Accessibility of University of Botswana main campus bBuildings to wheelchair users

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Abstract

The built environment, including schools, has many architectural barriers which may prevent wheelchairs users from independently gaining access to buildings. The purpose of this study was to assess the accessibility of the University of Botswana's (UB) main campus buildings to wheelchairs users. A buildings checklist, participant observation and interviews of wheelchair users were used to collect data. It was found that the majority of the buildings were not accessible. Of major concern was the fact that most buildings which are used for academic and social purposes are inaccessible to students with

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disabilities. Common barriers include steep ramps with no shade, marked but narrow, un-shaded parking lots, inadequate ramps at the entrances, high counters and lack of shaded pathways. On a positive note, some institutional buildings were found to have wide doors, wide corridors, some ramps with rails, and some shaded entrances. It is recommended that the existing buildings be modified to accommodate students with disability, to promote their independence and improve the quality of their social and academic life.

Keywords: institutional buildings, accessibility, wheelchair users, barrier free design

Introduction

People with disabilities can have as satisfying a lifestyle as able-bodied people if, in addition to their rehabilitation, physical barriers are removed. It is crucial for buildings and facilities to be accessible to wheelchair users to promote access to education. This would enable students with disabilities to take part in the development of their country. Various studies have investigated the accessibility of various public places in general (Useh, Moyo, and Monyonga, 2001; Rivano-Fischer, 2004; Hamzat and Dada, 2005;), and of educational buildings in particular (Losinsky, Levi, Saffey, and Jelsma, 2002; Bargerhuff, Kirch, and Wheatly, 2004; Dolan, 2005; Hamzat and Dada, 2005; Fidzani and Mthombeni, 2009; Mthombeni and Fidzani, 2011). However, the majority of research conducted on educational buildings is from Western countries, and does not focus on tertiary institutions. The accessibility of institutional buildings is a source of great concern in Botswana, and yet it has not received enough attention, especially in research, education policies, and building codes for institutional planning.

For many people with disabilities, the built environment has a lot of architectural barriers which prevent them from independently moving around and gaining access to buildings. Inaccessible structures have been identified as the main cause of "social status alteration, isolation, limitations of economic opportunities, unhealthy lifestyle, dependence, choice restriction, discrimination and poor[er] quality of life" (Rivano-Fisher, 2004: 1). Daily activities of students with disabilities are more complex than those of students without disabilities (Graham, Weingarden, and Murphy, 1991). They have additional needs which impact their lives, especially in educational environments. Many of them continue to face many challenges during their stay in educational institutions due to architectural barriers.

The term accessibility is defined in this paper as the extent to which parts of a built environment are accessible to wheelchair users (Otmani, Moussaoui and Pruski, 2009). The definition also includes added distance and the time the wheelchair-bound students take to get around campus (Losinsky et al. 2002). The objectives of this study were: a) to determine the accessibility of the University of Botswana (UB) buildings to wheelchair users, b) to explore the daily living experiences of wheelchair users at UB, and c) to recommend effective strategies to accommodate wheelchair users. Identifying possible barriers in the university buildings is necessary for the improvement of accessibility which would encourage enrolment of students using wheelchairs into the institution. The argument is that disability is physical not mental, and students with disabilities have the right to access to formal tertiary education.

The importance of building accessibility by wheelchair users

According to McGuire, Scott, and Shawn (2006), good design does not necessarily ensure accessibility. Many buildings are well designed but still lack this fundamental feature. A building that restricts mobility is the most common handicap for people with disability. Accessibility of buildings must enable the wheelchair user to take part in productive activities, to be independent, to have privacy, to enhance personal fulfillment and have a good quality of life. A building designed for a person with disability is equally convenient and accessible to the able-bodied population (Burgstahler, 2001). A wheelchair provides the user with many benefits that improve interaction with the physical environment. But when a person with disability has an appropriate and functional wheelchair, its effectiveness may be reduced by limited access to buildings (McGuire, Scott and Shawn, 2006).

Graham, Weingarden, and Murphy (1991) argue that challenges experienced by most wheelchair users are mainly attributed to structural dimensions, interior design, entrance ways, and the layout of furniture as result of physical limitations in mobility, reach, and posture. The physical and social environment of an educational institution impacts the students with disabilities' decision to enrol into tertiary education as well as a choice of such institutions and academic programmes.

