# Circulation Facilities and their Impact on Comfortable Use in Government Girls Primary School, University Campus, Karachi, Pakistan

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### Abstract

This research study aims to determine the relationship between circulation facilities and their impact on users' comfort. The study was carried out at a Government Girls' Primary School, University Campus located in Gulshan-e-Iqbal Town (Female), District East, Karachi (Semis Code No. 408080064), Pakistan. Data were gathered and analyzed using both quantitative and qualitative methods. In the quantitative method, questionnaires were used, and in the qualitative method, observations (site visits, architectural drawings, and photographs) were used for staff members: teaching staff (academic staff) and support staff (general staff). According to the findings, circulation facilities were statistically significantly related to the performance and turnover rates of staff members: teaching staff (academic staff) and support staff (general staff).

Moreover, users were negatively impacted by circulation facilities. The findings include the identification of insufficient facilities such as entrances and exits, including emergency access (from the main entrance of the school, from built-up areas, from classrooms, and the upper floor in the form of a staircase and ramp), corridors, staircases, ramps, and lifts. Furthermore, emergency access (from built-up areas, classrooms, and the upper floor in the form of a staircase and ramp) was missing. A ramp and a lift were not there.

The research concluded that the Government Girls Primary School, University Campus, Karachi, needs improvements in many areas in terms of proper movement facilities, including design consideration for physically challenged users.

Keywords- Circulation Facilities, Comfortable Use, Impact, School, Users.

## I. INTRODUCTION

Education is considered a fundamental human right and a formidable weapon for social transformation that impacts every part of an individual and a community, regardless of a child's race, sex, region, or religion. It is crucial for a nation's advancement, plays a significant influence on a child's psychological development, and is closely related to a country's economic expansion. Through awareness, knowledge, and social innovation, it also plays a significant part in enhancing human potential and speeding up economic growth. Schools, colleges, universities, and other institutions of society provide formal education [1]. Pre-primary education is referred to as the first phase of organized teaching, which is primarily intended to introduce young children to a school-like environment and serve as a transitional period between the home and the school setting. Preprimary schooling is linked to greater reading and math proficiency at the start of primary school, but these relationships vanish by the end of the first grade. Researchers also discovered that pre-primary schooling is linked to greater levels of behavioral issues when preschools are not housed in public schools [2]. One of the main strategies for fostering economic development and raising living standards in developing countries is seen to be primary education [3]. However, it is expected that when fundamental education is paired with up-to-date information and appropriate technical training at the primary level, the quality of education will improve. In the struggle against poverty, it is generally acknowledged that enhancing access to basic education should be a primary priority. [4]. It is the initial phase of compulsory education, lays the groundwork for students' academic careers, and is viewed as a fundamental human right.

Students should have access to adequate supplies of high-quality textbooks, teaching aids, and other school facilities [5]. The motivation of instructors is

significantly impacted by inadequate school facilities, which in turn hurts the academic performance of children [6]. Facilities are the means through which satisfactory ends are attainable. For the achievement of school objectives, facilities play a crucial role. School facilities impact student achievement, attendance, and teacher retention [7].

In the past, schools were studied more for their shape, form, structural design, sustainable building materials, air and water pollution control measures, conservation of water and energy, and waste management strategies than for how well they served their users' other very important requirements: circulation facilities. These necessities may comprise numerous factors, with comfort being the most vital. The users of schools today are more interested in schools that offer opportunities for circulation. School facilities are also seen as important to staff members: teaching staff (academic staff) and support staff (general staff). Academic staff includes faculty, and general staff includes administrators, deans, counselors, cashiers, assistants, watchmen, servants, gardeners, guards, cleaners, etc. Sustainability is seen as being dependent on the facilities, i.e., circulation facilities, provided by a school. Circulation facilities are of interest to users who want to be able to move around the school easily. Circulation facilities can include entrances and exits, including emergency access (from the main entrance of the school, from built-up areas, from classrooms, and the upper floor in the form of a staircase and ramp), corridors, staircases, ramps, and lifts.

Karachi, the capital of Sindh province, is Pakistan's largest and most populated metropolitan city and the seventh biggest metropolitan city on earth. It is the head financial and industrial hub of Pakistan and fills in as a transport hub. Karachi, which is situated on the Arabian Sea, is also well-known as the "City of Lights" and "The Bride of Cities." 16,839,950 people are likely to live in the city by 2022 [8].

