wheelchairs but a full-length mirror provided that can accommodate all users. The lavatories fulfill the standard requirements of approach, height, knee and toe clearance. The pipes below the vanity are not concealed and can be unhygienic if they get in contact with legs of wheelchair users. Water closets are located in separate stalls

that are too congested with narrow entrance doors is 24 inches to accommodate wheelchairs.

The layout of toilets in COMSATS is quite spacious for easy manoeuvring of a wheelchair. One stall in each toilet facility has an outward opening door that enables wheelchair clearances and turning space within the stall. The width of stall entrance doors is 24 inches that is quite less than the standard 32 inches. The floor level of stalls in first floor toilets is 2 inches lower than rest of the floor and is not bevelled or provided with slope. The mirror is provided over the lavatory and the soap dispenser are mounted higher than approachable height The lavatories fulfil the standard requirements of approach, height, and toe clearance but the knee clearance gets interrupted by the washbasin.

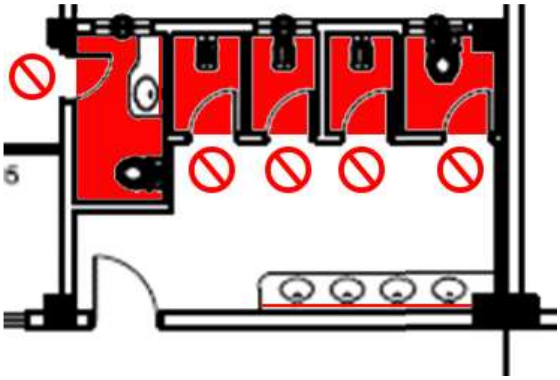
Figure 15. Plans of toilet blocks showing level of accessibility



The toilets in UMT are quite spacious and has standard space to reach lavatories, hand dryer and towel rail. A four inches high ledge provided under the lavatory shelf restricts the approach by blocking knee and toe clearance. The faucets are easy to operate and can be used with just one hand but are difficult to access because of floor ledge blocking the clearance space.

Water closets are located in separate stalls that are too congested to accommodate wheelchairs. The doors open inwards and internal stall space is insufficient for the wheelchairs to take 180 degree turns after entering the stall. The width of stall entrance doors is 24 inches that is quite less than the standard 32 inches. There are no grab bars provided in any stall to assist weakened, disabled, or elderly individuals safely access the facilities.

Figure 16. Plan of toilet blocks highlighting all accessibility barriers (a) UMT, (b) PU

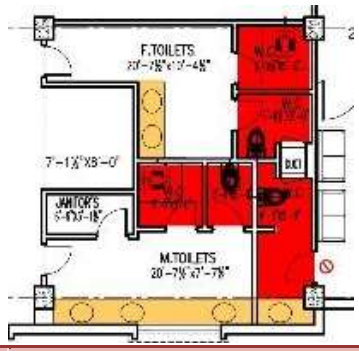


a) b)

In PU, the entrance doors are adequately wide and the lavatories areas have spacious manoeuvring clearances for wheelchairs. The lavatories have a vertical standing post that blocks the knee clearance. As the depth of lavatories is 18 inches so faucets can be easily accessed and operated. The soap dispensers are mounted over vanities on an accessible height. Mirrors mounted higher than 40 inches can also not be used by wheelchair users.

None of the student restrooms and only one faculty restroom has adequate turning clearance. No grab bars have been provided in any restroom. The doors to water closet stalls are less than 32 inches. The locks of these doors are mounted at the top of doors making them inaccessible for diverse users.

Table 4. Inclusivity percentage of circulation



Sr. No.	Name of Institute	Total marks of applicable parameters	Obtained marks of parameters that were followed	Inclusivity percentage= b/a*100
		a	b	%
1.	University of Engineering & Technology, Lahore.	41	18.5	45

2.	COMSATS University	42	23	55
3.	University of Management & Technology	43	21	49
4.	University of Punjab	42	24	56

Access to services and amenities

This section primarily implies the access to amenities and services provided within the building. It was observed that some of these items do not comply with the standards of inclusivity.

In UET, the primary information counter is provided in the admin office with a height around 4'-6" and does not has any accessible part at 36 inches height. The congested layout of the office does not allow users with wheelchairs to pass through the room and access the workstations. The counter in basement library, on the other hand, is 36 inches high and allows all users to coordinate with librarian. The waiting areas provided in main lobbies of are quite spacious and can accommodate wheelchair spaces with the waiting benches. The auditorium style sitting in classrooms have movable chairs that can be arranged according to requirements. Most of the switch boards in classrooms, corridors, jury hall and toilets are located higher than standard height of 48 inches and a few switches and most of the power plugs in classrooms are provided lower than 15 inches form floor level which cause difficulty of access for different users.