The University of Botswana Disability Support Services

The University of Botswana is committed to widening the access and participation of students with disabilities in its programmes and activities. The institution has formulated a policy to give support services and academic accommodation to students with disabilities through the office of Disability Support Services (DSS). The Office's mandate is to provide students with disabilities the opportunity to realize their full potential in physical, social, emotional and intellectual development, through a full participation in the university life. Some of the programmes include extended time during tests and examinations, transportation, and assistive devices (University of Botswana, n.d.). However, the university policy does not clearly and specifically address making physical structures accessible to promote students' independence, accord them privacy and maximize their academic and social experiences at the university. In comparison, the University of Cape Town (UCT), through its Disability Service Office, has developed clear accessibility guidelines to the built environment to accommodate students with physical disabilities that address such physical features as ramps, toilets, parking bays, lifts, and wheelchair access map (Watermeyer, 2002).

Accessibility of institutional buildings guidelines

In the USA, when the Americans with Disability Act (ADA) went into effect in 1992, it considered the accessibility of both new and existing educational buildings. The ADA clearly addresses and outlines accessibility requirements such as ramps, door widths, toilets, playgrounds and other educational areas (Dolan, 2005; U.S. Architectural and Transportation Barriers Compliance Board, 2000). The UNESCO (2005) inclusion guidelines recommend that exclusion be reduced by making some structural modifications for successful learning and increased participation by students with disabilities. The guidelines address the false perception that creating accessible educational structures is costly when only minor adjustments are usually required, and could also benefit other students. In Botswana, the Housing Policy and Building Code does not specifically address accessibility or barrier-free design issues for institutional buildings.

Botswana inclusive education and accessibility of school buildings

Although the Government of Botswana has made progress with inclusive education in terms of identification of students with disabilities, their integration into mainstream schools, teacher training and other issues (Hopkin, 2004), little has been done or discussed in terms of creating accessible learning environments for students with special needs. The Botswana Revised National Policy on Education (Government of Botswana, 1994) suggests some modifications of existing schools to make them accessible to students with disabilities, among which is the installation of ramps. The policy, however, is vague and lacks specifications on how to make the school buildings more accessible.

The Tertiary Education Council (TEC) (Tertiary Education Policy, 2008; Tertiary Education Act, 2008), and Botswana Training Authority (BOTA), which are responsible for the promotion, coordination and accreditation of tertiary education in Botswana, do not clearly address structural issues in learning environments. As part of the accreditation process, the policies and the act only indicate that conducive physical facilities must be provided and managed to enhance the quality of tertiary institution programmes. However, they do not specify how this should be done. Lack of commitment to remove barriers to physical access to institutional structures may exclude students with disability and defeat Botswana's vision of an education for *all*.

Literature review

The accessibility of educational buildings

Despite the stated commitment to open access to higher education for people with disabilities, most institutions still fail to meet the compliance requirements of buildings. Losinky, Levi, Saffey, and Jelsma's (2003) study examined the accessibility of buildings to wheelchair bound students, added time and distance travelled on the campus of a large institution of higher education in South Africa. Of the 18 buildings within campus, only two were found to be fully accessible. Wheelchair users took a longer time and travelled longer distances between lecture theatres compared to able bodied students. The mean time taken was 16 minutes which was longer than the 7 minutes for the able bodied students, making them arrive late for lectures and preventing them from reaching their destination within the allocated 10 minutes between classes. The majority of the buildings were partially accessible, especially old buildings. Toilet cubicles, work surfaces and lift controls were found to be the most inaccessible facilities; only the main entrances were fully accessible (Losinky et al. 2003).

Prellwitz and Tamm (2000) found that children in one Swedish school were generally satisfied with the classroom physical environments and the school library. Major barriers included difficulty in manoeuvring wheelchairs around the classrooms, using adapted chairs placed in the classroom, small toilets (accessible ones were placed further away), and inaccessible playgrounds because of difficult transfer trips, books placed on difficult to reach areas, and high blackboards. Students with disabilities were excluded from recreational facilities such as the gym, and also from the dining hall because the rooms were in the inaccessible upper levels. Hemmingson and Borell (2001) found that the most common unmet accessibility needs in one school included lack of assistive devices, automatic doors, ramps and elevators to access upper floors.

