Wayfinding in Libraries: A Study of University Library Users in Mumbai

Nidhi N. Rakshikar / Dr. Sushama C. Powdwal

Abstract

This article reports a study focusing on the wayfinding experiences of the first-year students with respect to the ability to find their way in the university campuses in Mumbai and to locate the library and its collection as well as to find out the availability and evaluation of signage through SWOT analysis in the university libraries in Mumbai. The study further uses TOWS matrix with alternative strategies for wayfinding in university libraries. The results demonstrate that on the one hand, first-year students are new to the wide-spread university campuses and huge university libraries. On the other hand total absence of the required signage and inadequately designed signage results in the disorientation and frustration among first-time users of the library. The results point a need to pay serious attention to improving the visual guidance system in university libraries in Mumbai to make the libraries more user-friendly. It suggests measures to minimize wayfinding problems as well as to render university libraries more user-friendly and humanely oriented.

Keywords: Wayfinding; Human orientation; University libraries; Signage; Directional guidance; user-friendliness; SWOT analysis; TOWS matrix

1. Introduction

Information behaviour is a key research area in both librarianship and information science and this concept encompasses a wide array of information behaviour patterns, including wayfinding, a spatial information behavior. Wayfinding is the study of how human beings use a variety of informational media to orient themselves and navigate in space. Wayfinding research accepts the goal of trying to understand human spatial orientation and behavior processes. Improved wayfinding cues can lessen users' frustration in library facilities and ease the burden of library staff to direct users to locations that users could find for themselves if the library's wayfinding information system is more intuitive and self-explanatory. This can improve the overall user-friendliness and approachability of library information and resources, helping users find information they might miss otherwise. The present study focuses on wayfinding experiences of university library users in Mumbai through conducting user study on wayfinding behavior of university library users. It also attempts to observe and evaluate the signage in university libraries in Mumbai.

Surroundings make special demands upon visitors at any public place, whether it is a transportation terminal or a university library. Unfamiliar or unexplored environment and surroundings create more tension among the first-time visitors. Wayfinding is an important facet of science of human orientation. Navigational aspects are significant from the user's point of view. As rightly pointed out by (Modak, S. K., 2013), the Human Orientation Science believes in multi-dimensional thought process which comes to grips with the problems related to way-finding at public places, the usage of things, the physical settings, and situations created around us to respond to social and psychological needs. Physical surroundings and directions affect everyday human behaviour. For libraries, they also affect information seeking behaviour.

2. Need for Research

University libraries are unique in their own way in the sense that their floor plans and architectural settings are totally different from other types of libraries. They are very spacious and often multi-storied. There are very few rooms housing the collections. Most of the items are stored

in departments that often encompass large open spaces, sometimes, floors. Due to this, it is difficult to identify small spaces with names, to help patrons isolate specific locations of items. The items in the collection pose an additional problem. Many of them are of the same size and shape. They are stored in large numbers of linear feet of shelving. Even though the collection is organized with the help of classification scheme, new visitors are not much familiar with the classification scheme and the numerical arrangement of the collection. Neither the items in the collection nor the shelving have many distinguishing characteristics to aid in the finding process such as use and allocation of the different color for bound books and journals as per different subjects. Just getting information about where the items are stored in the building is often a challenge.

University library users belong to varied age groups, backgrounds, and educational levels. Many of them do not have experience of using such libraries; some may have never visited a large library before. In addition, every year such libraries add new users. Users unfamiliar with the library engage in wayfinding and navigation, and this process can be either aided or frustrated by the environment they encounter. By studying user reactions to the surroundings of libraries, librarians can make their libraries more accessible and user-friendly. Wayfinding studies help in creating a comprehensive, clear and consistent visual communication system with concise messaging. How well people are able to find their way in libraries has an impact on their ability to successfully use library facilities to accomplish information needs. With this need and concerns, the study was conducted.

2.1 Definitions

Wayfinding, as defined by (Johnston & Mandel, 2014), refers to 'the ability of users of the built environment (i.e. a facility) to navigate through that environment to find specific destinations'.

The study adopted the following definition of the term wayfinding; (Li & Klippel, 2012), 'Wayfinding is the way humans find their way through an environment'.

2.2 Operational Definition

The definition of Wayfinding adopted for the present study is as follows:

Wayfinding is the way first-year university students navigate and find their way through the university libraries.

3. Review of Literature

According to (Misenhelter, M., 2017), in the sphere of academic librarianship, limited mention has been made regarding navigability within library spaces by means of general wayfinding. To assess this statement, review of literature was initiated to explore the previous studies completed on wayfinding especially related to libraries. Research on wayfinding is very scanty but is conducted in a wide variety of settings, covering city areas as well as buildings. This literature review is limited to the discussion of wayfinding in buildings.

Using the term 'visual guidance system' to express the central idea to incorporate signage system with all other related components associated with planning and organizing a signage system, (Pollet & Haskell, 1979) used term 'wayfinding' as a self-explanatory term for geography and navigation from users' point of view. According to the authors signs are central to the idea, but the concept goes further to include building directories, wall graphics, printed library guides, maps of the building, space arrangement and displays. In short, they include all visual means of helping readers find and use the services of the library.

(Wickens, 1992) presented the Landmark, Route, and Survey (LRS) Model treating landmark knowledge as visual representation, route knowledge as verbal knowledge of how to get from one place to another, and survey knowledge as abstract and spatial knowledge that will allow drawing an accurate map. The signage system which is primarily designed to help people navigate can be evaluated according to this LRS model (Table 1). The two studies by (Siegel & White, 1975) and, are conducted after studying the maps of respected university libraries. They, proposed Landmark-Route-Configuration model to explain spatial representation and knowledge of wayfinding, its function is primarily to prevent getting lost and to facilitate location and movement within the environment. Knowledge of landmark is descriptive information of noticeable places within an environment. Knowledge of route is the knowledge of mentally defined routes between locations. Configuration

knowledge is spatial knowledge in the form of a mental map of an environment. This model is very widely adopted in the research field of wayfinding and spatial representation and presented in Table 1.

TABLE 1. LRS MODEL: KNOWLEDGE OF WAYFINDING

Category	(Siegel and White , 1975)	(Wickens and Hollands, 1992) (Thorndyke & Hayes-Roth, 1982)
Landmark	Descriptive information of noticeable places within an environment	Visual representation
Route	Knowledge of mentally defined routes between locations	Verbal knowledge how to get from one place to another
Survey	Spatial knowledge in the the form of a mental map of an environment	Abstract and spatial the knowledge that will allow to draw an accurate map

Source: (Kim et al., 2011)

4. Research on wayfinding in library settings

(Kinsley et al., 2016) used GoPro camera as an ethnographic tool for their wayfinding research at Florida State University Library. As a process of data collection students were instructed to find the listed items using whatever tools or methods they normally used to find materials in the library. Researchers followed them with the GoPro camera attached with the chest harness and recording and recorded the routes taken. Where students stopped or got confused, where they asked for help, where they used computers or mobile devices, and where they looked at signs or directories was captured in the camera. Researchers also observed and notated the students' behavior, decisions, thoughts, and emotions followed by a debriefing survey. The findings revealed that library catalog, directories, help from the staff, use of smart phones, signs and maps were frequently used tools by users for wayfinding. The average time to find one item was 12 minutes. In the debriefing survey, students reported that the online floor maps and human help were the most helpful wayfinding tools. Responses revealed that the most challenging part in finding items was looking for the reference collection in compact shelving, understanding call numbers, deciphering row arrangement, and being aware of splits in the collection by floor.

The Burke Library at Union Theological Seminary conducted a wayfinding study that also utilized the think-aloud protocol (Baker et

al., 2015). They sought to measure the effectiveness of their signage and recorded trouble spots for new library users, along with the average time of completion for each series of tasks. The hardest tasks included finding a Library of Congress book in the stacks and a bound periodical on the shelf.

(Johnston & Mandel, 2014) took Stempler's idea one step further by focusing their study on results of expert-reviewed signage systems in selected school libraries. According to them signs serve three central roles pertaining to wayfinding: directional markers to orient users to a space; regulatory in nature, indicating internal or external regulations or policies; and informational, which comprise all other signs in library spaces. The study was conducted within elementary, middle and high schools at United States. Researchers identified sign type, sign location, and sign errors in relation to a sign's ability to effectively communicate spatial information. Findings illustrated that the majority of signs were informational in nature and only a small percentage were regulatory and directional; color usage was identified as an important consideration, and identified lack of appropriate directional signage and unclear signs and placement.

(Stempler, 2013) case study of a signage redesign project in 2008 at CUNY Staten Island also highlights the need to address issues relating to signage in academic libraries. Stempler's case study also underscores signage as a major factor in a patron's wayfinding ability and emphasizes lack of information related to how readers should locate materials within the stacks. Carried out over a two-year period, Stempler's signage redesign project most notably implemented a consistent and comprehensive stack signage system involving the implementation of a color coded scheme, along with a variety of new informational and wayfinding signs.

In the seminal research on wayfinding within library spaces, (Li & Klippel, 2012) provide valuable insight into understanding how individuals navigate through library spaces. Their study underscores the value of library signage and the importance of design as a means of addressing problems and issues within library spaces that inhibit an individual's wayfinding abilities. Results of the study suggest that while familiarity with specific library spaces certainly plays a role in wayfinding, so, too, does a building's physical structure. According to

the authors, signs and maps are the most effective and simplest way to improve wayfinding as spatial guidance tools.

