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Users' Satisfaction Level with an Academic Building in Nuhu Bamalli Polytechnic, Zaria Via Post Occupancy Evaluation (POE)

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Abstract
Buildings are important components of educational institutions and their conditions and performance have been acknowledged to play vital roles in the productivity of the teachers and the students who use them. As a consequence, evaluation of building facilities after its construction phase has become necessary as it gives insights on the performance of such buildings and what necessary measures could be taken to restore or retain it in good condition. This paper seeks to use the post-occupancy evaluation (POE) approach to get users perception of the condition and performance of one of the most recently constructed academic building in Nuhu Bamalli Polytechnic, Zaria, which is the School of Vocational and Technical Education. Data were collected based on questionnaire survey, in which users of the building facilities were asked to report on their assessment and experience of the facility. Sixty-three web-based questionnaire responses were used for the analysis to get mean score of occupants' opinions. Findings from the study pointed to areas of deficiency in the level of noise, quality and cleanliness of washrooms/toilets and adequacy of storage spaces. It also showed that the deficiency in some of these facilities prompted users' activities which directly or indirectly affected their comfort and performance level within their work spaces. The study recommends that higher education institutions in Nigeria can improve their buildings performance by using users' feedback to formulate maintenance policy and improve on future infrastructural development from the design stage. It also recommends that post occupancy evaluation should be incorporated in the building procurement processes.

Keywords: POE; Academic Building; User Satisfaction; Building Performance; Nuhu Bamalli Polytechnic.

Introduction
The importance of education in the development of any nation cannot be overemphasized. It is recognized to be the foundation or bedrock for the development and progress of any society. Also, buildings are acknowledged to form a major part of the physical infrastructural facilities of any educational system and they have been proven to play vital roles on the productivity and wellbeing of its occupants.

As stated by, Okolie and Ogunoh (2013) stated that buildings in higher education institutions constitute an expensive long-term resource which must be designed to reflect the institutions' vision and strategy for learning. In the same vain olatunji (2013) in his study called for educational buildings and their environments to be given high consideration for effective functioning and productivity. As Heitor (2005) noted, a successful educational building is determined by evaluating how the building is functioning, how the learners and teachers are utilizing the spaces and how the design has promoted the educational process. Thus, the ability of the building to successfully accomplish the purpose for which it is designed measures its success.

Based on the aforementioned, Okechukwu et al (2020) pointed to one of the pressing issues with educational buildings which is that most of them are designed, planned, constructed and managed based on standards and specifications established by governments, professionals and experts without input from it users. On the same note, several studies have shown that sometimes building design standards and specifications

do not conform to the changing needs and expectations of users and thus users are not always satisfied with the performance of their buildings (Zeiler et al, 2008, Meir et al, 2009).

Post occupancy evaluation (POE) has emerged as a tool that looks at the condition of existing building facilities and how well they satisfy their users' needs and identifies ways to improve the building fitness to its design purpose. But, despite the prevalence of research in the context of building performance, post- occupancy evaluation (POE) as a systematic method of gathering data on buildings in-use has not found wide practice for buildings in higher education institutions especially in Nigeria (Ahmadi, 2016). Consequently, based on observations and discussions with some staff and built environment professionals of Nuhu Bamalli Polytechnic, it is claimed that the polytechnic have faced issues related to the poor performance and low utilization rates of its constructed buildings. This is supported by a study by Abdullahi and Muhammad (2021) which determined facilities utilization rates in Nuhu Bamalli Polytechnic. It was also established from interactions with management staff of physical planning and procurement of the institution that building performance evaluations are not carried out after completion and handing over of the building structure except for the inspections carried out during the defects liability period. This leaves a performance gap in respect to knowing how these buildings are satisfying the goals of its users who are mostly staff and students.

On the aforementioned note, the issue to be probed in this research will consider the functional, technical and behavioural elements for POE studies in order to get a more holistic insight to the extent to which the recently constructed School of Vocational and Technical Education building in Nuhu Bamalli Polytechnic, Zaria has satisfied its end users.

Review of Related Issues

Performance Evaluation of Educational Buildings in Higher Education Institutions

As elements of educational management, the influence of educational buildings on the learning process of teaching cannot be over-emphasized. Through use of appropriate educational facilities, greater efficiency is attained in helping students comprehend materials delivered. Like all other organizations, the higher education system is not relenting in its quest to reposition itself for greater efficiency and improved quality of learning in the face of higher operating cost and need for enhanced satisfaction of users (0kechukwu et al, 2020). Hitherto, very little has been done to identify factors which enhance user satisfaction. Today, in spite of heightened admittance of the pivotal role of users in asset management, their habits and traditions has not been efficiently identified and hence, inadequately reflected in the product processes of construction. Thus, resulting in a mismatch in user objective with performance of the product. As further noted by Okechukwu et al (2020), a major indicator of strategic facilities management in higher institutions is the condition of its physical estate. The rapidly growing interest on assessment of learning environment appears to be in tandem with opinions of Preiser and Nassar's (2008) that agrees, 'bottom up' approaches to assessment, which holds dearly, the views of the user and advocates an ''open, two-way communication, community building, cooperation, trust and honesty'' are being developed in education currently.