Pivik, McComas, and Laflamme (2002) asked students and their parents to identify barriers in eight different schools in Canada. The main barrier in all the buildings was access to the schools through the main entrance. The accessible entrance was at the back and the ramps were steep. Barriers were also found in wash rooms (inaccessible basins and toilet accessories), passageways (narrow and crowded), small elevators, recreational facilities (located in different floors), water fountains (too high), interior doors (no automatic door buttons and not wide enough), and stairs.

West et al. (1993) found that students with physical disabilities who enrolled in higher education institutions in Virginia, US, were generally satisfied with services and accommodation provided. However, accessibility challenges experienced included inaccessible lab space, lack of elevators, inaccessible computer labs, long distances between accessible entrances and accessible parking from entrance; and rooms crowded with furniture. The students' respective institutions responded by removing physical barriers and modifying most of the old buildings. The students indicated that they should be included in developing disability-related policies and services for a more effective and comprehensive accessibility.

Accessibility of educational buildings and social and academic participation

Paul's (1999) study of higher education institutions in the United States regarding the experiences of wheelchair users found that going to the university by the students brought new anxieties about the social and academic environment. The choice of university was not only based on its academic standing, but also on disability services available and the accessibility of buildings such as classrooms, toilets, lifts, various facilities (computer, recreation, library, and dormitory facilities), the distance between and time taken to reach the buildings students were going to frequent. Efforts made by the university to make buidings accessible allowed them think of their (academic) role as students first and to freely and independently make personal choices about their daily activities instead of constantly worrying about their disabilities.

Hemmingson and Borell (2001) found that the majority of students with physical disabilities in Swedish mainstream schools experienced barriers in both social and physical environments. The barriers in the social environment restricted participation and social contact with their peers, and excluded them from various activities around the school, especially outdoor ones. Losinky et al. (2003) found that the inaccessibility of buildings impeded full social integration of wheelchair users in the campus life of a South African institution. Long routes and longer travel times taken reduced socialization with other students. It was found that the (in)accessibility of buildings greatly influenced choice of programme of study because some faculty buildings did not cater for wheelchair users. Prellwitz and Tamm (2000) found that inaccessible buildings and school yards restricted the socialization of children with limited mobility with other children. They were often isolated by having separate play places reserved for them.

Accessibility of schools in Botswana

Mthombeni and Fidzani (2011) found that most junior secondary schools in the South Central region of Botswana were not accessible to wheelchair users. The majority of these schools did not have any ramps at the entrance, accessible toilets, wide corridors, paved shaded pathways or lifts for classrooms in the upper floors. However, most of them had slip resistant flooring, and reachable and easy to operate door handles. Fidzani and Mthombeni (2009) found that most of the Home Economics laboratories in junior secondary schools in Botswana were on the ground floor and had wide doors. Despite this, they were inaccessible because they had no ramps, the laboratories were congested (less circulation space) and there were no accessible special units and equipment that could be reached from a sitting position. The next section describes our study design, specifically the methods used in the collection of data for the study.

Methods

A mixed model design was used whereby both qualitative (participant-observation approach, interviews and photographs) and quantitative (observation checklist) approaches were utilised for a more comprehensive and triangulated assessment of accessibility (Neuman, 2006).

Sample

A convenient sample of all the three (3) on campus wheelchair-bound students, consisting of two male (Kabo and Tefo) and one female (Lesego) at the University Botswana were identified with the assistance of Disability Support Services. Due to the low numbers of students on wheelchairs, a participant-observation approach was used by having eight (8) student researchers registered for the Housing for People with Special Needs course at the time of the study in a simulation experiment in order for them to experience challenges faced by wheelchairs users at UB. The approach allowed for the assessment of other buildings that wheelchair bound students did not use on a daily basis. The experience by the students lasted for 24 hours, during which period they made observations while they were going about their daily activities of going to class and visiting various buildings and facilities around campus. Permission and ethical clearance was obtained from the Office of Research and Development (ORD) at UB to carry out the study. For confidentiality, pseudonyms were used for the three students.

