

**HUMAN ORIENTATION IN LIBRARIES: A STUDY OF
UNIVERSITY LIBRARIES IN MUMBAI**

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by
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DECLARATION

UNDERTAKING

I declare that the form and content of the thesis are original and have not been submitted, in part or full, for any other degree/diploma of this or any other University or Institution.

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CERTIFICATE

Certified that this thesis is a bonafide record of work done by **Ms. Nidhi N. Rakshikar** during the period Jan 2014-Oct 2021 at S.H.P. T. School of Library Science of S.N.D.T. Women's University, Mumbai.

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ABSTRACT

The broad objective of the study was to assess the navigational aspects from the University Library first time users' point of view and evaluate the available guidance tools to facilitate ease of wayfinding and overall usability.

Literature Review revealed that there are a very few studies conducted on freshman or first time library user. The available studies mainly focus on library orientation programs and library tours. Again, the absence of research based studies in the context of self-guidance system for freshman in Indian university libraries with focus on creating user friendly libraries through the provision of spatial information guides with the bent of human orientation in libraries motivated to fill the gap in research. This study tries to fill the gap.

The study focused on Human Orientation practices followed by university libraries in Mumbai. The physical settings of libraries, locations for departments and guidelines through appropriate signage, hoardings, displays, day to day library operations and processes were taken into consideration to foresee the inconvenience, confusion, uncertainty, and irritation faced by users. The study focussed on the first time visitor students specifically first year Postgraduate and first-year M. Phil/Ph. D students and newly appointed teaching faculties in university libraries in Mumbai. University librarians' views were also gathered through questionnaire to explore constraints faced by them while facilitating humanely oriented.

The study is descriptive in nature; hence survey method is used. In order to have a comprehensive picture of Human Orientation measures followed by university libraries in Mumbai, the mixed method of research with qualitative and quantitative techniques was used for data collection and analysis.

The theory and principles of Human Orientation and Dr. S. R. Ranganathan's facets of knowledge classification, PMEST were applied in this research. Findings and observations were analysed and recommendations were generated based on the facets of PMEST. The study also presented a signage model for university libraries with the checklist of various external as well as internal signs as an outcome of the research findings.

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Chapter 1

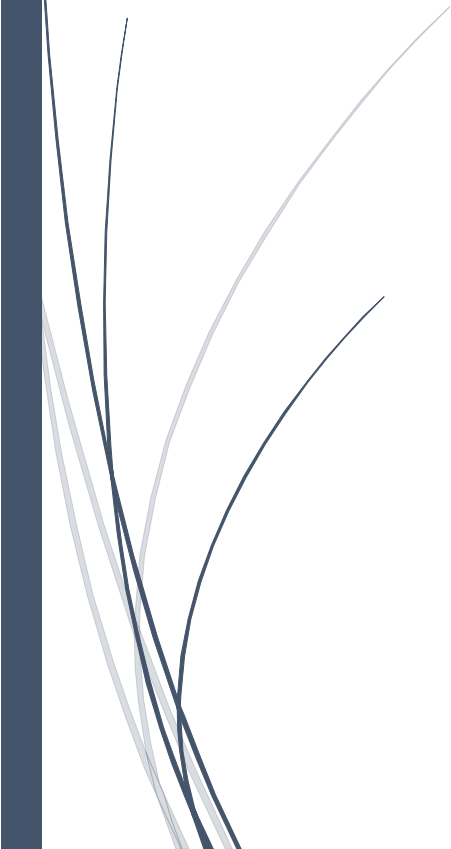
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Chapter 1

INTRODUCTION



CHAPTER 1

INTRODUCTION

1.1 Background

Sustainable development encompasses social inclusiveness, economic prosperity, and environmental quality, and is, therefore, a foundation for the development of any country. It is common to see huge structures created by man but more often it is seen that those structures are not friendly towards users. The Human Orientation Science first draws attention to the problem of uncertainty, confusion, and inconvenience caused to the users by the shortcomings in designs, process operations and then enunciates principles which suggest ways and means eliminate the shortcomings.

In 1970s, at an international level, particularly in U.S.A., a movement called 'Human System Management' (HSM) was launched by Milan Zeleny, who was a pioneer in this area. She published her research through a quarterly international journal entitled, Human System Management in 1980. Zeleny stressed two complementary facets. One aspect was to optimize and improve the design, management and performance of any system that serves the people like transport, bank and hospital or any public place. The other aspect was to manage every system 'humanely'. According to the pioneers of Human Orientation (HO) Science in India, (Modak, S. K., 1993), the movement led by Zeleny in USA was the motive behind the emergence of Human Orientation discipline in India in nineties.

Human orientation can perform multiple functions. At the most basic level, it provides effective information and direction for people to find their way around a specific location-may it be a building complex, park, or any other location like educational institution or its library

The Human Orientation Science covers multi-dimensional thought process related to way-finding at public places, the usage of things, the physical settings, and situations created around to respond to social and psychological needs. As a result, it takes into account human behavior influenced by physical surroundings. For example, crowd of readers at circulation counter gives rise to considerations like forming queue at the counter.

1.2 Rationale

Human behavior is very much influenced by physical surroundings. People often get lost in large public places. As a result, there is an uncertainty in their minds. Human orientation tries to get a feel of what may be going on in the minds of concerned persons moving around in huge unfamiliar public places and then anticipate the possible causes or elements of confusion, with suggesting solution for the same.

Mumbai and the metropolitan region around are growing constantly with the growing population. Such overcrowded cities are struggling to meet the increasing demands of the community and try to expand public facilities. Hence, in cities like Mumbai, it is difficult for libraries to grow horizontally due to space crisis. The problem of space crunch is a major challenge for libraries behind facilitating splendid spaces, universal access, along with humanely oriented ambience. Navi Mumbai is the largest planned city in the entire world, which came up in 1970s. It is less crowded, with adequate space provisions for educational institutions unlike Mumbai. Therefore, university libraries in metropolitan region of Mumbai were mainly targeted as the scope of the present study.

1.3 Human orientation and libraries

Whenever people enter an unfamiliar environment, they experience disorientation and stress. Libraries are no exception to this. They intimidate potential users through their size, complexity of design, and layout of the library building, use of unfamiliar tools, and equipment.

If applied to libraries settings, Human Orientation helps to complete the process that begins with the acquiring and continues with organizing and storing of information for quick and easy retrieval. It supplements the services of library staff in helping users gain access to the collections of the library. In addition, a humanely oriented library sets a tone for the services, subtly conveying that a library has a friendly and is ultimately a well organized efficient place.

A prominent designer has speculated that much user frustration is a result of knowing that all the necessary information is available in the library, but not knowing how to get it (Pollet & Haskell, 1979). Libraries are perhaps our most enduring public

institutions—priceless repositories of history, language, and culture. Libraries serve as centers of discovery and communication—places where people gather and where information comes alive through teaching and personal interaction. In other words, libraries now see success being linked to their role as public places and destinations. Despite the impact of World Wide Web, the library building as a place is important.

Just as libraries are adapting to new circumstances, so too are librarians. Eric Stackhouse, chief librarian at the Pictou-Antigonish Regional Library in New Glasgow, Nova Scotia, opines that ‘librarians have to think about our spaces differently. Before we managed book collections, and today we’re doing much more management of community spaces. That’s where our role is heading—towards more community development skills’ (Stackhouse, 2019). This also applies to academic libraries in the changing scholarly communication process today.

1.4 University Libraries and Human orientation

University libraries can be very different from one another in their architecture and floor plans. While most libraries are organized, in one respect or another, based on one of the suitable classification scheme, very often this is at a secondary level, with the main classification scheme, the users have to take into account the designated sections. There are very few actual rooms housing the collections. The most items are stored in sections that often encompass large open spaces, sometimes, floors. Because of 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. Neither the items in the collection nor the shelving has many distinguishing characteristics to aid in the finding process. Just getting information about where the items are stored in the building is often a challenge.

1.4.1 Need of Human Orientation in University Libraries

Serves wide spectrum of information seekers: The university library, as a medium for information, serves a wide spectrum of information seekers, has a critical role to play as a facilitator of information and knowledge provider. It is difficult for university libraries to cater to all users with personalized assistance and guidance.

University library users are of varied ages, backgrounds, and educational levels. College students do not have experience of using such libraries; some may have never been to a large library before. In addition, every year such libraries receive new users. Hence, an unhindered access to knowledge is essential in the scholarly communication process. Human orientation science will definitely play an important role here to anticipate and draw out causes of difficulties and irritations experienced by users of the library in their day to day work.

Different structures of different university libraries: University libraries can be very different from one another in their architecture and floor plans. Some are historic structures that have been retrofitted to house their current collections. A user cannot necessarily enter one large library and expect it to have the same layout as another. Even the main and the branch libraries of the same universities have different structures.

Introduction of new technologies: Due to advancement in technologies information is available in different formats. Remote access is also possible to search required information; therefore, the availability of the information is also in different forms and formats in the library at different places. For example, in university library there will be a CD collection stored separately, selected databases will be available in the computer laboratory of the libraries. Because of these technological changes there are designated departments in university libraries according to the changing forms of collection. Creation of such varied departments and sections needs guidance and orientation.

Dehumanization: Technology invariably sets in dehumanization. In the past library services were mainly provided by personal assistance and guidance. Today it has been demonstrated that personalized contact is vanishing. In effect, university libraries which are fully automated may result in dehumanization.

Confusing floor plans and poor signage: Confusing floor plans, poor signage and use of library jargon in signs, poor directional information, incomplete instructions or guidelines confound library users, especially first- time visitors.

Excessive commercialization: Due to excessive commercialization manufacturers and publishers often do attractive packaging of their products, but after removing this

attractive packaging the real product may create confusion while using or searching the same product in case of libraries. For example, in case of hardcover books having book jackets, the publishers often make the book jackets more attractive and colorful. But when the jackets are removed the plain hardcover of both sides makes it difficult for readers to search for the same book. Many times jackets are stuck on the card boards, but in due course of time, they get discoloured, binding process also renders the book into plain hardcover entities.

There is no earlier Indian study of application of Human Orientation Science to large libraries; this has motivated the researcher to select the present topic for the research.

1.5 Human Orientation Science: Definition and Meaning

According to S.K. Modak and V.N. Patkar (1993, p.17) “HO Science can be said to be an integrative science which studies human beings in their mental as well as physical relationship with the artifacts and the situations which they encounter in the conduct of their activities, with a view to emphasis, anticipate and draw out the difficulties and irritations experienced by them and to suggest improvements or solutions with the objective of making human life more easy and hassle-free.”

The following points emerge from the above definition:

It

- Is a science which takes within its fold a number of sciences to investigate and analyze the human needs both expressed and unexpressed.
- Explores both mental and physical behavior in relation to the use of material and non-material things of everyday life.
- Analyses the thought processes through empathy and anticipates difficulties faced by people during their work and leisure.
- Suggests ways and means modify the product designs, physical settings and situations in such a way as to make the activities of individuals and the community more effective and pleasant.

Human Orientation is both a positive and normative science. It believes in principles of objectivity in thinking. Everyday activity, process or situation is split into its natural parts or phrases and examined from the point of view of the underlying

thought process and the physical action accompanying it. It tries to emphasize on of what may be going on in the minds of persons and then to anticipate the elements of possible confusion, friction, and uncertainty. The way is thus clear for the emergence of solutions. It propounds certain principles and working rules which helps in developing suitable modifications in the design of artefacts and guidance systems at public places. It also helps in creating new designs to replace old ones.

1.5.1 Principles of Human Orientation

The twenty principles propounded in the book ‘Human Orientation Science’ by (Modak, S. K., 2013, pp. 48-86) are based on very keen observation of surroundings, extensive personal experience and intensive intuitive thinking on the root causes of disorientation, inconvenience, confusion, uncertainty and irritation that common people undergo every day. Therefore, for the current study of Human Orientation in University Libraries in Mumbai, these twenty principles will be taken into consideration while designing data collection tools to conduct the study and will form the foundation of the study.

Following are the twenty principles which form the foundation of Human Orientation Science.

1.5.1.1 First-time visitor

According to this principle, it is presumed that every person visiting a public place is arriving there for the first time and the guidance sign should be designed in such distinct way that the person is not required to make any additional inquiries while finding his way.

1.5.1.2 Location of sign

Location of the sign should be done by identifying the points where visitors tend to get confused and need assistance for choosing correct direction.

1.5.1.3 Choice of language and word sets

The choice of words should be simple to understand the meaning people associate with it. The words should be kept limited in number.

1.5.1.4 Size of letters and color combination

Size of letters should be decided on the basis of the distance from which the display board is likely to be read. Selection of different color is not enough; they should also be in contrast with each other.

1.5.1.5 Height of display

The information display boards should not be fixed so high that either they escape the attention of the visitor or can be read only by upward stretching of the neck. A board should be fixed at viewer's eye-level. Display information on board horizontally to facilitate ease of readability by a natural sideways movement of eyes.

1.5.1.6 Separate display for each function

Use of separate display board for describing each function is advisable.

1.5.1.7 Universal applicability of symbols

Standardized symbols should be used for easy identification. For universal applicability, symbols should have two characteristics: readability and quick identifiability.

1.5.1.8 One word, one function

It is necessary that one specific word or word-set should be consistently used to describe a specific function or a message.

1.5.1.9 Not to dilute importance of main information

The existence of less important information in between or in close proximity to main information should be avoided as it draws away the attention of visitor from the main message.

1.5.1.10 No overload of information

The quantity of information the visitors may willing to read should be taken into consideration. Overload of information may result in ignorance.

1.5.1.11 Utility more than artistry

A message that is intended to be carried should always be considered more important than beauty and artistry. Functional utility criterion should be given more importance than barely making display attractive.

1.5.1.12 Use of suggestive word sets

Instead of explicit word-sets simple word-sets or symbols can be used for easy understanding.

1.5.1.13 Order of display

Avoid administrative terms in the initial word-sets of a display. The order of any information provided on display boards should be in conformity with the convenience of readers while the requirement of providers of service should get secondary importance.

1.5.1.14 Avoid technical jargon

Simple word-sets should be used for better understanding by common people instead of the use of technical terms.

1.5.1.15 Avoid handwritten information on boards

Handwritten information may not be legible enough; it may confuse the reader because letters and numbers sometimes look similar.

1.5.1.16 Oral information to supplement signage

Sign or display information should be supplemented with oral announcements wherever necessary and possible.

1.5.1.17 Avoid distraction at staircases

Leaving spaces completely blank on all staircase walls are desirable. If circumstances are compelling, only portrait frames may be hung on landing wall facing upstairs movement but never on walls facing downstairs movement.

1.5.1.18 Layout of forms

The layout and the format of the forms and slips to be filled by users should be neat and simple. A complicated layout should be avoided. Enough space should be provided wherever required.

1.5.1.19 Distinguishing between similar sides

Users should be able to distinguish the front and back side from the cover page of the provided material.

1.5.1.20 Regulation of queue system

Movement of persons standing in a queue should be regulated in an anti-clockwise direction. The counters or booking offices should preferably be located on right side of the entrance. These principles are further explained in the context of the library in chapter 4.

Thus, human orientation goes much beyond disciplines like ergonomics which basically deals with interaction between man and machine, kinesics which concern itself with non-verbal communication, semiotics or semiology which concentrates on finer aspects of sign languages, ekistics which focuses on human dimension in architectural design and psychology and sociology which look into the human mind and societal behavior. Its specialty lies in the fact that it lays emphasis on applications and practical aspects. It is also an art which tries to blend individual good with collective good. It traces the origin of irritation and discomfort in everyday life and prescribes a remedy to eliminate it or circumvent it (Modak, 2013).

1.6 Present study

Human orientation science is a new concept as the term ‘Human Orientation Science’ was coined in nineties by Modak & Patkar (1993). They suggested that human orientation can be applied to other public places including academic institutions including their libraries to make libraries user-friendly. Human Orientation Science is not yet applied to libraries by library professionals. Therefore, the study primarily focused on aspects associated with human orientation science such as navigability, signage and self-orientation. The present research mainly concentrated on the

qualitative aspects of research by studying behavioral expressions and emotions of novice library users as well as the qualitative analysis of available wayfinding and signage system available at university libraries in Mumbai to promote human orientation.

The broad objective of the study was to assess the navigational aspects from the user's point of view and evaluate the available guidance tools to facilitate ease of wayfinding and overall usability. The present study attempts to throw light on application of human orientation science to university libraries in Mumbai. Redesigning a library is often impractical, whereas reviewing and overhauling the signage, wayfinding system and removing physical and psychological barriers with the application of human orientation is feasible; hence, the study was undertaken with the practical implementation of HO principles for university libraries in Mumbai.

In the present study concurrent design of mixed method was applied. For generalizing the findings, a survey of university library users as well as university librarians was executed through questionnaire. Further microscopic study was conducted by observing behavior, and through interviews to gain in-depth understanding about the participants' perspectives from selective users of total sample. The data obtained through these research methods then were combined and analyzed on a more generalized level, which were finally interpreted based on the analogy of the framework of Ranganathan's categorisation of human knowledge (PMEST).

Data was collected through various data collection tools like, questionnaire for users as well as university librarians and structured observation schedule for users, and interview of selective users as well as structured observation schedule for library building observation along with photographs and videos wherever permitted with the due consent of users.

In case of qualitative data, signs of each university library building were captured and stored in the form of photographs. Total 160 photographs of signs analyzed and evaluated on the basis of factors such as number of signs available, nature of signage type (directional, instructional and regulatory), classification of signs (permanent and temporary), placement and location of signs in each library, language of signs, utility

of signs, consistency, readability, visibility of signage and the signs which need to update or remove. These photographs were also analyzed using ATLAS.ti (Qualitative Data Analysis and Research Software), and SPSS through labelling and allocating codes to each photograph, to cross-check its validity and accuracy (Annexure VIII).

1.6.1 Chapter scheme

Introduction chapter includes theoretical and conceptual background and rationale and need of the study along with the twenty principles of Human Orientation Science to explain the connotation. The Second chapter gives a detailed review of relevant research on Human orientation and its related aspects. Chapter 3 describes research methodology, objectives, scope and limitations, and a hypothesis of the study. Chapter 4 elaborates interview with the pioneers of HO science and their views about applicability of HO science to libraries. Chapter 5 describes findings gained through data analysis from user's responses and university librarian's responses. The sixth chapter describes the analysis of qualitative data and its findings. The seventh chapter presents the rationale, objectives and summarizes major findings of the research. These findings were presented through use of Framework of Ranganathan's theory of knowledge by using concepts of 'Personality', 'Matter', 'Energy', 'Space' and 'Time' (PMEST). It concludes with a summary of findings and recommendations for future research, also suggesting ways to make libraries more humanely oriented. The study culminates into model signage system suitable for university libraries.

There is little research on the application of human orientation science for libraries available at present, but some aspects of human orientation which have been studied could serve as a starting point in defining human orientation needs for future research. Therefore, in order to understand comprehensively and to analyze new users of university libraries, it was essential to review existing relevant literature and get insights of the problem. The next chapter presents the detailed review of relevant literature about aspects of human orientation for libraries studies by various library professionals and researchers.