(Mandel, 2012) demonstrates that facilities should be designed with user wayfinding information needs in mind. Then it will be easier for users to navigate while seeking information, increasing satisfaction levels with the facility. Geospatial analysis was employed for the routes identified from unobtrusive observation and user interviews. Thematic content analysis was used for identifying the wayfinding tools after the document review and expert review interviews, and conceptual content analysis of the transcripts of user interviews. The research concludes with the finding that user wayfinding behavior in the research site is different to some degree. But the degree to which that is so or why that is so remains unexplored.

Applying an ethnographic methodology to the investigation of wayfinding, (Hahn & Zitron, 2011) of the University of Illinois, Urbana-Champaign, locate the navigational signposts in the library building structure that aid in wayfinding, as well as, to highlight fail points(locations where students unable to decide direction). While searching and locating library sources each student was followed and asked to verbally express how and what s/he was using to find the materials. This was followed by the student debriefing the researcher. Results of this study accentuate the necessity for a better understanding of classification systems. Further they asserted that library classification exists both as navigation fail point and also is the major way in which students find navigation success, as well as calling for more maps and better and more uniform signage.

(Beecher, 2004) presents the qualitative case studies of three public library buildings in the United States. Observations of volunteers and their perception about way-finding were the tools obtained for data collection. The study reveals that many of the way-finding tools available in libraries do not facilitate item retrieval. Inconsistencies, ambiguities, obstructions, disparities, and operational deficiencies all contribute to end-user frustration and retrieval failure.

(Beneicke et al., 2003) underline the importance of way-finding and different tools of way-finding in libraries, such as signs, light, color, pathways, indicators, etc. Further, they have discussed the principles of way-finding such as site logic, systems, orientation, sign elements,

consistency and visitor's abilities to recognize and understand signs. The steps for planning and preparing a good design are explained in-depth. The study emerges with sign planning checklist.

There is an identical need of exploration studies for application of wayfinding behavior research to facilitate design in university libraries especially such research that will improve library signage systems. There is an ample material in LIS literature on understanding information needs and how patrons solve those needs. There is considerably less focus on the wayfinding information that patrons need. The absence of research-based studies in Indian context related to wayfinding in libraries motivated the researchers to select the area of research.

5. Research Questions

Considering the significance of wayfinding in university libraries following research questions emerged:

- What are the problems faced by the university library users while navigating through large university campuses and while finding sources in huge university library buildings as new users?

- Do the available guidance systems around the campuses and inside the university libraries facilitate self-guidance to first time users of the university library users while navigating and searching information?

6. Objectives

Following objectives emerged out of the research questions:

1) To explore the sources of directional guidance used by university library users available within university campus up to the library, in navigating and wayfinding in university libraries in Mumbai.

2) To investigate the availability and utility of university campus map within university campuses in Mumbai.

3) To explore the utility of university campus map by library users of university libraries in Mumbai.

4) To study the problems faced by library users while navigating and wayfinding at university libraries in Mumbai.

5) To analyze the extent of self-guidance provided through the available directional tools to university library users in university libraries in Mumbai.

6) To find out the availability and suitability of signage in the university libraries in Mumbai.

7) To obtain and scrutinize users' opinions about additional wayfinding tools required to improve wayfinding in university libraries in Mumbai.

7. Scope of the Study

This study is a part of the larger study on Human orientation in Libraries: study of university libraries in Mumbai. University libraries serve more heterogeneous population than college libraries. So, one cannot generalize findings about wayfinding behavior of university library users without conducting user study of university libraries. The research surveyed university libraries in Mumbai including branch libraries. Out of 13 university libraries in Mumbai 10 university libraries were surveyed in the present study. Three university libraries were excluded from the study due to consent issues. To focus new users of university library only First-year students of Post-graduate degree and M. Phil/Ph. D. degree and newly appointed teaching faculties were selected as a population of the study. Available signage was observed and evaluated with reference to readability, visibility, consistency, universal applicability and ergonomic design of signage.

8. Methodology

Wayfinding can be guided through spatial information systems, including architectural legibility, signage, and people (Julien et al., 2011). Taking into consideration views and opinions of the previous researchers both quantitative as well as qualitative methods were applied to the present study. A questionnaire was used as a tool for primary data collection to conduct user study to explore wayfinding problems faced by university library users related to spatial information systems, including architectural legibility and signage. The performance of a library as a building or its services can be measured in terms of how well it is meeting the needs of its users. In addition, university library buildings were

personally observed by the researcher with structured observation schedule for the availability and evaluation of signage with reference to readability, visibility, consistency, universal applicability for signage and availability of ergonomically designed signage. Observational findings were analyzed through SWOT analysis and further TOWS Matrix advocated by (Weihrich Heinz et al., 2008) for suggesting wayfinding strategies.

8.1 The Demographic Profile of Participants

A survey was conducted at 10 university library buildings including branch libraries within Mumbai and primary data collected from 328 participants including PG students, newly appointed teaching faculties. To concentrate new users of the university library, data was collected from Post Graduate First Year students, M. Phil./Ph. D First Year students and newly appointed teaching faculties as fresh users of university libraries in Mumbai. The final composition of academic status of participants is presented below:

Table 2: Academic Connotation

Academic significance	Frequency	Percent	Cumulative Percent
PG - I	284	86.6	86.6
Ph. D - I	28	8.5	97.9
M. Phil - I	9	2.7	89.3
Teaching Faculty	7	2.1	100.0
Total	328	100.0	

Academic status of participants: According to the academic status as presented in Table 6.3, Post Graduate first-year students were the highest participants explicitly 86.6% and 8.5% were the participants of Ph. D. first-year students. The strength of enrolment for Ph.D. degree is considerably less as compared to PG degree hence, availability of first-year Ph. D students was one of the major reason behind few participants of Ph. D students in the study. Very few universities conduct M. Phil. Programmes. Therefore the available M. Phil. students concisely 2.7%

participants were covered in the study. During the period of study, 2.1% newly appointed teaching faculty who visited libraries were also covered in the present study.

8.2 . Findings and Analysis

Wayfinding is the study of how human beings use a variety of informational media to orient themselves and navigate in space. Wayfinding research accepts the goal of trying to understand human spatial orientation and behavior processes. Improved wayfinding cues can lessen users' frustration in library facilities and ease the burden of library staff to direct users to locations that users could find for themselves if the library's wayfinding information system is more intuitive and self-explanatory. This can improve the overall user-friendliness and approachability of library information and resources, helping users find information they might miss otherwise. The present section covers library users opinions regarding wayfinding experiences obtained through questionnaire.

Findings of the study were analysed qualitatively and quantitatively and are presented below:

8.3 Sources used for wayfinding inquiry: Signs and displays play a very important role in wayfinding as sources of inquiry. Table 3 (Figure 1) presents the same.

Table 3: Sources of Inquiry for Wayfinding

| Sources	Responses		Percent of Cases
	N	Percent	
Inquiry of routes with passerby as source of inquiry	187	40.2%	58.1%
Personal inquiry as source of inquiry	116	24.9%	36.0%
Directional signs as the source of Inquiry	74	15.9%	23.0%
Campus map as source of inquiry	57	12.3%	17.7%
Other source of inquiry	18	3.9%	5.6%
Information kiosk as source of inquiry	13	2.8%	4.0%
Total	465	100.0%	144.4%

Figure 1: Sources of inquiry for wayfinding
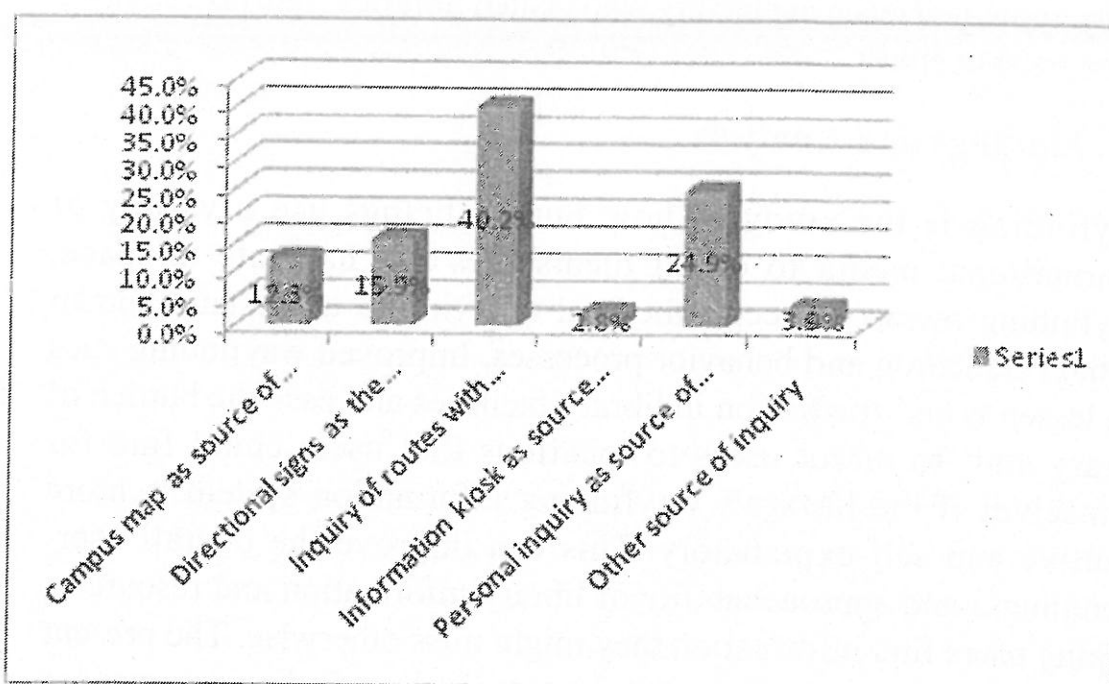
Sources used for wayfinding inquiry: Signs and displays serve a very important role in wayfinding as sources of inquiry. Figure 1 (Table 3) shows the sources used by university library users to find their way around the campus and to search the library within the campus. Inquiry of routes with passerby is the highest source of inquiry. In case of other sources help from friends is the highest source of inquiry for wayfinding.