A total of 26 buildings were randomly selected to represent buildings used by the majority of students ranging from old to new ones on campus. Though specific data were not available, it was established through the Institutional Planning office that the selected buildings were built at different decades from the 1980's to the 2000's. The buildings assessed for accessibility were: a) Nineteen (19) service buildings consisting of Block 108 (Administration Block), Main Campus Library, Block 252, Students Centre (Block 139), Block 231 (Faculty of Education), Block 245 (Faculty of Business), Block 233 (Faculty of Science), Block 240 (Faculty of Social Sciences), Block 239 (Faculty of Humanities), 2 Refectories, 8 classrooms/laboratories for various faculties, and b) 7 single and multi-storey hostels (Hostel 417C, 419, 423, 424, 466, 479, and 480).

Instruments and data collected

An observation checklist and interviews were used to collect data. The checklist was used to assess the interior and exterior accessibility of 26 buildings around the main campus in relation to ramp steepness, toilet sizes, lifts, parking lots, outdoor corridors/footpaths, and the reachability of interior items. One - on - one interviews were conducted with the the three wheelchair bound students and the eight researchers who were simulating to learn about their experiences of access to buildings at UB. Observations were made at their hostel rooms and bathrooms. At the end of the participant-observation, the student researchers wrote a journal about their experiences, noting both accessible and inaccessible places around the campus to use for analysis. Photographs were taken by the researchers to assist in analysing data and writing the report. The checklist was analysed using SPSS version 19.0 for descriptive statistics. Qualitative data were transcribed verbatim to identify common patterns (Neuman 2006).

Findings

Service buildings

Ramps and entrances

Ten of the 19 buildings had accessible wide double doors and one did not have to use steps or stairs. In the library and the Administration block three entrances had wide and functional automatic doors. The three wheelchair users reported that they rarely went to the bookstore because of the revolving turnstiles at the entrance. They reported that, if they did, they normally asked for help at the entrance. Eight of the buildings had ramps, but only two of them (the Student Centre and the Administration building) (Figures 1 and 2) had handrails on the ramps. Some entrances did not have a ramp and some had ramps that did not have a dropped kerb at the end (Figures 3 and 4).

The three wheelchair users indicated that at Block 247 (opened in 2012), the outside ramp was not accessible. Kabo described the ramps as "very dangerous because they are steep, have no rails and one of them lands straight into the road". None of the buildings had indoor ramps except the Student Centre. This meant that the upper floors were only accessed through a lift which posed safety problems in the event of a fire or power outages. They all agreed that the entrance ramp for the Student Centre (Block 139) was the most accessible but the indoor ramp was very steep with no landing spaces (Figure 5). Accessing the top floors is thus a dangerous undertaking.

Although the Administration building's eastern entrance, which is commonly used, was found to have ramps with rails into the shaded verandah and an automated double door, it was, however, found to be impossible to access because there is a step (200mm rise) and no ramp or assessible threshold (Figure 3).

Figure 1: Suitable gradient ramp with no handrails and no shade – Student Centre

Figure 2: Good gradient shaded ramps with handrails and non-slippery flooring – Administration building

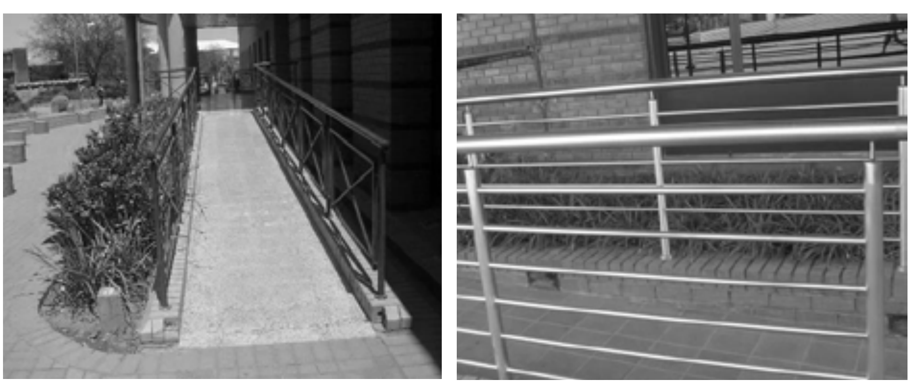

Figure 3: No ramp or threshold at the Administration building entrance

This was confirmed by Lesego who explained that she only uses the southern entrance because it has a shaded corridor, a gentle ramp at entrance, and double automated doors. The northern entrance has a double automated door, a level entrance and a threshold. Kago indicated that he always takes a longer route to go to Administration building to avoid barriers. He never goes to the library at night because of long, dark, and unsafe accessible routes. One participant assisted by a stranger said:

