

Assessment Of Universal Design Principles On Nigerian Institution's Faculty Buildings

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-----ABSTRACT-----

Public facilities/buildings seem to favour only the able persons as manifested in communal facilities like schools, hospitals, and banks among others According to the Commission for Architecture and Built Environment. In institutions, the public facilities such as faculty buildings fail to be friendly to every user of the building especially in terms of accessibility. Hence, there is need to include everybody in the design of faculty buildings and other public buildings/facilities. This is because most of the design provides facilities for only the able people, as if there is no tendency to have a disabled person in the institutions. This research investigated the level of application of universal design principles on the school of environmental technology of AbubakarTafawaBalewa University Bauchi, Bauchi State Nigeria. The research method used was case study research and observation using checklist was used in collecting the data from the cased building. Tables charts were used to analyze the data collected. The results show that the applications of universal design principles were not adequately applied in the cased building. There is need to include the application of universal design principles right from design stage to make the building accessible to all.

Keywords: *Universal, Design, Disability, Accessibility*

Date of Submission: 15-03-2023

Date of Acceptance: 30-03-2023

I. INTRODUCTION

1.0 Background of the Study

It is a matter of great concern that people with disabilities on the African continent face barrier in the education system for a multiple of reasons. Public facilities/buildings seem to favour only the able persons as manifested in communal facilities like schools, hospitals, and banks among others Commission for Architecture and Built Environment (CABE, 2012).

An environment that is responsive to people with special needs „is equally responsive to everyone, (Baiyewu, 2012). Anyaedele, D. (2012) states that the environment is not friendly because our public buildings, transport system and academic institution are hostile to people with disabilities, He further explained „institutionally, the public and private sectors design their policies,” products and services at the exclusion of persons with disabilities (PWDs). As at today Section 15 and 42 of „Nigeria”s constitution is silent on discrimination against disability and most states have no disability-sensitivities laws, This negligence on constitutional provisions has adverse effect on PWDs that constitute 19 million of the total population: he concluded by saying it (disability knows no social status, age, gender, tribe, race and religion. No one is immune to acquiring disability, if you do not get it at young ages, you may get it at old age.

1.1 Universal Design Concept

The universal it led the way in the 1990s with its intense efforts to facilitate society for everyone. The concept simply means an attitude or way of considering things, where surroundings, buildings and products are planned and designed so they can be used by everyone to the greatest extent possible. In the US there has been a fairly heated debate about this concept and its consequences. The fact that the concept can be understood in a number of ways is something that in itself fuels the debate. One interpretation is that; It could also happen to me, i.e. that I could become functionally challenged, and that this is not only something that happens to others. Another stance is that this means nothing more than what good design and planning has always been about.

Needless to say, the debate also focuses on how the concept was first arrived at and who was responsible for this (Christophersen, 2002).

The concept of (UD) stemmed from two separate but related movements, one focusing on removing the *they* and *us* attitude, an approach that marginalized persons with functional disabilities, and the other focusing on a democratization of the definition of good design with users in mind (Christophersen, 2002).

1.2 Statement of the problem

It is a matter of great concern that people with disabilities on the African continent face barrier in the education system for a multiple of reasons. Public facilities/buildings seem to favour only the able persons as manifested in communal facilities like schools, hospitals, and banks among others Commission for Architecture and Built Environment (CABE, 2012).

In institutions, the public facilities such as faculty buildings fail to be friendly to every user of the building especially in terms of accessibility. This is because the design provides facilities for only the able people, as if there is no tendency to have a disabled person in the institutions (CABE, 2012).

Faculty building, just like other public buildings is meant for everybody. As everyone has equal right to use it for his own need. In an institution, students have equal right to access the school facilities, such as lecture halls, library, laboratories and faculty buildings (WHO, 2011).

Several studies conducted on universal design include; Exploration of inclusive design principles in public facilities in Nigeria (Suleiman, 2017). Application of universal design on shopping centers in Nigeria (Michael, 2013), Educational facilities and environment accessible and usable for all user group should also be right rather than privilege (Sholanke, Adeboye&Alagbe 2019).

These studies advocate for a comprehensive general implementation of the universal design theory without considering the peculiarities of faculty buildings.

Thus, this study bridge the gap, finds it necessary to apply the principle and concept of universal design on the design of faculty buildings and its peculiarities to enhance accessibility of users and their immediate needs

1.3 Aim and Objectives of the Study

The aim of the research is to determine the level of application of universal design Principles on institutional buildings.

The objectives of the study are:

- i. To determine the level of application universal design principles on existing institutional buildings.
- ii. To identify the suitable principles as related to faculty buildings.

1.4 Significance of the Study

Universal design ultimately benefits everyone. People who do not have an immediate need may not value universal design, even though at some point in their life they may find universal or Inclusive design beneficial. This includes everyday products that become easier to use, such as lecture halls, laboratories, Studios, offices and other facilities within the Faculty. For most people, universal design is unnoticeable, except that it is more convenient Most people are surprised that universal design provides safer, more comfortable and more usable products, spaces or information.

People with disabilities benefit dramatically from the effective adoption of the universal design concept one of the benefit is the recognition that disability is part of the natural human condition. People with disabilities become customers and participants, not just patients, clients or service recipients (Connell. B.R. et al, 1997). Nigeria is a diverse nation which has about 19 million people living with one form of disability or the other (Seun, 2014). Considering them in our design can give barrier free education in the society. Giving them access to education can lead to the improvement the economy.

II. The principles of Universal Design

The principles of universal design according to Center for Universal Design (CUD, 2014) are as follows;

2.1 Principle 1: Equitable use



Figure 1: Equitable use. Source: CUD, North Carolina (2022)

Definition: The design is useful and marketable to people to people with diverse abilities.

