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ASSESSMENT OF UNIVERSAL DESIGN PROVISIONS AT THE MAIN ENTRANCE OF UNIVERSITY BUILDINGS IN EKITI STATE, NIGERIA

Rasaki A. Ibrahim[1]*, Joseph A. Fadamiro[2], Foluso C. Awe[3] and Tolulope A. Falusi[4]

[1,2,4] Department of Architecture, Afe Babalola University, Ado Ekiti.
[3] Department of Architecture, Federal University, Oye Ekiti.

Corresponding email: Ibrahimra@abuad.edu.ng

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Abstract. People have diverse characteristics and undergo different stages in life, which require design standards when designing public buildings. Universal Design (UD) is the design approach that aims to create accessible and usable environments for everyone. An academic building is a structure designed and used for educational purposes. The need to establish a barrier-free academic environment for all to use with equal opportunity for learning (Sholanke et al., 2020) and to remove obstacles, defeat disabilities, and improve accessibility (Powell, 2011). It is essential to have a clear understanding of what is being done to address accessibility, inclusive and sustainable learning environments. All these requirements together form a complex idea that calls for different insights to investigate and build on. The study aims to assess the effectiveness of the UD provisions at the main entrance of academic buildings in universities in Ekiti State, Nigeria. The qualitative and quantitative research approaches were employed with checklist used to gather information on accessibility from eighty-two academic buildings in the universities in Ekiti State. For the quantitative approach, questionnaires were administered to students to seek information on aspects pertaining to the provision of UD at the main entrance of university buildings. The findings revealed that 68.0 % of students in ABUAD considered the UD provisions at the main entrances of academic buildings more effective, followed by EKSU (63.4 %) and FUOYE (62.8), with the latter being the least.

Keywords: Universal design, university buildings, main entrance, accessibility, facility.

1. Introduction

Everyone, even the most physically fit individuals, experiences periods of childhood, temporary illness and injury, and old age weakness (Centre for Universal Design (CUD, 2003). Universal Design (UD) is a design approach that aims to develop standard designs for everyone rather than creating unique designs for each individual group when creating public structure for people to use. Any environment designed for people with disabilities will be easier for everyone to use, regardless of their ages, abilities, or current state of health (Maclean, 2014).
The CUD (1997) at North Carolina State University defines UD as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.” Duman and Asilsoy (2022) see it as “the strategy that has a core target to make the designs and combination of environments and products usable for everyone without the need for adaptation or specialized design solutions.” Centre for Excellence in Universal Design (CEUD) (2024); Kim and Chang (2018) also noted that “the commonly observed aims of UD concepts are the creation of spaces that allow for participation and empowerment for

all; the development of environments where human performance, health, and wellness are facilitated; and facilities that can be accessed, understood, and used." Considering the different phases of people's life, including childhood, youth, pregnancy, and old age, standard designs are created for individuals with different characteristics by taking into account mental, congenital, and physical disabilities at some point in life, regardless of race or gender (Duman & Uzunoğlu, 2022). Academic buildings are described as physical structures that are planned, designed, and used for educational purposes. It is the location of several events such as administration, teaching, conferences, and researches. They are comprised of classrooms, lecture halls, libraries, offices, studios, conference rooms, and laboratories. The educational environment that improves accessibility and inclusivity can be better achieved through the extended mission to provide possibilities for UD provisions. The university has a unique responsibility and opportunity to increase access to educational opportunities. By doing this, it demonstrates to the communities the benefits that accrue to everyone and the possibility of removing barriers (Powell, 2021).

According to Sholanke et al. (2020) "it is essential to establish a barrier-free environment for all students in an academic setting so that people can experience and benefit from all aspects of learning within the university, regardless of age, size, or physical ability". UD has the capacity to transform universities into institutions that provide all users equal opportunity to learn, succeed, and realize their full potential. Individuals with disabilities perform less academically and participate less in cultural and political activities (Aniekan, 2021). Though more than a hundred nations have ratified the International Convention on the Rights of Persons with Disabilities since 2006. This was adopted in Nigeria in 2018 and despite its adoption, inclusive education is still an abstract ideal. In order to improve accessibility, we must remove obstacles and defeat disabilities (Powell, 2011). By examining the physical characteristics and emotional development of students across different age groups, it is obvious to a large extent what is required to make them feel comfortable in the lecture room (Ivanova, 2019).