End Users' Needs and Satisfaction

As widely accepted, the occupants of buildings and its amenities are referred to as end users. Hence the wide use of the term "end user" in researches are centred on user satisfaction. An end-user can be defined as the final or ultimate user for which something is intended (i.e. the normal user of a product). Thus the design team comprising of professionals in the built environment does not directly include the end user as a part of it. However, the successful performance of buildings is determined by the interactions between it and the end user. Hakkinen and Nuutinen (2007) opined that, the possibility of providing an unsuitable working is eminent if such structures are designed without taking to account, the end user's basic requirements, Hakkinen and Nuutinen (2007), in view of the foregoing, suggested the need for involvement of end users and facility managers in the process of ascertaining the unique functional attributes of the building being provided. Okolie (2011), also notes that, in other to enhance functional performance of the building, its design ought to be collaborative and integrated in nature.

Furthermore, studies centred on satisfaction are a common feature in quite a number disciplines; the built environment, social as well as management sciences. In general, satisfaction is a subjective assessment of the degree to which the perceptions of users are met via the performance of the products and services. (Parker and Mattews, 2001; Uelschy et al, 2007; Hanif et al, 2010). It compares experience gotten to that intended when a product or service is consumed, in essence, satisfaction is the user's perception during or after consumption experience. Most satisfaction studies are based on the expectancy disconfirmation theory, which opines that users are said to be satisfied with products or services if the product's performance meets the user's needs and expectation. (Parker and Mattews, 2001).

Hence, like any other products, buildings are designed and constructed with a wide range of expectations by professionals, clients, the community and users. Clients, expect maximum returns on investment from buildings, considering the huge capital investment required, while on the other hand, buildings are seen by professionals as products of ingenuity, creativity, and positive imagination and thought process. While the users and community on their part, expect that buildings should support their peculiar needs and enhance their daily engagements (Preiser, 1995) and invariably enhance the aesthetic character of their surroundings.

Overview of the Concept of Post Occupancy Evaluation (POE)

POE is defined by Li et al (2018) as a holistic approach of getting feedback about the performance of a building in use, it also includes IEQ, energy performance, productivity, occupants' satisfaction, and so on. Preiser, (2001) and Park et al, (2020), also states that POE involves a systematic assessment of a building and assessing its thermal, energy, acoustic, ergonomic, visual, and spatial performances at post occupancy. It forms the basis for conducting in-depth audits and assessments of "buildings in use", through continual assessment during the lifespan of the building (Elsayed et al, 2023). In their study, Park et al (2020) notes that, POE depends on subjective investigations of Indoor Environmental Quality (IEQ) variables, i.e., air, visual, spatial, acoustic, and thermal qualities, which influence ergonomics. Moreover, researches have shown that it also depends on objective IEQ measurements of the technical attributes of building systems (TABS) to ascertain how systems influence the indoor environment and compare the findings to subjective findings of user satisfaction levels (Park et al, 2020 and Loftness et al, 2018). Also, methods of data collection in POE can be either subjective or objective. Methods of subjective data collections include interviews, walkthroughs, and occupant surveys (Li et al, 2018). There exists, other methods of subjective research, this include; observations of participants, interviews that are open-ended interviews, and photographic investigations that can aid the uncovering of implicit spheres of human existence and comfort levels (Pannier et al, 2021). Methods of objective data collection on the other hand, include water, energy, and IEQ evaluation parameters and so on, that can be measured. Thermal conditions such as air velocity, temperature, relative humidity (RH), etc are captured by means of advanced sensors and tools (Stevenson, 2019).

As identified by Preiser and Vischer (2004) and cited in Ilesanmi,(2010), there are three levels of effort in a typical POE work.

1. Indicative
2. Investigative and
3. Diagnostic (Preiser and Vischer, 2004 cited in Ilesanmi, 2010).

'Effort' as stated by Preiser and Vischer (2004), refers to the amount of time, resources and personnel put into a process or procedure of investigation using a POE approach.

The Indicative approach to POEs identifies the major strengths and weaknesses of a particular building's performance.

Investigative approach to POEs on the other hand seeks more depth in the understanding the performance of the building and so leads to the establishment of clearly stated objective evaluation criterias;

Diagnostic POEs requires a greater level of effort and expense, hence the need to use sophisticated measurement techniques.