The drinking fountains in all of the buildings have no knee and toe clearance space. The faucets are hard to operate and require continuous tight pushing of the knob and is difficult to grab.

In COMSATS, one of the lab has a 12 inches raised platform acting as a stage with no steps or ramps provided for access. This might impede elderly and mobility impaired people from fully participating in class presentations and lecture activities. The seating arrangement in one room consists of movable chairs so the wheelchair can easily be accommodated in group, however, the seating in other lecture rooms consists of fixed rows of chairs with narrow circulation aisle, and no provision of wheelchairs. Most of the rooms comprise of labs with adequate circulation spaces to access each workstation. Only one lab has workstations with two different heights. Other than this, no consideration has been given to provide a variety of working heights or flexible heights.

Figure 17. Raised platform in lab Figure 18. Fixed seating arrangement

The ground floor of the building in UMT consists of library. The central reception and issuing booth of the library is well designed with different heights that can accommodate diverse users. The length of these sections is also more than 36 inches with clear floor space for parallel approach. The waiting space and reading lounge in the library are spacious enough to accommodate a wheelchair sitting along with other sitting spaces without obstructing the circulation path. The circulation space between reading tables of the library is not adequate for wheelchair manoeuvring. A few power plugs in classrooms are provided at 12 inches from floor level but the availability of other plugs and switch boards at 42 inches height in the same room creates balance between different ranges of access for different users.

Figure 19. Accessible portion in main reception of library

The main reception counter in PU has been cordoned off by glass panel and has an inaccessible height. The counter in the library, on the other hand, has accessible height with provision to knee and toe clearance. The lecture rooms has auditorium style seating in which only lowermost level is accessible but the first row of tables is aligned over first step which makes the seating in lecture rooms inaccessible. The working counters in all labs are provided along the wall with wide central clearance space to approach each counter. The cabinet under these counters block the knee and toe clearance of users.

Figure 20. Inaccessible services at PU

(a) main reception (b) Seating in lecture rooms (c) No knee and toe clearance in working counters of lab

a) b) c)

Table 4. Inclusivity percentage of services and amenities

Sr. No.	**Name of Institute**	**Total marks of applicable parameters**	**Obtained marks of parameters that were followed**	**Inclusivity percentage= b/a*100**
		a	**b**	**%**
1.	University of Engineering & Technology, Lahore.	29	13.5	47
2.	COMSATS University	17	9	53
3.	University of Management & Technology	23	14	61

4.	University of Punjab	29	13	45

Signage

The signage has been provided at a few points throughout the campuses to guide the users towards important buildings and facilities within the campus. The signage in campus, outside the building, provides directional information about important buildings. Within the buildings the sign boards are provided designating the important rooms and spaces none to provide directional information and assist in wayfinding. A reception desk has been provided only in Punjab University to guide the visitors about the facility. There exists exists a color contrast between characters and background to make them more prominent. The use of glass and stainless steel base plates in COMSATS and UMT causes severe glare of light from nearby light fixtures. The information about fire safety and emergency evacuation contains pictograms along with texts in COMSATS and PU.

Figure 21. Signage provided at inappropriate height

Table 5. Inclusivity percentage of signage

Sr. No.	**Name of Institute**	**Total marks of applicable parameters**	**Obtained marks of parameters that were followed**	**Inclusivity percentage= b/a*100**
		a	**b**	**%**
1.	University of Engineering & Technology, Lahore.	7	4	57
2.	COMSATS University	7	3	43

3.	University of Management & Technology	7	4	57
4.	University of Punjab	7	5.5	79

Total compliance to inclusivity assessment tool

The results of the research show that the compliance of each university to the inclusivity assessment tool is very low. The highest compliance level that any studied university was able to achieve is only 60%, for UMT. It is then followed by PU with 54%, UET with 46% and COMSATS at last position with only 44%. These figures clearly show that the current physical infrastructure of universities in Lahore is highly exclusive for diverse user groups.