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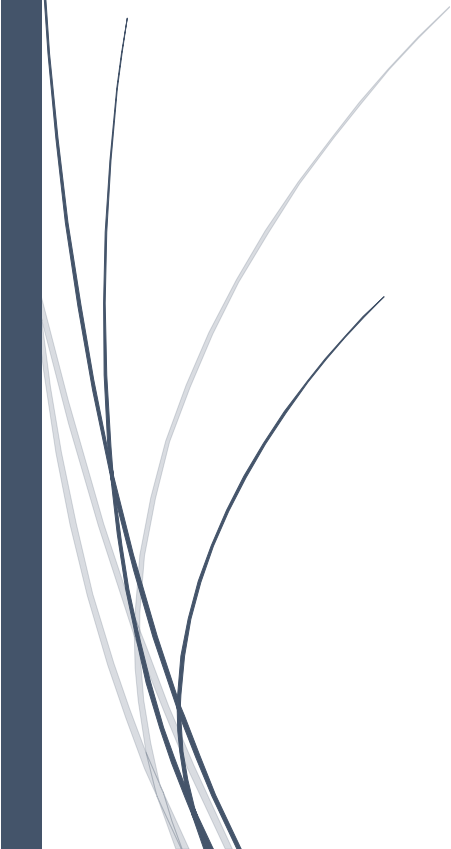
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Chapter 2

**REVIEW OF
LITERATURE**



Chapter 2

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CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

Human orientation science is a new concept as the term 'Human orientation science' was coined recently in 1990's by (Modak & Patkar, 1993). Still few earlier researchers had already studied this concept under different nomenclature. In 1987, Veatch thought about making library environment 'human oriented' through application of environmental design (Veatch, 1987). There are very few studies which are conducted purely of Human Orientation, but these studies are conducted in case of transport terminals as a public place. Major studies are conducted on some of the aspects of Human orientation. As Human Orientation is more inclusive and wider in connotation it includes following related aspects:

- Wayfinding behaviour
- Semiology/Signage
- Physical and psychological barriers
- Environmental design and space planning

Therefore, the present literature review considers the references published on the following related aspects of Human orientation.

Publications on Human Orientation Science are very few; as it is a recent concept. Till now Human orientation studies are conducted in case of air ports, railway stations and bus stops. Thus, these studies are undertaken only for finding problems faced by people while using these transportation terminals as public places. Studies in the context of libraries are also very few and are mainly conducted in developed countries, however such studies dealt with only signage and wayfinding as facets of human orientation science. These studies are mainly related to public libraries. Way finding is a method use in human orientation studies with tools such as signage, display system and indicators. Therefore, books and articles, theses and dissertations and other written works on related aspects of human orientation science are read and considered for the present study. To present the historical development of the concept

of Human Orientation Science, review of literature is organized in a chronological sequence from its etymology till its present applicability.

2.2 Wayfinding behaviour

There have been quite a few attempts to incorporate human behaviour aspects in system design; the earliest study being done by (Zipf, 1949). Through this work the author gave a new direction to the thought of ‘Least Effort’. The author propounded the principle of least effort that man or any other animal by nature tends to move by the path which involves least efforts or minimum opposition. The principle states that an information seeking client will tend to use the most convenient search method, in the least exacting mode available. Information seeking behavior stops as soon as minimally acceptable results are found. The author has theorized that the distribution of word use was due to the tendency to communicate efficiently with least effort and this theory is known as Zipf’s Law. This theory holds true regardless of the user’s proficiency as a searcher, or their level of subject expertise and is being used in Bibliometrics- a well recognized discipline of research in Library Science.

In the conferences and papers during the years 1950-1952 (Shera & Egan, 1951, pp.72-93) (Egan & Shera, 1952) Shera mentioned the phrase ‘social epistemology’. This new subject was published in periodicals certainly accessed only by library science academics. In 1952, these founders published a paper to which most authors attribute the first use of the new phrase (Egan & Shera, 1952). In this article Shera and Egan introduced the first description of what social epistemology would be as an academic discipline:

Such a discipline is here denominated, for want of a more accurately descriptive term, “social epistemology”, by which is meant the study of those processes by which society *as a whole* seeks to achieve a perceptive or understanding relation to the total environment— physical, psychological, and intellectual. The derivation of the term is readily apparent. Epistemology is the theory or science of the methods and foundations of knowledge; and through it the philosopher seeks an understanding of how the individual achieves a perceptual or knowing relationship to his environment. Social epistemology merely lifts the discipline from the intellectual life of the individual to that of the society, nation, or culture (Egan and Shera 1952, p.132).

Shera (1965) documented a fundamental theory of librarianship as a social epistemology and portray library as a social and cultural agency. He specified that with the invention of printing in nineteenth century, librarians given weight age to accumulation of information, however with the advances in Information and Communication Technology the role of library professionals has transformed from accumulation to dissemination of information by bringing resources to the attention of anticipated users through a social channel. However, he further advised that automation and computerization should not result in dehumanization.

Other works deal with studies applicable to public facilities, for example, at airports. This was the study done by Braaksma & Cook (1980), where they applied human orientation in transportation terminals. In the present study, for the first time the concept of 'Visibility Index' was put forth to measure the ease with which facilities at an airport terminal become visible to passengers as they enter the terminal area. The two authors were the first to use the term 'Passenger Orientation' and 'Human Orientation'. The methodology was applied to eight air terminals, one rail terminal, and one bus terminal. The floor plan and signage system of one air terminal was improved to demonstrate how these changes can be measured by changes in the visibility indices.

Passini's Conceptual Framework of Wayfinding proposes two user-specific styles and five problem-specific strategies of wayfinding based on user behaviour (Passini, 1981). According to Passini through the structured process of wayfinding decision plan, the wayfinder can focus on individual wayfinding behavior task or subtask while keeping the larger wayfinding information problem in mind. (Strategy 1: dividing) the task into manageable parts while keeping an eye on the larger task at hand, focus on one problem or subtask at a time. (Strategy 2: Narrowing) or modifying his wayfinding behavior when unforeseen problems occur. (Strategy 3: Adapting and responding) when Wayfinder relies on solutions he has used to solve prior spatial information problems. (Strategy 4: Accessing one's Schemata) and one relies as best one can on the spatial information available in the environment. (Strategy 5: Gathering information and adapting accordingly) aligns with collecting information and adapting it.

The two wayfinding styles describe people's overall systems or methods of completing wayfinding tasks: what guides overall wayfinding behavior. Using Style 1 (Linear style), the wayfinder relies on the signage system, which Passini explains as a linearly organized wayfinding support system that progresses from one location to another, guiding the Wayfinder with the spatial information he needs to execute decisions along his route. Using Style 2 (Spatial style), the wayfinder relies on his spatial understanding of the setting. This is affected by his familiarity with the setting (past experience), architectural legibility of the setting (visibility and other cues) and wayfinding tools like maps and floor plans.

(Eaton, 1991a) explores how elementary and secondary school library users would navigate in shelf searches by applying experimental method. She pointed out that the subjects were not a random sample as many of them were skilled in library searching. It was not possible to determine if spatial skills were the true cause of user success, or if success was caused by an outside variable such as general cognitive development of the user (Pg. 83). The paper suggested that there was room for further research into “metacognition” as the most successful subjects were those who stopped to reconsider their search strategies (Pg 84). User search strategies that utilized locational aids seemed to work well as the aids limited the amount of information users needed to process (Pg 84). Her strongest finding was that most successful were students who “decentered” themselves, detaching from unsuccessful strategies and continuing in a different way.

(Eaton, 1991b), reported the results of a test of a formula developed by Gordon Best in 1969—the formula was based on the premise that the number and complexity of choices a user must make within a space allows a researcher to calculate "route uncertainty." The paper suggested that wayfinding problems can be solved by observing users during their searches and taking the library's design into account.

Harding (2011) provides wayfinding and signing guidelines for airport terminals and landside. In this book they provided key principles to develop wayfinding strategy. Those principles were mainly continuity, connectivity and consistency for the designing elements of wayfinding tools. According to them design element of consistency should evaluate;

- Terminology and message hierarchy,
- Visibility and Legibility,
- Typography and Symbology,
- Format and Color and
- Placement

They further suggested that every architectural project should be evaluated from passenger's wayfinding perspective.

Beneicke et al. (2003), underlines 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, visitor abilities and consistency. The authors also illustrate how to provide and present public information and directional information in an appropriate way. The steps for planning and preparing a good design are explained in-depth. Sign planning checklist is also provided by authors.

Beecher (2004) in her dissertation presents the qualitative case studies of three library buildings which were originally designed as library buildings instead of buildings that were modified from some other use (Beecher, 2004). This research is exploratory in nature. Each of the libraries has at least 375,000 square feet of space and a collection size of at least one million items. Data were available from study of participants from these three main libraries in three large cities in the United States. Observations of volunteers and their perception about way-finding were the tools obtained for data collection. An analysis of the data indicates the preference to way-finding tools, the expectations of the users in terms of the information tools, and the effectiveness of these tools. It indicates where and when patrons would prefer to use these tools. In addition, it gives some indication as to user perception of their way-finding experience. The study reveals that many of the way-finding tools currently available in libraries do not facilitate item retrieval. Inconsistencies, ambiguities, obstructions, disparities, and operational deficiencies all contribute to end-user frustration and retrieval failure. The study suggests that failing to address these issues may prompt library patrons—end users who are increasingly interested in finding information with minimal expenditure of time and effort—may turn to other information-retrieval strategies and abandon a system that they find confusing and frustrating.

Carr (2006) discussed the effects of stack end signage on user wayfinding success in searches in academic libraries. Before conducting the study researcher believed that signage in public libraries is more user-friendly. Therefore, prior the study he visited Chapel Hill Public Library and Cameron Village Branch Library to develop a picture of characteristics of clear, user friendly signage. The literature review provided by the researcher facilitates suggestions given by different authors and researchers on effective signage in libraries. The population studied was the university community. In this study, an action research strategy was employed. A three week study was conducted to survey the effects of three different iterations of signage on the success of searches to locate materials in the Sloane Art Library, University of N Carolina, United States. Subjects were asked to visit the Sloane Art Library campus once a week for three weeks, each for different set of signs to complete brief study activities and fill out a survey once they completed the activities. The results of study explore the amount of information included on stack end signage and that level of information affects patron success in wayfinding in library.

Tatarka et al. (2006), asserted the benefits and utility of wayfinding studies as a tool for highlighting barriers to the use of library collections. In the Spring of 2005, a team at the University of Chicago Library undertook a study to help identify the reasons users were having trouble finding books in the Regenstein Library at University of Chicago. The team started by identifying the steps required to, find a book in a library and the wayfinding processes as well as operations. The team divided these operations in to seven steps. Those steps were transcribed onto a form that could be used by the users while searching for materials in the library. First year students of the University of Chicago who had minimal experience of using library's collection were given preference. The myriad approaches to searching made it difficult to record data on the form that the team had created for this purpose. The form assumed a linear approach that proved unrealistic. It became clear that narratives were the best way to capture wayfinding attempts, so after each session was completed, the recorders wrote narrative summaries. The study team analyzed the narratives to identify failure points, and recurring failure points were noted. The findings revealed that every participant failed to find all three books without at least some prompting. Some participants found one or two of their items without help, but none were able to find all three. Failure points were found both in searching the online catalogue and in navigating

physical spaces, though the latter presented more challenging impediments. Among the most frequent stumbling blocks were ineffective and poorly placed maps, failure to distinguish between reference collections and the main book stacks, unclear terminology, and poorly delineated reference collections with multiple call number sequences on a single floor. At the time of the study, library maps and signs did not meet users' directional needs. The Library's physical footprint is not easily discerned because of its non-rectilinear shape. Finally, authors suggested future researcher that more attention should be paid on how to best record data through direct observation of users rather than focusing on the mechanics of conducting the sessions.

According to (Hahn & Zitron, 2011), First-year undergraduate students frequently encounter navigation problems in locating known items in the library. Their study seeks to surface the thought processes of first-year undergraduate students as they navigate an unknown environment. The significance of this research is to uncover the conceptual frame of the first-year undergraduate student and to draw recommendations for building layout such that navigation to known items may be made more amenable to the new undergraduate students as they search for resources in the building. This research is a qualitative examination of navigation within the physical library space. This study recruited first-year students at the University of Illinois at Urbana-Champaign. Three sets of data were collected in this study. Researchers recorded the students' verbalized thought processes as they navigated the stacks in the Undergraduate Library. The students were instructed to share aloud anything in the library they were using to help them locate the book. These comments were recorded and analyzed. Researchers kept observation notes (in the form of investigator logs) about help tools that students used to locate items, and finally, collected data in the form of a debriefing interview. These qualitative data help to triangulate a picture of navigation success and fail points in the search for items on the library shelf. Researchers developed a coding schema based on all think aloud items that were verbalized as ways to find items on the shelf. For fail points these included library classification, arrangement of stacks, starting point, format, cutter numbers, no prior knowledge, library labels, shelf arrangement, and erroneous interpretation of knowledge. For successful library navigation, the items were coded as sign, library classification, asking staff, format, prior knowledge, map, application of knowledge, shelf arrangement, and arrangement of stacks. The authors conclude

with providing some implications for way finding such as positioning of staff members at likely fail points, use of signs in an inviting way and uniformity in signage to facilitate visual consistency.

In the seminal research on wayfinding within library spaces, Li & Klippel (2012) provided valuable insight into how individuals navigate addressing problems and issues within library spaces that inhibit an individual's wayfinding abilities. Results of the study suggested 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), expressed his views that facilities designed with user wayfinding information needs in mind will be easier for users to navigate while seeking information, likely increasing satisfaction levels with the facility. Therefore, the overall purpose of this case study is to explore user wayfinding behavior in a medium-sized public library (serving a population greater than 25,000 and fewer than one million users). This dissertation follows a multi-method case study research design which includes document review, unobtrusive observation, intensive interviews, and an expert review. The research is based on Passini's Conceptual Framework of Wayfinding (1981), which proposes two user-specific styles and five problem-specific strategies of wayfinding. Data analysis for this case study involved three major analytic techniques: geospatial analysis, content analysis, and data integration. The researcher employed geospatial analysis for the routes identified from unobtrusive observation and user interviews, thematic content analysis for the wayfinding tools identified in the document review and expert review interviews, and conceptual content analysis of the transcripts of user interviews. The research concludes that user wayfinding behavior in the research site is variant to some degree, but the degree to which that is so or why that is so remains unexplored. The researcher further concludes that a significant amount of work remains to be done with regard to Passini's Conceptual Framework of Wayfinding (1981).

The Burke Library at Union Theological Seminary conducted a wayfinding study that also utilised the think-aloud protocol 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 (Baker et al., 2015).

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.

Zaugg et al. (2016) investigates similar and different wayfinding strategies used by novice and expert patrons at The Herold B. Lee Library (HBLL) of Brigham Young University. Researchers administered an observational schedule by identifying 12 wayfinding tasks (locate people, product or services) that were deemed important for users. Scenarios were written for these tasks. Each scenario was written on a 3×5-inch card. Participants were randomly given one card at a time to complete. Participants had ten minutes per scenario or a total of 40 minutes to complete all scenarios. If a participant reached the 40-minute time limit, he or she was not allowed to complete any further scenarios. A participant could stop any wayfinding activity at any time. Student researchers followed and video recorded each participant as he or she completed each scenario. Student researchers also interviewed and audio recorded each participant about his or her search experience. The video recordings, field notes, and interview data offer insights into the wayfinding tools used by patrons to navigate

pathways. Data indicated four dominant wayfinding tools all students used: signs, maps, service desks, and technology. The primary wayfinding method used was library signs. Signs at eye level were more helpful and preferred than those hanging from the ceiling. Maps were the second most used wayfinding tool by students. Novices used the interactive Directory Kiosk map as their primary map. Several participants had difficulty reading the maps. The third most wayfinding tool used was asking library personnel at service desks. Previous experience emerged as one of the most used strategies in wayfinding in case of experts. Researchers concluded that novice and expert wayfinders assists librarians as they frame wayfinding tools in the world of patrons instead of trying to fit patrons into the world of libraries. Knowing the differences enables librarians to help patrons move from novice wayfinding strategies to those of experts. Adjusting librarians' thinking and actions to model the way patrons think and act will make library services and resources more accessible.

Mandel (2017) reviewed library wayfinding literature using Library and Information Science & Technology Abstracts (LISTA).

2.3 Semiology/Signage

Claus & Claus RJ, (1974) defined readability as "the quality which enables the observer to correctly perceive the information content of letters or numbers grouped together in words, sentences or meaningful relationships". Legibility as a precursor of readability focuses on the space between the letters and numbers. Thus different factors of readability comprise stroke width, letter height, irradiation, the width of letters, typeface, etc.

Library related studies were carried out by Pollet & Haskell, (1979) associated with signage in libraries. Its objective was to bring together experts and writers from various fields relevant to the topics such as library science, psychology, optometry, geography, design and space planning for portraying different types of library experiences with signage systems. Therefore, various topics mentioned above indicate the scope and variety of author's approaches about library sign systems. According to authors signs are central to the idea for all visual means of communication but the concept goes further to include building directories, wall graphics, printed library guides, maps of the building, space arrangement and displays. In short all visual

means of helping readers find and use the services of library. All these means or components are expressed by the authors with the term “visual guidance system”. The book is divided in four parts. Part 1 lays the groundwork for the design of a visual guidance system by presenting theories and research relevant to user behavior in public service environments. The results of research on user orientation needs, mental mapping and human vision system are applied to the library setting. Part 2 covers the specifics of planning and designing a visual guidance system from defining the needs of a particular library, to engaging a consultant, to producing signs and to evaluate the system as a whole. Practical solutions developed by real libraries are covered in part 3. Ideas and case studies are presented for school media centers, public, special and academic libraries. Part 4 suggests ways in which library building planning and space arrangement can assist the wayfinding process. Chapter 20 provides photographs which are best example of effective sign system. Thus the chapters cover the theoretical aspects as well as the practical application. An annotated bibliography on visual guidance systems offers further reading on theory and research, materials and techniques, visual guidance systems in libraries and in other institutions. The book discusses the issues involved in variety of settings related to sign systems in different library buildings and proposes solutions to problems that often require expertise and experience.

Eaton et al., (1993) designed an instrument to survey library users at the University of Rhode Island on their perceptions of library signs and asserts that signs are necessary to compensate for the complexity of library buildings. This includes the sometimes complex arrangements of stacks resulting from expansion. Eaton's 1990 study of the effect of signage on user success discusses this problem. Eaton mentions some factors that aid wayfinding in the library. These include a simple arrangement of materials, open lines of sight in the library space and the absence of "visual clutter" which, due to expansion, is usually inevitable. Eaton defines some common signage problems, which often seem to relate to the number and placement of signs. Library personnel place signs to solve the problem of frequent questions—for example, the location of the elevator or restrooms. Placement of signs is usually decided by available space, so signs may be placed too high or may be covered by the library's architectural elements. Eaton also states that for signs to be effective, research shows that signs must be concise and clear, their placement is critical and that the fewer there are in

place, the better. The researchers also conducted observations of user behavior at major library signs including "you are here" maps, directional signs and others. Most users did find their destinations within the library, but among those users already familiar with the library, most said that memory, not signs, was helpful in finding their way. The authors provided guidelines to make signs more effective.

Bosman & Rusinek (1997) outlined a basic inventory performed in order to evaluate student perceptions of signs at the library of Indiana University Northwest. They believed that one of the components of a user-friendly library is effective signage. They argued that proper signage may lower directional questions and may alleviate student anxiety. Further, they argued that consistent signage would create a more aesthetically pleasing environment.

Describing the objectives of signage systems, Kupersmith (1980) reviews typical approaches to signage in libraries. These objectives of comprehensive sign system are grouped in six general categories: orientation, direction, identification, instruction, regulation and current awareness. Further he discusses components of sign systems, and outlines a method for designing and developing an effective system. Though the article dates back to 1980s; the principles apply remarkably in the present era. The author concludes with elaborating current trends and recommendations regarding use of informational graphics and sign systems as well as scope for further research in designing of library signs and graphics.