This means that we should create designs that appeal to everyone and offer everyone a way to participate. Principle 1 addresses making designs useful and marketable to diverse groups of users concurrently: design for all people.

Guidelines:

- i. Provide the same means of use for all users: identical whenever possible, equivalent when not;
- ii. Avoid segregating or stigmatizing any users; identical whenever possible, equivalent when not;
- iii. Avoid segregating or stigmatizing any users;
- iv. Make provision for privacy, security, and safety equally available to all users;
- v. Make the design appealing to all users.

2.2 Principle 2 Flexibility in use

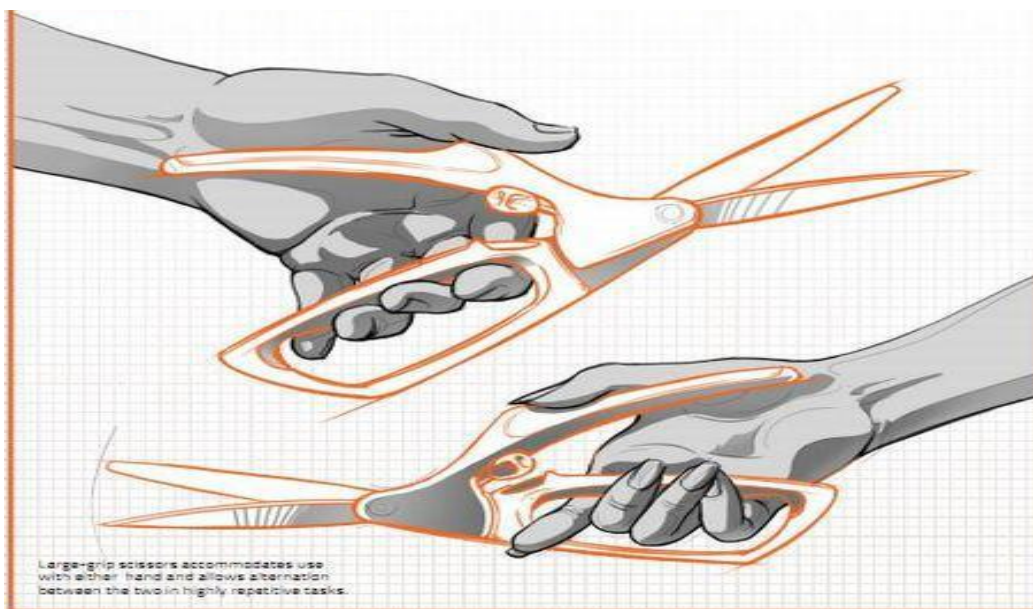


Figure 2: Flexibility in Use. Source: CUD, North Carolina (2014)

Definition: The design accommodates a wide range of individual preferences and abilities.

This means that we should provide for multiple ways of doing things. People ought to be able to use the design in any way that suits them personally. Adaptability is one way to make designs universally usable. Principle 2 addresses individual needs: design for each person individually.

Guidelines:

- i. Provide adaptability to the user's space
- ii. Facilitate the user's accuracy and precision;
- iii. Accommodate right or left-handed access and use;
- iv. Provide choice in methods of use.

2.3 Principle 3 Simple and intuitive

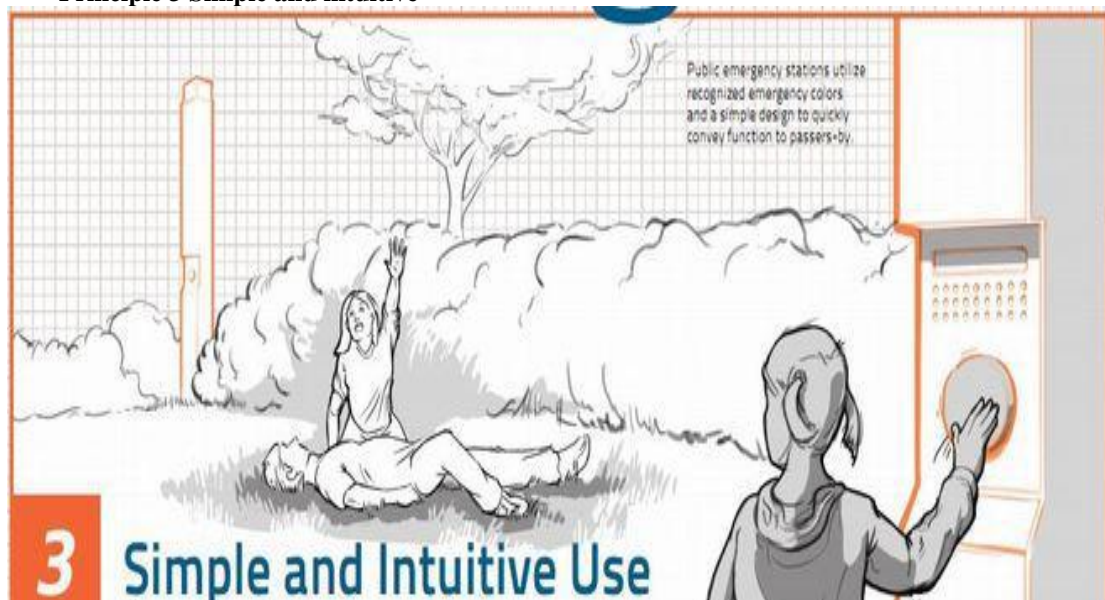


Figure 3: Simple and Intuitive Use. Source: CUD, North Carolina (2022)

Definition: Use of the design is easy to understand, regardless of the user's experiences, knowledge, language skills, or current concentration level.