Several schools in the city help students. The charm of a school can be created by several diverse factors, which ultimately define the user's comfort level. The current study examined the facilities of the school in terms of circulation facilities. Among all the specific facilities of a school, the facilities that act as the main front support for comfort level are circulation facilities for example entrances and exits, including emergency access (from the main entrance of the school, from built-up areas, classrooms, and from the upper floor in the form of a staircase and ramp), corridors, staircases, ramps, and lifts. Users' ability to utilize the amenities raises questions about the usefulness of their presence if they are unable to do so.

The Government Girls Primary School, University Campus is in Gulshan-e-Iqbal Town (Female), District East, Karachi (Semis Code No. 408080064), Pakistan, in one of the densely populated urbanized zones, and aims to provide educational opportunities to the local community. As an important school in the city, some of its user facilities need to be analyzed to ensure its best practice have a positive effect on users. The study aims to survey the facilities of the Government Girls Primary School, University Campus, Karachi, i.e., the limited availability of circulation facilities. It tries to assess these facilities and make improvements for the users.

These limitations were noted in this study:

- The study was focused only on selected school facilities, such as circulation facilities at Government Girls Primary School, University Campus, Karachi. It delineates the learning environment assessment and the organizational climate description.
- Only staff members—teaching staff (academic staff) and support staff (general staff)—from this school were selected to participate in this research study, as they are regular and experienced users. It makes it difficult for regular primary school students, ages 6 to 11, to understand the circulation facilities. It delimits the school visitors, as their movement and usage are very limited.

### II. LITERATURE REVIEW

In the twenty-first century, increasing education is the key to economic growth. Every aspect of society and each individual is impacted by this social reform tool. Institutions of society that are known as schools, colleges, and universities are responsible for providing formal education. Social knowledge, skills, and creative strength play a crucial part in developing human potential and boosting economic potential [1]. There is a wealth of literature that supports spending money on young children's development. Learning is easier in early childhood than later in life, according to research in psychology and cognition [9, 10, 11]. A learning environment that provides early childhood education to students, often between the ages of three and five, before the start of primary school's mandatory instruction is known as a pre-primary school, preschool, nursery school, or kindergarten. Most students attend preschool before entering the first grade. To provide children with a better start in life, several middle-income countries have adopted universal pre-primary education [12, 13]. According to research, primary school is crucial for agricultural raising and economic production. Additionally, it has been shown that education, particularly for females, is strongly associated with improvements in health as well as declines in rates of infertility, infant mortality, and morbidity. Therefore, it is believed that education is both economically and socially desirable [14, 15, 16].

Students need to have access to adequate supplies of high-quality textbooks, educational tools, and other

school resources [5]. The lack of resources at the school hurts staff and student motivation. The motivation of teachers and the success of students are significantly enhanced by a decent learning environment and suitable facilities [17]. A negative effect on students' achievement is where there are inadequate school facilities [18]. Facilities in schools help students learn and succeed while also enabling teachers to carry out their duties. Researchers also emphasized how the availability and appropriate usage of school facilities can influence a teacher's motivation to instruct pupils successfully, which in turn has a favorable impact on students' academic achievement. As a result, the school's facilities (standardized buildings, circulation facilities, and classrooms with their facilities, teaching materials, and child development tools) require proper care because they are crucial for boosting the morale and motivation of instructors and students as well as for enhancing the standard of instruction [19].

Schools used to be examined more for their design, structural layout, sustainable building materials, air and water pollution control measures, conservation of water and energy, and waste reduction management strategies than for how well they met the other very important needs of users. These needs encompass several factors, with comfort being the most crucial one. The users of schools today are more drawn to those that offer circulation facilities. Staff members-teaching staff (academic staff) and support staff (general staff)value the facilities at schools. Sustainability is viewed as being dependent on the facilities, i.e., the circulation facilities, offered by a school. Users who wish to be able to move around the school quickly are interested in circulation facilities. Circulation facilities can include entrances and exits, including emergency access (from the main entrance of the school, from built-up areas, from classrooms, and the upper floor in the form of a staircase and ramp), corridors, staircases, ramps, and lifts. So, it is evident from an analytical review that school facilities that act as the main front support are essential, which, in turn, provide user satisfaction and comfort.

The global standards to measure the efficacy and facilities of schools are stated in the Time-Saver Standards for Building Types standards. McGraw-Hill [20], Building for Everyone: A Universal Design Approach: Booklet 2 - Entrances and Horizontal Circulation [21], Building for Everyone: A Universal Design Approach: Booklet 3 – Vertical Circulation [22] and Karachi Building and Town Planning Regulations-2002 Amended Up to Date March 2017 [23].