Verma (1994) analyzed an ergonomic evaluation of the existing signage system in S.N.D.T. Women's University, Juhu Campus, based on location and its physical characteristics from the view point of ergonomics. The aim of the study is to develop criteria for re-designing signage system for better visual performance. Initial part of the study consists of psycho-physiological, dimensional and physiological aspects of the viewers. The preferred typography and size of display are discussed with inclusion of problems related to Indian scripts such as Devanagari. Literature review of this dissertation comprises types of signage, functions of signage and procedures involved in sign posting. The researcher also elaborates human factors in sign perception. The present study emphasizes that the display and the visual environment behind or around the display have major influences on responses and effects on the viewers. To get the basic idea about effectiveness of display and their visual environment

preliminary survey was conducted in the form of pilot study in S.N.D.T. Women's University, Juhu Campus. To get users view data was gathered through questionnaire. The study of physical characteristics of existing signs was examined through personal visit and with photographs of available signs. The study of viewer aspect was based on both the qualitative and quantitative facets. The qualitative aspects consist of questionnaire analysis and personal observation, which indicated that the existing signage was insufficient to satisfy viewers. More directional information was preferred to cater the needs of users. Under quantitative evaluation four aspects were considered time and motion study, dimensional, physiological and psychological issues. Under this evaluation it was revealed that the existing signage was insufficient to provide the required information to reach desired destination without help of a passerby. The study further reveals that no particular standard pattern was followed in writing text on display boards. Based on the observation and inferences drawn from the study, the researcher provided list of recommendations towards designing and better functionality of signage system.

Verma (2002) examined the role of colour and characters of signage at composite building of Home Science, S.N.D.T. Women's University, Juhu campus. The objectives of the study were to identify behavior of visitors in the area of study, to find the extent of usability of existing sign boards, to know the suitable colour combination to design a sign boards for the selected area and to know the suitable typeface to design a sign boards. Respondents were selected purposively to participate in the study who was first time visitors. 150 first time visitors selected as the sample of the study. In order to get responses for suitable colour combination and typography to design sign boards 25 from regular visitors were chosen purposively. Data was collected through structured interview schedules and observation technique. Structured interview was prepared in two sections, one for first time visitors to collect data on behavior and approach. Another structured interview schedule was designed and administered to the sample of 25, who participated in judging colour combination and typography. The preferences of colour combination were collected for the parameters like readability, lighting condition, aesthetics and attractiveness. Observation technique was adopted to know the number of people contacted and time taken to reach the given destination. The study revealed that the text written in black and white background was most preferred as per the parameters. Halvetica-medium

was most preferred for typeface and typestyle for its letter size, height, readability, proportion and appeal. Based on the findings list of recommendations are provided, further she highlights the scope for future research in development of signs for educational system can be undertaken.

Gallo (2008) opined that displays are the silent salespeople and appeal primarily to people's emotions. Since public libraries are in the business of circulating materials and keeping their customers reading, display spaces are necessary for marketing the collection. The article presents simple techniques to display library material with minimum expenditure. These techniques are illustrated with examples, such as for libraries that have shortfall of extra cash to purchase cubes or crates, decorate different-sized boxes with magazine clippings or wrapping paper, stack them, and surround them with books. As teen service librarian (Librarian for teen section or libraries for teens), the author has suggested a way to promote a use of collection to those reluctant readers or those teens that only come in to the library to use the Internet, hang out, or wait for their parents to pick them up after school, i.e. the potential readers.

Wang & Tzeng, (2009) first defines the factors that influence the visual and spatial link between users and libraries related to sign systems in libraries. The present study digitized the measurement model and overall measurement indices from different samples to establish criteria to improve sign system quality. The analysis includes collecting informational graphic and sign system literature and conducting in-depth interview, use of Confirmatory Factor Analysis (CFA) to establish sign systems measuring model to test its validity and the value for the goodness-of-fit and to convert the developed scale into a result-oriented evaluation tool. On the basis of literature review on wayfinding, sign systems and library sign systems, the authors provided eight principles of sign systems for libraries such as location, content, color, font-style, lighting, size, shape and forms and material. Taking into consideration these principles the authors developed a questionnaire. The measurement of this research is based on the 6-point Likert Scale and the researchers used purposive sampling to conduct pilot study on measurement tools. The research performed both Item Analysis and Exploratory Factor Analysis to examine the sample for reliability and validity. A sample of 450 individuals is the population for the questionnaire. The

population was collected from a public university, a private university and a public technology university in Taiwan. This research constructed four models i.e. Model 1: first order one factor model, Model 2: first-order multiple factor orthogonal model, Model 3: first-order multiple factor oblique model and Model 4: second-order factor model. According to author the measurement modelling in the present research can be used for long term follow-ups for users' requirements, and for implementation when library interior partitions are redesigned.

Larson & Quam (2010) present a case study of Darrell W. Krueger Library at Winona State University on applying networked digital signage at Winona State University. The Cisco Digital Media Manager establishes central management for the publishing of digital content, which is broadcast through a Cisco digital media player connected to individual flat-screen TVs on their local area network. As Cisco succinctly states, "The Cisco Digital Media Player is a dynamic, flexible, solid-state device used for the decoding and display of digital media— including high-definition live broadcasts, on-demand video, Flash animations, text tickers, and other web content—on digital signage displays." The responsibility for the library's internal coordination of digital signs resides with the public services coordinator (PSC). The PSC supervises, recommends, and approves digital sign content. The Information Gallery Library Technician (IGLT) is the creative designer of both the slide templates and ongoing slide creation. The digital initiatives librarian is designated to back up both the Public Services Coordinator and Information Gallery Library Technician. On a weekly basis, two library personnel and one IT staff member are directly involved with the digital signs; however, the amount of time spent varies according to the number of new signs that need to be created. Thus the article facilitates an overview about responsibility and co-ordination of library personnel in designing and creating digital signs, as well as provides the staff pattern and a work flow pattern for allocation of work to maintain and up-date these digital signs in the library. While concluding the authors states that even though they seek technological solutions to the signage issues, they will continue to use multiple methods of communicating with their patrons by using traditional methods of signage like paper and dry-erased boards also.

McMorran & Reynolds (2010) provided tips on making the digital signs and displays more approachable and more informative and eye-catching. The technical problems

and solutions while installing, using as well as editing digital displays are mentioned in the article. An article also provides technical specification which will help in decision making while acquiring digital displays such as some popular digital display brands, different display models, its resolution, internal memory, etc. As digital displays provide changing screens and slides the author states that these displays will help to remove the mess and cluttered library desk.

Barclay & Scott (2012) asserts that even though the architects have control over the building identification and regulatory signs the librarians have considerable control over the directional and informatory signs in the library. They suggested avoiding terms such as “no,” “forbidden,” and “prohibited,” as they may be viewed as punitive and uninviting (p. 37). They addressed directional signage as “wayfinding” (p. 37) and coined the term “bump points” (p. 37) to identify the location to mount directional signs where users stop to make decisions. They also provided visual examples of good signage (p. 38) and a “Bad Signals” chart to outline mistakes to avoid such as negative language, as well as overuse of text in bold, italics, underlined, or red, exclamation points, and crooked or poorly mounted signs. They concluded by suggesting that donor-recognition signage, which is informational in nature, should never hinder directional signage (p. 38).

Santy (2012) discussed the need to have library signage, types of signs, and tips for designing signs. Further the author mentioned different aspects to improve the quality of signage, such as lettering, color, size and shape, structure of presentation, layout, terminology etc. The article analyses the difference between temporary signs and permanent signs, and the importance of maintenance of these signs. The article also provides links which will guide and assist in sign generation.

Serfass (2012) provided valuable guidelines for developing effective signage. In addition to consistency in font type, and color, Serfass recommended using a logo to establish a unifying theme (p. 5). She emphasized the importance of using positive language to create a user-friendly atmosphere and discussed how signage can be a helpful marketing tool. She also pointed out the need for signs to be accurate, such as the case with many signs that indicate no cell phone use is allowed. This is misleading; as it is only cell phone talking that is prohibited (p. 6). Serfass also wrote that the overuse of signs leads to ineffective signs that may be ignored.

Donne (2013) facilitates background research on the use of sign language with students who are deaf/hard of hearing and students with low incidence disabilities, such as autism, intellectual disability, or communication disorders. The practice of utilizing technology incorporating sign language to promote language development, reading comprehension, and writing in sign language users is examined. Also, researchers studied various forms of technology incorporating sign language: multimedia adapted books, educational instructional videos, and online instruction of sign language. In addition, the implications for rural educators are discussed. Based on the review, a resource of technology applications is provided for parents, interpreters, and teachers to implement at home or in the rural classroom. Research documents the benefits associated with using sign language among students with disabilities. For example, with students who are deaf/hard of hearing, exposure to speech and sign language positively influenced language development. On the other hand, students with autism are nonverbal, and, for these students, sign language could be more effective than speech alone for expressive and receptive language development. By reviewing the literature published between 1993 and 2013 to explore the research base on technology to support sign language users, the author summarizes that sign language facilitated the expressive and receptive vocabulary acquisition and overall language development of students with low incidence disabilities, such as hearing loss, autism, and intellectual disability. As libraries serve the community as a whole, librarians have to think as a service provider for all types of users in the society, including students with different types of disabilities who need special form of sign language for communication. This article will guide librarians to meet the signage requirements of disabled users.

Stempler & Polger (2013) focuses on the steps involved to conduct a thorough and valuable signage audit. Signs were inventoried and classified into three categories: directional, policy, and informational. The authors also conducted a content analysis of signage across all three floors of the library. Signage was divided into permanent and temporary signs and then analyzed for language, branding, and design. As a result of this audit, the authors uncovered a multitude of issues relating to language, design, branding, and overall aesthetic. In addition, the authors administered a survey to 255 students at College of Staten Island, New York, regarding permanent library signage. After the survey analysis, the authors discover that students understood the simple and

straightforward language of the ceiling boxed permanent signage. However, the signage audit of the entire library revealed that some signs were outdated, confusing and contradictory, used punitive language, lacked consistency in design and branding, and did not comply with American with Disabilities Act (ADA) guidelines. The authors conclude that developing a signage policy, a library brand that aligns with the College, and developing best practices guidelines will help bring consistency and clarity to library signage and other promotional material.

Schander's writings focused on digital signs. The recent articles on the subject illustrate that digital signs, just as paper signs, have their own set of limitations and drawbacks. The issue of strategically placing signs in heavily trafficked areas at eye level remains as relevant for digital signage as with paper. However, a complication with digital signs, whether using computer monitor or flat screen, is the need to have a central processing unit (CPU) secured in close proximity. Such technology, both hardware and special signage software, can be expensive and necessitate training. He suggested that although freely available tools such as PowerPoint can be used, if proprietary software is purchased, signage may only be licensed for one computer (Schander, 2013).

Kasperek (2014) explored a case study of Mansfield University Library's project to improve communication between the library and its patrons through redesigning the library's present sign system. The Mansfield library redesign project began after the Special Events and Customer Service Committee created a comprehensive communication plan that focused on all the ways the library conveys information to patrons. The committee reviewed the library's current communications pathways and determined that there were problems in several crucial areas, such as inconsistency in signs, handouts and other promotional items. Through applying basic principles of contrast, color selection, alignment and repetition along with standards from the American with Disabilities Act, the library improved the visual communications within the library. Thus the article mainly focuses on basic elements of design and the process of redesigning the signs. With all the existing signs in the library updated, the committee addressed the creation of future signs so that library employees can create ad hoc signs. The outcomes of designing and redesigning show how the consistency of the design and application of contrast and alignment make these signs easier to

understand and to recognize as official library signs. Additionally, the signs overall look more professional and more visually appealing. The author as a committee member suggests that organizing a sign design workshop and demonstrating the distance test for judging and improving signs might be useful in helping everyone in the library understand the application and purpose of the design specification and design principles.

Rane (2014) presented her views about signage as an important tool for marketing library services. She further provides suggestions on applying sign system in libraries and tips for marketing library using signage. The article suggests that a good signage program should begin outside the library to attract and welcome potential users inside the library. She further adds that signage plays an important role as a pathfinder for library users. Signs not only help to find way in the library but also help users to navigate through the information while accessing OPAC or through the web pages of e-resources. The article ends with a student's view on signage at SNTD branch library at Juhu campus.

Warren & Epp (2016) focused on the physical aspects of library space (including wayfinding, space usability and signage) and how these aspects of library affect the library users experience. The authors are staff of University of Manitoba libraries, undertook a project decided to combine the ideas of a kindness audit and a signage audit. They explain kindness audit as a low-cost review of the positivity, usability and welcoming attitude of a space. The objective of the project is to prepare and implement a standard procedure to evaluate the wayfinding, signage and user experience at all University of Manitoba Library's locations. For data collection, the researchers developed note sheet with questions, dividing note areas into standard sections of a library such as entranceway, service areas, study areas, computer areas and stacks. The guiding questions were designed to reflect research regarding wayfinding, signage, space usage and criteria for success or failure. Photos were collected of spaces, but only when a particularly good example of a space experience issue or success was found. Results highlighted that most of the locations assessed had identified issues with homemade signage, including signage that was cluttered, outdated, inaccurate or damaged. In addition to frequent signage concerns, a large number of locations had technology-driven spatial problems. Many locations did not

have enough electrical outlets, and some locations had outlets that appeared risky. Several guidelines are provided by authors such as to replace end panel signage with poor visibility as well as damaged or cluttered homemade signage, use of contrast colours and visible font size for signage.

Mandel & Johnston (2017) evaluates a signage inventory to determine how many signs a library needs. This article proposes a ready-to-use method that any library can use to inventory its signage by adapting the inventory worksheet depending on factors related to the library type. The ultimate goal in developing a standardized method is that it would facilitate comparisons across libraries to attempt development of more specific signage guidelines or a formula that could calculate how many signs are “enough” and “too many” for a library given its type, population, and other criteria. The results of the study found common issues across all three library types were unclear signs, outdated signs, damage to signs, damage to sign holders, and other.

2.4 Physical and psychological barriers

Physical and psychological barriers are grouped in sub-themes as following:

2.4.1 Library instructions

Knapp (1965) investigated a landmark study at Monteith College, Wayne State University during 1960-61. Called the Monteith Library Project, its objectives were to "stimulate and guide students in developing sophisticated understanding of the library increasing competence in its use" (p. 11). The project attempted to provide library experiences which were directly related to their course work. She mentions that "Traditional college instruction fails to exploit fully the library resources available for it and that the average college student's experiences with the library constitute a limited and fairly insignificant part of his education" (p. 11). The project involved close planning with the teaching faculty. She concludes that the concept is workable; it resulted in the development of a model program for Monteith College. Knapp strongly supports the idea that librarians and teaching faculty must work together to support learning goals. Only then, she mentions, can librarians go beyond simply assisting students but can teach them to develop a strategy and analyze their specific information needs.

Adams (1980) provides different approaches to individualized instructions and its applications in libraries and offers guidelines for use of adequate signs, effective guides and handbooks, creating simple tutorials and programmed instructions for library users. It also demonstrates how these approaches can be organized in structured and controlled formats, in case of automated libraries personalized approach or individualized instructions are in the withdrawing stage which leads to dehumanization.

Marcus & Beck (2003) addresses the best means of introducing incoming freshmen to the library and the skills and concepts of information literacy. The results of a traditional librarian-led orientation tour are compared with those of a self-guided treasure hunt. The goal for this program “was to provide a positive, welcoming, and first time experience for students to become acquainted with the physical layout of the building and make them aware of the range and variety of information resources available. This mystery tour served as a model for the development of an interactive, self-guided treasure hunt form of orientation for the students. According to author an important objective of such type of orientation tour is that of raising the student comfort level. As part of an Introduction to College Life course in a multicultural community college, students in classes selected randomly participated in the alternate forms of orientation. Identical questionnaires, completed by all participants, contained both a test of learning objectives and an attitude survey. Student feedback provided the basis for evaluating the results of the tours. Although problems with both experimental design and execution weakened the study, analysis of the collected data and universally positive feedback from everyone involved provided evidence that the self-guided tours were highly effective.

2.4.2 Library Anxiety

Buddy (1982) described one project designed to familiarize high school seniors with the university library. In June 1980, Ohio Department of Education implemented a teacher grant “Elimination of Academic Library Research Shock”. The objectives of this grant project were to expose high school seniors in the areas of English and Social Studies to: specialized reference tools, techniques of research strategy and writing, and an academic library environment and its resources. To gain an understanding of the specific areas of the academic library that caused research shock

this writer conducted several interviews with academic librarians during the summer of 1980 to learn the major areas of library intimidation for freshmen students. 86 percent of the librarians interviewed noticed students were intimidated by the size of library building. 71 percent of the librarians felt students were amazed by the size of the collection(s); 86 percent agreed that research shock occurred when the students were introduced to the Library of Congress Classification System. The students had difficulty in understanding and copying the call numbers and 86 percent of the librarians reported students were hesitant to ask librarians for assistance. The author concludes that the missing link, orientation to an academic library environment prior to graduation, makes the chain of senior student's activities incomplete.

Mellon (1986) first time constructed a grounded theory of Library Anxiety through a qualitative research. She conducts the study at a Southern University with six thousand students to explore the feeling of students during their research period in academic library. The article presents both the study and the theory behind the study. The study involves the gathering and analyzing of descriptive data in an attempt to see a setting or an experience from the participants' point of view. The original purpose of collecting data was to help find better ways to teach search strategy and tool use within the fifty minute session allotted by the composition faculty. The students were asked to keep journals documenting their library use to complete class assignments. The journals were then analyzed for recurring themes. The themes that emerged were fear and "feeling lost" (p. 162). Four components of the "lost" theme also emerged: "the size of the library; not knowing where things were; not knowing what to do; and not knowing how to begin the research process." (p.162) In addition, toward the end of the semester, students were requested to do an in-class essay that addressed various questions regarding their changing feelings about the library over the course of semester. She observed that freshmen began college with minimal knowledge of library use. Faculty members and administrators, however, expected the student to know how to use the library to conduct research ranging from simple to complex studies. Thus faculty did not encourage instruction in library research and some resented the suggestion that such instruction was needed. Further interaction with students led her to conclude that what had "previously been perceived as a lack of interest and motivation began to seem more like a phobia" It was discovered, however, that when asked about using the library for research, students did not

discuss the problems they encountered with search. Instead, they discussed feelings of fear that kept them from beginning to search or that got in the way of their staying in the library long enough to master search processes. Data were collected each semester from participating instructors and were analyzed for recurrent "themes" using the constant comparative method. It was found that 75 to 85 percent of students in each class described their initial response to the library in terms of fear or anxiety. Terms like scary, overpowering, lost, helpless, confused, and fear of the unknown appeared over and over again. Mellon thus describes students' fear of the library as library anxiety and to consider treating it within the anxiety framework. Formulating a grounded theory of library anxiety and examining its underlying causes helped librarians and composition faculty of Southern University library to understand better the problems students encountered in using the library for research. From these observations, a closer cooperation between composition faculty and librarians resulted. This changed both the presentation of library research in beginning composition classes and the design of the library-instruction program.

While Mellon's theory of library anxiety seemed sound, there existed no scale by which to measure it. Influenced by Mellon's research, Bostick (1992) constructed a Library Anxiety Scale (LAS) in order to discover whether the phenomenon could be measured quantitatively. The LAS is a questionnaire consisting of 43 Likert-type statements relying on the self-reporting by the participants. Bostick in the course of validating and testing the LAS found that the causes of library anxiety could be summed up in five categories. These causal categories include: barriers with staff (perceptions that librarians and staff are unapproachable or preoccupied); affective barriers (stemming from a belief that the student holds inadequate skills); comfort with the library (concerning the general safety and welcoming nature of the library space); knowledge of the library (familiarity with the layout and policies); and mechanical barriers (ability to use and the operational condition of various mechanical equipment). The findings provide evidence that the scale does not discriminate between males and females in determining the types and levels of library anxiety. Statistical analysis used to determine the reliability and validity of the Library Anxiety Scale. Analysis used to answer the three subsidiary research questions also provide data to support the contention that the instrument is usable for all types of students, community college, undergraduate and graduate university

students. Age and gender of the students did not provide differences with the exception of students over 50 who appear to have more anxiety than the other students.