As the importance of POE is being increasingly recognized, it is becoming necessary to be undertaken on many public projects. Researchers have recent times generated frameworks geared towards the emergence of tailored assessment methods, as opposed to the production of a generic assessment tool that can be adopted for use across diverse spaces.

In 2006, a guide to Post Occupancy Evaluation was produced by the Higher Education Funding Council for England (HEFCE). The guide aimed at supporting evaluations over three broad areas: functional and technical performances, and process. This guide provides a framework that allows users conduct strategic evaluations that are context-specific., rather than provide a single approach to the assessment of environments of higher education learning. The adoption of this approach was to ensure that diverse views purposes of POE could be integrated.

POE categories based on building performance elements

The focus of a POE can be considered in terms of three broad categories of performance elements. These categories include the technical performance elements, functional performance elements, and behavioral performance elements (Preiseretal.,1988; Blyth et al.,2006). These performance elements consist of performance indicators that represent signs, markers, attributes. Performance indicators change based on the evaluation purpose and the case study at hand (Kim et al.,2005; Sanni-Anibire et al.,2016).

Functional performance elements

Functional performance addresses the functionality and efficiency level of the features in university buildings and facilities. Functional elements include accessibility, spatial capacity for activities, and adequacy of necessary facilities.

Technical performance elements

Technical performance elements deal with survival attributes, such as structure, sanitation, fire safety, and security. From an environmental perspective, technical performance addresses the issues of indoor environmental quality(IEQ), which affect the comfort, health, and productivity of occupants (Choi et al.,2012).

Behavioral performance elements

Behavioral performance elements create a link between occupants' activities and the physical environment. Typical behavioral performance issues include the effect of area size and number of persons that share it upon a building's occupant, and the effect of functional distance between spaces upon the frequency of use.

Table 1: POE Performance Attributes for Educational Facilities as established by literatures

Performance Elements		Performance Attributes	References
Technical Categories			
Thermal comfort	1.1	Indoor temperature	Preiser (1995), Borys et al. (2001), Hassanain and Mudhei (2006),
	1.2	Control of thermostat	
	1.3	Overall satisfaction with the thermal comfort of classrooms	Meir et al. (2009) Gorgievski et al. (2010), Driza and Park (2014),
	1.4	Overall satisfaction with the thermal comfort of offices	Hassanain and Iftikhar (2015), Lawrence and Keime (2016), Hassanain et al. (2018) and Abisuga et al. (2019)
Indoor Air quality	2.1	Air freshness	Khalil et al. (2011), Driza and Park (2014), Lawrence and Keime (2016), Hassanain et al. (2018) and Murgu (2020)
	2.2	Overall satisfaction with indoor air quality throughout the building	
Acoustic comfort	3.1	Noise from adjacent rooms	Borys et al. (2001), Hassanain (2008), Nawawi and Khalil (2008), Meir et al. (2009), Potthoff (2009), Hassanain and Iftikhar (2015), Khajehzadeh and Vale (2016), Lawrence and Keime (2016), Abisuga et al. (2019), Kamaruzzaman and Azmal (2019) and Murgu (2020)
	3.2	Noise from HVAC systems	
	3.3	Audio quality of classroom speakers	
	3.4	Ability to hear the lecturer in the classroom	
		Overall satisfaction with classroom acoustics	
Visual comfort	4.1	Amount of daylight throughout the building	Preiser (1995), Meir et al. (2009), Potthoff (2009), Khalil et al. (2011), Driza and Park (2014), Khajehzadeh and Vale (2016), Kamaruzzaman and Azmal (2019) and Hassanain et al. (2020)
	4.2	Level of brightness (artificial lighting) in classrooms	
	4.3	Level of brightness (artificial lighting) in the laboratory spaces	
	4.4	Control of artificial lighting	
	4.5	Adequacy of lighting levels in the buildings' corridors	
		Outdoor views from the building	