Scholars have also mentioned that horizontal circulation is a type of movement that can affect users' comfort in educational institutions. To allow users to enter and exit the school building easily during a time of high traffic and in the event of an emergency, entrances and exits must be broad enough. 2,000 mm should be the minimum width requirement for corridors in educational facilities so that two wheelchairs can pass each other without feeling crowded [24]. Another remarkable example is how busy certain times of the day may be in public buildings. For instance, entrance and exit will be controlled during school hours, and it is anticipated that the main entrances and exits of school buildings will be quite congested at the opening and closing hours of the day. Because use varies at the earlier mentioned times of the school day, essential circulation patterns and elements should be created to comfortably accommodate users throughout those times [25]. According to prior research, a form of hallway or gallery that is often short compared to its length and serves as a passageway connecting various portions of a building is known as a school corridor. It frequently connects adjacent rooms and has building entrances. School corridors should have distances between objectives of no more than 100 feet [26].

Another study on vertical circulation found that, in schools, stairs should be easy to climb and descend, ramps should be made for kids with disabilities, and the handrails should be sturdy [27]. Additionally, past studies have demonstrated the necessity of including emergency stairs in multi-story schools [28]. Ramps are also the ideal circulation features to apply in the design, according to prior studies, and should be incorporated into the functional space of the educational institution in an inventive way [24]. Prior research has also shown that having schools with ramps and lifts, as well as wide doors that can accommodate wheelchairs and are specially constructed, is beneficial to education [29].

Thus, it is agreed that school amenities, such as circulation facilities, can be designed with a school's motive in mind in terms of user comfort level or user satisfaction. After a serious literature review, these facilities present numerous considerations in the school's design, which, in turn, provide user satisfaction. It has been proven that school facilities, which serve as the primary support for comfort level, can have an impact on a school's performance. Additionally, users should take into account the availability of circulation facilities at the school while choosing any institution. As a result, it is also argued that school facilities, which are the primary source of comfort, may also have an impact on how well a school operates. These facilities have been chosen for additional research.

#### III. METHODOLOGY

Some qualitative information in the form of anecdotes is included, however, to further enrich the statistics. Quantitative methods are generally employed to acquire data for the study, which is conducted as a case study (through site visits architectural drawings, and photographs). The city of Karachi was chosen for the case study. The additional source includes a publication-based review of the literature, past studies, reports, census, books, personal records, archives, and any other relevant referential materials. Surveys and observations were used as the primary sources of information (through site visits, architectural drawings, and photographs for reference). The standards set forth by the various pertinent sources accessible in the literature and observations were then combined with the selection of facilities to create a checklist. Both data-gathering methods were processed using the facilities that were chosen from the defined checklist. The questionnaire responses were gathered, and the results were statistically processed. To reach conclusions, these findings underwent additional analysis.

## A. Techniques For Samples & Sampling

The sample included one type of user; staff members, including teaching staff (academic staff) and support staff (general staff). Based on the users' level of interest in answering the questionnaire questions, the sample was chosen.

Large samples are frequently employed in descriptive research, and it is advised that they represent 10%–20% of the population that may be reached. A minimum of 30 participants should also be included in a sample since this number enables the use of big sample statistics, which lowers the likelihood of standard error. The objective was to find out how they interacted with the school. The staff members: teaching staff (academic staff) and support staff (general staff) at this institution totaled 38, thus we chose 30 as our sample size.

## B. Research Instruments

Questionnaires and observations are the two main methods used to collect data for this study (for analysis of existing facilities through site visits, photographs, and architectural drawings for valuation).

## C. Collection of Data

For this investigation, both primary and secondary data were gathered. The primary data support the surveys and on-site observations (site visits, photos, and architectural drawings) made through the research case. Multiple site visits were made between January 2022 and December 2022 to collect data. The secondary data is used to support a variety of literary materials, including books, essays, websites, newspapers, and more. A thorough on-site survey involved creating baseline drawings of the structure for data collection. This includes the creation of measured drawings, explanatory and analytical drawings, explanatory drawings, and drawings of facilities that help the school achieve its objectives.



For the study, a local case study—Government Girls Primary School, University Campus—was chosen. The school is located in Gulshan-e-Iqbal Town (Female), District East, Karachi (Semis Code No. 408080064), Pakistan, as shown in Fig. 1. Many hospitals and schools are close to the place. Public conveyance is available near the school. The limited number of students and staff in this school suggests that current user facilities are completely inadequate to provide a comfortable environment. This is why the number of people in this school is often lower than in other schools. If given as proposed by users and specified in standards, these facilities may be able to meet a wide range of people's needs.