Table 6. Compliance of universities to inclusivity assessment tool

Sr. No.	**Name of Institute**	**Total marks of applicable parameters**	**Obtained marks of parameters that were followed**	**Inclusivity percentage= b/a*100**
		a	**b**	**%**
1.	University of Engineering & Technology, Lahore.	182	84.5	46
2.	COMSATS University	167	73.0	44
3.	University of Management & Technology	175	105.5	60
4.	University of Punjab	180	98.0	54

Table 7. Summary of the results of inclusivity assessment tool

	UET			COMSATS			UMT			PU		
Description	**Max. Marks**	**Obtained marks**	**%age**	**Max. Marks**	**Obtained marks**	**%age**	**Max. Marks**	**Obtained marks**	**%age**	**Max. Marks**	**Obtained marks**	**%age**
Part-01												
Access points	3	0	0	3	3	100	3	1	33	3	2	67
Parking	15	6	40	12	1	8	12	5	42	12	5	42
Approach & Parking	**15**	**6**	**40**	**15**	**4**	**27**	**15**	**6**	**40**	**15**	**7**	**47**
Part-02												
Exterior Accessible Pathway	8	4.5	56	9	6	61	8	8	100	8	5	63
Curb Ramps	12	5	42	12	4	29	12	7	58	12	5	42
Ramps	13	7	54	13	0	0	13	7	54	13	11	85
Entrance	10	5	50	10	4	40	8	6	75	8	5	63
Interior Accessible Route	9	4	44	9	8	89	9	7	78	9	7	78
Vertical Circulation	23	4	17	19	3	16	21	15	71	23	4	17
Interior Doors	6	4.5	75	7	4	57	7	6	79	7	6	86
Rooms and Spaces	9	8.5	94	7	6	86	9	5	56	7	6	86
Circulation	**90**	**42.5**	**47**	**86**	**34**	**40**	**87**	**61**	**70**	**87**	**49**	**56**
Part-03												
Availabiliy of accessible toilet	2	0.5	25	2	1	50	2	1	50	2	1	25
Signs at Toilet Rooms	4	1	25	4	1	25	4	0	0	4	2	50
Entrance	6	4	67	7	5	71	7	7	100	7	6	86
Interior space	3	0	0	3	2	67	3	2	67	3	3	83
Lavatories	7	6	86	7	6	86	7	3	43	7	6	86
Fixtures and amenities	4	3	75	4	1	25	5	2	40	4	2	50
Water Closets (in Single-User Toilet Rooms and Compartments)	8	2	25	8	3	38	8	3	38	8	4	44
Toilet Compartments (Stalls)	7	2	29	7	4	57	7	3	43	7	1	14
Public toilets	**41**	**18.5**	**45**	**42**	**23**	**55**	**43**	**21**	**49**	**42**	**24**	**56**

Table 15. Summary of the results of inclusivity assessment tool

Conclusion

	UET			COMSATS			UMT			PU		
Description	**Max. Marks**	**Obtained marks**	**%age**	**Max. Marks**	**Obtained marks**	**%age**	**Max. Marks**	**Obtained marks**	**%age**	**Max. Marks**	**Obtained marks**	**%age**
Part-04												
Receptions and Service Counters	6	0	0	0	0		6	4	67	6	2	33
Seating: General – reception areas, waiting rooms, etc.	1	1	100	0	0		1	1	100	1	1	100
Seating: Assembly Areas – theaters, auditoriums, theater style classrooms, etc.	6	5	83	6	0	0	0	0		6	0	0
Seating: At work surfaces (classrooms)	4	1.5	38	4	3	75	4	1	25	4	2	50
Controls – light switches, security and intercom systems, emergency/alarm boxes, etc.	3	1	33	3	3	100	3	3	100	3	3	100
Drinking Fountains	5	3	60	0	0		5	3		5	2	
Wall mounted objects- hand sanitizers, fire extinguishers, public telephones, etc.	3	2	67	3	2	67	3	2	67	3	2	67
Emergency Evacuation Systems	1	0	0	1	1	100	1	0	0	1	1	100
Access to services and amenities	**29**	**13.5**	**47**	**17**	**9**	**53**	**23**	**14**	**61**	**29**	**13**	**45**
Part-04												
Signage	**7**	**4**	**57**	**7**	**3**	**43**	**7**	**4**	**57**	**7**	**5.5**	**79**
TOTAL	**182**	**84.5**	**46**	**167**	**73**	**44**	**175**	**105.5**	**60**	**180**	**98**	**54**

The results of surveys compiled through inclusivity assessments tool shows that the current physical infrastructure of universities in Lahore is highly exclusive for diverse user groups. Among all four, none of the studied universities was fully complying with any local or international disability inclusion codes. A few accessibility elements were provided but there are several other design aspects that need to be incorporated or improved to make the spaces more inclusive. Following conclusions can be drawn based on the results of research:

Non-inclusive built environment

The results of the research show that the compliance of each university to the inclusivity assessment tool is very low. The highest compliance level that any studied university was able to achieve is only 60%, for UMT. It is then followed by PU with 54%, UET with 46% and COMSATS at last position with only 44%. These figures clearly show that the current physical infrastructure of universities in Lahore is highly exclusive for diverse user groups.