In order to enhance the accessibility needs of the users, this study fills the gap by examining how the UD concepts can be applied to the educational buildings. Whether UD principles are broadly or occasionally implemented by universities due to unfamiliarity is less clear. "It is important to have a clear understanding of what is being done to address accessibility on campuses and to determine whether universities are committed to more sustainable, inclusive, and equitable learning environment or whether they remain theoretical ideal" (Fleet & Kondrashov, 2019).

The study aims to assess the effectiveness of the UD provisions at the main entrance of academic buildings in the universities in Ekiti State, Nigeria. The objectives are to evaluate the adequacy of the approach features with the view to making recommendations that will enhance access towards achieving inclusive and sustainable society. The study assessed main entrance accessibility components of the eighty-two (82) academic buildings in the universities. The approach features targeted were car parks, ramps, walkways, and steps, entrance doors, and entrance porches, as these require more consideration to make the buildings usable and accessible to all. Based on these, the study examined UD provisions at the main entrance of universities buildings and identified solutions that would enhance access for everyone, including students with disabilities.

2. Literature Review

2.1 Importance of Universal Design

According to Allen (1988), a university is an "institution that has power to award its own degree and excellence in the field of research." "It is a center for professional training to serve society's socio-economic, political, and cultural needs. The university has developed innumerable traditions worth maintaining research, teaching, and models for the betterment of the society" (Powell,

2011). The major goal of university is to advance intellectual capacity and conduct methodological study in academic disciplines (Ruegg, 1992).

When compared to other kinds of higher institutions, a university has a greater potential to draw in students and staff. It serves as a vehicle for the development of highly skilled human capital and knowledge for the professions with the potential to transform the world (Powell, 2011; Alemu, 2018). According to Assié-Lumumba (2005), a university is a higher education establishment that nurtures advanced research and increases the intellectual level of both lecturers and students in the traditional professional subjects as well as the arts and sciences. "The university is a continual source of enlightenment and a perennial engine of innovation. It requires all levels of education to be inclusive, which benefits everyone, including those who are having disabilities or impairments." Powell (2015). The need to appreciate diversity and promote environments that are understandable, accessible and usable by all regardless of ability or disability is indispensable since university is a place where people of different background and cultural identity come together. Therefore, approaches to the design of university built environments required focus on users' inclusion, which is the ultimate goal of UD.

The university's academic buildings are institutional spaces where scholars conduct research work, knowledge collides with knowledge, study is pushed forward, discoveries are validated and refined, and errors are revealed. The place where teachers and students showcase science knowledge in its most comprehensive and effective form (Newman, 1910). It is believed that UD academic environments are crucial to people's personal development and the well-being of the societies. People won't be able to fully engage in society or realize their own potential in order to maximize abilities without such UD environments (Sholanke et al., 2020).

2.2 The concept of Accessibility and University Buildings

Accessibility refers to the "design and use of products, services, or environments such that they are usable by people with disabilities. This consists of physical accessibility, which includes the design of lifts, ramps, walkways, and stairs, or digital accessibility, which includes the design of computer programs (AACSB, 2022). According to Babalola (2020), accessibility is the "relationship between physical or cognitive human capacity and being able to use the environment, as well as the demands from the environment on the user." Hansen (1959) defined accessibility as "the opportunity which an individual or type of person at a given location possesses to take part in a certain or set of activities" (Cascetta, 2013).

Inclusion and equity depend on accessibility, which has an influence on several aspects of human existence, including technology, building, city planning, legal and policy frameworks, and the places where we work and play. "Accessibility is a fundamental human right to ensure compliance and creating a truly welcoming community that recognizes and values diversity requiring more than rules and regulations. There is need to make effort and ensure that everyone has an opportunity to contribute and participate fully in the society, which is the goal of UD" (Stauch & Snowdon-Lawley, 2024).

UD encompasses a wider range of accessibility and user-friendliness; spatial environments with UD features are more cost-efficient. From children to the elderly, UD provides accommodations and support for a wide range of users, including persons in need of medical attention and persons with disabilities. Accessibility design only addresses the needs of the final two demographic groups, while UD addresses the needs of diverse users to the highest extent possible (Harrison, 2011).