The Government Girls Primary School, University Campus, Karachi, as shown in Fig. 2, is a well-known government school in Karachi, Pakistan. This school offers a 5-year program from class 1 to class 5 with a total of 120 students and 38 staff members: teaching staff (academic staff) and support staff (general staff). The school day runs from 8:00 a.m. to 12:45 p.m.

When one arrived at the school, it was made of concrete and had a solid mass. It consists of a ground-plus-onefloor structure. The school had adequate space for outdoor activity areas, adequate natural lighting, colorful soft boards in the corridors, and good ventilation.



The school is situated in Gulshan-e-Iqbal Town, District East, Karachi, Pakistan (Semis Code No. 408080064), which is a densely populated area of the city. The purpose of this study is to explain the current state of a few facilities about the school's spaces. The Government Girls Primary School, University Campus, Karachi, was analyzed based on certain facilities. Its objective is to take these amenities into account to improve user comfort and convenience. In horizontal circulation for user convenience, the entrances and exits were not wide enough in some places, like classrooms and both main entrances and exits of the school. Even cars could not enter from the two main entrances. The columns in the corridors were not sunken into the walls. In terms of vertical circulation, there was no other staircase in this school in case of an emergency.

Furthermore, emergency access (from built-up areas, classrooms, and the upper floor in the form of a staircase and ramp) was missing. A ramp and a lift were not there.

As a result, there appears to be a type of minimal circulation infrastructure at play, suggesting that individuals are not interested in this particular institution. Proof that a school's circulation facilities are essential to its functioning.

## D. Explanation Of Data

The study concentrated on the examination using a qualitative and quantitative method that was gathered through carefully chosen tools (observations and questionnaires), such as site visits, architectural drawings, and photos. A statistical tool is used to examine and understand this strategy further. The survey's collected data was examined. A standard for facility comfort was set. Conclusions required analysis to be reached.

IV. ANALYSIS AND FINDINGS A. Entrances and Exits of School



When asked about the school's entrances and exits, 10% of respondents stated that the entrances and exits were prominent, so they could not easily reach them; 5% said they were impressive; 5% said the main entrances and exits of this school were wide enough for cars to enter, while 90% said the entrances and exits were secure, and 70% said they were comfortable to use, as shown in Figs. 3 and 4.

Yet, it was observed that the entrances and exits were not prominent, impressive, or wide enough that even cars could not enter from the two main entrances while they were secure and comfortable. This is important to note here because, due to the excessive movement of users and cars, they could not enter from the two main entrances in the school selected, making it unavoidable to provide wide entrances and exits.

This is cited in Section II: Literature Review, as listed in standards [20, 21, 22, 23] and referred to by scholars [24, 25].

### B. Corridors of school



Of the defendants, 90% showed that the corridors were wide sufficient and could be used conveniently; 90% of defendants showed that the corridors were safe to prevent accidents; and 100% of defendants showed that the use of the corridors was comfortable, as shown in Figs. 5 and 6.

However, columns in corridors were not sunken into the walls. But corridors were comfortable, secure, safe, and wide enough to accommodate two wheelchairs passing each other without feeling crowded and for other mobility aids as well as two-way traffic. Classrooms were surrounded by corridors; as a result, they also served as the entrance to the classrooms. This is important to note here columns in this school's corridors should be recessed into the walls.

Other than the observational analysis, it is also cited in Section II: Literature Review, as listed in standards [20, 21, 23] and referred to by scholars [24, 26].

#### C. Staircases of school



The graphs in Figs. 7 and 8 demonstrate that just 10% of respondents were content with the staircase's width, while 95% of respondents were content with the staircase's placement, 92.5% were content with the non-slip surface, and 90% were content with the staircase's comfortable slope.

Researchers observed that the staircase was not wide enough. While the location of the staircase was perfect, the staircase was easy to use with a non-slippery surface. And adequate space was allotted to achieve a comfortable slope. This is important to note here the staircase should be wide enough to accommodate twoway traffic. A handrail on the staircase should be available, and it should be sturdy in this school for handholds. And is also cited in Section II: Literature Review, as listed in standards [20], [22], and [23], and referred to by scholars [27] and [28].

D. Recommended facilities in this School



The above Fig. 9 graphical representation shows that 97% of respondents suggested that there should be emergency access (from built-up areas of the school, from classrooms, and the upper floor in the form of a staircase and ramp), 80% of respondents suggested that there should be a lift in the school, and 80% of respondents suggested that there should be a ramp in this school.

It was observed that emergency access was not present in the school in case of fire or any emergency. This is cited in section II: Literature Review, as listed in standards [20, 21, 22, 23] and referred to by scholars [28].