Absence of reliable guidelines

There do not exist any reliable guidelines about inclusion of diverse ranges of people in social fabric and even less about built environments that just leave this critical issue upon the discretion of architects, clients, builders, etc. The standards of building regulatory authorities applicable in various areas of Lahore are very basic and insufficient to provide an accessible built environment to diverse users.

Huge impact of minor details

Inclusive design does not recommend huge and rigid design implications in a built environment but it focuses on small details. These minute details are to be considered carefully to remove undesired barriers. It was observed that minor details like availability of accessible counters, smooth but slip-resistant surfaces, mounting height of door locks, impact user's experience of the physical environment and ultimately shape up their perception about social attitude towards them.

Compromised quality of accessibility elements

It is observed that some of the elements to assist accessibility are provided but there is severe compromise on their quality and complaint to standards. For example a ramp with steep slope remains inaccessible for wheelchair users to climb on independently and require assistance of any attendant in access to this.

No significant improvement with passage of time

The level of inclusivity is not significantly improved with the passage of time. For example, exterior infrastructure of PU is oldest, followed by COMSATS, UMT, and UET in the end with recent upgradation of the selected exterior route. Whereas the inclusivity percentage of their exterior routes is 50%, 43%, 75% and 48% respectively. This shows that UET with recently developed exterior route still lags behind already existing examples.

Lack of awareness among stakeholders

The lack of awareness leads the stakeholders to consider the implications of the accessible design as an additional burden instead of a primary need. This notion is clearly evident in the primary entrance of the Department of City and Regional Planning, UET. The entrance has recently been upgraded with proper steps leading to the entrance podium, however, the importance of the access ramp has been totally neglected and a small ramp with gradient 1:2.5 has been provided.

References:

ADA National Network (2016). ADA checklist for existing facilities. New York: Institute of human centred Design.

Barnes, C. (2011). Understanding disability and the importance of design for all. Journal of accessibility and design for all, 55-80.

Clarkson, J. P., & Coleman, R. (2015). History of Inclusive Design in the UK.

Fletcher, H. (2008). The principles of inclusive design. London: Commission for Architecture and the Built Environment.

Guffey, E. (2017). Designing Disability: Symbols, Spaces and Society. London: Bloomsbury Publishers.

Hilhorst, R., Rickard, R., Reid, J., & Sheikh, M. A. (2019). Moving from the margins - Mainstreaming young persons with disabilities in Pakistan. British Council.

Imrie, R. (2012). Universalism, universal design and equitable access to the built environment. Disability & Rehabilitation, 34(10), 873-882.

Lacey, A. (2004). Designing for Accessibility: an essential guide for public buildings. London: Centre for Accessible Environments and RIBA Enterprises.

Levine, D. (2003). Universal Design New York 2. New York: Idea Publications.

Liebergesell, N. P., Vermeersch, P. W., & Heylighen, A. (2018). Designing from a Disabled Body: The Case of Architect Marta Bordas Eddy. Multimodal Technologies and Interact, 2(1). https://doi.org/10.3390/mti2010004

Manley, S. (2016). Inclusive Design in the Built Environment-Who do we design for? Cardiff: Design Commission for Wales.

Oliver, M., & Barnes, C. (2012). The new politics of disablement (2 ed.). London: Palgrave Macmillan.

Raheja, G., & Suryawanshi, S. (2014). Inclusive Strategies for Universal Access in Educational Campus Environments. Inclusive Designing: Joining Usability, Accessibility, and Inclusion (pp. 165-174). London: Springer International Publishing.

Schillmeier, M. (2010). Rethinking Disability: Bodies, Senses, and Things. New York: Taylor & Francis Group.

Shakespeare, T. (2006). Disability Rights and Wrongs. Abingdon: Routledge.

Steinfeld, E., & Jordana, M. L. (2012). Universal Design: Designing Inclusive Environments. John Wiley & Sons.

Swain, J., & French, S. (2012). Disability on Equal Terms. SAGE Publications Ltd. https://doi.org/10.4135/9781446213261

Waqar, D. K. (2014). Disability:Situation in Pakistan. Karachi: RTE Pakistan.

WHO. (2011). World Disability Report. World Health Organization. Geneva: WHO Press.

Wong, H.-L. (2014). Architecture without Barriers: Designing Inclusive Environments Accessible to All. Ontario: Ryerson University.