2.3 Universal Design and Its Built-in Principles in Institutional Buildings

Over the three decades, several terms have been introduced to propose equal opportunities for everyone living in the built environments. These include inclusive design, design for all, UD,

barrier-free design, usable design, adaptive design, and accessible design. The most prominent strategy among these concepts is UD, which is the most inclusive strategy proposed to address the issue of discrimination in design (Duman & Asilsoy, 2022). According to Steinfeld (2012), UD is "a process that improves human performance, health and wellness, and social participation in order to enable and empower a diverse population." Centre for Excellence in Universal Design (CEUD) (2024) defined UD as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.” The aim of UD is to benefit everyone, not only people with impairments but a philosophy that eliminates the differences between people of different abilities (CEUD, 2024). Maclean (2014) stated that “the focus of universal design at the public building is to make life easier for everyone by improving the usability of built environments and products for as many people as possible at little to no additional expense, benefiting people of all ages and abilities.

According to Doman & Asilsoy (2022) architect Ronald L. Mace worked with a group of architects, product designers, engineers, and environmental designers in 1985 to establish seven principles of UD, which are as follows: Equitable Use: It entails giving all users equal opportunities for use, preventing user stigmatization or segregation, and ensuring all users have equal access to privacy, security, and safety features. Flexibility in use offers a variety of usage options and accommodating both left- and right-handed users. Simple and Intuitive Use means removing redundant complexity and aligning with user expectations. Perceptible Information includes presenting significant information in a variety of ways. Tolerance for Error implies that the design reduces risks and the negative effects of unintentional or accidental activities. Low Physical Effort involves little physical strain while using the design effectively and comfortably. Size and Space for Approach and Use entails taking into consideration differences in hand and grip sizes and allows enough room for the use of assistive equipment and personal assistance.

These principles' primary objectives are to promote inclusivity, which prohibits exclusivity, and hide people's disabilities (Imrie & Hall, 2001; Kadir & Jamaludin, 2013), and accommodate diversity by offering flexible design solutions for users with different backgrounds and abilities (Gossett et al., 2009).

2.4 Approaches to the Institutional Buildings

Duman and Uzunoğlu (2022) state that “the approaches institutional buildings enables people living on the campus to access all of the campus’ facilities.” Everyone on campus has the most natural right to this. In society, different kinds of users coexist. Engaging in campus activities and experiencing a sense of belonging are essential aspects of the university’s built environment. According to Fleet (2019), to make people happy to call the university home, the design should be simple, barrier-free, convenient, and secured, with simple layouts, with clear signage and easy-to-use entrances that should conveys clarity. There should also be broad, accessible walkways with raised curbs and varying textures to differentiate edges. Cracks, poor joints, additions, and broken or damaged surfaces should all be absent from the walkway's continuous surface while right materials should be employed, and the walking surface shouldn't be slippery (Martino & Farrag, 2022).

An accessible car park must be set aside for drivers and passengers with disabilities and located very close to the accessible entrances of the buildings served. Convenient and secured spaces for pickup and drop-off should be provided around the buildings (Inclusive Mobility, 2021). Accessibility measures for steps, ramps, lifts, or any combination of these must be put in place to ensure that everyone can use the entrance if there are any changes in level in relation to the walkway or the entrance door. Ramps or steps should be used in the design of buildings with level changes that exceed the allowable height in order to give access to the buildings (Department of justice, 2010). Ramps can be dangerous and difficult for individuals to use, if not correctly planned

and designed. Steps and ramps should be appropriately wide to handle the expected traffic flow and have landings at the top and bottom to enable people to rest and maneuver (The Building Regulations, 2015).

3. Materials and Method

Research methods include all the approaches and techniques that have been taken to carry out research". Neuman (2017) and Morenikeji et al. (2022) noted that "there are three main approaches that are generally utilized when conducting research, which are quantitative, qualitative, and mixed method." Qualitative and quantitative research approaches were employed in gathering research data from academic buildings in the universities in Ekiti State with secondary data reviewed from an earlier study, which served as the basis for this research. These comprise meticulous documentation, observation, and analysis of the unique features and functions provided by the building and its facilities, which were considered appropriate for the study. Three academic buildings were evaluated for this study using the accessibility and universal design parameters as a framework. The academic buildings were chosen based on the importance of the buildings to the users; which included the administrative buildings, college/faculty buildings, and lecture theatres. The study used a checklist to collect reliable data on a large number of buildings to ensure that all academic buildings were represented in the research,