8.4 Availability, Visibility and Readability of Campus Map

Table 4: Campus Map- Availability, Visibility and Readability

Particulars	Responses		Responses	
	Yes	Percent	No	Percent
Available	190	57.9	138	42.1
Visible	166	50.6	27	8.2
Readable	162	49.4	31	9.5
Total	518	15.9%	196	59.8

Figure 2: Existence, Visibility and readability of campus map
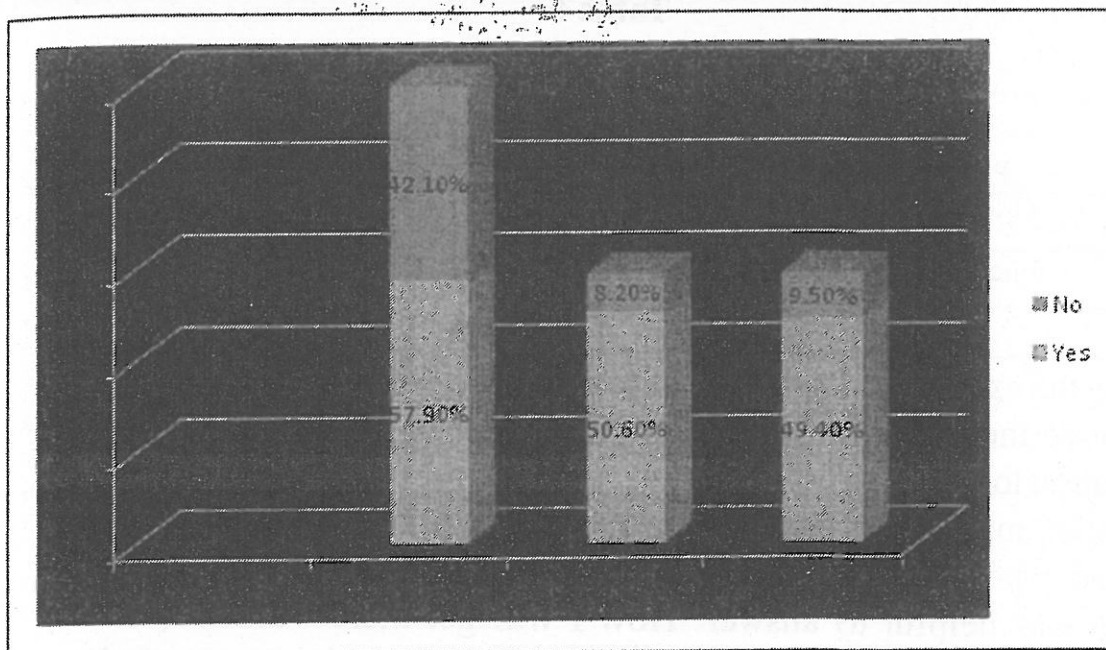
As suggested by Li and Klippel (2012), signs and maps are the most effective and simplest way to improve wayfinding. Table 4/Figure 2 revealed that 57.9% participants opined that campus map was available either at the entrance of university or at decision points. However 42.10% participants replied that campus map was not available in the university libraries in Mumbai.

Through maps, visitors obtain a vision about places they had never seen or imagine. University campus maps give visitors the simple ability to locate, identify and decide their routes and destination. Even though 190(57.9%) participants opined that campus map was available at the entrance of the campuses in the university libraries in Mumbai, 166(50.6%) agreed that it was visible and 162(49.4%) were agreed that campus maps were readable. Remaining merely 27(8.2%) participants opined that the campus map was not visible. Further in case of readability 31(9.5%) opined that the campus map was not readable.

8.5 The Utility of Campus Map

Table 5

| Particulars	Responses		Percent of Cases
	N	Percent	
How I will get..	93	52.5%	55.4%
Where am I going	84	47.5%	50.0%
Total	177	100.0%	105.4%

Only the existence and display of campus map is not sufficient, it should provide the utility for deciding routes and should help to identify the required location as well. Although 190(57.9%) participants opined that campus map was available either at the entrance of university or at decision points, from 57.9 % participants, 93(52.5%) agreed that campus map was helpful to answer 'How I will get there' and 84(47.5%) participants agreed that the campus map was helpful to answer 'where am I going'. (Table 5).

8.6 **Time requirement to reach library**: Effective signage within the university campus will result in minimizing time in inquiries while reaching till library for new visitors. However signage is not the only decisive factor here the time required to reach library from the campus gate also is an important aspect. The study indicated following results (Table 6).

The Time Required to Reach Library from Campus Gate

Table 6

Particulars	Frequency	Percent
Less than five minutes	148	45.1
More than five minutes	72	22.0
More than ten minutes	108	32.9
Total	328	100.0

Figure 3: Time required reach library from campus gate
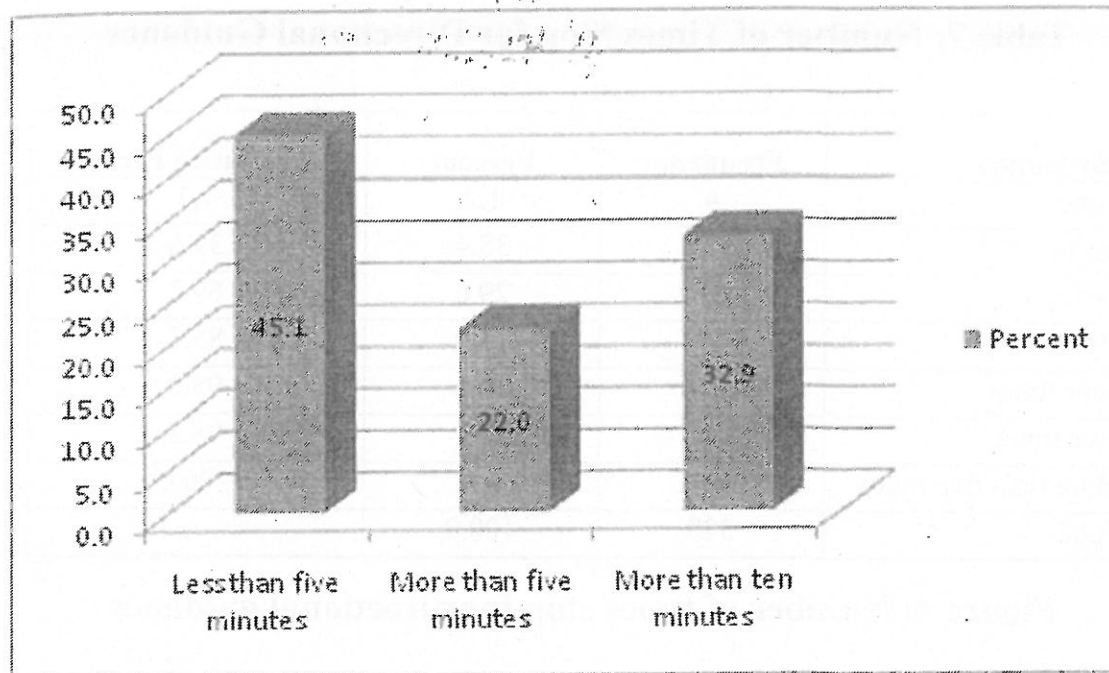

Provision of appropriate signage within the university campus will result in minimizing time in inquiries while reaching till library. However time requirement of way finders from campus gate till library is also depends upon the distance between the campus entrance till the library, still existence of guidance system within campus will have an effect on time requirement, hence the question was raised about the same. Figure 3 represents that 45.1% participants were able to reach library from campus gate within less than five minutes. However, 22% participants required more than five minutes to reach the library. However 32.9% participants required more than ten minutes to reach library from the university campus gates (Table 6).