> We used the corridor by Block 225 but we could not pass because of the trench. We used the ramp which was steep, so my assistant had to put in a bit of effort to hold the wheel and prevent it from rolling back.

Another participant said:

> Some of the sidewalks have a slight slope to drain water. For example, in front of Block 225 going towards the library. That area really drained me out because I had to wheel towards the higher side to avoid rolling toward the slope and at the same time wheeling forward. I cannot explain the fatigue I experienced at that moment for just a short distance.

The majority of classroom entrances in various faculty buildings (66.7%) had a step and did not have ramps to allow wheelchairs to get in. Most had double doors to manoeuvre the wheelchair but only one side of the door was always open (Figure 7). Only 7 of the entrance doors had delayed action to allow time for a wheelchair to access the building.

Figure 4: Ramps with no dropped kerb, no handrails, and no shade

No dropped kerb for smooth transfer at the end of the ramp

Figure 5: Steep indoor ramps with handrails and no landing space – Student Centre

Figure 6: Gentle ramps at the refectory and bookstore but no rails

Figure 7: Only one side of a double door is open

Figure 8: A well maintained and not so well maintained dropped kerb

Interiors

The counter heights for most service areas were found to be high and/ or had no knee space. Of concern was the Block 252 and 139 help desks, security help desk, admission desk in the Student Centre, and cashier's counters in the Administration building (Figure 9, 10 and 11). The library was the most accessible building except for the high OPAC computer tables, and printers. The reading tables and circulation desks had knee space but were of standard counter depth, which left no space for putting things on top. Other places of concern were laboratories such as the food laboratory and clothing laboratory at the Department of Family and Consumer Sciences (Figure 12). There were no custom designed units for students with special needs. For both laboratories, the barriers included high tables/counter tops. In the food laboratories, range controls were not located in front; there was no knee space under the sinks and countertops. Most of the science laboratory tables were accessible from a sitting position with knee space, except that the switches were not reachable.

Sources of restricted movement and reduced active class participation in most classrooms included stairs (especially in auditoriums), fixed tables and chairs, and crowded classrooms. A wheelchair user could only sit at the back or the front of the classroom depending on the location of the entrance. Even though there was knee space provided for the tables, most of these tables were either too high or too low. Some classrooms were on the upper levels of the buildings. Lesego said this when responding to a question on accessing classrooms:

> One class was on 2nd floor and there were no lifts. The lecturer had to look for another classroom. But I cannot go to the lecturer's office for assistance because it is not accessible. In one class I had to attend it from outside because I could not access it. I missed the class for 3 weeks until a ramp was erected.

Both student who participated in the research and the wheelchair users needed more time to reach classrooms, and always arrived late for classes. The major problem was that the routes they used were inaccessible and the outdoor corridors were congested, especially during the 10 minute interval between classes. For student research participants, it took an average of 20 minutes to get to class. Tefo always left her room earlier than other students in order to get to class on time. One participant said when she responded to the question about the time it took to move between classes:

> …I was coming straight for my room to attend HRM class and I thought I was very early because I knew it was going to take longer with the wheelchair… I was wrong…As always the room was full. I couldn't get in, while on the other hand I didn't want to miss class. I asked those sitting by the door to at least push themselves to the front to at least hear what the lecturer was saying. Luckily one guy moved to the front and I was able to move to where he was from but still at the back.