Safety & security	5.1 5.2 5.3 5.4	Ease of identifying emergency/escape routes Ease of exiting the building in case of fire emergency Number of fire drills during the term Overall satisfaction with safety and security systems in the building	Hassanain and Harkness (2000), Hassanain (2008), Hassanain and Iftikhar (2015), Rieh (2018), Leung et al. (2014), Khajehzadeh and Vale (2016), Babatunde and Perera (2017) and Rieh (2018)
Maintenance & management	6.1 6.2 6.3 6.4 6.5	Elevators Washrooms Lighting in the building HVAC in the building Handling of users' complaints	Preiser (1995), Hassanain and Harkness (2000), Hassanain (2008), Potthoff (2009) Gorgievski et al. (2010), Khalil et al. (2011), Driza and Park (2014), Hassanain and Iftikhar (2015), Babatunde and Perera (2017), Abisuga et al. (2019), Kamaruzzaman and Azmal (2019) and Murgu (2020)
Functional Categories			
Overall building	7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 7.10	Ceiling height in the building Number of elevators in the building Circulation in the building Wayfinding within the building Overall layout of the building Operation of doors Cleanliness in the building Accessibility to disabled people Quality of sidewalks outside the building Adequacy of parking	Preiser (1995), Borys et al. (2001), Hassanain (2008), Gorgievski et al. (2010), Inah et al. (2014), Leung et al. (2014), Khajehzadeh and Vale (2016), Sanni-Anibire et al. (2016), Babatunde and Perera (2017), Hassanain et al. (2018), Rieh (2018), Abisuga et al. (2019), G€oçer et al. (2019) and Hassanain et al. (2020)
Classrooms/Lecture rooms	8.1 8.2 8.3 8.4 8.5	Number of seats in classrooms Size of overall classrooms Flexibility of furniture in classrooms Quality of furniture in classrooms Classroom amenities (board and projector)	Leung et al. (2014), Hassanain and Iftikhar (2015), Babatunde and Perera (2017), Hassanain et al. (2018), Abisuga et al. (2019) and G€oçer et al. (2019)
Computer laboratories	9.1 9.2 9.3 9.4 9.5 9.6 9.7	Number of computer laboratories in the building Size of computer laboratories Overall satisfaction with computer laboratory layout Quality of furniture in the computer laboratories	Borys et al. (2001), Hassanain and Mudhei (2006), Meir et al. (2009), Khalil et al. (2011), Leung et al. (2014), Hassanain and Iftikhar (2015), Babatunde and Perera (2017), Hassanain et al. (2018) and Abisuga et al. (2019)

		Adequacy of data points (Internet) in the computer laboratories	
Science laboratories	10.1 10.2 10.3 10.4 10.5	Adequacy of space in the lab. Storage space in the laboratories Overall space layout of the laboratories Amenities within the laboratories Quality of furniture in the laboratories	Marmaras and Nathanael (2012), Inah et al. (2014) and Amin et al. (2015), Hassanain and Iftikhar (2015), Khajehzadeh and Vale (2016)
Offices	11.1 11.2 11.3 11.4	Number of offices in the building Size of individual offices in the building Flexibility of furniture in the offices Quality of furniture in the offices	Marmaras and Nathanael (2012), Leung et al. (2014), Hassanain and Iftikhar (2015), Babatunde and Perera (2017) and Hassanain et al. (2018)
Student & Faculty lounges	12.1 12.2 12.3 12.4	Number of student & faculty lounges in the building. Size of lounges Quality of furniture in the lounges Adequacy of data points (Internet) in lounges	Marmaras and Nathanael (2012), Leung et al. (2014), Hassanain and Iftikhar (2015), Babatunde and Perera (2017), Hassanain et al. (2018) and Rieh (2018)
Toilets/Washrooms	13.1 13.2 13.3 13.4	Number of toilets/washrooms in the building Size of washroom in the building Functionality and quality of fixtures Cleanliness in the washroom	Leung et al. (2014), Khajehzadeh and Vale (2016), Babatunde and Perera (2017) and Rieh (2018)
Behavioural Categories			
Privacy	14.1 14.2 14.3 14.4	Density of users within the building Density of users within the classrooms/lecture rooms Density of users within the laboratories Density of users within the washrooms/toilets	Hassanain (2008), Gorgievski et al. (2010), Leung et al. (2014) and Khajehzadeh and Vale (2016)
Building location	15.1 15.2 15.3 15.4 15.5 15.6 15.7	Appropriateness of location within the campus Location of classrooms within the building Location of laboratories within the building	Borys et al. (2001), Hassanain (2008) and Inah et al., 2014)

		Location of offices within the building Location of common areas within the building Location of canteen within the building Location of washrooms/toilets within the building	
Building proximity	16.1 16.2 16.3 16.4 16.5	Proximity to place of worship Proximity to the central dinning facility Proximity to the parking area Proximity to the transportation amenities/bus stations Proximity to the library	Fatoye and Odusami (2009) and Inah et al. (2014)
Appearance	17.1 17.2	Exterior design of the building Interior design of the building	Babatunde and Perera (2017) and Kamaruzzaman and Azmal (2019)
Quality of materials used	18.1 18.2 18.3 18.4 18.5 18.6 18.7 18.8	Classrooms/lecture rooms Computer laboratories Science laboratories Student & Faculty lounges Lecture halls/auditoriums Canteen Offices Washrooms	Khalil et al. (2011), Jylh€a et al. (2015), Hassanain and Iftikhar (2015), Pissourios and Lagopoulos (2017), Hassanain et al. (2018), Boge et al. (2019), Br€ochner et al. (2019) and Hassanain et al. (2020)

Source: Adapted from Hassanain et al, 2020

Research Design

The study is all about gaining an insight on the occupants satisfaction level with the School of Vocational and Technical Education building using the POE. For this study, questionnaire survey is largely dependent on. The research time frame is cross-sectional which is dependent on a single moment in time data. The targeted population size of respondents is 150 persons (that is, staff and students).