This means that we should make things work the way you would expect them to work. Principle 3 addresses the cognitive issues of design use. A new user should be able to understand how to use the design the first time.

Guidelines:

- i. Arrange information consistent with its importance;
- ii. Provide effective prompting and feedback during and after task completion.
- iii. Accommodate a wide range of literacy and language skills;
- iv. Be consistent with user expectation and intuition
- v. Eliminate unnecessary complexity

2.4 Principle 4 Perceptible information

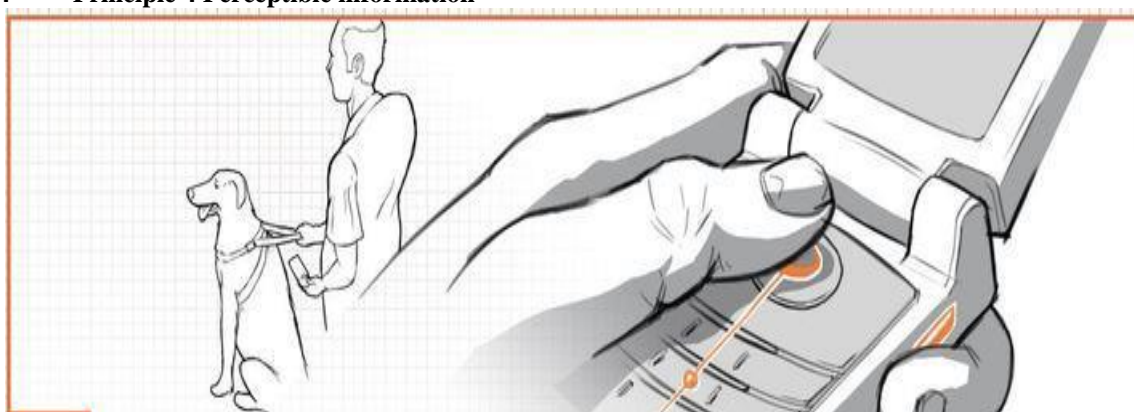


Figure 4: Perceptible Information. Source: CUD, North Carolina (2022)

Definition: The design communicates necessary information effectively to the user, regardless of ambient conditions or user's sensory abilities.

This means that we should provide for multiple modes of input and output. Principle 4 addresses the sensory issues of designs. (For design applications, we are primarily concerned with limitations of sight, hearing, and tactile sensitivity and less with limitations of smell and taste).

Guidelines:

- i. Provide compatibility with a variety of techniques or devices used by people with sensory limitations.
- ii. Maximize „legibility „ of essential information
- iii. Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information
- iv. Differentiate elements in ways that can be described (i.e make it easy to give instruction or direction);
- v. Provide adequate contrast between essential information and its surroundings.

2.5 Principle 5 Tolerance for error

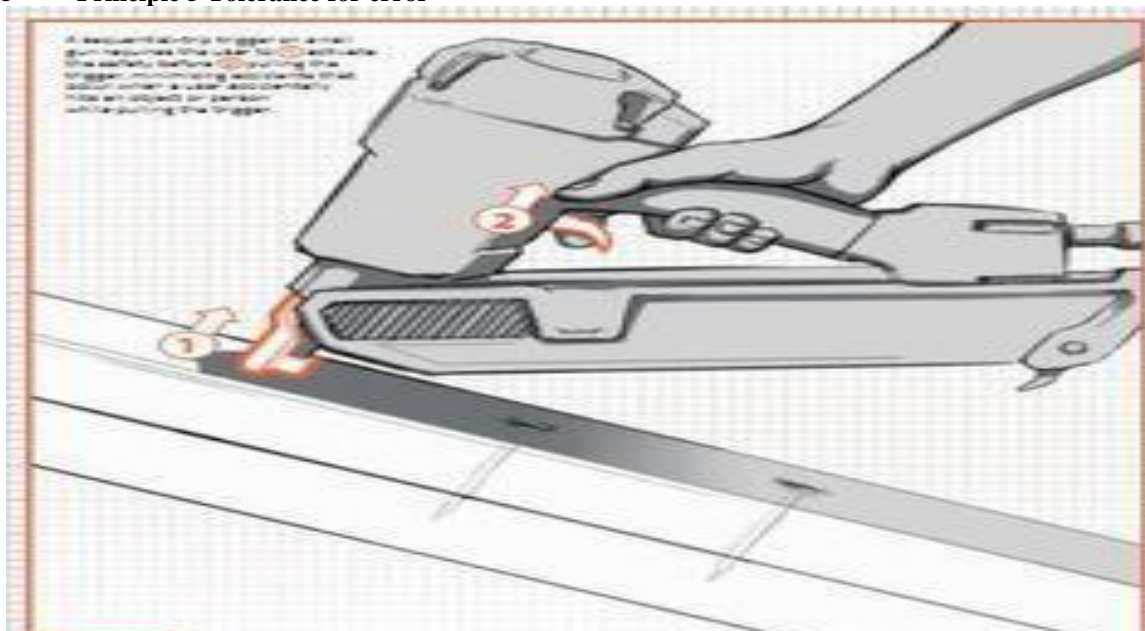


Figure 5: Tolerance for Error. Source: CUD, North Carolina (2014)

Definition: The design minimizes hazards and the adverse consequences of accidental or unintended actions.

This means that we should make it difficult to make a mistake, but if someone does, he should not hurt himself or the product. Everyone makes mistakes; but designs should be forgiving. Whenever possible, mistakes should be reversible or at least cause no harm

Guidelines:

- i. Provide warning of hazards or error;
- ii. Discourage unconscious action in task that require vigilance;
- iii. Arrange element to minimize hazards and errors: most used elements, most accessible; hazardous element eliminated, isolated, or shielded;
- iv. Provide fail safe features;

2.6 Principle 6 Low physical effort



Figure 6: Low Physical Effort. Source: CUD, North Carolina (2022)

Definition: The design can be used efficiently and comfortably and with a minimum of fatigue.