8.7 Number of Times Stop for Directional Guidance

Table 7: Number of Times Stop for Directional Guidance

Particulars	Frequency	Percent	Cumulative Percent
None	4	1.2	1.2
Once	126	38.4	39.6
Twice	97	29.6	69.2
Thrice	52	15.9	85.1
Four times	33	10.1	95.1
Five times	10	3.0	98.2
More than five times	6	1.8	100.0
Total	328	100.0	

Figure 4: Number of times stop for directional guidance
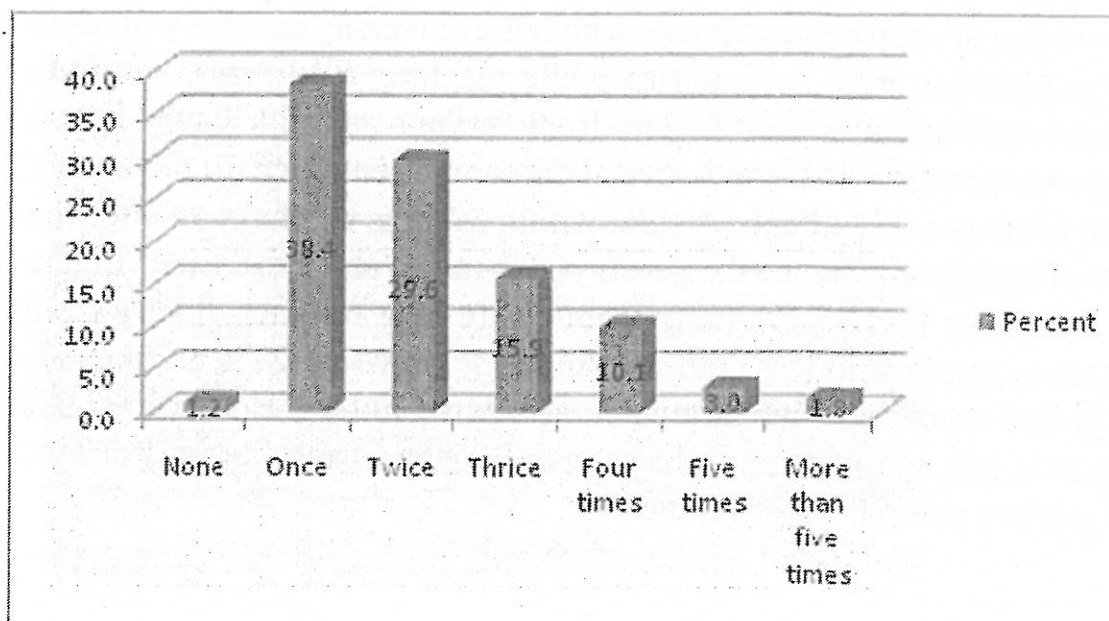
Availability of directional signage reduces the hurdles in finding routes while wayfinding. Therefore participants were asked about the number of times they stopped for directional guidance while wayfinding in library. When this was studied and numbers of stops for directional guidance taken by users were measured, following results emerged. Figure 4/ (Table 7) highlights that maximum visitors of university libraries stopped for inquiring about directional guidance while moving around inside the university library from the library entrance till finding their actual destination and a source of information.

8.8 Instructional sources used for wayfinding: In case of availability of good signage system in libraries, need of other sources for directional and instructional help tend to decrease automatically.

Sources Used for Instructional Help

Table 8

Particulars	Responses		Percent of Cases
	N	Percent	
Library staff	186	44.4%	56.9%
Other library users	119	28.4%	36.4%
Library guides	43	10.3%	13.1%
No help was required	40	9.5%	12.2%
Instructional manual	22	5.3%	6.7%
Other	9	2.1%	2.8%
Total	**419**	**100.0%**	**128.1%**

Figure 5: Sources used for instructional help
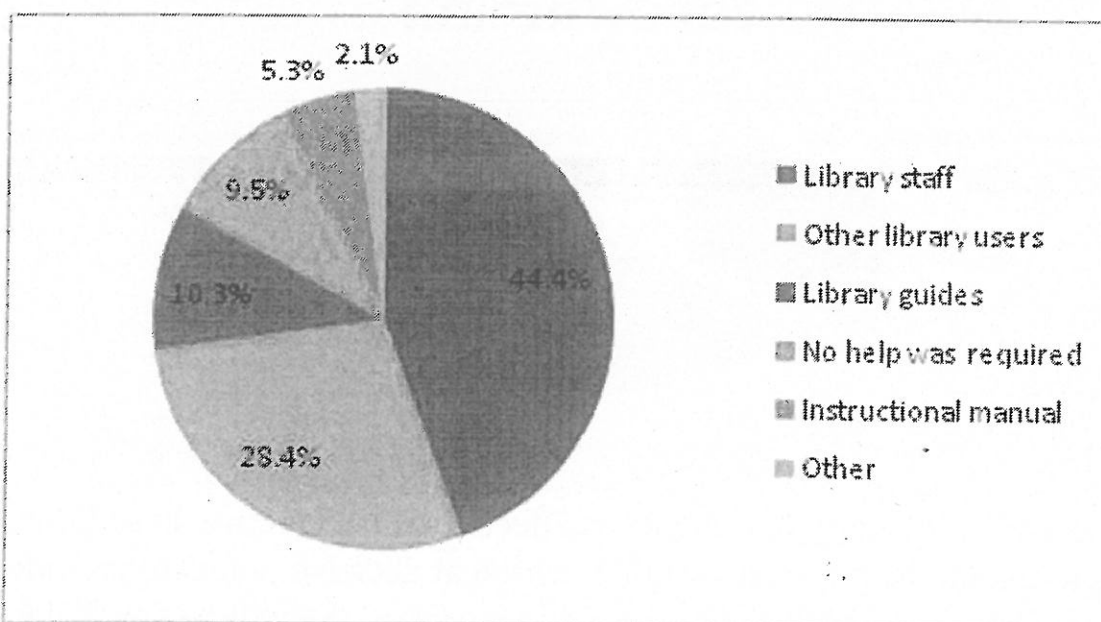
There were various sources and guides used by the readers that help them in wayfinding. The use is shown in Table 8. While moving around in the library and while searching information sources 44.4% library users consulted library staff for the instructional help till reaching the

destination or source. 28.4% library users taken other library users help for the same. Very few users, to be exact 9.5% users able to find their way and required information source without any help. In case of other, they have taken help of seniors and friends (Figure 5). Library guides and instructional manuals have been hardly used by participants.

8.9 Utility of Available Wayfinding System

Table 9

Guidance System Provided Right Direction	Frequency	Percent	Cumulative Percent
Yes	208	63.4	63.4
No	120	36.6	100.0
Total	328	100.0	

Figure 6: Utility of available wayfinding system
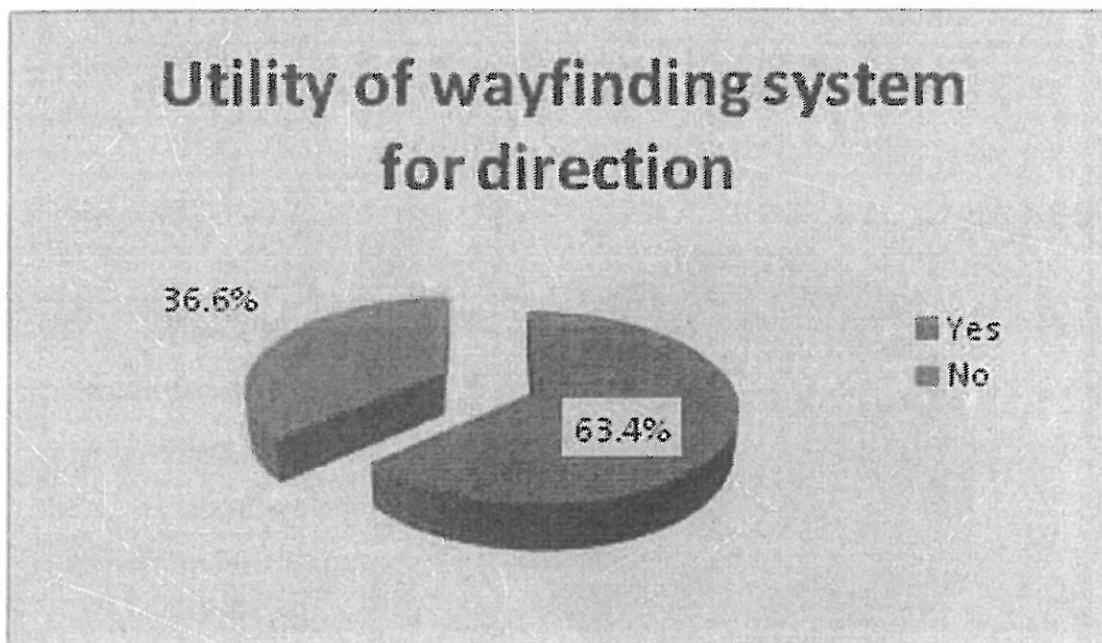
The available sign system should be effective and interactive. In addition, signs should be placed at a right location at decisive points to provide right directions. While exploring views regarding the utility of available wayfinding system Figure 6 presents that 63.4% library users were of opinion that the available guidance system provides right direction in university libraries in Mumbai. However, 36.6% replied that the

available guidance system does not provide right direction in university libraries in Mumbai (Table 9).

8.10 Wayfinding Problems: Availability of directional signage with floor maps and designated list of departments will minimize wayfinding problems of users.