Data Presentation and Discussion

School of Vocational & Technical Education Complex

Participant Specific Information

Table 2: Gender of Respondents

	Frequency	Percentage (%)
Male	54	81.9
Female	12	18.1
Total	66	100

Table 3: Categories of Participants

	Frequency	Percentage (%)
Academic staff	15	22.7
Students	46	69.7
Administrative staff	5	7.6

Total	66	100

Users' Satisfaction with Specific Building Performance Attributes

This section presents a discussion of the building specific findings from the analysis of the SV& TE survey responses. This part required the respondents to rate their satisfaction level based on 35 performance indicators based on the functional, technical and behavioral attributes as adapted from Hassanain's study. The respondents were required to rate their satisfaction level based on seven-point scale: "1" (very dissatisfied), "2" (dissatisfied), "3" (slightly dissatisfied), "4" (moderate), "5" (slightly satisfied), "6" (satisfied) and "7" (very satisfied). Table 4.13 illustrates the users' satisfaction level toward the listed performance attributes.in the order of the different sections in the survey.

Results of the Functional Design Performance (FDP) Elements

Three of four items related to the accessibility (ease of access from entrance to office, horizontal circulation, and adequacy of vertical circulation) recorded mean scores of (4.65), (4.03), and (5.28), respectively, indicating that their satisfaction degree is higher than moderate. Ease of movement for the disabled achieved mean value of 3.08 meaning that users satisfaction level for this item was lower than the moderate level. For the quality, cleanliness of toilets and overall building a mean value of 3.22 was achieved indicating that users satisfaction level was lower than moderate. Also, for adequacy of storage spaces in the building a mean value of 4.11 was achieved indicating that the satisfaction level was above moderate. Based on users' responses, the mean value of the overall quality and adequacy of accessibility attributes was 4.21 suggesting that the adequacy of accessibility achieved a degree of satisfaction above the moderate.

Results of the Technical Performance (TP) Elements

Two out of the five items relating to safety and aspects of the environment that make one feel safe (visibility of security and lighting within and around the building) recorded mean values of 4.12 and 4.03 respectively indicating users satisfaction level above moderate. The remaining items and attributes (Ease of exiting building, Ease of identifying emergency route, spatial configuration of building) achieved mean scores of 3.33, 3.50 and 3.81 respectively, indicating satisfaction level below moderate. Based on users' responses, the mean value of the overall adequacy of safety within the building was 4.17 suggesting it achieved a degree that was above moderate level.

Nine of nine items relating to indoor environmental quality (Quality of air in offices, classrooms, ease of control over natural ventilation, thermal satisfaction with working spaces, noise level from outside, noise level from adjacent spaces, quality of natural lighting within the building, Level of artificial lighting within the building, ease of control over natural lighting and ease of control over artificial lighting) achieved mean scores of 4.05, 4.36, 4.14, 4.53, 4.78, 4.03, 4.64, 4.67 and 4.64 respectively indicating users satisfaction level above moderate. Based on users' responses, the mean value of the overall quality of IEQ was 4.03 suggesting it achieved a degree of satisfaction above moderate.

Results of the Behavioral Performance (TP) Elements

Three of four items related to the density of users per space (density of occupants in the overall building complex, density of users in an office and density of users within classrooms,) recorded mean scores of (4.67), (4.64), and (4.48), respectively, indicating that their satisfaction degree is higher than moderate. Density of users within washrooms/toilets recorded mean value of 3.55 signifying users satisfaction below moderate. Based on users' responses, the mean value of the overall adequacy of users per space was 4.03 suggesting it achieved a degree of satisfaction above moderate.

Two of four items related to the location of spaces (location of offices within the building and location of classrooms within the building) recorded mean scores of (4.29) and (4.28), respectively, indicating that their satisfaction degree is higher than moderate. Location of building within campus and location of toilets within the building recorded mean values of 3.69 and 3.47 signifying users satisfaction below moderate. Based on users' responses, the mean value of the overall adequacy of location was 4.03 suggesting it achieved a degree of satisfaction above moderate.

One of three items related to the proximity to facilities within the campus (proximity to the parking area,) recorded a mean score of 4.03, indicating that the satisfaction degree is higher than moderate. Proximity to places of worship and proximity to the transportation amenities/bus station recorded mean values of 3.33 and 2.69 signifying users satisfaction below moderate. Based on users' responses, the mean value of the overall adequacy of the proximity to facilities was 4.03 suggesting it achieved a degree of satisfaction above moderate.