Figure 9: High counters at the admissions office

Figure10: Smooth ramps but high counters at food court eatery

Figure 11: High counters at cashier's office

Figure 12: High counters and no knee space at the food laboratories

Toilets

Toilets were found to be generally available at different floor levels. Only eight buildings had toilets reserved for people with special needs. However, only four of those had space to transfer from the wheelchair to the toilet. Seven buildings had washbasins with knee space and taps reachable from a seated position. The toilets had grab bars but some items and accessories such as light switches, mirrors, toilet paper holders, soap dispensers, and hand dryers were too high (Figure 13).

Figure 13: Accessible toilets but high accessories

Hostel rooms

Ramps and entrances

Most hostel main entrances were accessible from the outside without having to use steps, and they did not require ramps. However, entrance mats that did not flush with the floor made it difficult to access the entrance (Figure 16). The ramps in some of the hostels did not have handrails. Three hostels did not have a threshold, and in 2 hostels the threshold was less than 15mm high. Six hostels did not have automatic doors. Only three (3) hostels had doors with a delay action device.

Figure 14: No ramps or thresholds

Figure 15: An access hindering gate at Block 480

Figure 16: Uneven mat at hostel entrance

Interiors

The personal space for the three wheelchair-bound students we investigated was their hostel rooms and bathrooms. Kabo and Tefo's rooms were spacious and allowed for circulation (turning circle of 1500mm) because they were not sharing whereas Lesego complained about lack of space because she was sharing her room with another student. Similarly, Kabo indicated that the interior arrangement and mounted furniture (bed and study table) were a serious movement challenge as he could not rearrange the furniture to suit his needs. As confirmed by the wheelchair users, in most hostel rooms the study tables were accessible as they were 840mm high and had knee space. In addition, the flooring was non-slippery; the beds allowed for easy transfer to and from the wheelchair) and light switches (86%) were reachable. Inaccessible items were high book and closet shelves (he only used lower shelves), high mirrors (960mm above the floor), high notice boards, unreachable electrical sockets (either high, or under the desk) and high windows (Figure 17). Lesego was forced to sit on the table in order to study because the table was too low to fit the wheelchair and book shelves were high above the desk.

Toilets and bathrooms

Toilets and bathrooms were not accessible by wheelchairs despite being reserved, with the international symbol of accessibility. None of the hostels surveyed had a space at least 600mm wide next to the toilet to allow for a lateral transfer, or grab bars. Lack of circulation space in the toilet and shower cubicles forced the wheelchair users to leave the wheelchair outside and the door open, and this compromised their privacy. With no wheelchair, Lesego struggled to access the bathtub that had no rails to hold on to. Only one hostel had grab bars in the bathtub. Wash basins in 4 hostels and taps in 5 hostels were reachable from a sitting position.

Figure 17: Accessible study table and high book shelves

Outdoor corridors and pathways

Most administrative and faculty buildings were connected by shaded outdoor corridors, though some needed maintenance. The three wheelchair users confirmed that unpaved and/or unshaded corridors connecting hostels to critical service areas (e.g. faculty buildings and refectory) were a major problem for the movement of the wheelchair, and they had no protection against the scorching sun and rain. Despite wide outdoor corridors, the students reported that they were constrained in terms of which entrances to use because few entrances were connected to the shaded corridors (e.g. Administration building). To reach service buildings, the students used car routes and crossed at unstable bridges placed on ditches. This raised serious safety concerns and increased students' dependence on other people to assist them. The major barrier in the pathways was the uneven surfaces (due to lack of maintenance), items placed on the pathways, and poorly maintained, high, and/or lack of dropped kerbs, (Figures 8 and 20). Lesego, when responding to the question about accessible routes said:

> Mostly I use the road because the pavements are not even and are not well maintained. But cars are a problem. I was nearly hit by a car more than 10 times. After every week I

always say I have survived due to the possibility of being hit by a car.

Figure 18: Shaded pathway / outdoor corridors

Figure 19: Unshaded pathway to the hostels

Figure 20: Obstruction by items placed along the pathway

Lifts

The majority of administrative and faculty buildings had lifts except the Faculty of Education building and multi storey hostels. The main barrier was the small size of the lifts, which had no space to manoeuvre the wheelchair and, as such, the students had to exit the lift by reversing out of it (Figure 21). Other barriers included high emergency communication buttons or none at all. The Faculty of Science had a manually operated lift which had to be opened twice (Figure 22). Although the doors are bi-fold it took a lot of effort to open and close them. The Book Store did not have a lift to access the top floor where most course equipment and books were placed. It was accessed by a steep indoor ramp which had a door that was always locked. Kabo narrated that he was once stuck in a lift at Block 252 for 3 hours. There was no cellphone signal or emergency bell in the lift. Luckily, some students saw him going in and asked for help. He said:

> I was rescued from 2nd floor which does not have an indoor ramp to go down. I had to be lifted with my chair to ground level which took time.