Opinion on Wayfinding Problems

Table 10

Particulars	Frequency	Percent	Cumulative Percent
Yes	153	46.6	46.6
No	175	53.4	100.0
Total	328	100.0	

When asked about experience and opinion about wayfinding problems 53.4 % users opined that they did not faced problems while finding their ways. However 46.6% users faced a problem of wayfinding in university libraries in Mumbai (Table 10). Thus though major participants agreed that they didn't face any wayfinding problems yet; from the total participants 46.6% participants faced wayfinding problems.
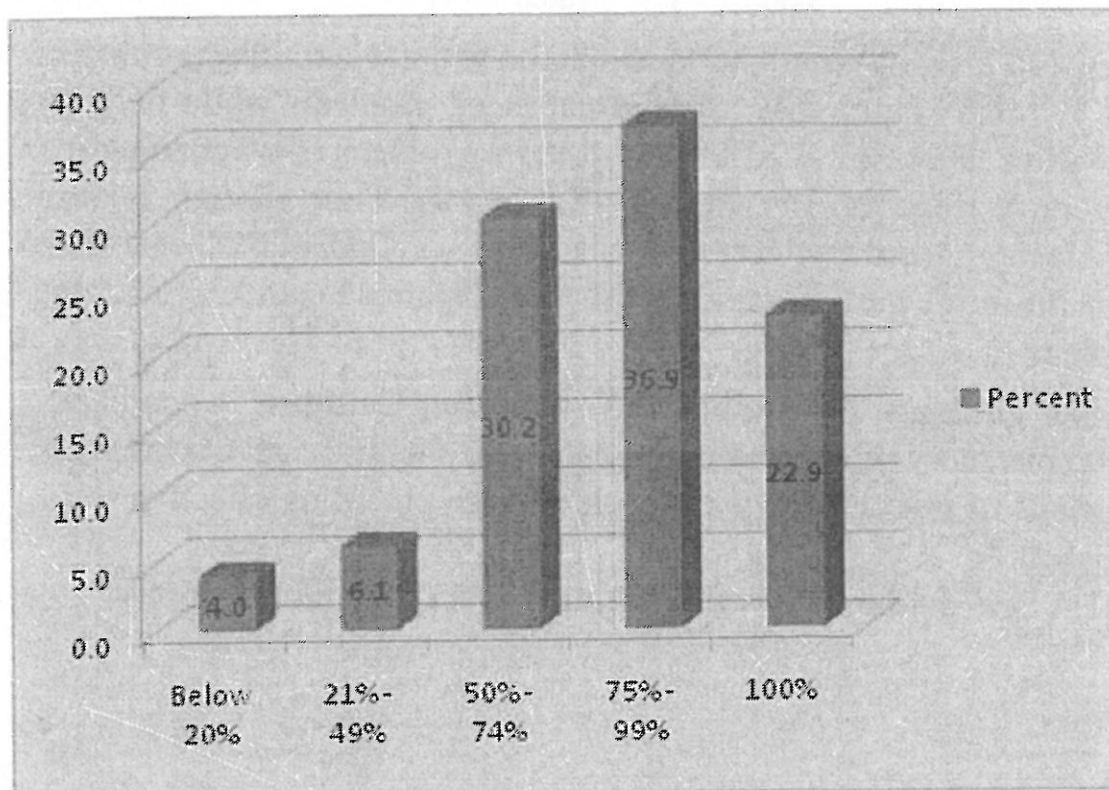
Self-guidance in Finding a Way around Campus: A good and self-explanatory signage helps to explain the facilities and answers the questions of visitors before they ask through providing effective self-guidance.

8.11 A Self-guidance Level in Finding a Way around Campus

Table 11

Particulars	Frequency	Percent	Cumulative Percent
Below 20%	13	4.0	4.0
21% - 49%	20	6.1	10.1
50% -74%	99	30.2	40.2
75% - 99%	121	36.9	77.1
100%	75	22.9	100.0
Total	328	100.0	

Figure 7: Degree of self-guidance in finding a way around campus

A good and self-explanatory signage helps to explain the facilities and answers the questions of visitors before they ask through providing effective self-guidance.

As per Figure 8, only 36.9% library visitors said that 75% - 99% degree of self-guidance provided through available signage guidance
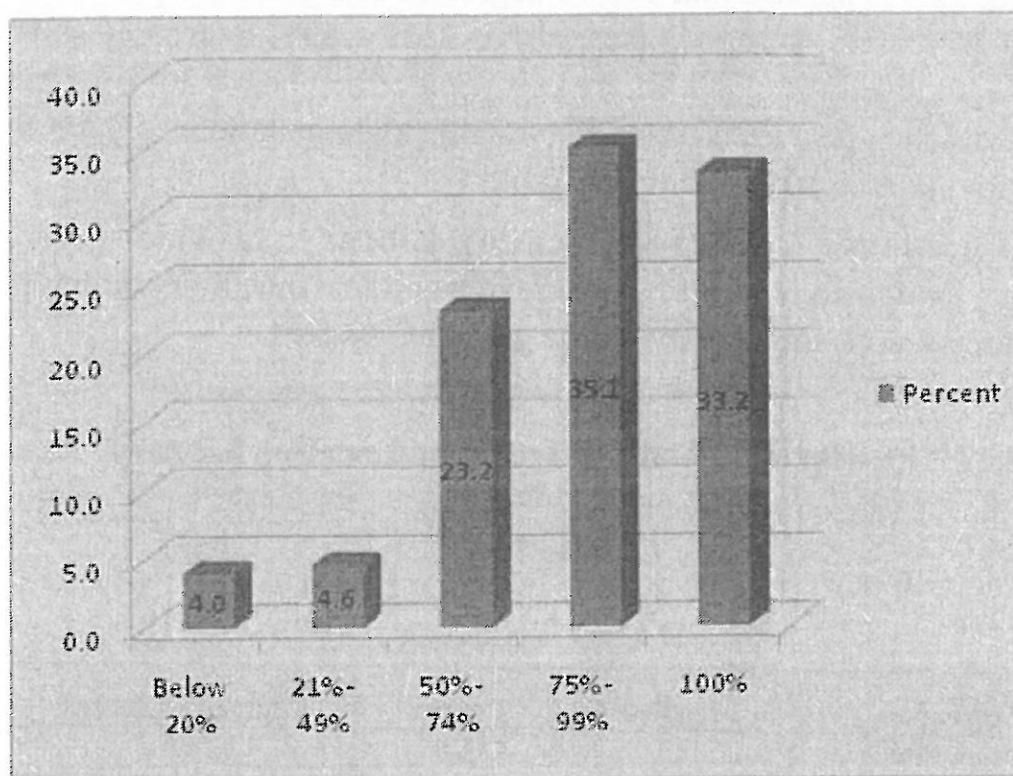
system, while 30.2% argued that 50% -74% degree of self-guidance provided, 22.9% agreed that 100 % degree of self guidance provided, 6.1% library users were of opinion that 21% - 49% degree of self-guidance provided and 4.0% library users opined that below 20% degree of self-guidance provided through available signage guidance system while moving around the campus (Table 11).

Self-guidance Level for Locating Library: In wide-spread university campuses, visitors have to search and find the library building within the campus through available guidance system.

8.12 The degree of Self-guidance for Locating Library

Table 12

Particulars	Frequency	Percent	Cumulative Percent
Below 20%	13	4.0	4.0
21% - 49%	15	4.6	8.5
50% -74%	76	23.2	31.7
75% - 99%	115	35.1	66.8
100%	109	33.2	100.0
Total	**328**	**100.0**	

**Figure 8: Self-guidance for locating library**

In case of locating library 33.2% participants expressed that 100% degree of self-guidance provided, whereas according to 35.1% respondents 75%-99% degree of self-guidance provided, while 23.2% participants informed 50% -74% degree of self-guidance provide, 4.6% participants were of opinion that 21%-49% degree of self-guidance provided and 4.0% participants pin-pointed below 20% degree of self-guidance provided for locating and finding library building through the available ques. (Table 12, Figure 8)

8.13 Self-guidance for Awareness of Different Departments: Organization of university libraries, being multi-departments and size being very large, guidance and direction for different departments is essential. This can be achieved through titles of departments or signage for directions to the departments as well as sources and services.

Table 13

Particulars	Frequency	Percent	Cumulative Percent
Below 20%	17	5.2	5.2
21% - 49%	52	15.9	21.0
50% -74%	126	38.4	59.5
75% - 99%	82	25.0	84.5
100%	51	15.5	100.0
Total	328	100.0	