This means that we should minimize physical strain and overexertion. While some universal design experts in landscape architecture disagree with this Principle because it defeats the purpose of exercise, most others agree that designs should not physically overtax users.

Guide lines:

- i. Minimize sustained physical effort
- ii. Use reasonable operating forces;
- iii. Minimize repetitive actions;
- iv. Allow user to maintain a neutral body position;

2.7 Principle 7 Size and space for approach and use

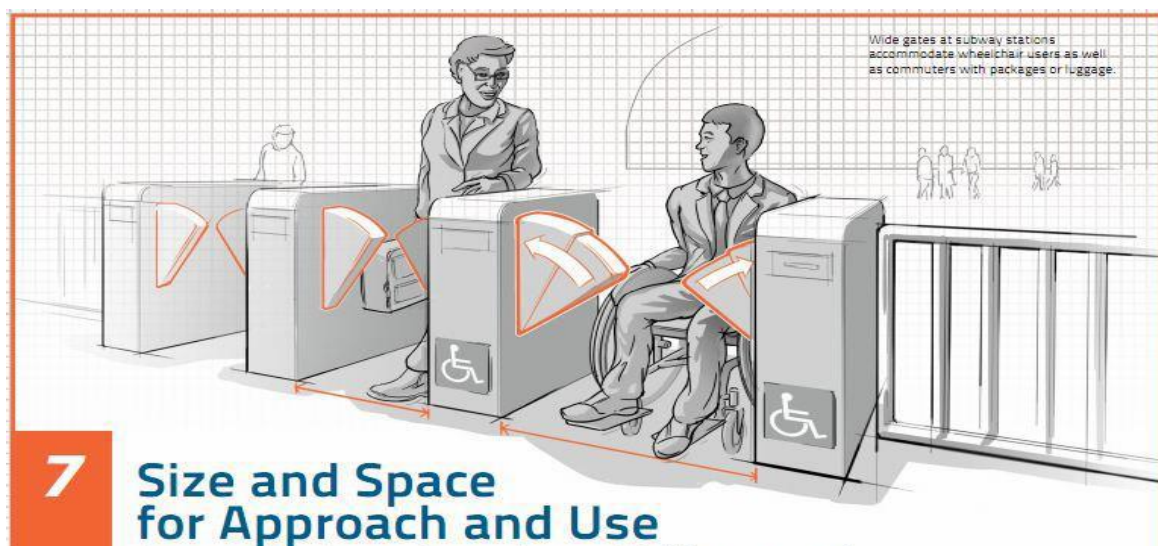


Figure 7: Size and Space for Approach and Use. Source: CUD, North Carolina (2022)

Definition: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility

This means that we should accommodate variety in people's body sizes and ranges of motion. This Principle addresses the physical space incorporated into a design to accommodate the user's body and any devices or companions needed during use.

Guidelines:

- i. Provide adequate space for the use of assistive devices or personal assistance.
- ii. Make reach to all components comfortable for any seated or standing user;
- iii. Provide a clear line of sight to important elements for any seated or standing

iv. Accommodate variation in hand and grip size;

Universal design based on the above principles is very important in the sense that it is useful and marketable to people with disabilities, it also accommodates a wide range of individual preferences as it is easy to understand regardless of user's experience or skills. Universal design also minimizes hazards and fatigue. It also provides adequate space for approach, reach, manipulates and use regardless of users body size, posture or mobility.

III. Methodology

3.1 Research design

Uji (2009) define research design as the act of putting in place the research strategies that would help ensure that the study provide answer to the fundamental question raised on it. Research design define as the specification or procedure for collecting and multiplying the data necessary to help solve the problem at hand such that the different between the cost of obtaining various level of accuracy and expected value of the information associated with each level of accuracy is maximized

3.2 Research approach

Research approach are plans and the procedure for research that span the decision from broad assumption to detailed method of data collective and analysis, it involve the intersection of philosophical assumption, design and specific methods. Therefore this research conducted in two stages.

The first stage include a detailed literature review and analysis, which continue through the research and then integrated into data analysis, the second stage consist of in- depth review of case studies, site visit, and document review, this stage help the researcher to validate the research question and identify the variables of interest related to variables of those question. The uses of multiple of data source help to increase internal validity and reliability.

This research would be conducted on the interpretivism philosophy and inductive approach Based on the tripartite cluster classification of research, (Groat and Wang, 2001),

3.3 Research strategy and time horizon

The research adopted mono method of data collection being the best and most suitable for Architectural research work (Groat and Wang (2001, Uji2009, Yin 2009 and Imenda, 2014) in cross sectional time would be used to collect the data at a single point.

To insure a reasonable outcome both primary and secondary source were use in collecting data for the research. However the research objective was addressed by the primary data therefore.

i Research objective one of this study was addressed by observation/ checklist

ii Research objective two of this study was addressed by observation

iii Research objective three of this study was addressed by finding from field and its subsequent application in the design

3.4 Research method

A case study research approach was adopted for this research work. This is because it is used to study a particular case in point with a view to examining in great depth and extent, the characteristics of that individual unit (Aina, 2002). Thus, a descriptive case study is to be adopted so as to compare the level of application of universal design principles on existing faculty buildings.

IV. CASE STUDY

4.1 Faculty of Environmental Technology, ATBU Bauchi

The Faculty of Environmental Technology of the AbubakarTafawaBalewa University, Bauchi has two (2) complexes. Phase I and Phase II. The emphasis of this thesis is the Phase II building. The building is located at the Yelwa Campus of the University. The Complex was constructed by Jibrilla Enterprises Ltd and supervised by New Grafix Limited. The construction date is 2007. The faculty Building is currently Functional.