Based on Bostick's Library Anxiety Scale, Jiao & Onwuegbuzie (1999) overviewed their research by surveying large groups of students using the LAS and one or more other instruments that measure behavioral or demographic characteristics. They were thus able to identify major factors associated with each of Bostick's five dimensions of library anxiety as well as factors relating to library anxiety in general. They identified three antecedents of library anxiety: dispositional, situational, and environmental. Dispositional antecedents are internal factors, such as self-esteem and self-concept, Situational antecedents related to the physical library characteristics, including "the layout and decor of the library, as well as whether the library has appropriate signs and floor plans, uncluttered aisles, and appropriate access for physically challenged users. The third antecedent of library anxiety that is environmental factors, such as demographics and experience such as type of population and the language used by the library. The study examines the relationship between library anxiety and trait anxiety of 115 graduate students in the United States. Findings revealed that trait anxiety was not significantly related to any of the five dimensions of library anxiety, suggesting that library anxiety is a unique, independent phenomenon. Therefore, library anxiety should be taken seriously. The authors recommend action-research approach to addressing library anxiety.

Shoham & Mizrachi (2001) modified and translated the LAS into Hebrew using 35 statements that reflected their cultural environment and used it on 664 Bachelor of Education students dividing the scale into seven factors instead of the original five. They did not mention however, which statements were dropped and what additions or modifications were made in the original scale. Two important points that emerged from this study, related to the first research question (concerning the level of library anxiety among Israeli B.Ed. students), should be addressed:

- There is library anxiety among students, although not to an overwhelming extent; and
- Anxiety over using English-language searches and resources is the strongest factor of library anxiety among Israeli B.Ed. students.

The author concludes that the public libraries, and particularly the school libraries, must understand that it is up to them to construct a program aimed at instilling the necessary skills for coping with the information world of today. The academic libraries, for their part, need to prepare an instruction program for students and should also be more flexible in their policy toward students and in the rules and procedures that they establish for library use.

Onwuegbuzie & Jiao (2004) spoken about the test of the Anxiety-Expectation Mediation (AEM) Model of Library Anxiety. The AEM model contains variables that are directly or indirectly related to information search performance as measured by student's scores on their research proposals. This model posits that library anxiety and self-perception serve as factors that mediate the relationship between performance in writing a research proposal and other cognitive personality and demographic variables. The model was tested using 225 graduate students enrolled in several sections of an introductory level course at a Mid Southern University. Through their profile studies using the library anxiety scale (LAS), Onwuegbuzie and Jiao (2004) identifies many of the characteristics and situations of students most at risk for library anxiety. According to them demographic patterns, learning preferences, personality traits, study habits, and behavioral characteristics are most closely associated with library anxiety. Participants in their studies include undergraduates, graduate, and doctoral students, and show that library anxiety is found among all segments of these population; it is not a phenomenon limited to first-year students and novice researchers. Further Onwuegbuzie, and Jiao noted, "Of all forms of academic-related anxiety, library anxiety appears to be the most common." They further suggested that more scales are needed to measure various components of library anxiety.

According to Van Kampen (2004), MLAS was created because of the age of the original LAS and other developments in the field of library user research. Multidimensional Library Anxiety Scale consisted of a 54-item Likert-type scale that assessed levels of library anxiety experienced by students enrolled in a doctoral degree-granting program at an urban southeastern university. It was divided into the following six categories: comfort and confidence when using the library (Cronbach's alpha 0.86), information search process and general library anxiety (Cronbach's alpha 0.87), barriers concerning staff (Cronbach's alpha 0.73), importance of understanding

how to use the library (Cronbach's alpha 0.79), comfort level with technology and how it applies to the library (Cronbach's alpha 0.73), comfort level while inside the library building (Cronbach's alpha 0.74).

Lawless (2011) examined the presence and degree of library anxiety among students at Cape Breton University (CBU) in Canada. Casual discussions with some students at CBU provided anecdotal evidence of potentially high level of library anxiety among the students. The research question that drove this project was whether CBU students suffered high levels of library anxiety, as suggested by anecdotal evidence. According to author it is important to analyze library anxiety as studies have shown that high levels of anxiety among students can lead to procrastination, library avoidance, reduced quality of deliverables, and even increased drop-out rates. A Library Anxiety Survey (LAS) instrument was prepared by following Library Anxiety Scale (LAS) prepared by Bostik (1992). This Library Anxiety Scale (LAS) divided into five categories. These causal categories include: barriers with staff (perceptions that librarians and staff are unapproachable or preoccupied); affective barriers (stemming from a belief that the student holds inadequate skills); comfort with the library (concerning the general safety and welcoming nature of the library space); knowledge of the library (familiarity with the layout and policies); and mechanical barriers (ability to use and the operational condition of various mechanical equipment). The Library Anxiety Survey (LAS) consists of 43 simple statements, with students responding by using a five-point Likert scale. The average results of LAS showed low to moderate levels of anxiety overall. With possible final averages ranging from 1 to 5, actual scores by category were: barriers with staff (2.53); affective barriers (2.90); comfort with the library (2.48); knowledge of the library (2.25); and mechanical barriers (2.57). Overall, students experienced relatively high anxiety levels in their first two years and lower levels in their third year, followed by increased levels again in their final year. The adjustment to the rigors of university research may explain the decrease seen among third year students, while more significant research assignments in the final year renewed student anxiety. The author concludes that obscure classification schemes, confusing layouts, unfamiliar jargon and imposing online catalogue systems can all contribute to increased levels of library anxiety among university students. They further suggested that while the LAS was useful in determining overall levels of anxiety among students, a shorter survey with

more open-ended questions may provide more insight into the real causes of anxiety among the students.

Abusin et al. (2011) highlighted on library anxiety amongst Sudanese university students and identified factors that contribute to this phenomenon. The factors were identified using the diary approach collected from 51 third year undergraduate students who were taking the research method course at the Sudan University of Science and Technology for the first time. The analysis of diary entries revealed eight library constructs named Sudanese Library Anxiety Construct (SULAC). The constructs comprises:

1. Negative perceptions towards academic library environment,
2. Negative perceptions towards library staff,
3. Affective barriers,
4. Negative perceptions towards peers,
5. Negative perceptions towards library services,
6. Negative perceptions towards library collections,
7. Negative perceptions towards library regulations, and
8. Cognitive barriers (i.e. fear of writing a research paper)

The results confirmed the presence of feelings similar to those discovered by Mellon's (1986) theory of library anxiety. There were similarities in experiences that trigger the feeling of anxiety amongst Sudanese students although the elements which cause those experiences may be different. The analysis of the diaries found that 88 percent of students expressed feelings of fear and anxiety when they are using the academic library to write their first research paper.

Anwar Mumtaz (2012) planned her research to design a reliable and valid library anxiety scale that is suitable to measure library anxiety among undergraduate students and to explore significant differences in a library anxiety scores between female and male students as well as significant differences in a library anxiety scores among students who studied in different types of high schools. The instrument was developed by distributing library anxiety situation statements under nine factors such as library staff, information resources, technology/equipment's, environment, services/restrictions, knowledge of the library, organization, comfort with the library and user

education. A two-page library anxiety situation statement collection form was designed to collect data at Kuwait University Library. The responses of 622 students on the 66 statement instrument were analyzed. Thus the purpose of developing library anxiety scale for undergraduates was achieved by using a set of unique situational statements. These statements were revised by the research team into 143 statements and reviewed by the panel of experts resulting in the instrument of 80 statements. Further after pilot study the process resulted in the final instrument of 40 statements which clustered into five factors. The data obtained during pilot study i.e. Phase 3, shows that gender, type of high school attended and the college where student studied have no significant relationship with library anxiety. While concluding author suggested that the new library anxiety scale will measure the library anxiety better than the scale designed in 1992 (Bostick) as it is based on changed electronic environment of library and to match the changing expectations of present students.

Katopol (2012) explored the information behavior of graduate students in education, in particular, black graduate students in a majority institution, that is, a university at which Caucasians are in the majority. It examines how these students obtain information needed for academic work, their problems in obtaining this information, and their perception of race and information acquisition and sharing. Importantly, it expands the notion of “library anxiety” to one of information anxiety as it considers the variety of information sources used by graduate students. The study reframes ideas about library anxiety by expanding the sources of information sought by students to include electronic and human, as well as print. The methodology applied was exploratory, qualitative study by using Cognitive Work Analysis, i.e. a methodological framework that examines cognitive behavior with a focus on the constraints faced by actors in the workplace as they perform knowledge work, that is, work that requires information and decision-making based on the information acquired. Participants included fewer than ten graduate students from various concentrations in the education program at a large university in the American Midwest. The interview responses revealed four significant aspects of participant information behavior: tasks, search, use of electronic media, and perceptions of race. The electronic and human information resources that graduate students use for academic tasks suggest that the concept of library anxiety should be usefully reframed into one of information anxiety. The participants’ anxiety arose from issues regarding

online information: 1) finding too much information, so that they spent a lot of time determining relevance; 2) not finding enough information, so that it was difficult to do research; and 3) determining authenticity and authority of the online sources. When working with human sources of information, anxiety arose when students had to seek out information from people (librarians and faculty) who knew little about research on minority populations. Participants were frequent users of electronic media and rarely visited the library. While they did not visit the physical library, participants did make frequent use of the library website, to access journal databases and individual journal articles. All participants perceived race as a negative factor in their search for information. The majority believed that librarians had no knowledge of their racially-related research interests.

Washington State University Library guide (2014) viewed library anxiety as a real and prevalent problem for many college students which includes as a fear of both the library space, which can be seen as overwhelming and confusing, and of the process of using the library to find materials. The state university library identified common signs and symptoms of library anxiety to include the following:

1. Fear and uneasiness with the physical space of the library, often related to how big the library is.
2. Fear of approaching a librarian or library worker to ask for help.
3. Fear that you are alone in not knowing how to use the library.
4. Feeling paralyzed when trying to start library research.

Washington State University Libraries Guides suggest users to ask for a help who find themselves encountering any kind of fears, further it also provides tips for users to overcome the feeling of library anxiety and a short quiz of five questions modelled on the basis of Bostick's Library Anxiety Scale (1992).

McPherson (2015) sought to resolve if there were any indicators of the presence of library anxiety among a sample of 150 undergraduates in the faculty of Humanities and Education at the University of the West Indies, Mona Campus and the factors contributing to this condition. A quantitative study was adopted to identify any indicators of the presence of library anxiety among first year undergraduate students and to identify some of the factors contributing to library anxiety among first-year

undergraduate students. The study was exploratory using the survey method. The instrument used for data collection was a questionnaire consisting of items related to students' demographics as well as their use of the library, and items referring specifically to library anxiety, based partially on Bostick's 1992 Library Anxiety Scale (LAS). The findings revealed that majority (71%) of the students experienced some form of negative emotions on their first visit to the library. The author divided factors contributing to library anxiety as personal and institutional factors. Both personal and institutional factors were identified as contributing to library anxiety among first-year students. Personal factors related to inadequate and/or lack of knowledge and skills of library resources, absence of previous library experience, lack of self confidence in conducting research, lack of appropriate information literacy skills and their general confusion with the various aspects of the information search process. Institutional factors related to the size of the library and the number of different resources, lack of or inadequate signage and staff issues.

Gogoi et al. (2021) attempted to understand the library anxiety experienced by students at three different universities in Assam. These universities draw their student populations from marginalized sections of the society. A stratified random sample technique was used for the study. The study hypothesized that factors such as gender, the language of instruction, type of university, and caste or community do not influence library anxiety among Northeast India students. – Results from the present study provided compelling evidence to suggest that many students, irrespective of their gender, the language of instruction, type of university, discipline, and caste or community experience library anxiety. The difference levels of library anxiety among independent variables indicate a critical lack of information literacy skills. Overall, library anxiety scores among the students were moderate; some categories such as staff approachability, the feeling of inadequacy, and library constraint are the attributes of the students' anxiety.

Nieves-Whitmore (2021) studied the available literature on library anxiety to assess the relation between the library anxiety and academic library space design considering the of effects physical environments on human mental and emotional needs. Considering the antecedents, they noted, academic library space planning has become so focused on the creation of social, informal, active learning spaces that libraries may

no longer meet students' expectations for a library setting, which results in library anxiety. They further explained the environmental variables like lighting, noise, temperature, seating, color and décor, control, signs and graphics and wayfinding that affects students' success in using libraries as elaborated by Eric Jensen in *Teaching with the Brain in Mind*. Further, through the available literature, they described about different types of spaces like academic commons, communal spaces and learning commons, and stated that traditional library settings, such as reading rooms or study lounges, fall into the quiet, less active category, while carrels are out-of-the-way contemplative spaces. They reviewed the literature on students' expectations about social spaces in discussed by other library professionals. They elaborated antecedents of poor library signage and its effects on wayfinding and library anxiety. While concluding they suggested the need to conduct the qualitative studies by analyzing students' responses from experiences to address and minimize library anxiety.

2.4.3 Physical Barriers

Booth (1993) discussed physical and psychological barriers to library use. Physical barriers discussed by the author such as location of library, accessibility, environment, floor plans, signposting, colour coding, etc. psychological barriers like image of library in the minds of users and negative mind set due to staff behavior are also discussed. Numerous suggestions are given by the author to remove these physical as well as psychological barriers which will affect library use. While concluding author recommends that attention should be given to YOU appeal i.e. anticipation and visualization of user needs and satisfying those needs.

Central Public Works Department, (1998) Ministry of Urban Affairs and Employment, India provided Guidelines and Space Standards for Barrier Free Environment for disabled and Elderly Persons which are framed to create barrier free environment under the Persons With Disabilities Act,1996 (PWD). Chapter VII of the Act, Sections 44 to 46 deals with non-discrimination in transport on the roads and in the built environment. It enjoins upon the governments and local authorities to ensure within their economic capacity provision for installation of auditory signals at red lights in the public roadsforthe benefit of persons with visual handicaps, kerbs and slopes to be made in pavements for the easy access of wheel chair users, devising appropriate symbols of disability and warning signals at appropriate places. In regard

to non-discrimination in the built environment, provisions have been made in this Act for ramps in public buildings, adaptation of toilets for wheel chair users, Braille symbols and auditory signals in elevators. These guidelines also considered the comments received from School of Planning and Architecture (SPA) Central Building Research Institute (CBRI), Handicapped Welfare Federation (NGO) and National Federation of Blind (NGO). These guidelines covers different types of disabilities such as Non-Ambulatory, Semi-Ambulatory, persons with blindness and hearing problems and provide recommendations about space planning for ease of use of space within the built environments for persons using mobility devices. These guidelines provide typical dimensions and specifications for barrier free use of mobility devices in public places. It also provides standards and specifications for signage.

Venter et al. (2002) undertook a project which aims to further the understanding of the mobility and access issues experienced by people with disabilities in developing countries, and to identify specific steps that can be taken to start addressing problems. A major objective of the project is to compile a compendium of guidelines that can be used by government authorities, advocacy groups, and donor/loan agencies to improve the access of people with disabilities to transport and other services in urban areas. The work undertaken in Phase I of the project included an investigation into the mobility needs of people with disabilities in five case study countries; and benchmark studies of current practice in Europe, Latin America, Africa and India. The five case study countries were India, Malawi, Mexico, Mozambique, and South Africa. The needs analysis highlighted three major types of barriers to access and mobility, namely social barriers, psychological barriers, and structural barriers. Focus group participants identified high transport costs, lack of awareness among transport staff and the general public of the needs of disabled passengers, and structural barriers in the transport system as major obstacles they face. The report is structured around 4 further sections. Section 2 gives an overview of the context of disability in the developing world, giving attention to the incidence and characteristics of disability, as well as the linkages between disability, poverty, and access to transport. Section 3 then describes the needs analyses undertaken in Africa, India, and Mexico, using a variety of qualitative survey techniques. In Section 4 a summary is given of the current practice with regard to accessibility provision in the case study countries, as well as in Europe and Latin America. This section starts to identify practices which

may be applicable more widely among developing countries. Finally, Section 5 summarizes the findings and points the way forward for the rest of the project. The problems identified were remarkably similar across the countries studied. Initial recommendations are made which include implementing incremental improvements to the pedestrian environment, disability awareness and driver training programs, and low-cost, high-impact features in vehicles (such as a lowered first step, sufficient grab rails, high contrast colour on steps, large print destination signs, lights when stopping and reserving seats for passengers with disabilities). Some questions that remain to be investigated are identified, including issues of technical and operational solutions that are appropriate under various conditions; and the prioritization of improvements within constrained budgets. The compendium of guidelines produced by this project provide practical guidance to disability groups, governments, and transport providers on pursuing common goals for accessibility through effective and meaningful co-operation.

Ball & Wolnick (2010) interpreted various assessment activities they conducted, what they learn from those activities, how and what users said and how they frame their strategies to design new services and redesign existing ones in Clemons Library, at University of Virginia. To collect data at initial stage they studied student feedback gathered through simple assessment techniques like FAQ's, existing survey results and library use assessments. Through periodic student surveys, which take place every four years, they already had a general picture of the student population in Clemons Library. Based on the available information they plan to identify areas of success and improvement regarding space planning and services in Clemons Library. They design a multi-phase assessment program that began with a Task survey followed by Focus groups and ended with group discussion to follow-up on previously noted trends. Survey provided information about who are the users and what kind of tools they use while in Clemons Library. The questions in survey comprises answers regarding activities that students were engage, use of equipment, facilities and other types of resources as well as time/hours spend in library in a single visit. Focus group comprised two assessments to know more about user's processes. Here the authors recruited 10-12 students for each of three focus groups and they ask students to participate in three different exercises, Exercise 1. Notes about Clemons, Exercise 2. Notes about activities, and Exercise 3. Timeline about process. Notes were

written by the students about food, studying and socializing. The most frequently mentioned activities for Clemons Library were group projects, studying and watching films. In the Exercise 2, the students were given large notes and asked to write down for each of their three visits to Clemons, what they worked on, whether it was a group or individual activity and what resources they used. From this exercise they discovered that students use all four floors of Clemons to do all kinds of work. In the Exercise 3 authors ask the students to work as a group to create a timeline of a project from beginning to end. The timeline exercise revealed that students generally follow similar paths when working on an assignment and that many phases of each assignment are completed outside the library. In Phase three researchers conducted a group interview with students who had previously participated in focus groups. Group discussion turn out to be most revealing part of the assessment to know deeper about roadblocks and how users seek help. Student responses two main roadblock areas: tools/facility and finding information. In tools/facility area students expressed frustration that various equipments, technology or building features posed an obstacle to completing their work in library such as power problem, computing problem and tools problem. Roadblocks to finding information were more complex and more frustrating for students. As per the evaluation of available information researchers draw conclusions about what new services to offer and how to further develop existing services.

Bhalerao, S. et al. (2016) evaluated on the basis of their review of literature, that all over the world services available for people with disabilities differ widely between developed and developing countries including educational services. The article aims to make library more accessible, so that persons with disabilities can also take participation in gathering and sharing knowledge. The exploratory study focuses on the reach and impact of concept of 'Universal design' of libraries under United Nations Conventions on the Rights of Persons with Disabilities (UNCRPD) regulations. Authors discusses about universal design i.e. eliminating barriers through initial designs which consider the needs of diverse people whether they are persons with disabilities or persons without disability.

According to authors the two basic things to be adopted for universal design are Assistive technology that is the creation of new device to aid completion of task that

would otherwise be not possible and Adaptive technology which is the modification of existing devices and methods to enable completion of task. In addition, they also focus on accessible condition of library buildings, as well as library services and programs. Further they provide suggestions regarding physical access for persons with disabilities in libraries, library collection required for persons with disabilities and implementation of regular feedback system to make improvement in services for such users.

2.4.4 Ergonomics

Chandra et al. (2009) survey the attempts made by academic libraries in West Bengal regarding library ergonomics. The present study assesses the library shelving, organization of collection (including room for growth), and makes a preliminary observation of environmental conditions like illumination, noise, temperature, humidity and fire safety. The study further assesses user satisfaction with library services and resources. The findings of the study present that most of the academic institutions in West Bengal are going through a critical phase because of rapidly increasing enrollments, and consequently the libraries are also having problems with collection and study space. The academic libraries in the survey do not meet modern ergonomic standards. The authors conclude with providing recommendations to meet modern ergonomic standards.