Figure 9: Self-guidance awareness of different departments
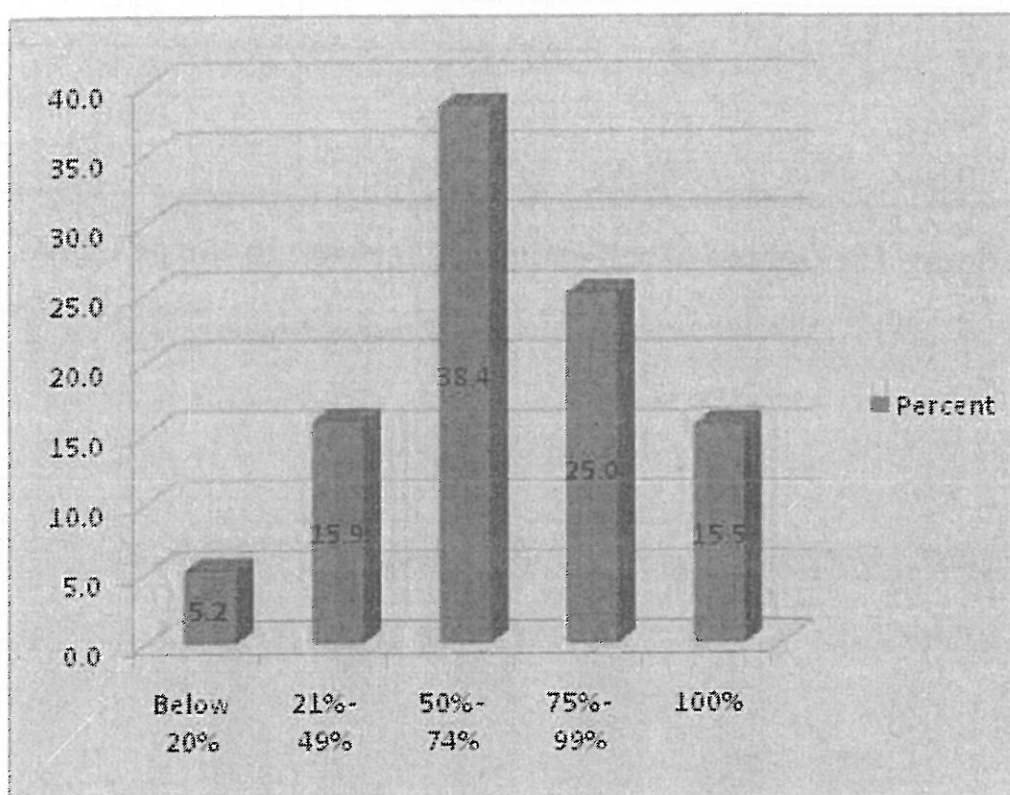
In case of awareness and locating departments 38.4% participants had opinion that 50%-74% degree of self-guidance provided, 25% respondents opined 75%-99% degree of self-guidance provided, 15.5% participants revealed that 100% degree of self-guidance provided, 15.9% participants had of opinion that 21%-49% degree of self-guidance provided and 5.2% participants had opinion that below 20% degree of self-guidance provided through the available guidance system (Table 13, Figure 9).
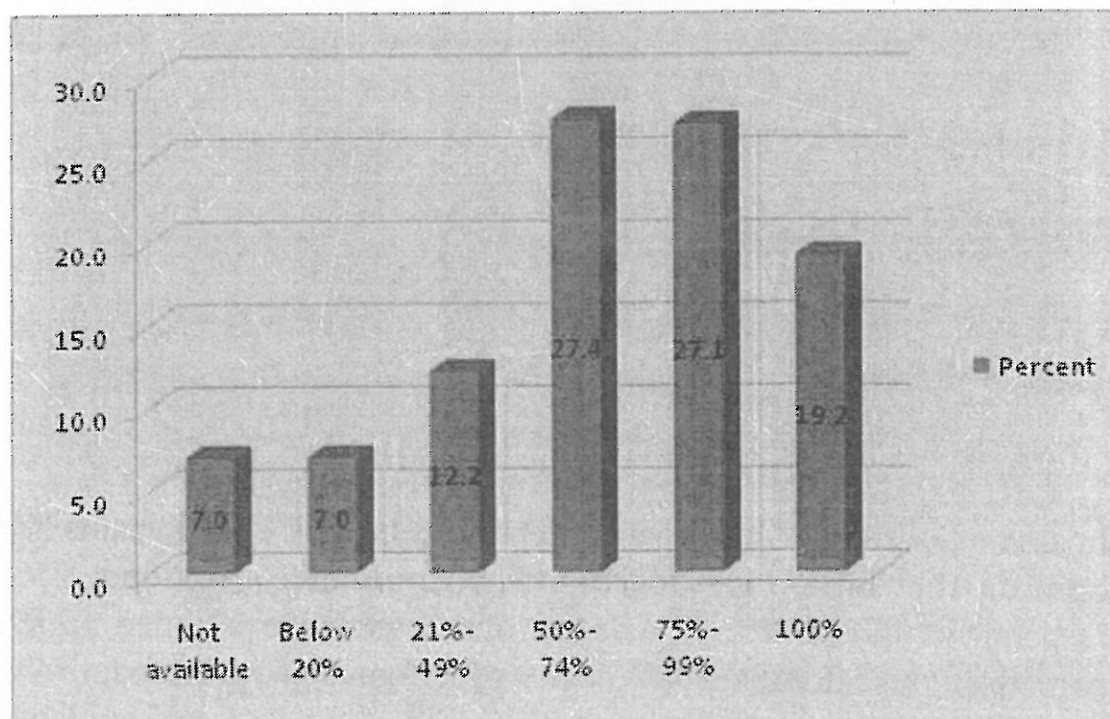
8.14 Self-guidance for OPAC: OPACs aid users to find the precise information source from the huge library collection and also provides information about other related sources with their locations.

Self-guidance for Ease in Use of OPAC

Table: 14

Particulars	Frequency	Percent	Cumulative Percent
Not available	23	7.0	7.0
Below 20%	23	7.0	14.0
21% - 49%	40	12.2	26.2
50% -74%	90	27.4	53.7
75% - 99%	89	27.1	80.8
100%	63	19.2	100.0
Total	**328**	**100.0**	

Figure 10: Degree of self-guidance for ease in use of OPAC

OPAC helps users to find the precise information source from the huge library collection and also provide information about other related sources with their locations. Only 27.1% participants were of opinion

that 75% -99% degree of self-guidance provided, 27.4% respondents replied that 50% -74% degree of self-guidance provided, 19.2 % participants were of opinion that 100% degree of self-guidance provided, 12.2% respondents answered that 21 % - 49% degree of self-guidance provided and 7.0% participants specified that below 20% degree of self-guidance provided for ease in use of OPAC. Whereas 7.0 % respondents replied that OPAC was not available in the library as the library was not automated till the time of study (Table 14, Figure 10).

8.15 Self-guidance in use of computer resources With the technological developments, university libraries have different forms of collection including computer based resources such as audio-visual material, e-books, e-journals, and databases which also needed guidance.

Self-guidance in Use of Computer Resources

Table 15

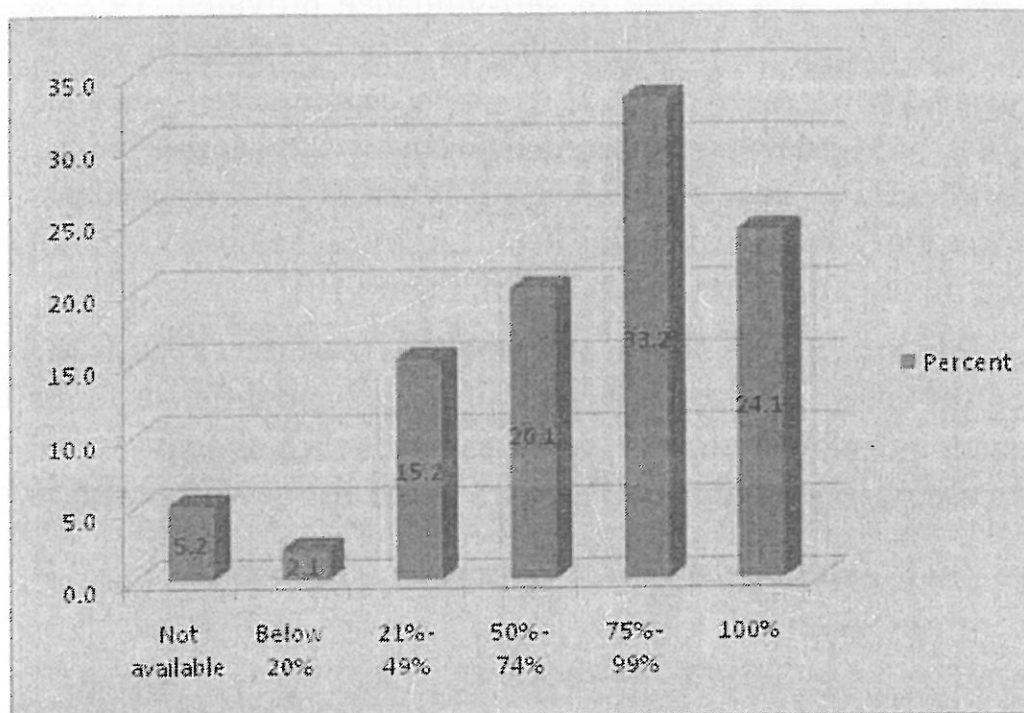| Particulars	Frequency	Percent	Cumulative Percent
Not available	17	5.2	5.2
Below 20%	7	2.1	7.3
21% - 49%	50	15.2	22.6
50% -74%	66	20.1	42.7
75% - 99%	109	33.2	75.9
100%	79	24.1	100.0
Total	**328**	**100.0**	

Figure 11: Degree of self-guidance in use of computer resources
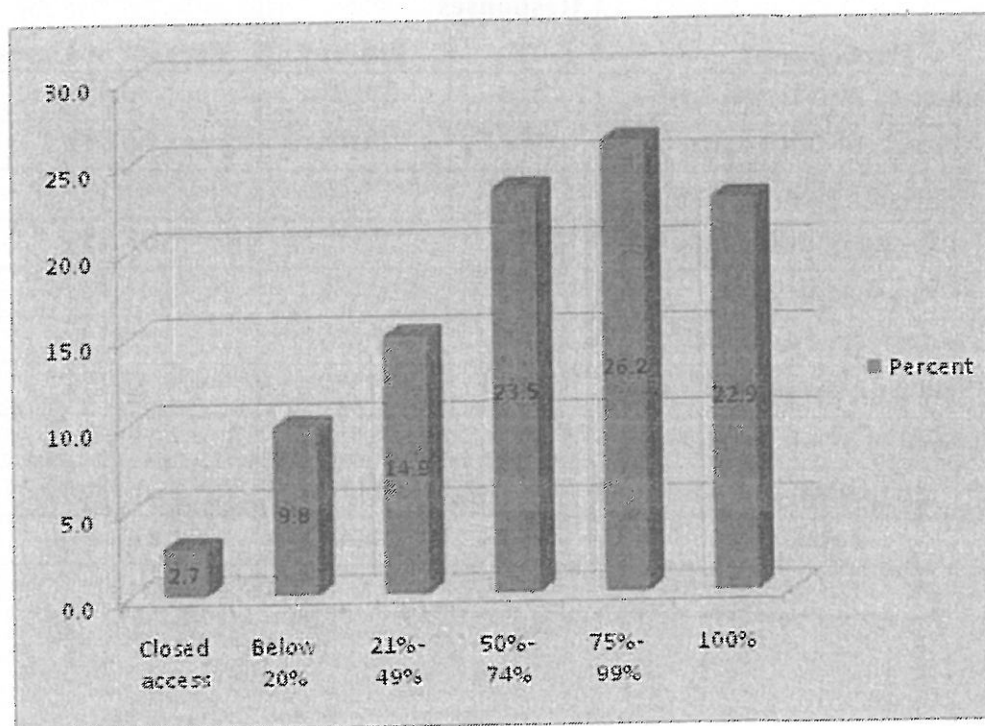

Table 15 indicates that only 33.2% participants were of opinion that 75% -99% degree of self-guidance provided, 24.1% respondents replied that 100% degree of self-guidance provided, 20.1% participants were of opinion that 50%-74% degree of self-guidance provided, 15.2% respondents answered that 21%-49% degree of self-guidance provided and 2.1% participants replied that below 20% degree of self-guidance provided in identifying and being comfortable in use of computer resources. Whereas 5.2% respondents replied that computer resources were not available in the library as the library was not automated (Table 15, Figure 11). Thus in case of awareness of computer resources, the satisfaction level of participants was very poor.