4.1.1 Brief History:

The AbubakarTafawaBalewa University Bauchi was established 1980 as the Federal University of Technology. Faculty of Environmental Technology was introduced in 1992; the site is located in yelwa campus.

The complex accommodates the following departments;

- 1) Department of Architecture
- 2) Department Quantity Surveying
- 3) Department of Environmental Management Technology
- 4) Department of Urban and Regional Planning
- 5) Department of Surveying and Geo-informatics



Plate I: Site location of the faculty of environmental technology A.T.B.U Bauchi

Source: Google Earth (2018)

4.2 Simple and intuitive

4.2.1 Building form

The building form employed is rectangular in shape. It is on a grid of 3.0 m centers, and various sections of the building were connected with walkways therefore making the building simpler.

4.2.2 Ease of identification

The main entrance to the building is clearly defined and celebrated



Plate II: Approach view to the main entrance of the faculty of environmental technology, A.T.B.U Bauchi

Source: Researcher Field Work(2022)

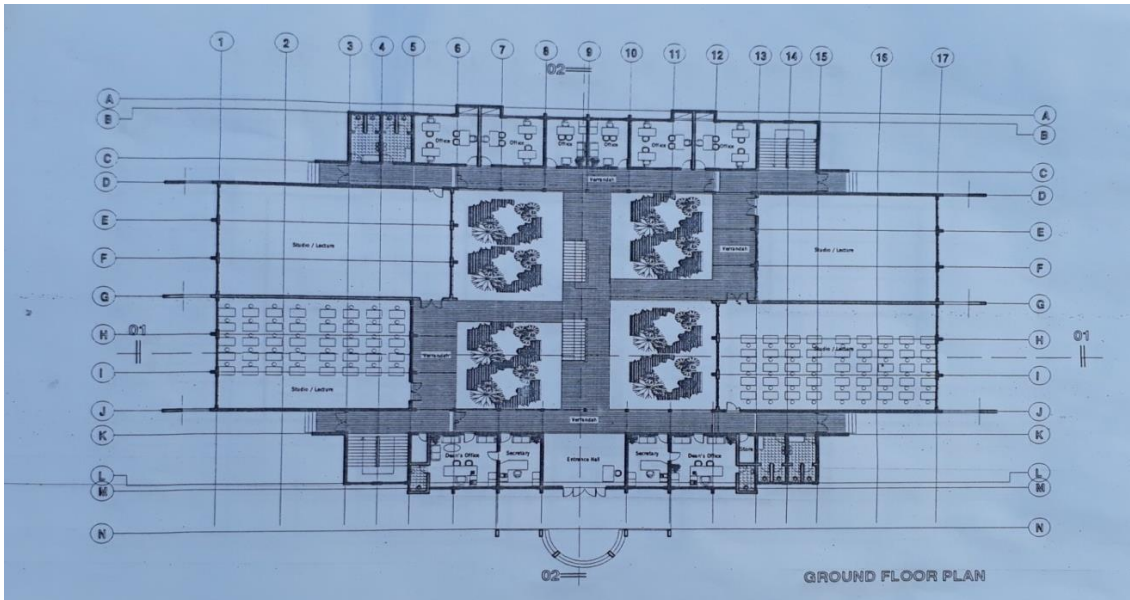


Plate III: Floor plan of the faculty of environmental Technology A.T.B.U Bauchi
Source: P.P.U. A.T.B.U Bauchi(2022)

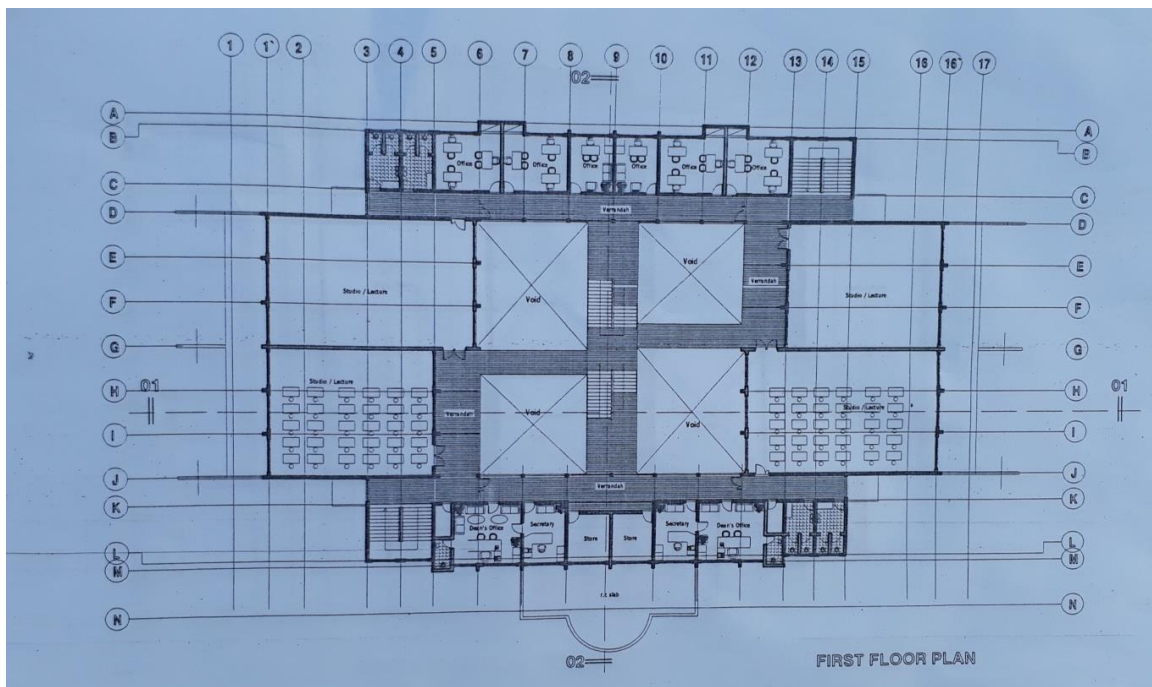


Plate IV: Floor plan of the faculty of environmental Technology A.T.B.U. Bauchi
Source: P.P.U. A.T.B.U Bauchi(2022)