There are six universities in the study areas which include Federal University Oye; Ekiti, Ekiti State University, Ado Ekiti; and Bamidele Olumilua University of Science and Technology, Ikere Ekiti; Venite University, Iloro Ekiti; and Hillside University of Science and Technology, Oke Imesi-Ekiti. The universities were first categorized on three basis of federal, state, and private institutions. Then, using basic random sampling, one university was chosen from each category, which included ABUAD (private), EKSU (state), and FUOYE (federal). FUOYE, EKSU and ABUAD were considered for this study because they have large numbers of academic buildings that constitute the largest population of the university buildings in the Ekiti State, Nigeria. Observation guides were used to measure UD provisions in eighty-two (82) academic buildings (14 in ABUAD, 32 in EKSU, and 36 in FUOYE), using the Morgan and Kregice chart as a guide, which represented the sample size.

Also, students were given questionnaires to source information on various variables related to accessibility and UD standards. According to Al-Assaf (2018); Sholanke et al. (2020), questionnaires offer "the benefit of improving data generalization while giving respondents the freedom to express their opinions." The questions were prepared to ask respondents to rate a number of specific features, such as car park size, walkways, ramps, and entrance doors accessibility, on a three and five-point Likert scale, for example: (1) Not Available (NAV), (2) Not Adequate (NA) and (3) Adequate (A). Questionnaires were distributed using the random sampling technique. A total of 150 questionnaires were given out in each university to the intended students utilizing the buildings that provided the foundation for the data analysis. Nonetheless, the total number of questionnaires returned was 132 (88%) in ABUAD, 137 (91%) in EKSU, and 142 (95%) in FUOYE, which represents 91% of the total questionnaires distributed to the target respondents in the universities.

Statistical package for social sciences (SPSS) was used to analyze the data obtained from the universities because of its versatility and suitability and the results were presented using descriptive tables.

4. Results and Discussion

4.1 Demographic Characteristics of Respondents

From table 1 it can be seen that a total of four hundred and eleven (411) questionnaires were retrieved out of the four hundred and fifty (450) distributed across the three universities investigated. FUOYE had 142 (52.8% male and 47.2% female), followed by EKSU with 137 (43.1% male and 56.9% female) and ABUAD with, 132 (52.3% male and 47.7% female) respondents.

The table further disclosed a notable disparity in age among respondents with ages 16-25 in ABUAD (62.1%), EKSU (62%), and FUOYE (52.8%), 26-35 in ABUAD (23.1%), EKSU (28.5%), and FUOYE (43.2%), and 36-45 (ABUAD 23.1%, EKSU 28.5%, and FUOYE 42.3%), while all other student ages are also well represented in a reasonable proportion in the table. It also shows that the educational achievement of the majority of the respondents is undergraduate at ABUAD (84.8), EKSU (86.8), and FUOYE (92.9), while other levels, such as degree, and postgraduate, are also represented in the table. Moreover, the table appropriately presented the religion and marital statuses of the respondents.

Table 1: Demographic characteristics of the students.

Demographic Characteristics	Universities		
	ABUAD n (%)	EKSU n (%)	FUOYE n (%)
Sex	Male	69 (52.3)	59 (43.1)
	Female	63 (47.7)	78 (56.9)
Age	16-25	82 (62.1)	65 (62)
	26-35	31(23.1)	39 (28.5)
	36-45	5 (3.8)	6 (4.4)
	46-55	11 (8.3)	5 (3.6)
	56-55	23(2.3)	2 (1.5)
	66 and above	1 (0.8)	-
Educational Achievement	Undergraduate	112 (84.8)	119 (86.8)
	B.Sc./HND/NCE	9 (6.8)	11 (8)
	Post Graduate	11 (8.3)	7 (5.1)
Religion	Christianity	112 (84.8)	113 (82.5)
	Islam	12 (9.1)	16 (13.9)
	Others	8 (6.1)	5 (3.6)
Marital status	Single	118 (89.4)	129 (94.2)
	Married	14 (10.6)	6 (4.4)
	Separated	-	1 (0.7)
	Widowed	-	1 (0.7)

4.2 Accessibility Provisions in Universities' Academic Buildings, Ekiti State

Table 2 reveals that in ABUAD only one (7.1%) of the academic buildings examined has parking space reserved for persons with mobility impairments, and two (14.3%) of the walkways provided are on the same level as the car parks. The access entrances have appropriate clear width (100%) with sufficient spaces that allow for equal and full participation of wheelchair users. Six (42.9%) of the buildings have no ramps at the entrances, while some with the ramps three (21.4%) have high gradients and are too steep for persons with mobility impairment to use independently without the assistance of others. None of the steps and ramps in the buildings were provided with handrails on the sides. Of the 12 buildings that have steps at the entry, eight (57.1%) have consistent risers and treads.