Adeyemi (2010) examined the ergonomic problems and physical symptoms experienced by library staff which makes use of ICT resources in carrying out their daily routine, as well as the ergonomic measures put in place for the library staff of two universities of Nigeria. Data was collected through questionnaire to the library staff of University of Lagos (Unilag) and Covenant University. According to the findings most prevalent problems are poorly-designed seats, stress at workforce, awkward posture and exposure to computer screens on a regular basis without protectors which results in tension, stress, headaches and related ailment and pain in wrist, forearm, elbow, neck, back pain followed by discomfort as the two most visible ergonomic symptoms. The findings of this study raise awareness of ergonomic problems and provide the administration of academic libraries the knowledge regarding formation of staff safety polices, acquisition of library infrastructure and procurement of ICT resources for libraries. The author concludes by providing some

preventive measures such as use of trolleys and elevators, a compulsory one hour break and computer monitor protectors.

Timoteo-Afinidad (2011) focused on status of workstation and workplace ergonomics in Philippine libraries. The present study accentuates the need to weigh and assess the present situation of the computer workstations in libraries, including furniture and equipment. Proper work postures and performance of personnel are also touched since both are considered as influenced by the workstation conditions. Some basic motivational needs are also considered in this study as they relate to workspace design such as privacy and individuality; social needs considered such as interaction between the worker and other people through either face-to-face contact or use of electronic devices. The target population of the study was staffs from six academic libraries of Philippine who have direct interaction with computer workstations as long as 80% of their working hours. Face-to-face interviews were conducted to gather information about the effects of workplace design on motivational needs of the respondents. The study also employed the evaluation checklist and the guidelines designed by the Occupational Safety and Health Administration (OSHA) of the U. S. Department of Labor in examining potential hazards that may be caused by the present set-up of the computer workstations. The presentation of findings is divided in three parts. Part I identifies the physical attributes (such as weight, gender and height) of the qualified respondents. Part II shows the assessment of the computer workstations and workspace designs. Part III identifies the common discomforts that the respondents encountered related to their use of the computer workstations. While concluding the author elaborates some important findings such as the current workstation designs does not fit the average Filipino users, number of injuries in work areas can be attributed to the wrong dimensions for average Filipino users, social motivational needs are affected by the workplace designs of work areas and use of uncomfortable workstation design may heighten the probability of errors at work. Further he provided some measures to improve the ergonomics of the librarian's workstations and workplaces.

Mahalakshmi & Sornam (2011) planned the study to analyze the utilization and purpose of workspace design and to determine the prevalence of self assessment of physical discomforts to conduct an interventional ergonomic health education

program for library professionals of engineering college of Anna University, Tamil Nadu. The authors planned the study to meet basic objectives such as to study the demographic details of library professionals, to study the perception of techno stress among them and to study the relationship between ergonomics and techno stress among them. Data was collected through a questionnaire that comprises demographic data and other part with ergonomics and stress. The population consisted of librarians and assistant librarians. The findings indicated that personal factors of the participants like age, marital status, educational qualification and type of institution where they work have no significant influence on techno stress and it is suggested that regular breaks are taken if working for a longer period on a computer.

2.5 Environmental design and space planning

2.5.1 Environmental design

Veatch (1987) elaborated environmental design as the aspect of architecture and building planning concerned with the proper planning and design of built environments to accommodate the social, physical, psychological, and behavioral needs of people. She further adds that findings and methodologies from environmental design can be applied to library planning to contribute to the continuing process of providing better library environments. The present article facilitates an overview of environmental design in an attempt to provide conceptual and exemplary information pertinent to library building planning with an objective to make an awareness of the possibilities for and the implications of applying the concepts of environmental design to library buildings. According to author Information from environmental design can be used to make libraries more useful and functional. This is accomplished by making library environments more “human oriented”. The author suggests that environmental psychology and its aspects such as privacy, personal space, and territoriality should be taken into consideration while planning environmental design in library buildings. The article also covers the ergonomics and human factors in built environments and environmental space planning. According to the author the theory of ergonomics is simple, but the application is not quite so easy. Even a single environmental space contains a myriad of components each having a different impact upon each individual who uses that space. Additionally, different tasks performed by one individual in the same space

may require different sets of ergonomic considerations. The author concludes by suggesting that the library architect must rely upon the librarian-consultant for input regarding user behaviour and activity.

Schneekloth & Keable (1991) explored two case studies of library evaluations to demonstrate different approaches to facility evaluation. The first was done for an academic library at Virginia Polytechnic Institute and State University and the second for a research library serving a large international banking institute. Each evaluation designed to address a different purpose and context for its findings, with different methods employed in the evaluations to meet these goals. The discussion begins with a brief overview of the factors that have influenced changes in libraries' functions and facilities and major issues to be considered in library design and evaluation. On the basis of literature review and their own research, researchers conclude that there are seven key issues that describe the comprehensive nature of library building design considerations. These are Materials Processing, Behavior Settings, Resolution of Public, Private, and Interface Functions, Design (building)issue, Interface with Technology, Environmental Controls and Managing the Processes of Change. For the purposes of this study, however, they selected three of the seven major library issues for discussion i.e. Design, Behavior settings evaluations and Environmental controls: lighting and temperature.

The Carol M. Newman Library of Virginia Polytechnic Institute and State University faced the continued problem of space shortage. In 1981 a new addition to the library doubled the amount of square footage. The post-occupancy evaluation of the academic Library initiated to understand the implications of the move into an expanded library facility and to evaluate how that facility was functioning. Since provision of public space was a very important aspect of the expansion, the client was particularly interested in the library's public areas and how well they were meeting the needs of the students and faculty. The two-year evaluation of the Newman Library was primarily concerned with (1) fine-tuning the new library to work better and (2) the implications for longer-term changes to policies on space use throughout the university system. In the Newman Library, where the issue of fine-tuning was most important, researchers did extensive and detailed data collection (over 20,000 students and faculty) and analysis using multiple research methods of observations and survey instruments.

In the second case study, the banking institute wanted sufficient information about how the existing library functioned in order to program and design new facilities. The information had to be detailed and critically evaluated because it would be the basis for immediate action in the form of design. Due to the tight time frame and the focus on a limited number of staff in the institute favoured intensive interviews with representative staff members and their supervisors. Since the majority of library users did not enter the facility for very long periods of time, if at all, the institute was more concerned with improving the working conditions related to the library's materials processing, reference, and database services than with patron areas. The technical support staff work areas were also the most substandard, unsightly, and crowded places in the existing facility. This, plus the institute's commitment to improving all staff work areas throughout its organization, led the facility managers and the library's administration to focus on the library staff's concerns and insights about their facility.

For this study researchers have chosen two different types of libraries and applied two different research methods as examples of how evaluation can be used to generate information about and guide environmental change for libraries. According to authors these examples underscore the usefulness of evaluation for pre-design assessments, ongoing facility management, building adjustments and renovation, and institutional and professional learning.

2.5.2 Space Planning

In 1989, Bureau of Indian Standards published Design of Library Buildings - Recommendations Relating to its Primary Elements for the Librarians, planners and architecture's to plan library building as per IS 1553 (1989): Design of Library Buildings, IS 2672 : 1966 Code of practice for library lighting, and IS 11460 : 1985 Code of practice for fire safety of libraries and archives, for implementation of recommended environmental factors while constructing or renovating existing library buildings (Bureau of Indian Standards, 1989).

In architects concern for the sculpturing of interior spaces, they use slight level changes, avoid long interior vistas, and break up space to avoid monotony and to provide an element of visual "surprise". Thus in considering the design and arrangement of interior spaces, they unknowingly exclude behavioral considerations

of wayfinding. This omission is not surprising in light of the prevailing conception of architecture as an artistic process. As Sommer (1969) has argued, to the extent that architects are concerned with developing an empirical, scientific basis for their discipline, they have achieved considerable success from an engineering-technological perspective, " but in the behavioural realm, the way buildings affect people, architects fall back on intuition, anecdote and casual observation. Consultants flourish in the design fields because there is nobody of information assembled in such a way that it is useful to architects and other design professionals.

De Chiara et al. (1992) presented Time Saver Standards for interior design in space planning and discusses about standards for libraries and optimum shelving conditions for adults, teenagers and children. Further they provide designs for library shelves, library bookcase, cupboard and built-in bookshelves suitable for residential libraries as well as other types of buildings. They also cover designs for rolling ladder for library stacking area. But these standards mainly speak about residential libraries and focuses only on shelving standards. Standards for reading rooms, sitting arrangements, library furniture of reading room and workstations are not covered in this work.

Wang R. F. & Spelke (2002) distinguished three processes relevant for orientation: path integration, viewpoint-dependant place recognition and reorientation. Path integration is a process by which the relation of a human or a non-human animal to one or more significant places in the environment is updated continuously during movement. The viewpoint-dependant place recognition operates by template matching of viewpoint-dependent representations of landmarks. It allows navigating from one location to another. The reorientation system looks for balance between representations of the shape of the surface layout. It focuses on the geometry of the surrounding surface layout as a cue for orientation after being disorientated. Wang and Spelke regard encapsulated representations of the environment as building blocks for these three proposed mechanisms in animals and humans. Specifically, human symbolic capacities enable to construct new spatial representations and strategies to overcome the limits of the more primitive navigational systems.

Meilinger (2008) described orientation in spaces through several mechanisms such as spatial updating, route navigation, and reorientation by landmarks and geometry.

According to him human orientation capabilities build upon these mechanisms and other fundamental mechanisms. He examined which orientation strategies human navigators apply and the efficiency of those strategies. He focused on memory strategies for encoding spatial knowledge and on planning strategies especially during wayfinding. In the present study he examined memory strategies used to encode a route, map-encoding strategy, geometry of vista spaces, wayfinding strategies as a function of familiarity, metric and non-metric strategies including first-time visitors. Based on the results he formulated a theoretical framework for orientation in environmental spaces. This theory assumes that human navigators encode environments not only in a visual or spatial format (as probably also non-human animals do), but also in a *verbal* format. Thus this theory, stress on role of visual guidance system and signage in environmental spaces. It proposes a common memory structure for wayfinding and re-orientation, provides a common framework for route and survey navigation, and highlights similarities and differences between human and non-human navigators. The results of this publication proposed theoretical framework, as well as explore a step forwards in approaching a functional theory of orientation in space.

Boone (2003) narrated an interview held with Andrea Michaels, President of Associate Design Consultants. In the interview, she narrates her role enabling library planners to reach their goals and objectives in designing or re-designing library buildings, to strike an appropriate balance between meeting current demands and allowing space, furnishing and equipment adaptability. The specific topic taken up for discussion were changing use effect on buildings, how to accept these changes, space issues impacting the budget and focus on virtual space. In this interview Andrea Michael discusses the biggest challenges in preparing a building programme for libraries. Some important suggestions are given through this article for planning cost-efficient library buildings taking into consideration the future expectations of library staff and users. According to author the article will help in planning and designing of library building by visualizing future library needs.

Shill & Tonner (2003) conducted survey that addressed four major research questions related to types of improvements that have been done in recent library projects in California, and how extensively have they been done, types of improvements that are

closely associated with major increase in usage, and study of initial post-project increases in usage sustained over time. The current study draws on existing knowledge of academic library use, library users, space planning, and the library as a place. The study is intending to provide valid, cross-institutional evidence of the impact of facility improvements on both overall library usage and specific types of usage. As a basic criterion the study focused on projects completed between 1995 and 2002 related to recent facility projects and the kinds of improvements provided in libraries at California. Further a 20,000-square-foot minimum size for the project area was established to exclude minor renovations unlikely to have a significant effect on usage. The web survey contained sixty-eight factual, pre- and post-project comparison and open-ended questions designed to elicit descriptive and usage data about improved library facilities. Seven types of questions were raised, six questions about facility and institutional characteristics and one about usage level were asked. The survey responses confirm that public institutions completed more library facility projects than private, non-profit entities during the study period, doctoral institutions enjoyed the greatest success in completing building projects, relative to their number. During the 1995-2002 there was a significant overall increase in the size of physical library facilities as a result of building projects. In case of location of libraries, it appears that most library buildings are still located in areas frequented by students, even along the periphery of campus.

Xia (2004) delved into the reasons behind the re-organization of space in university libraries. Further she discusses about general methods libraries need to adopt while planning for space re-consideration. The article also provides literature review on space re-organization. According to author process of visualizing space management through traditional methods like making sketches and cut-to-scale paper models are not suitable now. Therefore, she discusses new computerized applications like MacDraft, CAD for planning and designing library spaces according to changing needs of users as well as staff. Further she points out the reasons behind the non-use of such computerized systems by major libraries. S/he describes the advantages of GIS and how GIS will be an effective tool for space management in libraries. The technical aspects of application, implementation and maintenance of GIS are also discussed. Though GIS technology is new to library space management, the author assures that it will definitely help in improving human orientation in libraries.

Macken (2006) opined that changing technology have resulted in several new models of library space planning. This article seeks to examine the impact of changing technology on the physical space of the academic art library and the relevance of current trends in space planning to the art library of the future. The writer asserts that in the changing era there are two spaces in the library physical and virtual. The amount of interaction that takes place in this virtual space has increased considerably since the advent of internet. Therefore, librarians are creating the digital space. According to writer even though the libraries are creating the digital space still there are limitations of digital resources which necessitate the existence of a physical space. The writer listed some of the limitations of e-resources such as non-availability of all resources in digital forms, need of internet, licensing and copyright restrictions of image databases, and high cost of image databases and non-replication of original works compared to printed images. The present article speaks about *Facilities Standards for Art Libraries and Visual Resource Collections*. While discussing library as a place a writer provides anecdotal and empirical evidences on role of user in space planning by comparing available literature with various surveys conducted on library as a space. Writer further discusses about the learning-centered model and multi-use model i.e. building that integrate non-library services into the library's facility and listed practical reasons behind applying multi-use model in libraries. Further writer discusses about information commons model and summarize that effective, lasting and desirable spaces that are conducive to learning should be built around people and not technology and comments that in the foreseeable future, digital materials will only supplement, not supplant books.

Webb et al. (2008) argued that learning and teaching are becoming more collaborative, and there is an increasing expectation for technology-rich social spaces on college campuses. The authors applied a multi-method research approach to investigate the use of non-classroom learning spaces at the University of Dayton. An important part of this investigation explores how students use spaces in the library, the largest non-classroom, non-residential building on campus. The study attempts to link building usage with student learning behaviors to better understand how the library facility can contribute to students learning. A secondary aspect of the study was to determine user seating preferences, both in terms of furniture type and location, to help guide future decisions. A variety of research methods were used including

videography and surveys. A video study was conducted in the library to determine frequency of occupancy in different areas of the library. “A best place survey” was developed to understand student’s perceptions of space on and around campus and their use of space. The web poll was offered to solicit information about student preferences about the library facilities. This article mainly describes University of Dayton’s efforts to employ a variety of methods to understand how library spaces may have an impact on and contribute to student learning behaviors. A multiple regression analysis was conducted to evaluate how well the function of the space predicted the number of people in the locations. The result of “A best place survey” conclude that both individual study spaces and group learning spaces needed in the library, but the characteristics of the two types of spaces should be different. In the library web poll furniture choice and window views were the most often cited preferences of location for studying. The data from these studies were evaluated in the context of National Survey of Student Engagement (NSSE) results to better understand the impact of building usage on learning. The findings of four parts of the space use and preferences study suggests that, when students seek to study alone they seek spaces with various characteristics such as freedom from distractions and noise, good lighting, comfort and pleasing aesthetics.

Robinson (2009) stressed the need for librarians to be proactively involved in institutional decisions regarding repurposing or annexation of library space. As libraries are in a transition phase from print to electronic and physical as well as virtual image, administration will begin to question the need to retain large runs of bound print journal volumes, especially in light of the ever-present space crunch faced by many institutions. According to author it is necessary to rethink how to utilize the remaining space with the library’s users in mind in the digital age. In the process create a digital library that would function as a learning commons with space for study and research, services, socializing, and a computer laboratory and classroom, serving as the campus information hub. It requires creating a balance between using floor space for collections and student study space, communal gathering spaces, computer access, and staff and operational space. The author provides process and steps followed by them while digitizing Harrell Health Sciences Library (USA). The article provides a viewpoint based on the experience of repurposing library space for alternative use. According to author it is imperative that librarians are actively

involved in defining the direction and future of the library rather than waiting for the decision to be made for them by their institution. Author concludes that librarians need to be proactive rather than reactive in planning for the future use of library space.

Sannwald (2009) provided the checklist which includes the questions concerning almost every aspect of space and function in a library building. This ensures that building design team in the evaluation and programming of spaces overlooks no element of the building. Most of the basic areas listed apply to college and university, public, school, and special libraries.

Author deals with “Sustainable design” which includes site selection, water efficiency, energy and atmosphere, materials, and indoor environmental air quality. The section “General Exterior Considerations” includes exterior conditions including loading docks and delivery, trash enclosures, and outdoor book and media returns. “Interior Organization of Library Building” section deals with information commons, media production and presentation labs, special collections, faculty/graduate carrels and study rooms and public art. “Interior Design and Finishes” section deals with behavioral aspects of spaces. “Safety and Security” section deals with disaster planning. “Maintenance of Library Building and Property” section includes routine maintenance, betterments and improvements. Last section gives importance to “Building Occupancy and Post-occupancy Evaluation.”

Author provided guidelines to librarians, architects, administrators, and other members of building design team in planning library spaces. Checklist served as a guide during various stages of the design process in order to make sure that all needed spaces and functions are included in the library design. This enabled the evaluation of existing library spaces as a part of library’s needs assessment process.

Tooley (2010) explored a case study of The Health Sciences and Human Services Library (HS/HSL), University of Maryland, Baltimore (UMB), located in an urban environment on the west side of downtown Baltimore. Founded in 1813, the library opened its current building in 1998 and is one of the largest health sciences libraries in the United States, with 6 floors and over 180,000 gross square and 118,000 net assignable square feet (NASF). The article focuses mainly on planning, design, and

construction process while renovating the library. Needs of library users and staff were also taken into consideration as part of a renovation of certain areas of the library. Library staff undertook a study to determine growth space. As mentioned earlier, when the library opened, 15 years of growth space were estimated to achieve 85% capacity. The 2006 calculations indicated that primarily due to the conversion to electronic journals, it would take approximately 40 years to achieve 85% capacity. A methodology was developed to weed the monograph collection. Any pre-1982 monographs that had not circulated during the last 10 years were removed from the shelves and placed in compact shelving. Duplicates and out-of-scope materials were also removed. 3 miles of compact shelving was constructed in the lower level. Input from users influenced much of the design. Space for copiers was located on every floor. Over 900 data connections were installed. A mixture of lounge, study table, and carrel seating was available. Probably the smartest design feature of the building was the 45 small group study rooms. The article provides innovative ideas about managing old library collection. As well as it suggests that users should be an important consideration and further suggest that more user space and user convenience should be planned while planning or renovating library spaces.

According to Somerville & Brown-Sica (2011) libraries require accommodating new services within existing facilities, that could be benefitted from an inclusive planning approach which produces a design concept and project phases for repurposing space. In the process, organizational decision making can move from print-centered to program-driven through intentional use of information to learn. This research reports the recent findings in a series of North American implementation projects begun in 2003. The most ambitious to date, it involves library staff and campus stakeholders in inclusive library redesign processes. The Auraria Library, University of Colorado, USA example illustrates the transferability of using inclusive information centered and learning-focused approaches for organizational direction setting. The purpose of the action-oriented and learning-focused approach is to engage participants in using information to learn. Participatory action research is therefore intrinsically emancipator. A dearth of professional literature on participatory action research exists in the library and information science. Therefore, this contribution both offers a promising approach for collaborative decision making and fill a gap in the professional knowledge base.

Jalalzadeh & Jalalzadeh (2013) opined that libraries are responsible for providing adequate resources and conditions to fulfil the information needs of all members of society without exception. The article focuses on blind and visually impaired library users. According to author a space to be used by blind and visually impaired, should be designed bearing in mind their perception of the architecture and consequently presenting an accurate pattern of the space which takes into account this perception. The present article reviews the importance of architectural design in public libraries for blind and visually impaired and provides guidelines with regards to library location, green areas, building type, entrance, motion axes, flooring and book shelves. The author concludes that evaluating blind and visually impaired user's physical conditions and understanding their problems with regard to their perception of space, can play a significant role in designing an appropriate and effective space to offer quality services to these users, increase number of library users, improve their accessibility to reference and strengthen their self-confidence.