The three wheelchair users indicated that the Library had accessible lifts but they are mostly out of order. One participant said this about accessing the second floor of one building:

> This limited my independence because I now entirely had to be assisted to go to the second floor. That is when I really felt unwelcome on campus and felt unable to access my world because if I can't collect my schoolwork then no independent living for me… I felt angry and embarrassed.

Figure 21: Reachable buttons but no space to manoeuvre

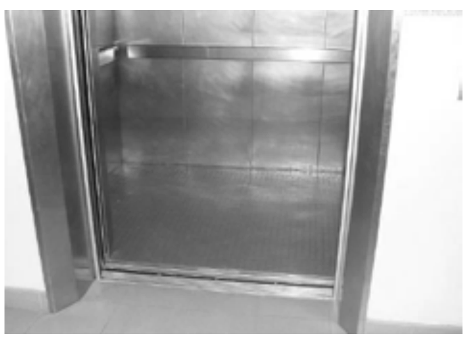

Figure 22: Manually operated lift

Parking lots

Twenty eight percent (28%) of the assessed buildings did not have parking lots close by. For those with reserved and clearly marked disability parking lots (43%), they were not accessible to wheelchair users because they were standard size, and did not allow for the transfer into or out of the car with or without assistance (Figures 23 and 24). From the main gates, there are no signs for easy identification and access to designated accessible parking bays. Only one parking space had signs to direct wheel chair users and shade to protect them from rain and the sun during transfer. For most parking lots, the wheelchair user would have to endure rain and heat during transfer into and out of the car.

Figure 23: Marked but not accessible parking lots

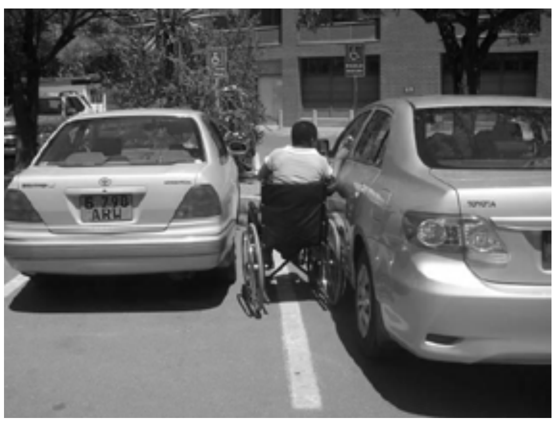

Figure 24: No space to transfer from or into the car

Discussion

The purpose of the study was to assess the accessibility of buildings around the UB main campus commonly used by wheelchair users. It was found that the most accessible building at the university was the Library, similar to Prellwitz and Tamm's (2000) findings, followed by the Administration block and Block 417 respectively. The most inaccessible building was Faculty of Education and hostel blocks mainly because there are no lifts or ramps. It is important to note that the Faculty of Education is older than the other buildings in this study, and this may explain the structural barriers in that building. However, the main concern, especially to wheelchair users, was that some of the new buildings on campus are just as inaccessible. This may be due to lack of a proper legal framework for ensuring that buildings in Botswana's educational institutions are designed to a standard similar to that used in the USA, for example.

The most common barriers included longer accessible routes, steep or no indoor/outdoor ramps, no automated doors, lack of hand rails, uneven pavements, unshaded corridors, especially from the hostels, small (less than 1500mm wide) lifts or no lifts at all, high counters at various help/service desks, and standard size reserved parking lots. On a positive note, some buildings had wide entrance doors, wide corridors, and non-slippery floorings.