The same is the case with the ramp, which was also not there. Ramps should be available in this school for emergencies, wheelchairs for physically challenged users, for the elderly, and baby strollers. This is cited in section II: Literature Review, as listed in standards [20, 22, 23] and referred to by scholars [24, 27, 29].

Some of the other facilities that are not present in the school are listed as "lifts." Lifts should be available in this school for physically challenged users, the elderly, and those pushing baby strollers. This is cited in section II: Literature Review, as listed in standards [20, 22, 23] and referred to by scholars [29].

## V. CONCLUSIONS AND RECOMMENDATIONS

The study draws several conclusions, each of which makes a distinct recommendation about the most important aspects of circulation facilities to maximize user ease. It was shown that the type of circulation that mostly involves the horizontal plane has an impact on the level of comfort experienced by students and teachers in educational institutions where it is prevalent. For user convenience, the entrances and exits were not wide enough in some places, like classrooms and both main entrances and exits of the school. Even cars could not enter from the two main entrances. Entrances and exits in this school must be wide enough to allow users to enter and exit the school building easily during a time of high traffic (the opening and closing hours of the day) and for car entry. And should be wide enough for wheelchairs and baby strollers to be moved simultaneously from both sides of entrances and exits. Entrances and exits were not prominent and impressive, but they were secure and comfortable. There were ramps in some places, but without handrails at the entrance and exit for physically challenged users and children's carts. But ramp access was not available from the upper floors. Also, there was no emergency access (from built-up areas, classrooms, and the upper floor in the form of a staircase and ramp) in the school. Emergency access with signs should be present in this school. Emergency exits in the form of a staircase and ramp with handrails must be wide enough to allow the movement of users, especially those with wheelchairs and strollers, from both sides. A ramp consumes a lot of space to achieve a comfortable slope, but a ramp is a better alternative for an emergency exit. The location of the emergency exits should be well-designed to choose the safest path so that users can exit the premises quickly and safely by going straight into the ground and opening to the outside in the event of a fire or other emergency. For safety reasons, signs of emergency exits and plan for emergency exit ways should be placed. Emergency access should be free from barriers, equipped with fire-resisting materials, have a non-slip surface, and have emergency access doors that are easy to open. In addition, the columns in the hallways were not flush with the walls. Columns should be recessed into the walls of this school. The corridors were wide enough in this school. The clear width of a corridor was around 7 feet to accommodate two wheelchairs passing each other without feeling crowded and for other mobility aids as well as two-way traffic. Classrooms were surrounded by corridors. As a result, they also serve as the entrance to the classrooms.

Corridors that were often short compared to their length and served as a passageway connecting various portions of a building were comfortable, secure, and safe to prevent accidents. There were colourful soft boards in these corridors to create interest. The school avoided modifications of level within a floor. In school, the surfaces of the floor were firm, levelled, and nonslippery.

Furthermore, for vertical circulation, there was no other staircase in the school. Other staircases should be available in this school in case of an emergency. The location of the staircase was perfect. Adequate space was allotted to achieve a comfortable slope in the design of the staircase. The staircase was easy to use with a non-slippery surface, easy to climb and descend, and accessible to all with adequate lighting and ventilation. There shouldn't be more than 12 steps in a flight of stairs that connects landings on different floors. The school building's staircase was designed accordingly. The staircase at school was not wide enough. It was only 3

feet and 6 inches wide. It should be wide enough to accommodate two-way traffic. A handrail was not on the staircase. A handrail on the staircase should be available, and it should be sturdy in this school for handholds. In essence, handrails contribute to stability by preventing people from sliding or losing their footing and collapsing. Similarly, there was no ramp in the school. Ramps should be available in this school for emergencies, wheelchairs for physically challenged users, for the elderly, and baby strollers. Ramps are also the ideal circulation features to apply in the design and should be incorporated into the functional space of the school in an inventive way. A ramp consumes a lot of space in an attempt to achieve a comfortable slope, but a ramp is a better alternative for vertical circulation. A ramp's width should be sufficient for wheelchairs and baby strollers to move in both directions at the same time. A handrail should be on the ramp for handholds. In essence, handrails contribute to stability by preventing people from sliding or losing their footing and collapsing. Furthermore, there was no lift in the school. Lifts should be available in this school for physically challenged users, the elderly, and those pushing baby strollers. If there are stairs nearby, the lifts should always be situated next to them to provide an alternative route. Lifts in a school building should be easily visible from the entrances. The lifts should be large enough and easily accessible to accommodate a small group of people, as well as have wide doors that can accommodate wheelchairs. A handrail in the lift should be available for handholds.

The school's designers should consider the recommended facilities for user comfort, as these facilities play a vital role in attracting people to this school.

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