Smith (2007) constructed architectural shelving blueprints to use to determine the amount of available shelf space in the main stacks, for the collections to be merged from two other satellite libraries at Adelphi University (AU). With Excel, the borders function was used to create stack blueprints, measure the amount of shelf space available, and determine where shelves could be added or built. In addition, the blueprints were then modified to create floor plans on each stack level. Each of the five floors had started out with similar floor plans; additional sections had been added to each floor on an ad hoc basis as collection growth in certain areas outgrew capacity. Existing sections where additional shelves could be added (i.e., a seventh shelf could be added to a section with six shelves) were highlighted in blue. In addition, areas where a new section could be built were indicated in red. Sections were counted by the number of shelves they contained and then multiplied by their capacity width (35.5 or 29.5) to get existing linear footage. Further calculations were made for the capacity that could be gained with additional shelves and new sections. In this manner, shelf capacities for each of the five floors of circulating stacks were obtained. The resulting linear footage required for each class-mark was then compared to the space available on each floor, and the class marks were allocated to each floor based on the most optimal fill rates. Using Excel to create stack blueprints, estimate the size of the merged collections, and make floor plans was, on a whole, a

success in the context of the needs requirements and time frame of this specific project.

Murari D. (2017) explored whether a library as a physical place is needed in academic institutions as presently libraries transformed from print to hybrid with sharing print and digital resources. To investigate a sample of 50 users of SNDT Women's University Campus, Pune were asked about the frequency and purposes of their visits to the library, as well as their changing expectations about the library as physical space in the digital era. Results highlighted that almost all students are using it as a learning space. As a physical space, the library has and will continue to have spaces for both print and digital material. What is needed is redesigning of available space to accommodate common areas for general reading and socializing, space for group discussions space for quiet study. She concludes that as a physical space the library provides an important studying and learning place used by range of students. Design should be primary in considering the various aspects of the libraries not only for collections but as a learning space.

2.6 Human orientation in India

In India Modak & Patkar (1993) have first applied Human Orientation (HO) at bus stations (1981) and at rail terminals (1984). According to authors human orientation is both an art and the science which is applied to guidance systems at public places, to work environment and to living spaces. Authors have also provided a definition to the discipline with nineteen principles of human orientation. Series of examples been quoted to identify the deficiencies in the guidance systems at public places and products. It also brings out the inconveniences and irritations caused by shortcomings in the artefacts and situations faced by people in the work environment and living spaces. They had studied three public places to apply HO science. A case study of Victoria Terminus railway station, St. George Hospital, Bombay, and the Prince of Wales Museum at Bombay are provided in the book. Practical examples, illustrations and case studies provided by the authors will definitely help readers and librarians to visualize human orientation problems faced by their users in libraries.

Modak and patkar (1993) through the discovery and application of human orientation science in public places further provided new insights in transforming libraries in a

cultural hub, by studying psycho-physiological as well as social behavior of novice library users which will make libraries more user-friendly and humanely oriented.

Modak (2013) provided improved work on human orientation by adding one more principle which discussed about the regulation of queue system. The twenty Human Orientation principles propounded in this book are based on very keen observation of surroundings, extensive personal experience and intensively intuitive thinking on the root causes of disorientation, inconvenience, confusion, uncertainty and irritation that common people undergo every day. Series of examples are provided with illustrations for easy understanding of readers. A writer has suggested simple low cost solutions wherever possible through adoption of the scientific human orientation approach. Author further states that these twenty principles are still in a nascent state and the subject provides ample scope for future research.

Biswas (2010) attempted to present a broad outline of the research topics undertaken by library science schools in India since the emergence of Ph. D. degree in library and information science till 2008. According to the data available with INFLIBNET 595 doctorate degrees were awarded by different universities till 2008 in LIS profession in India. Subject wise break up of doctorates on major topics were Bibliometric analysis (52), University Library (47), Library management (34), Users' study (31), Personnel management (28), Public library (28), Computer application (19), Collection development (18), Library and Information services (16), Information retrieval system (16), Special library (16), Agriculture library (15), Academic library (14), Classification (14), College library (13), Library history (12), Information and communication technology (12), Medical library (12), Library network (10), Library science education (10), Periodical publications (10), Subject index (10), Cataloguing (8), Library resources and services (8), Internet application (6), Bibliographic control (5), Resource sharing (5), Electronic information resources (5), Library Legislation (4), Manuscript collection (4), Document service (4), Indexing (4), Industrial library(4), Information resources (4), Information resources- newspapers (4), School library (4), Biography (3), Data processing (3), Library cooperation (3), Library Information research (3), Digital library (3), Electronic media library (3), Engineering college library (3), Government library (3), Reading habits (3), Bibliographic database & analysis(2), Current awareness services (2), Library communication process (2), Distance education (2), Information retrieval system design (2),

Thesaurus compilation (2), User's education (2), Bibliography-Persian literature (1), Book publishing (1), Children's literature-Hindi (1), Knowledge management (1), Library resource preservation (1), Library standards (1), Map collection (1), Database network (1), Grey literature (1), INFLIBNET (1), National library-Bangladesh (1), Professional association (1), Dr. Ranganathan (1), Scientometric study (1) and UNESCO (1). The distribution of Ph. D. thesis based on the subjects provided by Biswas highlights that there is an absence of research based doctoral studies conducted on wayfinding and signage in Indian libraries. Such studies are essential to facilitate more accessible, user-friendly and humanely oriented libraries.

2.7 Summary

Many recent articles have focused the development of Information Commons facilities within existing or new libraries. Other articles have focused on compliance with the Americans with Disabilities Act (ADA). Some books and articles have provided case studies of specific library projects. Many other books and periodical articles share knowledge about building planning in general or address specific facility issues. Some recent studies have focused on disciplinary information-searching patterns, student seating preferences in libraries, the use of print resources, student Web use in research, and library anxiety, among other topics.

To assess the level of human orientation or user-friendliness of university libraries it is essential to find out user perceptions. To explore user's perceptions in a quantitative form conducting user studies can be a preferable alternative. As pointed out by Zeisel, (1981) user needs are those characteristics required of an environment to permit the completion of activities planned or typically undertaken in the specific setting. The idea of user needs can be made clearer by distinguishing it from user wants, which refer to characteristics that might be desirable but are not absolutely necessary for successful adoption in a particular setting. Providing basic orientation at critical points through such vehicles as science and information personnel are related to user needs: the use of color and other designed elements that add visual interest, but do not constitute essential information, are more closely tied to user wants. One benefit to direct attention to user needs is that need can be identified and made more explicit. In fact, the current interest in providing more effective graphics and signage to guide people through public-access environments is a good example of identifying a

specific user need focus on audience description, and patterns in the circulation and handling of library materials (Wilson-Davis, 1977) and are limited primarily to academic libraries (Stevenson, 1977). Although knowledge of audience characteristics and circulation trends is indeed important, patron needs that are related specifically to orientation in the use of the library are one category that could be defined more explicitly. There is little research on library user orientation as defined here, but some behavioral aspects could serve as a starting point in defining patron orientation need for future research (Stevenson, 1977).

While reviewing the literature it was observed that, direct observation is the best method of qualitative data collection while studying human orientation aspects, since maximum researchers used direct observation method for determining whether users can successfully navigate a variety of spaces. Studies related to assessment of signage system and wayfinding studies are carried out through use of direct observation as a data collection method.

The analysis of the literature highlights that library anxiety occurs in all nationalities. In case of library anxiety, Mellon was the first researcher in 1986 to identify and name the concept in United States. However, Mellon's work significantly lacks reference to library space as a facet of library anxiety. Jiao and Onwuegbuzie (1999), initially thought of feelings of users while navigating the library and the anxiety faced by them. According to Jensen (2005), Anxiety is an emotional state or affect. Because emotional states are not static, library anxiety is also not a constant condition. Changing the emotional triggers of the physical environment can change the experience of the library. Properly designed spaces can help manage the flow of emotional states and set up students for positive library experiences. A few publications in the scope of library anxiety in other countries are also known. The authors of these publications suggest that library anxiety phenomenon occurs in Israel (Shoham & Mizrahi, 2001), Malaysia (Onwuegbuzie, Jiao, & Bostick, 2004), Kuwait (Anwar et al., 2004) and India (Gogoi T., Singson M., & Thiyagarajan S., 2021). However, path finding and the availability of signage was not specifically studied as an attribute resulting to library anxiety in the Indian context.

With increasing student reliance on the internet and electronic resources, along with growing administrator awareness of declining usage patterns in some physical

facilities, it is important to study the changing demands related to user space as electronic resources become increasingly central in student research and scholarly communication especially in case of university libraries. Changing needs of users in case of library spaces to meet the needs of digital landscape and the concept of information commons, future research should focus on application of GIS, and aesthetic reading spaces, as very few researchers had studied those areas, as per the review of literature (Xia 2004, Webb, Schaller & Hunley2008). Ironically, given the large cost of new or improved facilities, there are no systematic, empirical studies documenting the impact of library buildings on student usage of the physical library concerned with human orientation aspect. Therefore, there is need of studying human orientation science in university libraries so that all the aspects of human orientation science will be studied together.

Very few studies are conducted on freshman or first time library user. These studies mainly focus on library orientation programs and library tours. There is absence of research based studies in context to self-guidance system for freshman in libraries. Considering and planning self-guidance system as per the need of first time library user is the first and important principle of human orientation. Therefore, there is a need to conduct research on “Human orientation in libraries: a study of university libraries in Mumbai”.

2.7.1 Global scenario v/s Indian scenario

After studying the literature, it was observed that there is a gap in the available literature related to human orientation. The following points emerge from the comparison between global scenario and Indian scenario of the present literature.

Global scenario

- Major wayfinding studies are conducted in developed countries.
- Studies on signage are conducted in different types of libraries such as special libraries and academic libraries.
- Physical and psychological barriers are studied in relation to wayfinding and disorientation aspects.
- Studies on Environmental design and space planning are conducted while automating, digitizing or renovating libraries.

Indian Scenario

- Very few wayfinding studies are conducted in India and those studies are conducted for transportation terminals.
- Major studies on signage are conducted only in public libraries.
- Only physical barriers in libraries are studied more as compared to psychological barriers.
- Major researches done on space planning concentrated more on financial obstacles and space problems, and not directly studying human orientation aspects.

Library researchers often give weight age to user friendliness of library software and library websites. However, there is less focus on creating user friendly libraries through the provision of spatial information guides. Information seeking behavior begins with the spatial information behavior. However, literature review highlights that there are very few research based studies available, which focus on user friendly libraries. Those studies are conducted in developed countries. There is absence of research based studies in Indian context related to human orientation in libraries to facilitate user friendly libraries.

From the studies discussed above it is clear that some aspects of human orientation are studied in developed countries. Major studies are focused on signage aspect, referring to public libraries. Research studies conducted on space planning concentrate more on financial obstacles and space problems and do not directly study human orientation aspects. There is absence of research based studies in Indian context related to human orientation in libraries.

The present research will be contributing a step ahead as compared to the available literature as:

- The study is purely on application of principles of human orientation science.
- The study is on application of human orientation to university libraries in Mumbai and not the public libraries.
- All aspects of human orientation like signage, wayfinding behaviour, physical and psychological barriers will be taken into consideration in the present study and thus the study will not be limited only to signage or wayfinding in university libraries in Mumbai.

Thus, the literature review justifies the selection of the topic “Human orientation in libraries: a study of university libraries in Mumbai”.

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Chapter 3

RESEARCH DESIGN

Chapter 3

Research Design

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CHAPTER 3

RESEARCH DESIGN

This chapter elaborates the research design of the study. Explaining the objectives of the study it presents operational definitions. Outlining the scope and hypotheses of the study, it further describes the instruments used for data collection, the process of pilot testing, sample selection, scope and limitations of the study and the research method used to conduct the study. It also explains the procedure of implementation of questionnaires, observation, and interviews.

3.1 Introduction

The unprecedented growth in knowledge and the development of technology during the last few decades has resulted in dehumanization. Libraries are not exception as due to technological advancements the availability of the information is also in different forms in the library at different places and with the help of OPAC and available guidance systems users are expected to navigate and find their destination and the required information on their own. Human Orientation Science studies human behavior by moving ahead from information seeking behavior as information seeking behavior evaluates library user's awareness of library and library resources and services whereas human orientation studies take into account the navigational aspects from users' point of view and aid in the evaluation of the available guidance tools.

Generous research has been done on different facets of human orientation such as signage in libraries, wayfinding, library orientation and physical spaces of libraries. However, such facets were studied individually in developed countries in form of case studies of isolated libraries. In addition, as reviewed in the second chapter these facets are not studied collectively to make libraries user-friendly and humanely oriented. In Indian context maximum studies focused on library orientations and signage in libraries as highlighted through review of literature. The collective study of all the facets like wayfinding, signage, physical and psychological aspects with environmental atmosphere together will aid in exploring practices followed by university libraries in Mumbai, relating to application side of human orientation science.

Such studies remain to be explored in the context of Indian libraries. In addition, due to the huge architectural structures and wide continuum of enrolments of new students every year, the study of human orientation needs of university library users is the need of the time.

In this context, the pricking questions which need to be addressed were:

- What are the challenges faced by new users while navigating university libraries in Mumbai from the entrance of the libraries till their destinations?
- How far is the present signage system efficient in self-orienting new users of university libraries in Mumbai?
- What is the utility of the available guidance system on wayfinding behavior of new users of university libraries in Mumbai?
- How far is the library orientation program fruitful in self-orientation or self-guidance for new users of university libraries in Mumbai?
- How far the available physical settings and library environment of university libraries in Mumbai helpful in availing humanely oriented libraries in Mumbai?
- How far the provisions made in university libraries in Mumbai for all users including physically challenged users related to wayfinding indicators.
- How far the provisions made in university libraries in Mumbai for all users including physically challenged users for convenience in searching and using library material.

To get answers to all these questions it was necessary to know users' opinion about libraries and how users were served by these libraries to feel them more humanely oriented. Study of first-time users' group behavior could not be conducted without a well-designed descriptive method and hence researcher selected survey method to conduct this study. Therefore, data collection tools were designed to conduct a user study to explore wayfinding problems faced by university library users related to spatial information systems, including their awareness, wayfinding experiences, and signage. In addition, along with this to get the detailed insights of the navigational experiences, utility of library orientation programmes and wayfinding behaviours of university library users, a questionnaire for new users of university libraries, structured observation and structured interview schedule for selective users of

university libraries was used as data collection tools along with a questionnaire for university librarians and library building observation schedule.

Such type of user study will enable to measure the performance of a library as a building or its user-friendliness in terms of how well it is meeting the wayfinding needs of its users. The goal of the study was to explore answers to the above questions with an eye on helping the library to improve the facilities in the context of ease of wayfinding and overall usability.

3.2 Objectives

The broad objective of the study was to assess the navigational aspects from the user's point of view and evaluate the available guidance tools to facilitate ease of wayfinding and overall usability.

The study was conducted with the following specific objectives:

3.2.1 To find out users outlook regarding ease in physical search of service departments while using university libraries in Mumbai.

3.2.2 To investigate the extent of convenience and results thereof experienced by the readers while using university libraries in Mumbai.

3.2.3 To evaluate the document delivery processes affecting the users while using university libraries in Mumbai.

3.2.4 To find out ways and means to make university libraries in Mumbai more user-friendly and easily accessible.

3.2.5 To explore the appropriateness in the display of rules and regulations provided by university libraries in Mumbai.

3.2.6 To discover the suitability of signage system used in university libraries in Mumbai.

3.2.7 To find out the provisions made in university libraries in Mumbai including physically challenged users related to wayfinding indicators.

3.2.8 To find out the provisions made in university libraries in Mumbai including physically challenged users for convenience in searching library material.

3.3 Operational Definitions

The terms and concepts used by the researcher to describe the human orientation behavior of participants, meaning, and interpretation of those terms and concepts are operationally defined below.

3.3.1 Orientation

The processing of environmental information for two purposes: to locate one's position in a physical setting and to determine a course of action for coping with the demands of a particular environment.

3.3.2 Navigation

Guiding one's direction in space, and particularly in built environments—constructed surroundings, either cities and towns or buildings, and facilities, including libraries.

3.3.3 University libraries

Libraries, those are housed in the university campus and are dedicated to aid in university education and teaching.

3.3.4 University library user

First-year students of PG, M.Phil. and Ph. D. and newly appointed teachers of a particular academic year.

3.3.5 Wayfinding

Wayfinding refers to the activities and process of people navigating and finding their ways in an environment.

3.3.6 Wayfinding Process

Process completed by university library users while finding a particular destination.

3.3.7 Wayfinding Behavior

Conduct of university library user while navigating and searching information source in university libraries.

3.3.7.1 Anxious

Expression of feelings of tension, uneasiness, intense apprehension of university library user while wayfinding and searching location of information source in the university library (Rajpurkar S, 2017).

3.3.7.2 Confused

The expression of the feeling of uncertainty of university library user while wayfinding and searching location of information source in the university library (Rajpurkar S, 2017).

3.3.7.3 Confident

The expression of the feeling of certainty of university library user while wayfinding and searching location of information source in the university library (Rajpurkar S, 2017).

3.3.7.4 Comfortable

Expression of feeling at ease, free from stress or anxiety; of university library user while wayfinding and searching location of information source in the university library (Rajpurkar S, 2017).

3.3.7.5 Frustrated

Expression of feeling of discouragement and annoyance or lack of fulfilment of wayfinding need of university library user while navigating and searching location of information source in the university library (Rajpurkar S, 2017).

3.3.7.6 Indecisive

Expression or feeling of conflicts of university library user deciding the route while navigating and wayfinding in university libraries.

3.3.7.7 Challenging

Expression of a feeling of complexity while wayfinding or while searching location of information source in the university library.

3.3.7.8 Baffled

Feeling troublesome in the process of wayfinding while searching location of information in the university library.

3.3.7.9 Disoriented

Behavior of lack of control or guidance in deciding direction while wayfinding or for searching the location of information source in the university library.

3.3.7.10 Easy

Finding the process straightforward and uncomplicated while wayfinding or for searching the location of information source in the university library.

3.3.7.11 Lost

Expression of moving to misleading directions and unable to decide right direction while wayfinding and searching location of information source in the university library.

3.3.7.12 Surprising

Feeling amazed while wayfinding or for searching the location of information source in the university library.

3.4 Hypotheses

As the broad objective of the study was to assess the navigational aspects from user's point of view and evaluate the available guidance tools to facilitate ease of wayfinding and overall usability, accordingly the following specific null hypotheses was formulated for the study.

HO-1) University library users are not facing any problem or confusion while searching different service departments of university libraries.

HO-2) There is no significant relationship between human orientation and the extent of convenience experienced by the readers while using university libraries in Mumbai.

HO-3) There is no significant relationship between circulation processes and operations and the ease of use in the case of university libraries in Mumbai.

HO-4) There is no significant relationship between human orientation and user-friendliness of university libraries in Mumbai.

HO-5) Rules and regulations displayed in university libraries in Mumbai are not leading towards convenience of readers.

HO-6) There is no significant relationship between the signage system and certainty among readers while using university libraries in Mumbai.

3.5 Scope

This study focused on practices followed by university libraries in Mumbai, relating human orientation. The physical settings of libraries, locations for departments and guidelines through appropriate signage, hoardings, displays, library day to day operations and processes were taken into consideration. This will help to foresee the inconvenience, confusion, uncertainty, and irritation faced by users as well as library staff. The study focussed on the first time visitor students specifically first year Postgraduate and first-year M. Phil/Ph. D students and newly appointed teaching faculties in university libraries in Mumbai.