4.2.3 Arrangement of accessible with importance

The Faculty Building is divided into administrative offices, classes, and studios etc. which are used by the various departments collectively. The Building has clear defined paths for effective vertical circulation of having a central staircase, alongside other staircases at the extreme. These defined paths are characteristics of design for inclusiveness.



Plate V: Central staircase for vertical circulation of faculty of environmental technology A.T.B.U
Source: Researcher Field Work, (2018)

4.3 Equitable Use

4.3.1 Building accessible to every one

The Faculty of Environmental Technology Building Phase II is a three storey structure. It has a central courtyard that serves the entire building with natural lighting and ventilation. The structure can be access by vertical or horizontal means of circulation, but limited to only the able users.

4.3.2 Provision of safety along corridors

The Faculty Building has hand rails along all the stair case and corridors that linked the various department and offices of the building so as to minimize hazard for the users.

4.2.3 Learning facilities

All spaces provided in the building on all floors have a step to its entrance. This makes the building only considered the able users.

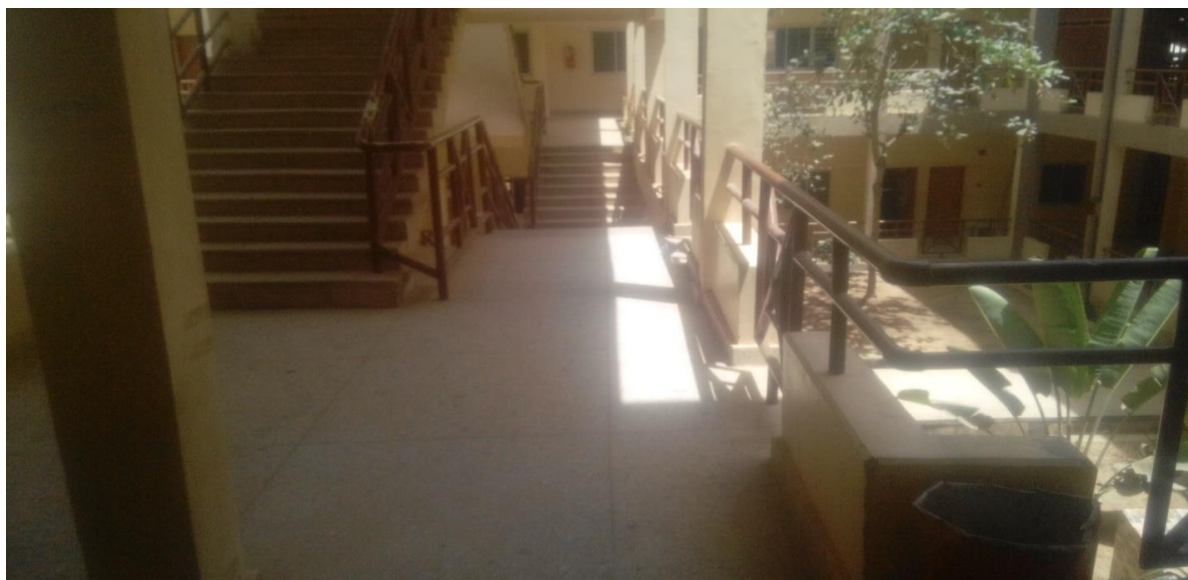


Plate VI: Staircase case with corridors along and provision of handrail for safety, A.T.B.U Bauchi
Source: Researcher Field Work(2018)

4.4. Flexible in use

4.4.1 Building has different access

The only means of vertical and horizontal circulation in the building are staircase and corridors respectively. However, Universal design requires more vertical and horizontal means of circulation as lift, escalators, ramp, travelatorse.t.c

4.4.2 Space to adopt changes

As the faculty building has limited (staircase only) means of vertical circulation space to adopt changes. Therefore, the user has no alternative.



Plate VII: Staircase case with large circulation area, A.T.B.U Bauchi

Source: Researcher Field Work, (2022)

4.4.3 Size and space for approach use

4.4.4 Height and Sizes of Handrail

The building has a different variety of handrail along floor and corridors with various thickness and height as required/needed.

4.4.5 Adequate space for movement

All the link corridors of ground floor and other floors have adequate sizes that will carry a lot of users for easy movement.