The findings from EKSU in Table 2 show that the buildings do not have parking spaces specifically dedicated to wheelchair users as required by accessibility design standards. Eighteen (56.3%) of the buildings are provided with inaccessible walkways that are slip-resistant but on the same level with the car parks. number of the entrances have clear opening widths thirty (93.7%) and appropriate spaces twenty eight (87.5%) before and after the doors for wheelchair users maneuvering. Though the majority of the buildings' door thresholds are within the allowable UD standards, twelve (37.5%) were inaccessible to people with mobility and visual impairments. Only eight (25.0%) and seven (21.9%) of the buildings' step risers and threads are consistent, while seventeen (53.1%) and eighteen (56.3%) are inconsistent with UD standards. Nine (28.1%) of the building ramp heights and slopes are adequate, while seven (21.9%) are inappropriately designed. Both ramps and steps do not have handrails to meet the requirements for accessible ramps and steps for users with mobility impairments. Fifth teen (46.9%) of the landings at the top and bottom of the ramps can be easily turned through by people using wheelchairs, while sixteen (50.0%) of the buildings are not provided with ramps.

Also, the results from FUOYE in Table 2 show that all buildings studied have made no provision for designated car parks for children, pregnant women, the aged, and people with mobility impairments as prescribed in accessibility design standards. The doors are provided with easy-to-operate handles and adequate opening widths. The steps provided have inconsistent risers seventeen (47.2%) and threads thirteen (36.1%), respectively. Only seventeen (47.2%) of risers and 58.3% of threads are appropriately designed. Thirteen (36.1%) of the buildings have no ramps, and 22 (66.1%) have adequate ramps, though only 1 (2.8%) has an inaccessible ramp as provided in accessible design guidelines. There is no consideration for persons with different characteristics because no provisions were made for handrails or block guides at the edge of the ramps to safely guide the users of the ramps.

Table 2: shows the adequacy of accessibility components at the main entrances of academic buildings at ABUAD, EKSU and FUOYE

Items	Accessibility Features	ABUAD			EKSU			FUOYE		
		NAV %	NA %	A %	NAV %	NA %	A %	NAV %	NA %	A %
Parking/ Walkway	Parking space reserved specifically for persons with disabilities	92.9	-	7.1	100	-	-	100	-	-
	Parking space with slip-free surface	-	-	100	21.9	50.0	46.9	5.6	36.1	58.3
	Appropriate bridging at change in level between walkway and parking space	-	14.3	85.7	28.1	56.3	15.6	5.6	47.2	47.2
	Provision of tactile marks along the walkways	100	-	-	100	-	-	100	-	-
	Walkways directing users to the entrances	-	7.1	92.9	3.1	25.0	71.9	5.6	36.1	58.3
Entrance	Provision of signage to direct people	-	-	100	-	-	100	30.6	5.6	63.9
	Well defined entrance	-	-	100	6.3	3.1	90.6	-	19.4	80.6
	Minimum space of 1500 x 1500 mm² before and after the door to facilitate manoeuvring of wheelchair users	-	-	100	3.1	9.4	87.5	13.9	36.1	50.0
	Adequate clear door width	-	-	100	6.3	-	93.8	-	-	100
	Ease of operating door handle	-	-	100	6.3	-	93.7	-	-	100
	Maximum of 10 mm threshold height	-	35.7	64.3	3.1	37.5	59.4	5.6	37.4	61.1