Two of two items related to the building appearance (external design of building and internal design of building) recorded mean scores of (4.19) and (4.08) respectively, indicating that their satisfaction degree is higher than moderate.

Table 4: Results of Occupants Satisfaction level with Specific Building Performance Attributes

POE Performance Attributes			VD 1	D 2	SD 3	M 4	SS 5	S 6	VS 7	Mean (X)
FDP	**Accessibility**	Ease of access from entrance to personal workspace	1	1	2	10	10	4	3	4.65
		Vertical circulation	2	4	4	10	14	1	1	4.03
		Horizontal circulation	1	2	3	7	11	5	3	5.28
		Ease of movement for the disabled	7	7	8	8	3	2	1	3.08
TP	**Cleanliness**	Quality, cleanliness of toilets & overall building.	4	7	12	7	3	2	1	3.22
	Storage spaces	Adequacy of Storage spaces	2	4	9	10	6	4	1	4.11
	Safety/aspects of the environment that make one feel safe	Adequacy of safety within the building.	2	3	5	11	9	4	2	4.17
		Visibility of security	2	5	8	10	5	3	3	4.12
		Ease of exiting building	4	5	12	8	5	1	1	3.33
		Ease of identifying emergency route.	3	5	9	12	5	1	1	3.5
		Lighting within/around building	3	3	6		9	5	1	4.03
		Spatial configuration of building	2	4	7	13	7	2	1	3.81
	IEQ	Quality of air in offices, classrooms, and labs.	3	3	4	13	7	4	2	4.05
		Ease of control over natural ventilation.	1	2	6	10	10	5	2	4.36
		Thermal satisfaction with working spaces	2	2	4	14	10	3	1	4.14
		Satisfaction level with noise from outside the building	1	1	4	9	15	5	1	4.53
		Satisfaction level with noise from adjacent spaces	1	1	4	5	15	8	2	4.78
		Quality of natural lighting within the building.	3	4	4	10	10	3	2	4.03
		Level of artificial lighting within the building.	1	1	5	9	10	7	3	4.64
		Ease of control over natural lighting	1	1	4	10	10	7	3	4.67
		Ease of control over artificial lighting	1	1	4	9	13	5	3	4.64
BP	**Density of users /space**	Density of occupants in the overall building complex	2	3	7	11	7	4	2	4.05
		Density of users in an office.	3	4	5	9	9	4	2	4.02
		Density of users within classrooms	2	3	3	7	15	5	1	4.36
		Density of users within washrooms/toilets\	6	6	9	7	5	2	1	3.25
	Location of spaces	Satisfaction with location of building within campus.	3	5	9	9	5	3	2	3.69
		Satisfaction with location of offices within the building.	3	3	3	9	9	5	3	4.29
		Satisfaction with location of classrooms within the building.	2	4	5	7	10	5	3	4.28

	Satisfaction with location of toilets within the building.	5	6	7	8	6	3	1	3.47
Proximity to facilities within the campus	Proximity to places of worship	5	8	10	7	5	2	2	3.33
	Proximity to the parking area.	2	3	4	16	7	2	2	4.03
	Proximity to the transportation amenities/bus station	11	9	5	5	4	1	1	2.69
Building Appearance	Satisfaction level of Exterior design of the building	3	4	3	12	9	3	2	4.19
	Satisfaction level of internal design of the building	2	3	4	15	7	3	2	4.08

Ratings: 1- Very Dissatisfied (VD); 2- Dissatisfied (D); 3- Slightly Dissatisfied (SD); 4-Moderate (M); 5- Slightly Satisfied (SS); 6- Satisfied (S); 7- Very Satisfied (VS) .

Discussions

The objective of the study was to get an insight of some specific building performance attributes by evaluating the users' satisfaction level with the selected building. The responses indicated concerns regarding such building performance issues as ease of movement for the disabled, quality and cleanliness of toilets/washrooms and overall building. Also, concerns were directed on adequacy of storage spaces, density of users within toilets/washrooms, location of toilets within building complex, proximity of building to worship spaces and proximity to amenities and bus stations as evident from the overall mean scores of each of the item mentioned.

Conclusion and Recommendations

An investigative assessment of School of Vocational and Technical Educational Studies (SV & TE) building was carried out in Nuhu Bamalli Polytechnic, in which a representative sample of the building users opinions was solicited. The study determined the degree of satisfaction obtained for thirty five (35) identified performance indicators using a web based questionnaire survey. The results shows satisfaction with staff offices, classroom space, studios/laboratories/workshops, air quality (ventilation) and security but had concerns with quality and cleanliness of toilets, storage spaces, internet facilities, inconsistent power and water supply and general maintenance of facility. The aforementioned outcomes showed that the challenges facing the academic facilities in the polytechnic are somehow similar to the studies carried out on such facilities in other higher education institutions in Nigeria. However, the study revealed that the deficiency in some of these facilities resulted in some certain behavioral patterns among the staff and students which directly or indirectly affected their comfort and performance level within their work spaces. Such issues were the lack of power and water supply within facility, density of users within toilets, location of these toilets and proximity to amenities. As staff and students had to seek favorable alternatives which kept them away from their workspaces and in turn affecting productivity and learning process.