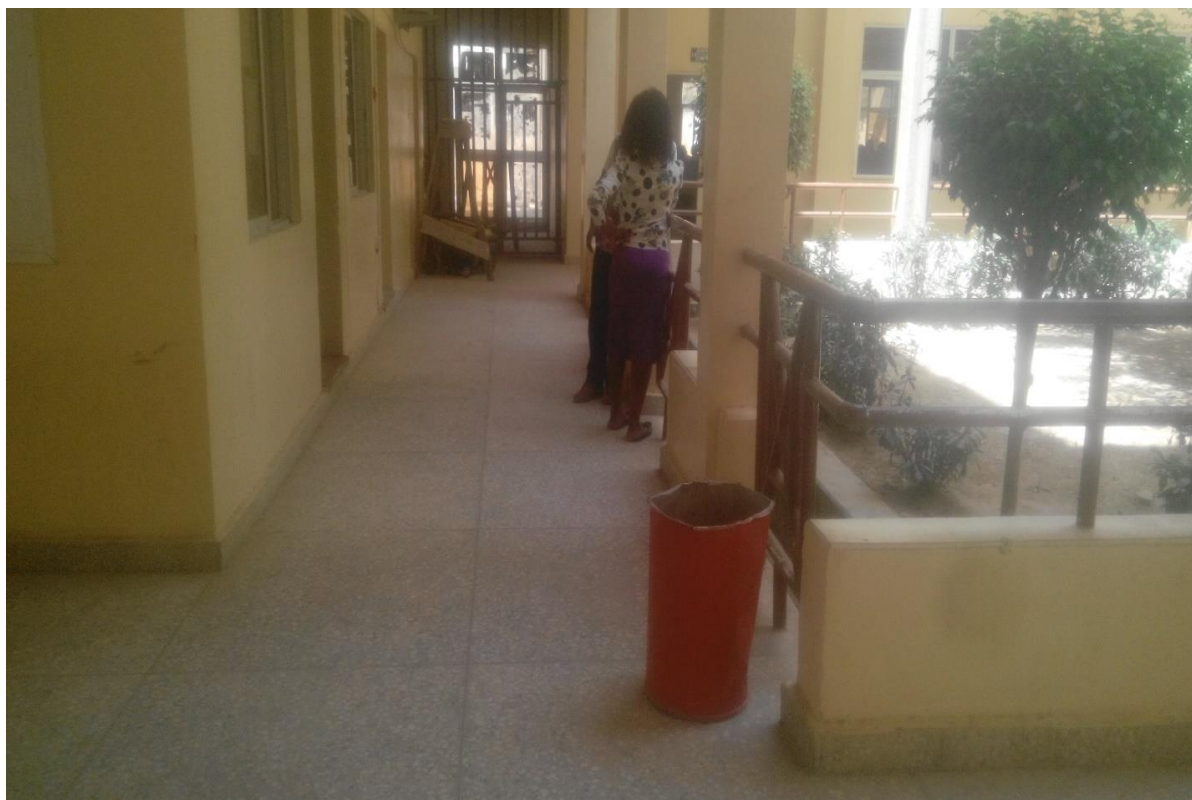


Plate VIII: Wide Corridor for movement with hand rail along, A.T.B.U Bauchi

Source: Researcher Field Work, (2022)

Table1. Below shows the Checklist for the Assessment of Universal design principles on faculty of environmental technology AbubakarTafawaBalewa University, Bauchi. The level of application of each variable in the design was rated.

Table 1. Checklist for the Assessment of Universal design Principles on Faculty of Environmental Technology AbubakarTafawaBalewa University, Bauchi

| S/No | Variables | Checklist | Level of Application | | | | | Remarks | |
|------|-----------------------------|--|--|---|---|---|---|---------|---|
| | | | 1 | 2 | 3 | 4 | 5 | | |
| 1 | Simple and Intuitive | Building Form | (Complex or Simple) | | | | | √ | Simple rectangular plan. |
| | | Ease of Identification. Arrangement of Accessible with Importance. | Entrance to the Building. Position of Staircase or Ramp. | (Defined or Hidden) (Defined or Hidden) | | | √ | | Clear define. Entrance Stair case Well defines. |
| 2 | Equitable Use | Building Accessible to Everyone. | Presence of Staircase or Ramp. | (Define or Hidden) | √ | | | | Access not for all users |
| | | Provision of Safety Along the Corridors. | Presence of Handrails Along Floors. | (Present or Not Present) | | | √ | | Hand rails are present in stair and corridors. Little easy to access. |
| 3 | Flexible in Use | Learning Facilities are they Accessible to everyone? | Access to Lecture Halls, Classes and Offices. | (Easy or with Difficult) | | √ | | | |
| | | Building has Different Access? Spaces for Access Adopt Changes | Staircase, Ramp or Elevator. Sizes of Ramp or staircase. | (Present or Not) (Easy or Difficult to use) | √ | | √ | | Only in stairway and corridor. Present of stair but its easy use. |

| | | | | | |
|----------|------------------------------------|------------------------------|--|---|-------------------------------|
| 4 | Size and Space for Approach | Height and Sizes of Handrail | Height, Diameter of Handrail. | √ | Height and diameter are fair. |
| | | Adequate Space for Movement | Corridor and Staircase. (Wide or Narrow) | √ | Space is adequate to move. |

Source: Researcher (2022)

Rating keys: 1=Poor,**2=**Not Adequate **3=**Fairly Adequate **4=**Adequate, **5=**Very Adequate.

4.2.6 Case Study Appraisal

- I. The Faculty building has different optional doors along the entire extreme end for exit and for feature expansion.
- II. The Faculty building has a staircase that link the entire functional department immediately after the entrance.
- III. The Faculty building has various staircases along different end in order to facilitate easier movement within the faculty.
- IV. The building has considered a central entrance porch at the midpoint of the faculty for easier identification.
- V. The staircase and corridors are wide for easy movement.
- VI. Both corridors and staircases have safety rail.