Step	Appropriate steps to bridge the level differences before the entrance	21.4	35.7	42.9	18.8	21.9	59.4	5.6	47.2	47.2
	Provision of consistent step risers	14.3	28.6	57.1	21.9	53.1	25.0	5.6	36.1	58.3
	Provision of consistent step depths	14.3	28.6	57.1	21.9	56.2	21.9	-	44.4	55.6
Ramp	Appropriate ramps to bridge the level differences before the entrance	42.9	21.4	35.7	46.9	34.4	18.8	36.1	27.8	36.1
	Ramp length before landing (less than 10 m preferred)	42.9	21.4	35.7	50.0	6.3	43.8	36.1	2.8	66.1
	Tactile indicators at the top and bottom of the ramp	100	-	-	100	-	-	100	-	-
	Appropriate ramp height	42.9	21.4	35.7	50.0	21.9	28.1	41.7	13.9	44.4
	Appropriate ramp slope	42.9	21.4	35.7	50.0	21.9	28.1	41.7	11.1	47.2
	Sufficient landings at the top and bottom of ramp	42.9	-	57.1	50.0	3.1	46.9	41.7	19.4	38.9
Handrail	Provision of handrails on sides of ramps and steps	100	-	-	93.8	6.3	-	97.2	2.8	-

Where NAV = Not Available, NA = Not Adequate, A = Adequate

4.3 Effectiveness of UD Provision of the Main Entrance of University Buildings

The assessment of the effectiveness of the UD provisions at the main entrance of academic buildings was carry out to establish the hierarchy and determine the accessibility needs of students Fig. 2. Table 3 shows the ranking of different features with reference to relevance UD guidelines. For example, a score is assigned to each parameter. 1, 2, 3, 4, and 5 were assigned to not available, not effective, neutral, effective, and highly effective, respectively. The results were ranked using a Relative Importance Index (RII).

The table also shows the comparison of UD provisions at the main entrances of the buildings in the study areas. The scores for parking space sizes were from 2.84 to 3.14, which is considered low except for ABUAD with 3.14. Parking floor surfaces were from 3.30 to 3.57, which indicated that the respondents' effective floor surface requirements were attainable. The parking sizes and floor surfaces were deemed moderate effective with mean values of 2.91 and 3.50, respectively. The external walkways' widths have a valued range from 2.88 to 3.17. These facts point out that ABUAD and FUOYE have effective walkway widths, while that of EKSU is low. The findings also revealed the value for walkway floor surfaces, which were rated from 3.46 to 3.68. These are effective in achieving the students' accessibility requirements. Both walkway widths and floor surfaces have mean scores of 3.03 and 3.55, respectively which were considered more effective according to the students' needs.

The rate achieved for the steps shows that the step widths range from 2.94 to 3.09 and the risers from 2.68 to 3.11. These have low attainable UD parameters, though only the ABUAD met the widths and risers' accessibility needs of students effectively in the universities. For the step depths and floor surfaces, the facts obtained were from 3.38 to 3.64 and 3.51 to 3.70, respectively. These are considered effective for the students' needs. Generally, the mean scores for step widths, depths, and floor surfaces are 3.00, 3.50, and 3.62, respectively, which were considered effective, except for the risers rated 2.91, which is low. The heights of handrails are rated from 2.81 to 3.04 for the EKSU and FUOYE. These are low to meet the accessibility needs of students effectively, while only ABUAD achieved the effectiveness. For the handrail sizes, all the universities effectively met the accessibility requirements of students. The results obtained for handrails show that the sizes improve effectively when compared to heights according to the mean values of 3.60 and 2.91, respectively.

The rate obtained for the ramps indicates that the widths are measured from 2.85 to 3.08 and the landing widths from 2.79 to 3.04, which is considered not effective for the students of EKSU and

FUOYE, though it met the accessibility needs of students in ABUAD. The slopes of the ramps and floor surfaces ranged from 3.21 to 3.70, and floor surfaces from 3.19 to 3.70. Thus, the mean value for ramp slopes (3.44) and floor surfaces (3.45) are considered more effective than the recorded mean widths (2.90).

The rate of entrance porch dimensions is from 2.84 to 3.26 in the universities. This indicates that entrance porches are low. Only in ABUAD was the entrance considered effective. The entrance floor's mean score is 3.48. This is considered effective in meeting the students' requirements and also better compared to the entrance porch dimensions of 3.01. The rate recorded for doors indicates that the opening widths are from 2.93 to 3.26, opening heights from 2.90 to 3.30, door handle heights from 3.38 to 3.77, and door thresholds from 3.38 to 3.70. Door opening widths and heights in some buildings in FUOYE and EKSU are very low and not effective. Generally, the results generated show the mean scores of door opening widths (3.09), opening heights (3.04), and door thresholds (3.54). This implies that the door's parameters are considered effective.