Recommendations

All concerns identified through the multiple evaluation techniques adopted resulted in the following recommendations.

i. Users' opinion should be incorporated right from the initiation stage of the design for future infrastructural developments in the Polytechnic so as to achieve a high performance building for learning.
ii. The quality of features and fittings like sanitary fittings and internet facilities should be highly considered when designing and constructing subsequent projects.
iii. There should be purposeful design for spaces that will accommodate alternative power plants which should be outside the facility so as to control the noise level in the building and health risk of its occupants.
iv. Future infrastructural projects in the polytechnic should highly ensure the universal design approach so as to accommodate persons with physical challenges.
v. A Building maintenance policy should be adopted that will require for regular updating of the polytechnic facilities.
vi. There is a need for the Polytechnic management to be enlightened on the benefits of conducting POE so that they can support the process.
vii. In the procurement process, building performance evaluation should be included. This will provide feedback if the building performance objectives are met during the design and construction.

REFERENCES

Abdullahi, I., and Muhammad, H. (2021). Resource Utilization of Tertiary Education Trust Fund Intervention Projects in Nuhu Bamalli Polytechnic, Zaria, Kaduna State. Journal of African Real Estate Research, 6(2), pp. 42-51. https://doi.org/10.15641/jarer.v6i2.1003

Abisuga, O.A. (2013). A Post Occupancy Evaluation of Lagos State Polytechnic Facilities: A user based system. Journal of emerging trends in engineering and applied sciences (JETEAS).4(2).229-236.

Ahmadi, R.T., Saiki, D., Ellis, C. (2016). Post Occupancy Evaluation an Academic Building: Lessons to Learn. *Journal of Applied Sciences and Arts*: Vol. 1 : Iss. 2 , Article 4. Available at: http://opensiuc.lib.siu.edu/jasa/vol1/iss2/4

AUDE and HEDQF (Association of University Directors of Estates and Higher Education Design Quality Forum). (2006). A Guide for Post Occupancy Evaluation. University of Westminster. (http://www.aude.ac.uk/home) as viewed in December 2022.

Blyth, A., Gilby, A., Barlex, M., (2006). Guide to Post Occupancy Evaluation. Higher Education Funding Council for England (HEFCE), Bristol (Available at) ⟨http://www.smg.ac.uk/documents/POE Brochure Final 06.pdf⟩.

Bordas, B. and Leaman, A. (eds.) (2001). Assessing building performance in use. Building Research & Information. 29 (2).

El-Darwish, I.I. and El-Gendy, R.A. (2017). Post occupancy evaluation of thermal comfort in higher educational buildings in a hot arid climate. Alexandria Engineering Journal 57, 3167–3177

El-Khawas, E. (2003). Today's Universities: Responsive, Resilient or Rigid? *Higher Education Policy*. **14**: 241-248.

Elsayed, M., Pelsmakers, S., Pistore, L., Casta˜no-Rosa, R., and Romagnoni, P. (2023). Post-occupancy evaluation in residential buildings: A systematic literature review of current practices in the EU. https://doi.org/10.1016/j.buildenv.2023.110307

Hakkinen, T. and Nuutinen, M. (2007). Setting Sustainable Solutions for Office Buildings.

Facilities, 25 (11/12): 437-451.

Hanif, M., Hafeez, S. and Riaz, A. (2010) "Factors affecting customer satisfaction". International Research Journal of Finance and Economics. Vol 60, PP 44-52

Hassanain, M.A.(2008).On the performance evaluation of sustainable student housing facilities.J.Facil.Manag.6(3),212–225.

Hassanain, M.A., Iftikhar, A. and Al-Hammad, A., Adel Alshibani, A., Ibrahim A.M., Abdallah, A. (2020). POE of public higher education facilities in Saudi Arabia: lessons learned from three case studies. https://www.emerald.com/insight/0263-7472.htm

HEFCE. (2006). Guide to post occupancy evaluation. Bristol: Higher Education Funding Council for England.

Heitor, T. (2005).*International Design Principles for Schools: Potential Problems and Challenges.* OECD Programme on Educational Buildings. [Online]. Available from www.oecd.org/dataoecd/61/45/35469220df. (Accessed 20 March 2023).

Ilesanmi, A.O., (2010). Post-occupancy evaluation and residents' satisfaction with public housing in Lagos, Nigeria. Journal of Building Appraisal, Vol. 6, 2, 153-169.