8.16 Self-guidance in stacks: The printed sources are stored in stacks; the stacking area should be welcoming and identifiable with stack end signage, deciphering row arrangement and signage for splits in the collection by floor.

Table 16: Self-Guidance for Searching and Finding Printed Sources in Stacks

Particulars	Frequency	Percent	Cumulative Percent
Closed access	9	2.7	2.7
Below 20%	32	9.8	12.5
21% - 49%	49	14.9	27.4
50% -74%	77	23.5	50.9
75% - 99%	86	26.2	77.1
100%	75	22.9	100.0
Total	328	100.0	

Figure 12: Degree of self-guidance in searching sources in stacks

In case of ease and convenience in searching and finding printed sources in stacks 26.2% participants had opinion that 75%-99% degree of self-guidance provided, 23.5% respondents opined 50%-74% degree of self-guidance provided, 22.9% participants revealed that 100% degree of self-guidance provided, 14.9% participants had opinion that 21%-49% degree of self-guidance provided and 9.8% participants had opinion that below 20% degree of self-guidance provided through the available guidance system while searching printed sources in stacking area.

Whereas 2.7 % respondents replied that, entry inside the stacking area was not permitted as the library had closed access. (Table 16, Figure 12).

8.17 Reasons behind Problems of Wayfinding: Poor signage system or absence of adequate signs results in lack of self-guidance and self-orientation of library users. As per the users experience of wayfinding, reasons behind problems of wayfinding differs. Such problems can be rectified with the required changes or through providing additional signs as suggested by users.

Problems of Wayfinding: Reasons

Table 17

| Particulars	Responses		Percent of Cases
	N	Percent	
Absence of directional signs	226	29.7%	70.4%
Absence of floor maps	182	23.9%	56.7%
Absence of building map	132	17.3%	41.1%
Confusing building map	55	7.2%	17.1%
Physical design	52	6.8%	16.2%
Artistic effect of architecture	44	5.8%	13.7%
Confusion of layout of library	39	5.1%	12.1%
Confusion of available signage	31	4.1%	9.7%
Other	1	.1%	.3%
Total	**762**	**100.0%**	**237.4%**

Figure 13: Reasons behind the problem of wayfinding
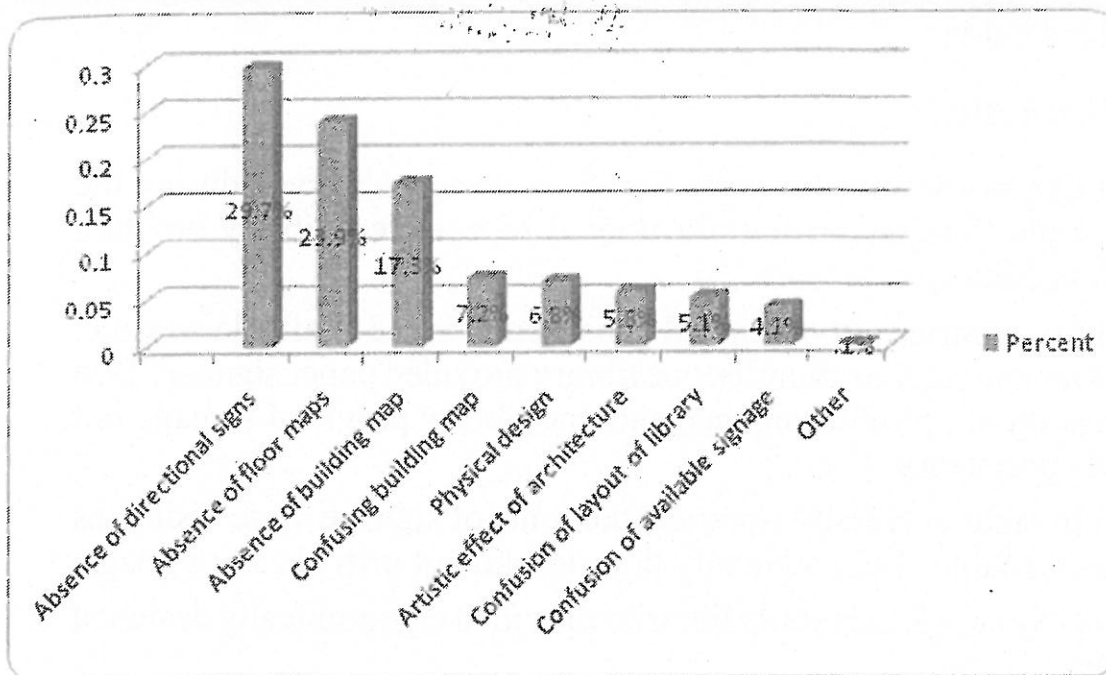
Table 17 indicates that signage systems of university libraries in Mumbai lacks in providing self-guidance for wayfinding and information search. Hence to improve the entire guidance system Participants opinions were invited about the reasons behind the problems of wayfinding.

While exploring reasons behind problem of wayfinding from the participants 29.7% participants replied the problem of absence of directional signs in university libraries, 23.9 % respondents revealed the problem of absence of floor maps, 17.3% participants were of opinion that the problem of wayfinding was due to absence of building maps, 7.2% participants expressed that the problem of wayfinding was due to confusing building maps, 6.8% participants replied physical design of university libraries , 5.8 % respondents revealed the problem of wayfinding was due to artistic effect of architecture, 5.1% participants were of opinion that the problem of wayfinding was due to confusion in layout of library, 4.1% respondents pointed out the problem of wayfinding was due to confusion of available signage and 1% participants specified other wayfinding problems such as absence of audio signals in case of special users in addition other reasons such as improper shelving and inefficient OPAC.

8.18 SWOT Analysis of Observational Findings

Analysis highlighting strengths, weaknesses, threats, and opportunities

(SWOT) of university libraries under research through personal observation was conducted. Considering the physical environment and basic signage available in university libraries in Mumbai the analysis is presented below:

8.19 Strengths

1) Out of the ten university library buildings observed during the study, eight libraries have multi-floored independent library building within university campuses.

2) Six libraries out of ten had consistency in the available signage. Out of remaining four libraries one library provided paper signage. Two libraries do not provide signage and one library provided signage but lacked consistency.

3) In eight university libraries, the fonts of signage were visible as well as readable. Two university libraries did not provide any signage.

4) 60% i.e. six university libraries provided ergonomically designed signage.

8.20 Weaknesses

1) Only four university library buildings provide campus maps at the entrances. Remaining six libraries do not provide campus maps.

2) All the eight libraries with independent library buildings are visible while moving in the campus. But only four university library buildings were identifiable. Remaining four library buildings were not identifiable due to lack of name plate of the library. Remaining two university library buildings were not situated in independent buildings.

3) From ten university library buildings only four libraries provided clearly visible library building map at the entrances. From remaining six libraries one library provided building map but it was not visible. Remaining five libraries did not provide library building maps.

4) Within ten university library buildings only four libraries provided the display of library's working hours. From remaining six libraries one library provided paper signage for the display of working hours and displayed the same on pamphlet rack, therefore it was not visible. Remaining five libraries did not provide the display of library working hours.

5) From the ten university library buildings, five libraries provided informational signage for locating departments, functions, and services.

6) Availability of informational signage is not sufficient for navigating successfully. Users also need directional signage in the pathways, corridors, stairways and in browsing areas. Only four university libraries provided directional signage. Remaining six libraries did not provide directional signage.

8.21 Opportunities

1) All the libraries have ample space to plan directional signage, digital signage or flash notices at the entrances or in the long corridors or in the browsing area. This opportunity needs to be tapped.

2) Good signage helps to attract potential users making aware existing users about the facilities and services provided by the libraries. Therefore signage acts as an effective marketing tool for libraries. Hence university libraries will be able to market their facilities and services through an effective signage.

3) University libraries receive UGC as well as RUSA (Rastriya Ucchatar Shiksha Abhiyan) Grants for digitization and acquiring infrastructure for libraries. These grants can be utilized to overcome financial constraints.

4) Placement of appropriate signage will help to earn points in NAAC evaluation and accreditation.