Table 3: The mean score of accessibility provisions at the main entrances of academic buildings

Features	ABUAD	EKSU	FUOYE	Means	Rank
Parking space sizes	3.14	2.93	2.84	2.91	14th
Parking floor surfaces	3.57	3.53	3.30	3.50	5th
External walkway widths	3.17	2.88	3.04	3.03	9th
walkway floor surfaces	3.52	3.68	3.46	3.55	2nd
Step widths	3.09	2.94	2.95	3.00	12th
Step risers	3.11	2.68	2.96	2.91	14th
Step depths	3.64	3.38	3.48	3.50	5th
Step floor surfaces	3.70	3.64	3.51	3.62	1st
Step landing widths	3.18	2.82	2.99	3.00	13th
Ramp widths	3.08	2.85	2.86	2.90	15th
Ramp landing widths	3.04	2.79	2.85	2.90	15th
Ramps slopes	3.70	3.40	3.21	3.44	7th
Ramps floors surfaces	3.70	3.45	3.19	3.45	6th
Handrail heights	3.04	2.81	2.87	2.91	14th
Handrail sizes	3.60	3.80	3.39	3.60	2nd
Entrance porch dimension	3.26	2.84	2.92	3.01	11th
Entrance Porch floor	3.77	3.33	3.34	3.48	6th
Doors opening widths	3.26	2.93	3.09	3.09	8th
Doors opening heights	3.30	2.90	2.91	3.04	10th
Entrance door handle heights	3.77	3.51	3.38	3.55	2nd
Entrance door thresholds	3.70	3.55	3.38	3.54	4th
Total Mean Scores of the evaluated Features	3.40 (68.0 %)	3.17 (63.4 %)	3.14 (62.8 %)	3.24 (64.8 %)	

ABUAD recorded the highest mean score 3.40 (68.0 %) for the UD provisions in the academic buildings in the study areas in meeting the needs of students, while EKSU recorded 3.17 (63.4 %) and FUOYE 3.14 (62.8 %) being the least. This means that the students in ABUAD considered the UD provisions at the main entrances of academic buildings more effective than the students in EKSU and FUOYE as shown in Fig. 1.