The theory and principles of HO and Dr. S. R. Ranganathan's facets of knowledge classification, PMEST are applied in this research.

Major three areas identified for the application of HO principles were:

- Sign systems inside and around the libraries
- Physical settings inside the libraries
- Free space in corridors, staircases and the indicators provided in such places

The study also covered the opinions of newly appointed teaching faculties as the university library users. Further, opinions of university librarians in Mumbai were also taken into consideration to explore the comprehensive picture of application of Human Orientation measures by university libraries in Mumbai.

3.6 Limitations and Challenges

3.6.1 Limitations

- The present research was limited to only University libraries.
- This study is limited to University libraries in Mumbai listed by UGC in the year 2017-18.
- As per the first principle of Human Orientation Science, this study is limited to the first time visitor students of university libraries in Mumbai that is first-year Postgraduate and first-year M. Phil/Ph. D students in university libraries in Mumbai and newly appointed teaching faculties who are not fully acquainted with the library's physical settings and services as the university library users.

Human orientation science mainly studies problems related to wayfinding at public places, which draws attention to the problem of confusion and inconveniences caused to users due to shortcomings in designs, process operations, artefacts and situations faced by people in the work environment, huge structures, and living spaces. Therefore websites of university libraries are not taken into consideration in the present research.

3.6.2 Challenges

The researcher faced multiple challenges like permission and availability of latest enrolment data from universities for data collection, difference in academic schedules of universities, (since student's availability in university libraries depends on their course schedule and academic calendar and lectures,) willingness of participants themselves for video recording of their movements. A few universities permitted data collection but opposed for videography and taking snapshots of their library users. In some university libraries users were not in favour of videography of their movements. Therefore in such situations observation was completed only with the use of structured observation schedule. An additional challenge was to search for first-year students specifically. It was difficult to approach first-year students, as students visit

university libraries during the free time between their course schedules. Each course has different time table for scheduled lectures, therefore students visit libraries as per their convenience. As a result, the time span of approximately one month was spent for data collection from each respective university library.

3.7 Research Methodology

In order to have a comprehensive understanding of Human Orientation measures followed by university libraries in Mumbai, the mixed method of research with (QUAL + quant) qualitative and quantitative techniques was used for data collection and analysis.

3.7.1 Mixed Method

Mixed methods research is a methodology for conducting research that involves collecting, analyzing, and integrating (or mixing) quantitative and qualitative data in a single study. The purpose of this form of research is that both qualitative and quantitative research, in combination, provided a better understanding of a research problem or issue than any one single research approach alone.

Following is the representation of research design in the chart format.

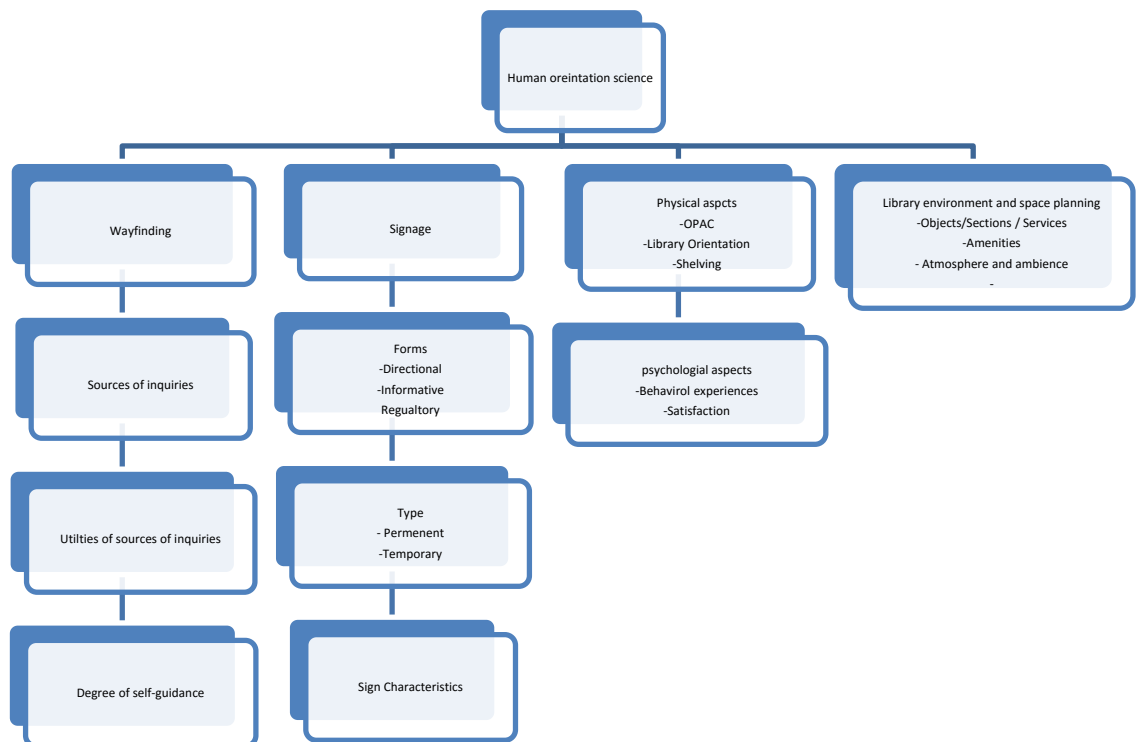


Figure 3.1: Research Design

In this design more emphasis is given on the aspects mainly associated with human orientation science such as navigability, signage and self-orientation.

Mixed method research design (QUAL + quant) was used adopting the concurrent design as a time orientation dimension through using initiation as the purpose of for mixed method research. Miles & Huberman, outline four types of designs for integrating both approaches in one design. In the first design, both strategies are perused in parallel. As presented in the figure:

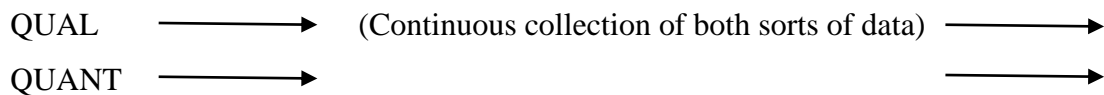


Figure 3.2: Research Design for Integration of Qualitative and Quantitative Research

Source: (Miles & Huberman, 1994, p.41)

A nested relationship sampling design was applied for the purpose of data collection. Time orientation refers to whether the qualitative and quantitative phases of the study occur at approximately the same point in time such that they are independent of one another (i.e., concurrent). A nested relationship implies that the sample members selected for one phase of the study represent a subset of those participants chosen for the other facet of the investigation (Onwuegbuzie & Collins, 2007, p.292).

In the present study concurrent design of mixed method was applied by using 'Context' as an aspect of mixed method design. "Context – refers to cases in which the combination is justified in terms of qualitative research providing contextual understanding coupled with either generalizable, externally valid findings or broad relationships among variables uncovered through a survey" (Bryman, 2006). Thus for generalizing the findings a survey of university library users as well as university librarians was done through questionnaire.

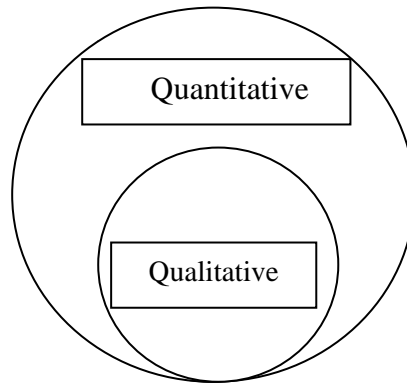


Figure 3.3: Mixed Method

Further microscopic study was conducted by observing behavior, and through interviews to gain in-depth understanding about the participants' perspectives from selective users of total sample. The data obtained through these research methods then were combined and analyzed on a more generalized level, which were finally interpreted from the perspectives of key theoretical propositions.

3.7.2 Reasons behind Employing Mixed Methods Design

- The combined use of both qualitative and quantitative approaches provides an expanded and in-depth understanding of this research problem.
- Need for understanding human behavior as well as the library environment and surroundings will be fulfilled through applying qualitative research method by using observation schedule and interviews with selective library users as well as a questionnaire for users mainly focusing on close-ended but qualitative answers.
- The need of understanding present signage system of university libraries and university librarian's technical and financial constraints behind updating the signs and display systems would not have been fully explored through quantitative research method by using the questionnaire as a research tool.
- A researcher is able to collect the two types of data simultaneously, during a single data collection phase through the applying concurrent design with nested sampling for the data collection.
- It lends the study with the advantages of both quantitative and qualitative data.

- By using the two different methods in this manner, a researcher could gain perspectives from the different types of data or from different levels within the study.
- Observation of available signage with the help of library building observation schedule provided the actual status quo and picture of the available guidance system in university libraries in Mumbai.

The study included first-year students of Post Graduation, M. Phil and Ph. D. and newly appointed teaching faculties as library users as well as university librarians as respondents for research. The researcher developed two different questionnaires by dividing respondents into two categories as university library users and university librarians. In order to get a general picture of a problem, the researcher applied a survey method to conduct the present study. However, studying the user's behavior is a complex phenomenon. It was realized that only survey method would not be appropriate to explore and analyze wayfinding behavior of university library users. Further frequently used tools for survey research are questionnaire and interview. Considering that only questionnaires would not help to explore and analyze the wayfinding behavior of library users; hence to get in-depth insight with the questionnaire, the researcher used interview schedule and structured observation of selective library users. A building observation schedule was developed to gather authentic information about the status and picture of the available facilities and relevant guidance system in university libraries in Mumbai.

3.7.3 Tools of Data Collection

Data was collected through questionnaires for users as well as university librarians and structured observation schedule, and interview of selective users along with photographs and videos wherever permitted with due consent of users. A structured interview schedule was prepared to delve into the motive behind Human Orientation efforts in India. This provided backdrop for the study.

3.7.3.1 Questionnaires

In order to obtain profound and thorough insight of research problem, two types of questionnaires were developed: 1) for university library users and 2) for university

librarians. The questionnaires consisted open-ended as well as closed-ended questions.

Both the questionnaires were pilot-tested, evaluated and discussed with the guide and subject experts to get the clarity of the questions and the answering alternatives included in the questionnaires. Constructing the questionnaires was a meticulous and time-consuming process. It took around one and half year to finalize both the questionnaires and construct interview and observation schedules for both users and university library buildings. The literature review showed that many earlier studies of wayfinding or signage planning focussed only on the use of spatial analysis of floor plans and transitional spaces. However, the researcher concentrated on actual wayfinding behavior of users to judge how humanely oriented are the university libraries in Mumbai, according to the perspectives of library users. Both questionnaires were administered personally by the researcher in the field.

3.7.3.1.1 Questionnaire for University library users

Questionnaire for university library users was divided into seven parts. The first part included general demographic information of library users.

Part two dealt with wayfinding experiences of university library users as new users of the university library. It covered sources of inquiry used by users while wayfinding within the university campus and inside the library until reaching to the actual sources of information. The questions also asked about availability, visibility, and readability of campus maps, the time taken by library users to reach till the library from the campus gate. In addition, users were also asked about a number of times they were stopped for directional inquiry till reaching towards actual direction and whom they have consulted for the help during the wayfinding process till getting the actual source of information. Further, the users were asked about the wayfinding experiences and reasons behind the wayfinding problems faced by them and the degree of self-guidance provided by the available guidance system from the campus gate till the library stacking area.

Third part consisted of questions related to signage and displays such as opinions of users about readability, visibility, and utility of available signage as well as an opinion about which type of signage should be added to provide effective directional

guidance. Questions regarding visibility and identifiability of library building were also asked. Further users were asked about the availability of library map, the height of existing signboards, the font size of characters to facilitate readability, the available character type, color scheme of signage and their preferences about the same.

Fourth part dealt with the use of OPAC by the library and their experience about using OPAC for searching location for library material. Questions covered opinion about the level of satisfaction provided through OPAC in case of user-friendliness, operating utility and visibility of search results. Further, they were asked about any trouble faced by them while using OPAC. Their opinions on solutions to reduce the troubles if any, as well as their opinion about the availability of OPAC manual and its utility were sought.

Fifth part covered questions regarding shelving and available directional and guidance system provided within the stacking areas for easy wayfinding, access, and retrieval of information sources. Questions regarding the time taken by library users to search for information sources in stacks after leaving OPAC terminal were also asked.

Sixth part consisted of questions regarding physical and psychological barriers. It has two sub-sections. First sub-section inquired about opinion regarding library instruction or orientation programmes and the utility of library orientation programmes. Second sub-section consisted of questions regarding users' search experiences, their feelings, and emotions as well as their level of satisfaction while obtaining library material.

Seventh part incorporated questions regarding library environment and space arrangements. It inquired about basic facilities, the arrangement of objects, sections, departments and services and ease of identification of all the facilities and services. The last part of the questionnaire asked questions about areas needing improvements to facilitate ease of wayfinding, better searching and the level of satisfaction with the environmental aspects of the library building and space allocation (Annexure II).

3.7.3.1.2 Questionnaire for University Librarians

The next questionnaire for university librarians was divided into two parts. First part started with the general information about the librarians and their institutional details.

Part two consisted of six sections. The first section covered questions regarding university library building, such as type of university, availability of other campus or branch library, availability of independent building for the library, the specifications of building construction norms followed while planning library building and about planning or renovation of library building through the application of GIS. The second section consisted of questions regarding user studies and user surveys conducted by university libraries related to wayfinding, signage, hindrances, and obstacles if any faced by users. They were asked whether they conducted user studies regarding conveniences and favourable conditions for special users. The third section discussed signage related questions such as whether the sign system was systematically planned, allocation of budget for signage and frequency of signage audit. The fourth section incorporated questions on physical and psychological conveniences such as methods used for library orientation programmes, type of access provided to a different type of collection and types of training provided to library staff related to communication skills or customer relationship management. The fifth section consist questions regarding space allocation and facilities provided to users including learning spaces and social spaces provided by libraries. Sixth part consisted of questions regarding facilities, services and assistive devices made available by university libraries to provide universal access to university libraries (Annexure III).

3.7.3.2 Scales used for the study

On a Likert scale, the respondent was asked to respond to each of the statements in terms of several degrees, usually five degrees of agreement or disagreement. The next scale used was of multiple choice responses. The respondent can select as many options as given for one item (Somekh & Lewin, 2011). Another scale used in questionnaires is the side-by-side matrix. A common and powerful application of the side-by-side matrix is the importance/satisfaction type of question. Through this scale, the researcher asked first about respondent's awareness about attributes, and further asked them about the importance of those attributes, for them.

3.7.3.3 Structured Observation

As mentioned earlier, as the quantitative data was inadequate to analyze and assess the wayfinding behaviors and expressions of the participants, a structured observation

schedule was used as a research tool. Structured observations are systematic investigations that generate numerical data, for example, the frequency of an event or behavior, which is entered into an observation schedule.

3.7.3.3.1 Library User Observation Schedule (OSI)

For the present study, the researcher prepared observation schedule to observe the university library users in the actual field. The observation schedule provided information about the behavior of library users while deciding and finding their way in university libraries for searching information in the library. It gave insights into users' approach towards library and expressional reactions while navigating and finding their way for searching information in the library.

Observation schedule consists of two parts: First part covered the demographic details of the participants and the second part covered the description of wayfinding behavior of participants.

3.7.3.3.1.1 Observation Schedule Part I

The first part of the observation schedule covered elements like the name of a university library, date and time of observation.

3.7.3.3.1.2 Observation Schedule Part II

Second part covered elements like description of participants in detail such as entry point behavior of university library users, their first approach for direction and wayfinding. Then the actual facial expressions of participants while searching information sources and reaching towards it. The actual process of wayfinding was observed and noted step by step. Further, the schedule noted the interactions and conversations that occur in library settings while browsing for the information sources and till reaching to the information sources. This included where the search process ends, informal activity (non-verbal communication) that was taking place and last any other point which researcher felt important while observing the wayfinding behavior of participants like any special gestures of participants smile on face, the way users used OPAC and their awareness about OPAC, expression of satisfaction or happiness after getting desired information. Coding of collected data was done in order to do

qualitative data analysis. The snapshots were clicked at the moment when the information searching process was completed by participants as well as moments when participants got confused or disoriented or expressed such pertinent facial expressions (Annexure VI).

3.7.3.3.2 Library Building Observation Schedule (OSII)

Another observation schedule that is building observation schedule consisted of a checklist for the available signage in different departments to observe the physical environment and settings, and the presence of essential signage in all service areas of the libraries.

Building and signage observation schedule consisted of eight sections such as essentials of building, library entrance, library signage, internal physical settings, shelving area, the arrangement of the reading area, and the computer laboratory and multi-media, and convenience facilities.

Essentials of the building include observation points such as visibility and identifiability of building, availability of parking space, availability of signage for parking space, availability of signage for parking space for disabled, signage for a silent zone near library building and availability of sitemap highlighting library at the entrance of university campus.

Essentials of library entrance consisted of observational points such as availability of sign for standard international symbol of library, availability of library building map, provision of space at library entrance, availability of wheelchair ramp with handrails at the entrance at main gate, and at other gate, availability of open/closed sign, display of library's working hours, instructional signs for OPAC/catalogue use, availability of signs for locating departments to identify the function or service within that room or area, availability of directional signs leading patrons to different departments and its placement at logical decision points, visibility of inquiry counter from entrance and provision of space near entrance for display cases, pamphlet racks, public bulletin boards, library rules and regulations and flash notices.

The schedule also included information on availability of pictorial sign with verbal descriptions, placement of signage at eye level, consistency of signage, design of

signage, use of universally applicable symbols for signage, simplicity of language on signs, use of universal norms while designing signage, use of suggested colour contrast on signs, height of letters on signage to facilitate visibility, readability of signage and availability of ergonomically designed signage.

Observation points under the section internal physical settings consisted of availability of tactile signage at the entrance and within the premises for visually impaired people, well lighted entrance and browsing area, visibility of staff areas, location of circulation area (near the library's entrance), visibility of circulation counter from the library's entrance, signs and indicators for locating circulation counter, availability of self-checkout/ computer checkout terminals, display of instructions near self-checkout, queuing system at circulation counter, visibility of circulation desk monitor to users, identifiable reference desk, signage to locate reference section, accessibility and convenience facilities for disabled at circulation desk, reference desk computer laboratory and reading areas. In addition, this section covers other points such as availability of exhibition area and signage for rare books, archives, special collection, manuscripts and microfilms if available in the library collection.

Essentials of shelving area comprised of availability of flow diagram for shelving arrangement, display sign for broken order (if any) within shelving area, availability of space between aisle area, availability of stools or small ladders between shelves, provision of sufficient light, height and visibility of shelf indicators between shelves, availability of books on shelves as per the classification scheme, provision of OPAC terminal near shelving areas and availability of open access facility to the entire library collection.

The section 'Seating arrangement of reading area' covered observational points such as availability of wide variety of reading areas for different users having many choices to fit their mood or reading environment needs, availability of natural light in reading area and provision of generously sized individual tables with task lighting, power switches for laptop computers and table lecterns for holding large books or rare book.

The section arrangement of computers laboratory/ multimedia facilities included observational points such as provision of independent cooling system, provision for opening windows to provide ventilation in case of electricity/system breakdown and provision of acoustically isolated spaces for audio visual carrels with built-in playback equipment, computer workstations and printers, revolving chairs, and other required peripherals.

The section of convenience facilities consisted of availability of directory or library guide identifying major library services and their locations, space allocated for convenience equipment such as photocopiers, printers, audio-visual equipment, availability of signage for each individual equipment and facility. The section further included points such as availability of other facilities such as refreshment area, vending machine, elevator, as well as the provision of restrooms on each floor (both for male and female) and restrooms for disabled. Further observation points related to universal access dwell with the availability of Braille signs for convenience facilities, availability of audio instructions and visible alarm in an elevator for special users and availability of Braille floor buttons in the elevator (Annexure VII).