5) Help from other departments like Department of Ergonomics, Art and Computer Science can be taken for preparation of appropriate signage.

8.22 Threats

1) Not a single university library building used international symbol at the entrance of the library indicating its location.

2) None of the libraries used universally applicable symbols for signage in the libraries excluding signage for water closets. Further only one university have textual signage including signage for water closets.

3) With the advancements in information technology and telecommunication technology every person is now using mobile and is familiar with the mobile apps. However none of the university provides wayfinding apps or navigating apps for university campuses and their libraries.

8.23 TOWS Matrix and Four Alternative Strategies

The TOWS matrix is a conceptual framework for a systematic analysis that facilitates the matching and combining the external threats and opportunities with the internal weaknesses and strengths of the organisations. The TOWS matrix has a wider scope. It suggests various strategies like SO strategy in which strengths are maximized with maximum exploitation of opportunities available outside (Maxi-Maxi), WO strategy in which weaknesses are minimized through maximizing the opportunities (Mini-Maxi), ST strategy in which strengths are maximized, minimizing the threats (Maxi-Mini), and WT strategy in which both weaknesses and threats are minimized (Mini-Mini).

Following figure explains the application of TOWS matrix suggested for wayfinding.

Figure 14: TOWS Matrix for wayfinding

SO Strategies	WO Strategies
➤ From the ten library buildings observed eight libraries have multi-floored independent library building within university campuses therefore all eight libraries have ample space to plan directional signage, digital signage or flash notices at the entrances or in the long corridors or in the browsing area. ➤ Application of ergonomically designed signage will help to earn points in NAAC valuation and accreditation. ➤ Availability of Departments like Family Resource Management teaching Ergonomics, Art and Computer Science with inter-department collaborations.	➤ University libraries receive UGC and RUSA Grants for acquiring infrastructure, equipments and digitization. Therefore libraries can plan directional signage, digital signage and flash notices at the entrances or in the long corridors or in the browsing area. ➤ Placement of directional and informational signage will automatically help to attract potential users and make aware existing users about the facilities and services and will act as an effective marketing tool for libraries sources and services.
ST Strategies	WT Strategies
➤ Out of ten university library buildings observed during the study, eight libraries have multi-floored independent library building within university campuses. Creating and putting international symbols of the library not being a costly affair, libraries should implement it on priority basis for identification of libraries. ➤ Non-existence of navigating app in University libraries can be obviated with the use of available technology. Universities can plan development of wayfinding app for university campuses and libraries with Global Positioning System with the help of UGC Grants.	➤ Display of libraries working hours and addition in directional and informational signage will lead to explain the facility and, in a sense, answers the questions before the questions are raised. ➤ Use of universally applicable symbols for signage in the libraries will lead to uniformity in signage and help universal readers who visit the library. This is necessary in multi-lingual country like India

9.Conclusion and Further Suggestions

In order to navigate successfully in the built and cement jungle environment, humans need information provided by wayfinding systems and tools, for instance, architectural cues, displays, signs, and maps. This is all the more important in university libraries where users enter in unfamiliar environments in wide-spread university libraries and possibly anxious (which may interfere with the ability to navigate successfully). To facilitate user wayfinding, which in turn can facilitate user information-seeking by helping the user navigate throughout the facility while looking for informational resources and materials, university library facilities need to be designed with consideration of users' wayfinding needs, along with their information-seeking and other library-specific needs.

Self-orientation: Good signage system helps to explain the facility and, in a sense, answers the questions before the questions are asked. The present findings of the study revealed that majority of participants have inquired about the routes with the passerby or at the inquiry counter or circulation counter in university libraries in Mumbai. Thus the available signage lacks in providing self-orientation to university library users in Mumbai. Thus the findings indicated that the university campuses in Mumbai do not have good and standard visual guidance system.

Maps: As per the present findings, very few universities provided campus maps and building maps. Even though universities provide campus maps in a few universities such maps are either not visible or not readable. In addition university campus maps were not able to provide answers to the direct questions of visitors.

Wayfinding guidance: While navigating in university libraries, the majority of participants consulted library staff for instructional help. With the problem of wayfinding participants also revealed that they were not aware of the different departments and their locations in university libraries.

OPAC Guidance: OPAC was not user-friendly and easy to operate for the users. OPAC manual or OPAC instructional guide should be provided near the OPAC terminals. In addition, some universities do not provide computer resources and OPAC service due to incomplete

automation work. Such facilities should be provided along with user education workshops in library orientation sessions to facilitate comfort and ease of use.

Shelf Guidance: Finding printed source in stacks with the available self-guidance tools was the major difficulty faced by participants. Many participants replied that they were unable to understand the shelving order due to difficulty in deciphering class numbers; others revealed the shelving problem. According to maximum number of participants, the signage in stacking area was ineffective to provide self-guidance. Hence signage regarding classification numbers and subject headings was found to be the need of the hour.

Visual Impact: Visual images are easy to understand and make permanent impression in the memory than the text hence use of different pictures and colors for binding according to different subjects will provide simplicity and specificity to the printed sources on stacks. Thus it is natural that a person would more readily remember the physical characteristics of a work than the exact wording of the title.

Users opined that the majority of wayfinding problems were due to the absence of campus maps, building maps, directional signs and of floor maps. In addition, a few special users suggested that audio signals and alarms should be provided. The status of heritage building of libraries have caused certain problems in implementation of wayfinding strategies they are artistic effect of architecture, the physical design of library building, and the layout of a building.

Thus findings revealed that university campuses and university libraries in Mumbai need to improve their signage system. The research suggests to plan effective wayfinding systems to help patrons more easily find their ways, all aforementioned factors should be considered. The design of wayfinding systems should be tailored to the specific characteristics of areas.

How well people are able to find their way and the level of accessibility in libraries has an impact on their ability to successfully use library facilities to accomplish information needs. By studying user reactions to the surroundings of libraries, librarians can make their libraries more accessible and user-friendly. Following suggestions will

aid in providing user-friendly access while navigating and wayfinding in university libraries.

10. Suggestions for user-friendly access in libraries:

- University campus map should provide dual look-up capability (using the included lists organized by both building name and number) tied to an integrated coordinate system for locating buildings.

- In case of universities, university librarian alone cannot decide and implement wayfinding tools for university campus. Therefore university campus signage system should be available from the concern university planning committee with the consent of librarian to include wayfinding signage for locating university library within the campus.

- A strong library signage campaign should ideally start outside the library building and carry into the interior library spaces. It should communicate clearly about the directional information to navigate confidently around the library spaces.

- Prominent building identification sign, with large illuminated lettering on the exterior near the entrance should be available to all university library buildings.

- There is a need to add directional signage with floor maps and directory display signs on each floor with designated list of departments and facilities available on each floor to provide right direction without the need to ask instructional and directional questions.

- Consistency of signage should be taken in to consideration.

- Changeable signage should be used especially in the shelving area, for showing opening and closing hours, as well as for current and forthcoming activities.

- Use of paper signage should be minimized.

- There should be no obstruction between the signs and the users' point of view.

- Signage should be legible, visible, with suitable font size and appropriate color contrast.

- Preference should be given to pictorial signs with the use of universally identified pictograms and symbols. This allows the signs to be independent of language barriers.

- Use of sharp ends while designing signage should be avoided. In addition placement of signage should be safe including for hanged signage.

- Space should be designed to anticipate wide range of users including special users. To facilitate universal access audio signals and Braille signage should be available in university libraries.

- The broad classification system can be briefly explain and made available on OPAC terminals.

- A display of library map or floor plan next to the computer terminal for catalogue search will be great aid in finding library resources.

- Often different places use different systems, therefore while floor wise splitting the library collection, broken orders in the collection should be specified and suitable signage should be available in such cases.

- Use of shelf-talkers, bookmarks or display stands for highlighting signs of class numbers, subject headings will increase the accessibility to the library resources.

- Use of different colors for binding as per different subjects will help users to search the sources easily in the stacking area. In addition the same practice can be followed to bound volumes of journals for easy identification. If such colors are used according to discipline the same concept can be used in online catalogue for searching.

Thus to save the time of library users university libraries in Mumbai needs to either improve the existing signage system of its physical library buildings or to provide library services in a digital form at user's

doorsteps. Yet such libraries housed with a large and varied forms of information sources which may be a challenge for libraries to convert and provide such huge and varied forms of information sources in a digital form. University library users are of varied ages, backgrounds, and educational levels. In addition prolonged reading is simply possible through printed books as compared to digital collection. Hence university libraries in Mumbai, needs to improve the existing signage system of their physical library buildings to facilitate its own distinctive environmental ambience and to transform libraries into happening places.

11. Directions for Future Research

The research also concluded that a significant amount of work remains to be done related to wayfinding studies in the Indian context as such studies are carried out mainly in developed countries.

Further clues can be provided for future research. Replicating the research by expanding the methods employed would enhance understanding of patron wayfinding behavior by addressing some of the why and how questions, including:

- How satisfied are patrons with their routes?

- Longitudinal studies can be conducted regarding improvement of the facilities for the ease of wayfinding.

Future research should investigate patrons' impressions of the library's wayfinding, possibly through surveys, observations, interviews, or focus groups studies. Additionally, experimental methods could be used to develop and test the efficiency and effectiveness of an intervention, such as altered pathways or signage. Such research will be a path to investigate, ways to make the library's collection and services more accessible by improving signage.

The study achieved its objective of exploring wayfinding signage facilities provided by University Libraries in Mumbai.

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