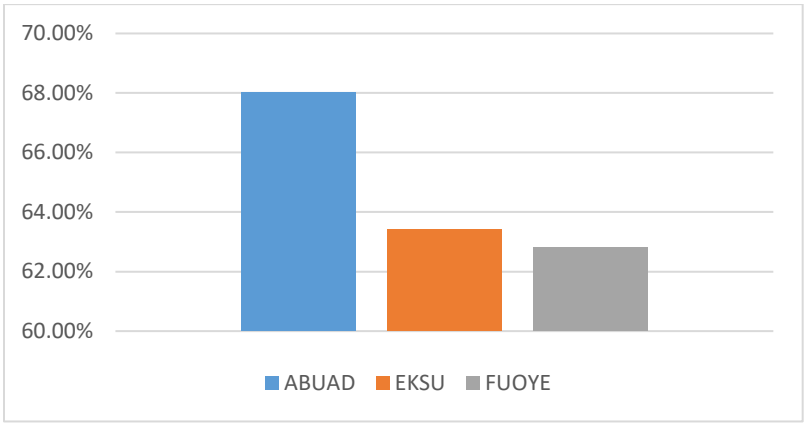

Fig. 1: Total score for the features evaluate in ABUAD, EKSU and FUOYE

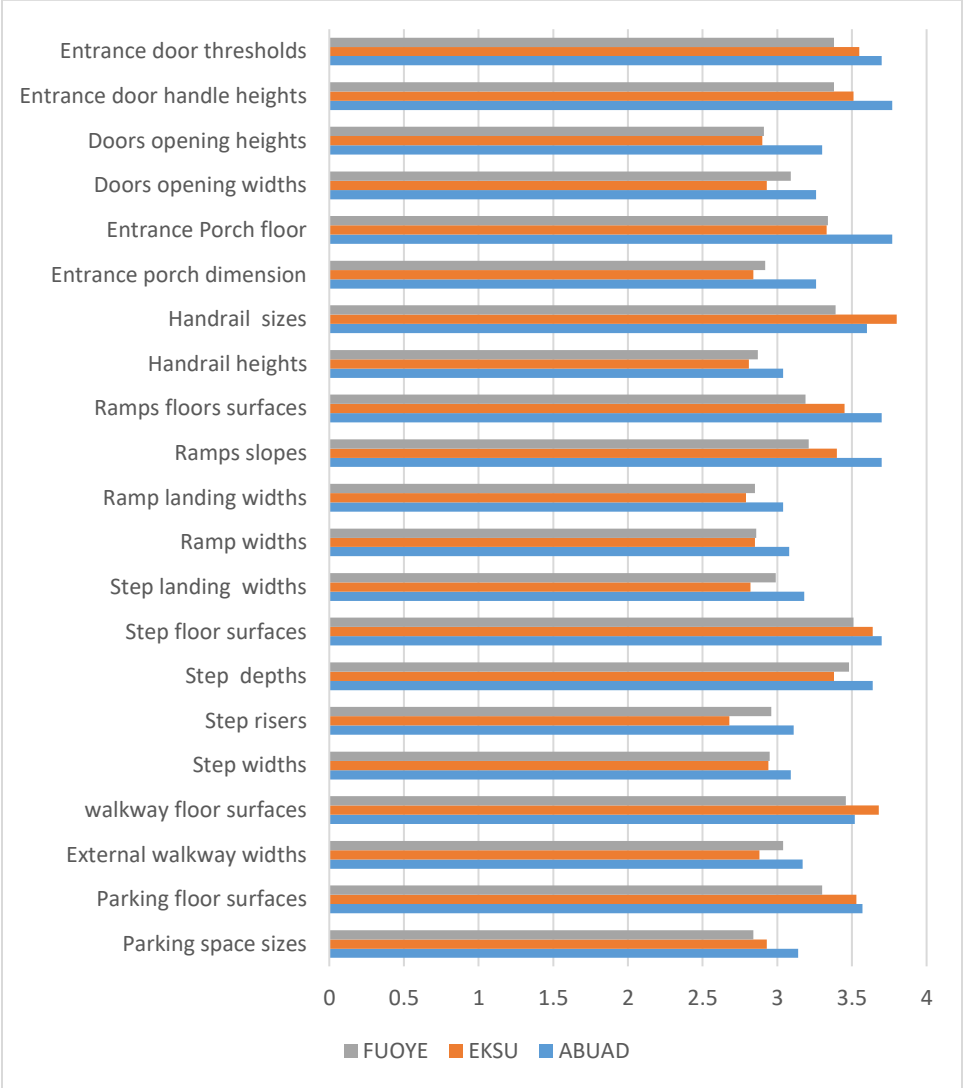

Fig. 2: Effectiveness of UD Provision at the Main Entrance of University Buildings

5.0 Conclusion

The study, through many features examined UD provisions in the academic buildings' main entrances of universities in Ekiti State. It established that the effectiveness of universal design

standards was generally average but was considered higher for ABUAD, followed by EKSU and FUOYE with the lowest.

This study was limited to academic buildings in universities because of their importance to necessary educational activities and students' success. Hence, the findings may not be able to generalize for other university buildings with different categories of use and management. Furthermore, the study population was limited to students. Further research covering other university stakeholders and other categories of users like staff and visitors may provide more information and is also envisioned in future research.

6.0 Recommendations

There should be a definite legal framework put in place by the appropriate authorities to measures the implementation of these standards, support system for the stakeholders, and punitive measures in case of non-compliance. This will ensure that further academic buildings in the university are designed and developed to comply with UD strategies.

Furthermore, building professionals, especially architects, should always be mandated to make adequate provisions for the accessibility needs of everyone, including PWDs, and consider future changes in the development of academic buildings. Conscious efforts should be made to ensure easy approachability for all potential users in such buildings.

Generally, the university authorities should carry out a phased renovation of the buildings to correct their non-compliance with the standards. Such renovation will involve retrofitting the buildings with UD provisions that are inclusive in nature, where they are lacking or inappropriately designed.

Finally, across Nigerian universities, everyone needs to embrace and raise voices to see change in the implementation of UD. Particularly at the main entrances of universities' buildings, if we want to be competitive with other universities in admissions and attract eager learners to Ekiti State, changes need to be made. Universal design is critical to sustainable campuses design in order to include all students and make scholars feel at home

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