Iiter, D.A., Ergen, E. and Tekce, I. (2018). A critical review of post occupancy evaluation (POE) tools. https://www.researchgate.net/publication/328783053

Li, P., Froese, T.M., Brager, G. (2018). "Post-occupancy evaluation: State-of-the-art analysis and state-of-the-practice review." *Building and Environment* 133: 187–202.

Leaman, A., Stevenson, F., and Bordass, B. (2010). Building evaluation: practice and principles, Build. Res. Inf. 38 (5) ,564–577, https://doi.org/10.1080/ 09613218.2010.495217.

Loftness, V.; Aziz, A.; Hartkopf, V.; Lam, K.P.; Lasternas, B. (2018). Humans and Nature in the Loop: Integrating occupants & natural conditioning into advanced controls for high performance buildings. Healthy Intell. Resilient Build. Urban Environ.

Meir, I.,Garb, Y., Jiao, D. and Cicelsky, A. (2009). "Post-occupancy evaluation: An inevitable step toward sustainability". Advances in Building Energy Research. Vol 3, No 1, PP 189-220.

Okechukwu, C.O., Okafor, C.V., and Okeke, A.U. (2020). User's Satisfaction Of Higher Educational Buildings In Nigeria: A Case-Study Of Nnamdi Azikiwe University Awka

Okolie, K. C (2011), Performance Evaluation of Buildings in Educational Institutions: A case of Universities in South-East Nigeria. A doctorate thesis in Construction Management in the department of Construction Management, Nelson Mandela Metropolitan University Port Elizabeth South Africa.

Okolie, K.C. and Ogunoh, P.E. (2013). Assessment of functional and environmental indicators in the performance of buildings in federal universities of South east, Nigeria.

Olatunji, A.A.,(2013).Post-occupancy evaluation of Lagos state polytechnic facilities: a user-based system.J.Emerg.Trends Eng. Appl.Sci.4(2),229–236.

Pannier, M.L., Lemoine, C., Amiel, M., Boileau, H., Buh´e, C. and Raymond, R. (2021). Multidisciplinary post-occupancy evaluation of a multifamily house: an example linking sociological, energy and LCA studies, J. Build. Eng. 37 https://doi.org/10.1016/j.jobe.2020.102139.

Park, J.; Loftness, V.; Aziz, A. Post-Occupancy Evaluation and IEQ Measurements (2020). Office Buildings: Critical Factors and Thresholds for User Satisfaction on Thermal Quality. Buildings, 8, 156.

Parker, C. and Mathews, B.P. (2001). "Customers Satisfaction: Contrasting Academic and Consumers' Interpretation", https://www.Researchgate.net. (Accessed on April 4th 2023).

Preiser, W. F. E., Rabinowitz, H. Z. and White, E. T. (1988). Post Occupancy Evaluation. New York: Van Nostrand Reinhold Company.

Preiser, W. F. E. (1995). Post occupancy evaluation: How to make buildings work better.

Journal of Facilities 13(11):19 - 28.

Preiser, W. F. E. and Vischer, J. C. (eds.) (2004). Assessing Building Performance: Methods and Case Studies, Oxford, UK: Elsevier.

Preiser, W. F. E., & Nasar, J. L. (2008). Assessing building performance: Its evolution from post-occupancy evaluation. International Journal of Architectural Research, 2(1), 84–99.

Sanni-Anibire, M.O., Hassanain, M.A. (2016). Quality assessment of student housing facilities through post-occupancy evaluation. Archit. Eng. Des. Manag. 12(5), 367–380.

Sanni-Anibire, M.O., Hassanain, M.A., Al-Hammad, M.A. (2016). Post-occupancy evaluation of housing facilities: an overview and summary of methods. J.Perform. Constr. Facil. 30(5) (10.1061/)(ASCE)(CF.1943-5509.0000868).

Stevenson, F. (2019). Housing Fit for Purpose : Performance, Feedback and Learning, RIBA Publishing.

Uelschy,L.C., Laroche, M., Eggert, A. and Bibdi, U. (2007). "Service quality and satisfaction: an international comparison of professional service perceptions". J Serv Mark. Vol 21, No 6, PP 410–423

Vischer, J. (2008). "Towards an Environmental Psychology of Workspace: How People are Affected by Environments for Work". Architectural Science Review, 51(2), 97-108. doi:10.3763/asre.2008.5114

Vischer, J. (2002). Post Occupancy Evaluation: A Multifaceted Tool for Building Improvement, Chapter 3. United States:

Zeiler, W. and Boxem, G. (2008). "Ventilation of Sustainable School: Better than Traditional Schools? On Indoor Air Quality and Climate". Copenhagen: Denmark