Inaccessible buildings and lack of lifts deprived wheelchair users access to and interaction with lecturers in the upper floors of faculty buildings and social interaction with students in single and multi storey hostels. A wheelchair user would have to depend on others to get something from the lecturers. This encourages dependency and compromises the students' privacy. Buildings with no indoor ramps are a hazard during fire, and are not accessible when the lifts are not operational. Hemmingson and Borell (2001) and Pivik et al. (2002) found that lack of automatic doors, ramps and elevators to access upper floors were major barriers in schools, making students dependent on others to assist them.

Although most tables in the classrooms (except those in the laboratories) were found to be accessible from a sitting position, the main barrier was the stairs in lecture rooms and crowded classrooms which did not allow for easy movement of wheelchairs. The laboratories had no accessible special units, similar to findings by Fidzani and Mthombeni (2009) for Home Economics laboratories in junior secondary schools. Consistent with Pivik's et al, (2002) findings, toilets reserved for people with special needs were wide enough and had grab bars. However, the accessories were placed too high.

Standard size parking lots were simply converted and reserved for people with special needs by marking them. Increasing the size of the parking space is important for wheelchair users because they need more space to transfer from the wheelchair to the car and vice versa. The marked parking spaces were not shaded to protect students from the weather. They are also not located close enough to the buildings, and hence expose the students to traffic related dangers.

Similar to Losinky's et al, (2003) findings, participants reported that they needed more than the 10 minutes allocated between classes to travel the long routes to various buildings around campus. They said that they constantly needed assistance to take shortcuts and reach their destinations on time. Although transportation is provided by the DSS to assist students with disabilities, the inaccessibility of buildings encourages dependency and exclusion from certain buildings and activities at preferred times (Prellwitz and Tamm, 2000; Rivano-Fisher, 2004). Even if specific hostel rooms are re-adapted to meet the students' needs, their social and academic life does not end in their rooms. Access to other buildings for the purpose of visiting around campus is crucial for these students to have independence, socialize, and be accepted by their able-bodied peers.

Conclusions

The findings of the study indicate that too many essential buildings at the University of Botswana are not accessible to students on wheelchairs. High-quality design does not translate to accessibility. Therefore, conscious decisions to design and provide accessible buildings and remove existing exterior and interior barriers at the University of Botswana is important to promote a conducive academic and social environment for students with disabilities. Although the focus is on students with disabilities, the university community expands beyond them to include staff members and the wider community. For Botswana to achieve its vision of education for all and an inclusive education, strict and clear guidelines must be designed to make all institutional buildings accessible to people with disabilities. Although this research focused mainly on wheelchair-bound students, future research is needed to examine the accessibility of buildings to students with other disabilities such as the blind and the deaf.

Recommendations

Based on these findings, the following recommendations were made to benefit the whole university community:

- Enacting legislations and putting in place regulations (e.g. similar to ADA) that detail and clearly define structural requirements for accessible buildings in tertiary institutions by the Accreditation bodies (through BOTA and TEC Policies), the Ministry of Education and Skills Development (through the Botswana National Policy on Education and Botswana Inclusive Education Policy), the Building Control Act, and specifically the University of Botswana Disability Policy. For example, they should address the following important accessibility issues.
    - Clearly marking accessible routes around campus without isolating students with disability from other students.
    - Constructing both indoor (for all floors) and outdoor ramps with good gradient (1:12), and handrails, good landing space, and good lighting in all the buildings.
    - Providing shaded and level outdoor corridors connecting all the crucial buildings around campus.
    - Providing clearly marked, wide (at least 3.5m) and shaded parking lots placed close to all the buildings.
    - Ensuring that hostel rooms are accessible (with room for circulation of 1500mm diameter, study desks with knee space, book shelves, switches and plugs that can be reached from a seated position).
    - Providing accessible toilets (with enough circulation space for easy transfer, toilet accessories reachable from a seated position) and bathrooms / showers (showers with a smooth ramp, non slippery flooring, wash basin with knee space and reachable taps).
    - Ensuring that each laboratory / classroom has at least one accessible unit designed for wheelchair users depending on the use of laboratory (e.g. lowered countertop of 840mm with knee space).

Physical planners at tertiary institutions *must* always involve people with disabilities and relevant professionals (e.g. interior designers, architects etc.) in designing and readapting buildings around campus.

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