4.2.7 Observations on Case Study

- I. The Faculty Building is designed for able users
- II. The design does not consider flexible to adopt changes.
- III. There are a lot of steps at the spaces entrance which make it not friendly to the non-able users
- IV. The Building has only one vertical means of circulation

Table 15: Summary of Result for ATBU Senate Building

| S/N | Variables | Average Score | Remark |
|-----|-----------------------------|---------------|-----------------|
| 1 | Simple and Intuitive | 4 | Adequate |
| 2 | Equitable Use | 2 | Not Adequate |
| 3 | Flexible in Use | 2 | Not Adequate |
| 4 | Size and Space for Approach | 3 | Fairly Adequate |

Source: Researcher, 2022

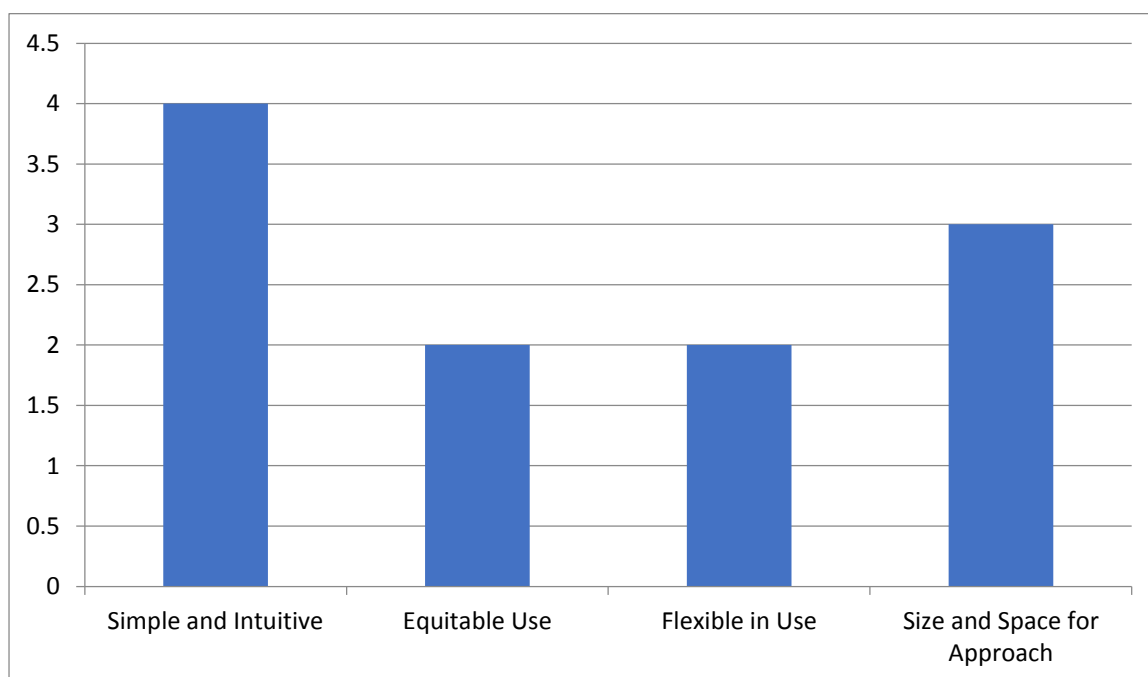


Figure 8: Level of Application of the Variables of ATBU Faculty of Environmental Tech.

Source: Researcher (2022)

From the figure above, only the first principle of universal design (Simple and Intuitive) is applied to adequate level, while the fourth principle (Size and Space for Approach) is fairly adequate. The Second and Third principle (Flexible in Use and Flexible in Use) are not adequately used.

V. Summary of Findings

Table 2: Summary of Finding

| Variables | General Characteristics |
|------------------------------------|---|
| Simple and Intuitive | The design plan for all the cased are on simpler form of squares plan, the entrance of the cased reflect the same element by having a well clear define entrance. The position of stair are well positioned in such a way immediately after the main entrance of the faculty, the means of movement are clear and visible. The building have its vertical/horizontal circulation design much more concern on able users, no ramp or lift to serve as other means circulation within the building. The cased building has only stair case. Both for vertical and horizontal movement consider means of safety which include handrails and concrete. The faculty building have a standard gauge handrail, the sizes of corridors are not wide enough for easy movement and convenient for users. |
| Equitable Use | |
| Flexible in Use | |
| Size and space for approach | |

5.1 Summary

In summary Universal design it is an approach that considers the widest possible audience, addressing the needs of people who have been traditionally excluded or marginalized by mainstream design practices. Good design should meet the needs of the diverse population and should remove the physical barriers that can segregate and exclude.

Universal design originally emerged from the disability movement. However, many older people, families with children and people whose first language is not English will also benefit from an accessible and universal environment.

5.2 Conclusion

Universal Design Principles requires the need for paradigm shift to social Architecture in education and in practice, this is because we must include everyone and fight for all to have equal access to the built environment. After all, that is what community is all about; Failure to respond to the demographic changes occurring will betray our future generations.

The simple reason is that we cannot solve problems by using the same kind of thinking as we used when we created them.

We need to be forward thinking with guidelines which architects will want to obey for the good of their people. Egalitarianism is vital to successful accessibility for all. We need designs that are not inherently discriminatory and will facilitate security, access, equality and dignity, regardless of physical or mental ability, should be there for all to enjoy and appreciate.

Everybody deserves equal access and a Nation's greatness is measured by how it treats its weakest members.

5.3 Recommendations

i. Public Awareness: Information is power; heightened social awareness in the society is required to educate the populace at all facets of learning for the users to demand from the service providers.

ii. Professional bodies: At professional level, architects and allied professionals should inform its members to provide the society with up-to-date solutions to be equipped to move the construction industry as a whole into a new era of design quality based on universal design principles.

iii. Regulatory Authorities: Nigeria being a signatory to Convention on the Rights of Persons with Disabilities (CRPD) should ensure the passing into law a bill titled 'an Act to ensure full integration of Persons with

Disabilities and to establish a National Commission for Persons with Disabilities' and empower the relevant regulatory authorities to enforce universal design standards to the environment, product and services.

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