3.7.3.4 Users Interview Schedule

Interview schedule consisted of 26 questions for library users related to their personal experience about the university library visit at initial stage. These questions inquired details about available guidance system, experiences regarding different processes and service areas within libraries. Further questions inquire details about navigability within stacking area, welcoming and off-putting aspects related to available directional signage, equipments, and facilities used by library users, their search experience, and satisfaction felt, as well as obstacles faced by them while navigating within service areas and while searching information sources. The last open ended question explored opinions and suggestions of library users to make library free of obstacles (Annexure V).

3.7.3.5 Subject Expert's Interview Schedule

Subject experts' interview schedule incorporated 15 in-depth open-ended questions related to genesis of Human Orientation Science, principles of HO, their writings and publications on HO with its impact on the scholarly community, practical benefits of

application of HO and need of application of HO in India at public places including their suggestions while applying HO principles to libraries (Annexure IV).

3.7.3.6 Images (Photographs) of users and signs and symbols.

Videos were recorded and photographs were captured while observing users expressions and movements as well as photographs of available sign system of university libraries in Mumbai were analyzed using ATLAS ti (Qualitative Data Analysis and Research Software), to cross-check its validity and accuracy (Annexure IX & Annexure VIII).

3.8 Pilot study

The pilot study was conducted for the pre-testing and further testing the feasibility of the above mentioned research instruments i.e. data collection tools. The data collection tools of the present study were:

- Questionnaire for university library users
- Questionnaire for university librarians
- Interview schedule for university library users
- Interview schedule for subject experts
- Observation schedule for university library building
- Observation schedule for university library users

The aims of conducting the pilot study were:

- Developing and testing the adequacy of research instruments
- Assessing the feasibility of a (full-scale) study/survey
- Collecting preliminary data

In the first phase of the pilot study, a questionnaire for university librarians was executed. For the pilot study of the questionnaire for university librarians, five experts out of which, two were the subject experts of Human Orientation Science, other three were the retired university librarians from Mumbai, were sent an online questionnaire. Experts were requested to fill out the questionnaire and provide suggestions and recommendations on the same. Out of five experts, two subject experts and one

retired university librarian responded to the questionnaire and provided suggestions. As per the suggestion of one subject expert following question was added in the questionnaire:

Q. No. 33) Does your library provide a resting room for library users? ((Annexure V)

In the second phase, a questionnaire for library users was sent to five Ph. D. scholars in the field of Library Science, Commerce, History, and Economics, as users of different university libraries in Mumbai. Four filled questionnaires were received back. Pilot study participants gave positive feedback with the remark of questionnaire being lengthy. But further, they commented that it mainly included closed-ended questions, related to opinions, expressions, and suggestions of library users, therefore, it was not time-consuming. Hence, the length of the questionnaire was inevitable.

Interview schedule for library users was sent to both the subject experts. According to the suggestions received one question was added in the interview schedule as follows:

Q.No.2 Did you notice guidance system provision at the entrance way? (Annexure V)

The suggestions received from the participants and the recommendations of subject experts of the pilot survey were incorporated in the data collection tools.

3.9 Sample

An authorized list of universities was obtained from the website of the University Grants Commission. As per list of UGC total eleven universities fall under the Mumbai region during the year 2017-18. From these eleven universities, two universities also have branch libraries. Hence there are 13 university library buildings falling under Mumbai region including branch libraries. From thirteen university libraries in Mumbai ten university libraries were surveyed in the present study including deemed universities and branch libraries. Three university libraries were excluded from the study due to consent issues. This provided a sampling frame for research. Therefore, total ten university library's newly enrolled users of Mumbai were considered as a population for the present study. 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 (appointed in the year 2017-18) were selected as a population of the study.

According to the first principle of HO science the built environment or a public place should be humanely oriented taking into consideration the perspectives and perceptions of first-time visitor. Hence in case of the present study past experience of visitors to the university library will be a confounding variable which will have an adverse effect on dependant variables of the study. Like past experience of old library users will enable them to navigate and use library more effectively even in case of absence of signage. Hence for counter-balancing the effect of confounding variable of past experience, only new or novice library users were taken as a population of the present study.

Searching for first-year students specifically was a challenge; hence purposive sampling method was adopted while outlining a sample frame. It was difficult to approach first-year students, as students visit university libraries during the free time between their course schedules. Each course has different time table for scheduled lectures, therefore students visit libraries as per their convenience. As a result, the time span of approximately one month was spent for data collection from each respective university library. Therefore, first-year students who visited libraries during the time span of one month in each university were selected as a sample for the present study.

Table 3.1 presents the total population of ten universities including branch libraries.

Table 3.1**Population of Ten University Libraries First-Year Users for the Year 2017-18**

Universities	PG Courses Ist year 2017-18	Integrated M. Phil/Ph.D. Ist Year	Ph.D. 2017-18 Ist year	Total 2017-18
IGIDR	31	22	Nil	53
IIPS	55	Nil	45	100
CIFE	79	Nil	56	135
UOM-K (2015-16)	1374	159	462	1995
ICT (Library 1)	361	Nil	43	404
TISS	278	94	136	508
SNDT Juhu	729	Nil	16	745
SNDT Church gate	751	Nil	14	765
UOM-Fort (2015-16)	392	Nil	20	412
MNLU	18	Nil	Nil	18
Total	4068	275	792	5135

Sample Size

As per the enrolment data available from respective universities total 5135 students were enrolled for the academic year 2017-18 for the first year of PG courses and first year M.Phil./ Ph. D. courses. Therefore 5135 was the total population for the study. The present study mainly focuses on the qualitative aspects of research by studying behavioral expressions and emotions of novice library users as well as the qualitative analysis of available wayfinding and signage system available at university libraries in Mumbai to promote human orientation. Hence researcher adopted purposive sampling specially to select and study novice library users. Quantitative data was collected for analysis with the qualitative data to justify the reliability of qualitative data analysis and to minimize the bias of researcher which may have crept in due to adoption of pure qualitative research. Hence mixed method of research was adopted. Though the total number of enrolments were available from the websites of respective universities, the list of students enrolled for first year of PG, M Phil and Ph.D. were not available in case of a few universities. Further it was difficult to approach every newly enrolled student according to the enrolment list to apply the random sampling

method as students visit libraries as per their convenience and need for accessing information sources. Hence to collect data from homogeneous sub-groups it was essential to apply purposive sampling. Therefore, sample was divided as newly enrolled library users of first year of PG, M Phil and Ph.D. and newly appointed teaching faculties.

Sampling was chosen to represent the responses from users of university libraries in Mumbai as specifically PG first-year students, Ph. D. or M. Phil first-year students and newly appointed teachers were chosen as sample. Thus, the first-year students who visited libraries during the time span of one month in each university were selected as a sample for the present study. In the case of University of Mumbai, branch library, proportionately the enrolments were very high as compared to other universities. Therefore, to justify the larger population and to cover ideal representation of a given population, as a sample size for library users, students who visited library during the time span of two months were selected as a sample.

Total 400 questionnaires were distributed within the time span of eleven months considering the chances of non-responses and incomplete responses. Out of 400, 328 filled questionnaires were received and considered for this study. Thus the response rate was 82%.

Therefore, sampling will be done as following in the present study:

3.9.1 Purposive Sampling

Novice users were taken up for the study and the following figure shows the division in the sample:

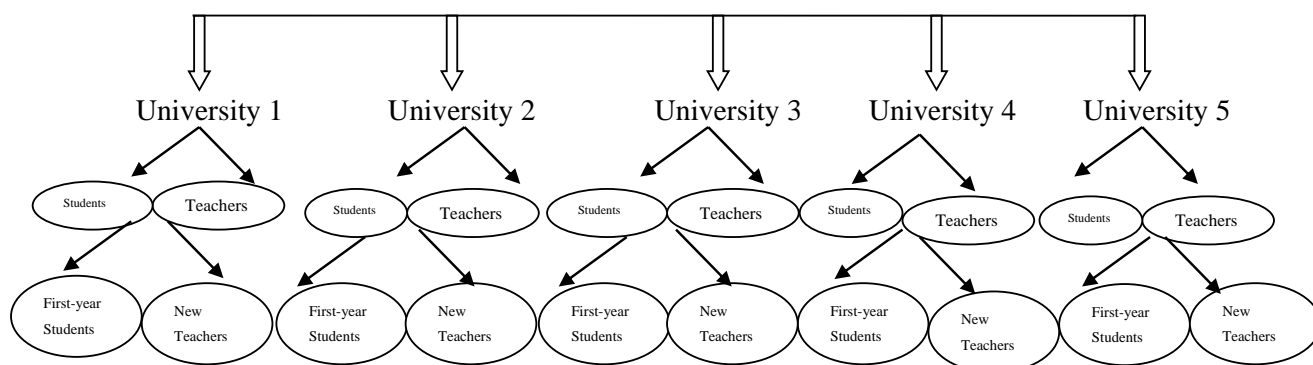


Figure 3.4: Purposive Sampling Design

In case of qualitative data collection an ideal sample size for ethnographic studies was defined as 30-50 cases in case one cultural or homogeneous group (Onwuegbuzie & Collins, 2007, p.289). Therefore to justify the sufficient and reliable sample size for observation and interview of selective users, 1% of the total users' population i.e. five users per university library were selected. The observation was non-participant structured observation as per the users' availability of users who were visiting the library for the first time for searching information sources. Five users per university library were selected and thus wayfinding behavior of total 50 library users was observed followed with administering questionnaire and interviews with them.

For administering interview schedule five first-year library users from each university library were selected as per their convenience and availability. Before administering the interview and questionnaire their wayfinding behavior was observed through structured observation with due consent.

Interviews of subject experts were also conducted with structured interview schedule which consisted of 15 open-ended questions. The motive behind those interviews was to get a clear and in-depth idea about human orientation, its principles and application of HO to libraries (Annexure IV).

Further questionnaires were administered to all 10 university librarians of university libraries in Mumbai. All the 10 librarians returned the filled questionnaires. Thus in order to have more complete and in-depth overview of wayfinding behavior of users and to know how far university libraries in Mumbai are humanely oriented data were collected from university library users as well as university librarians.

3.10 Implementation of Data Collection Tools

3.10.1 Administering the questionnaire

Questionnaires were administered immediately after the enrolment of students for Post Graduate and M. Phil./Ph. D. courses in different universities in Mumbai to catch new users. Formal inquiry and permission from all universities were sought to know their schedules for beginning the PG courses. To administer library users questionnaires researcher visited each university library after communicating with the university librarian regarding students lecture schedule and their availability in the

library. Users questionnaire were administered as per the availability of first-year students in the libraries. Filling up of questionnaire took around 20 minutes by the users. Further collected questionnaires were reviewed by the researcher at the same time and incomplete questionnaires were sorted out. Wherever possible, incomplete questionnaires were completed by the library users on researcher's request on the same day. Some of the users handed over the filled questionnaire on the next day. Very few newly appointed faculty members visited the university libraries during the period of data collection. All available newly appointed faculty members who visited the libraries during the period of data collection phase were filled the questionnaire as the users of respective university libraries. Frequent follow up was taken to get back the filled questionnaires. Total 400 questionnaires were distributed to new library users and 328 filled questionnaire received from library users. In the case of university librarians questionnaire were administered to them after prior communication with them. Frequent follow up was taken to get back the filled questionnaire from university librarians. Some librarians took fifteen days time; some took one month's time to give a filled questionnaire. Some librarians provided scheduled time to meet them personally to fill out the questionnaire with face to face conversation with the researcher. 10 questionnaires were administered to university librarians and all filled questionnaires were received within eight months of time. Responses of the questionnaires are presented in Table 3.2

Table 3.2: Questionnaire Response Rate

Respondents	Distributed	Filled received
PG First-year students	330	284
M. Phil First-year students	20	9
Ph. D. First-year students	40	28
Newly appointed teaching faculties	10	7
Total Library User Participants	400	328
University librarians	10	10

Thus 328 responses were received from different library users including PG, M.Phil. and Ph.D. students as well as newly appointed teaching faculties. The response rate for library users was 82% and the response rate of university librarians was hundred percent.

3.10.2 Profile of Respondents

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 on 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 age groups of the sample is presented in table 3.3.

3.10.3 The Demographic Profile of Participants

As the present study focuses on new users, an emphasis was given to first-year postgraduate students while collecting data. Very few universities provide M. Phil. degrees. As compared to enrolments for Post Graduate degree, strength and enrolments of Ph. D. students is less in addition, Ph.D. students do not visit libraries regularly. Hence it was difficult to approach Ph.D. students. Therefore, first-year students of Post Graduation were the biggest stratum of sample size

Table 3.3: Academic Significance and Age – Cross Tabulation

Academic significance		Age						Total
		21-25	26-30	31-35	36-40	41-45	46-50	
PG - I	Count	253	23	2	2	4	0	284
	% of Total	77.1%	7.0%	.6%	.6%	1.2%	0.0%	86.6%
M. Phil - I	Count	5	3	0	0	1	0	9
	% of Total	1.5%	.9%	0.0%	0.0%	.3%	0.0%	2.7%
Ph. D - I	Count	9	13	2	0	3	1	28
	% of Total	2.7%	4.0%	.6%	0.0%	.9%	.3%	8.5%
Teaching Faculty	Count	0	4	0	1	2	0	7
	% of Total	0.0%	1.2%	0.0%	.3%	.6%	0.0%	2.1%
Total	Count	267	43	4	3	10	1	328
	% of Total	81.4%	13.1%	1.2%	.9%	3.0%	.3%	100.0%

3.10.4 Academic Connotation and Age-wise distribution of participants:

The present study focuses on new users; an emphasis was given to first-year postgraduate students while collecting data. In this context maximum proportion of participants fall under Post Graduate first-year students with maximum students under the age groups between 21-25 years i.e. 77.1% and the total participants under first-year PG degree, to be precise 86.6%, as student enrolment strength capacity for PG degrees are more in all universities as compared to M. Phil as well as Ph. D degrees. Very few universities conduct M. Phil. Programmes. Therefore, the available M. Phil. students concisely 2.7% participants were under the age group of 21-30. The remaining age group mainly represents Ph. D students to be precise 8.5%. During the period of study, 2.1% newly appointed teaching faculty who visited libraries were also covered in the present study.

3.11 Administering the Observation Schedule

Wayfinding behavior of 1% of participants was observed. Five university library users per university library were observed. To achieve this researcher visited ten university libraries with the prepared structured observation schedule. The researcher had a different experience in each university library while observing the library user's wayfinding behavior. Since the population was only first-year students and new users of university libraries observation could not be possible at one time visit. Long time duration was required to perform observation. The strength and enrolment of M. Phil and Ph. D is limited as compared to enrolment of PG degree students. The researcher visited six to seven times to each university library to observe the wayfinding behavior of library users. Hence it was a tiresome and time-consuming task to complete observation. Out of ten university libraries, eight libraries were provided open access to the entire collection. One university library provided partial open access i.e. Open access to PG and Ph. D students and closed access to UG students as well as closed access to thesis collection. One university library had closed access to the entire library collection.

Since presently information sources are available in different forms such as printed books, journals, e-journals, e-books, databases, audio-visual material. Further remote access is also provided by university libraries for the convenience of users. Therefore,

users are not visiting libraries on daily basis for a physical search of a printed collection. Hence, from the targeted 1% population for observation i.e. 50 university library users were observed. The observation schedule was designed to jot down the descriptions of tasks and details about library users approach and their facial expressions and gestures while navigating and finding their way while reaching towards the required information sources in the libraries.

Wherever possible videos and images of observed participants were clicked to study and analyze their facial expressions and wayfinding behavior. Those images and videos showed that major new university library users were in a confused and disoriented state of mind while navigating in university libraries in Mumbai. Detailed data analysis of the observed data is given in Chapter VI.

The observation schedule explored users' facial expressions and behavior through direct observation while navigating in a variety of spaces and library collection and conducted a cause-effect analysis. All the participants were new users to the library who visited the library first time or a couple of times but were not yet familiar with the facilities, spaces and services of the university libraries. A researcher followed the participant from the entrance of the library and noted their actions, spatial movements and behavior including user's facial expressions in the structured observation schedule with the Average Task Completion Time (ATCT). To aid in observing behavior participants photographs and videos were captured with their due consent. Use of OPAC, reaching towards stacking area and essentially finding out the required source of information were the factors considered while observing participants. Besides, situations, where participants have taken hint or assistance from library staff or other users of the library, were also noted.

3.12 Administering the Interview Schedule

While administering the questionnaires selective university library users were interviewed who has been observed before administering the questionnaire. Five library users from each university library were interviewed i.e. 1% of total population, with a structured interview schedule to obtain in-depth information about their wayfinding experiences and to get their feedback and suggestions for the improvements to facilitate better navigation.

3.13 Data analysis

Data analysis in mixed methods research relates to the type of research strategy chosen for the procedures. In the concurrent strategies, a researcher may quantify the qualitative data. This involves creating codes and themes qualitatively, then counting the number of times they occur in the text data (or possibly the extent of talk about a code or theme by counting lines or sentences). This quantification of qualitative data then enables a researcher to compare quantitative results with the qualitative data. Alternatively, an inquirer may quantify qualitative data. The tabulated data was scientifically and systematically studied to determine the underlying, inherent facts or relationships.

- Descriptive interpretation of data including frequencies, percentages, and means was displayed in tables to enhance the meaning of collected data. SPSS 20.0 was used for data analysis.
- Testing of hypotheses was executed using Chi-square and Correlation wherever suitable
- Data available in response to the open-ended questions was analyzed using content analysis.

For the qualitative data, the validation and accuracy were verified and cross-checked with the help of images (Photographs) of users and sings and symbols using SPSS and ATLAS.ti.

ATLAS.ti is a computer program use exclusively for qualitative research or qualitative data analysis. Seventh version of ATLAS.ti was used for the present research work. ATLAS.ti consolidates large volumes of documents and keeps track of all notes, annotations, codes and memos in all fields that require close study and analysis of primary data consisting of text, images audio and video. In the present research ATLAS.ti was used for tracking, annotating and coding images and videos.

In a concurrent study, the quantitative and qualitative data collection may be presented in separate sections or can be merged together right from data collection phase, but the analysis and interpretation combine the two forms of data to seek convergence or similarities among the results (Creswell, 2003, p.280).

In the present study, both qualitative and quantitative data were collected together in the data collection phase. The findings of quantitative data analysis are described in chapter five and the findings of qualitative data analysis are covered in chapter six. Further both qualitative and quantitative findings are interpreted by integrating the same through the use of Framework of Ranganathan's theory of knowledge (PMEST) to get an in-depth overview. On the basis of analysis of objectives and hypotheses testing as well as an overview revealed through use of Framework of Ranganathan's theory of knowledge (PMEST) suggestions and recommendations were presented in chapter seven.

3.14 Summary

Each university library has different architectural plan and physical setting. According to different subjects and specializations, each university has its own unique library collection. Further, every university has different budgetary provision for different resources and facilities. As a result, wayfinding system and wayfinding tools are included under different budget heads like miscellaneous, maintenance, etc. They are also unique in user-friendliness related to wayfinding and problems arise out of these unique facilities, in fact, need to be explored in the case study basis. However, the application of human orientation science to libraries is yet remains un-attended by library professionals. There is an absence of research-based studies in Indian context related to wayfinding in libraries. Hence in present research, user study was carried of all the universities in Mumbai through survey method to get an overview of the self-guidance system provided by these libraries in Mumbai. As the findings of this study will be helpful for other library professionals and researchers to conduct an in-depth case study of one single university library in future research, the researcher selected a survey method with observation, questionnaire, and interview as research tools. 10 university library buildings including branch libraries were selected for the study. Overall 328 new users participated in the study including first-year students of PG, M.Phil. and Ph. D. and newly appointed teaching faculties. In addition, views of the university librarians were also collected from all 10 university libraries including branch libraries through the questionnaire. The present guidance system provided by university libraries in Mumbai was evaluated on the basis of principles provided by Modak and Patkar, the subject experts of Human Orientation Science. To explore HO science and its application to libraries both the subject experts were interviewed to express their views and opinions before conducting the study. The next chapter deals with their interviews, opinions and suggestions about application of HO in libraries.

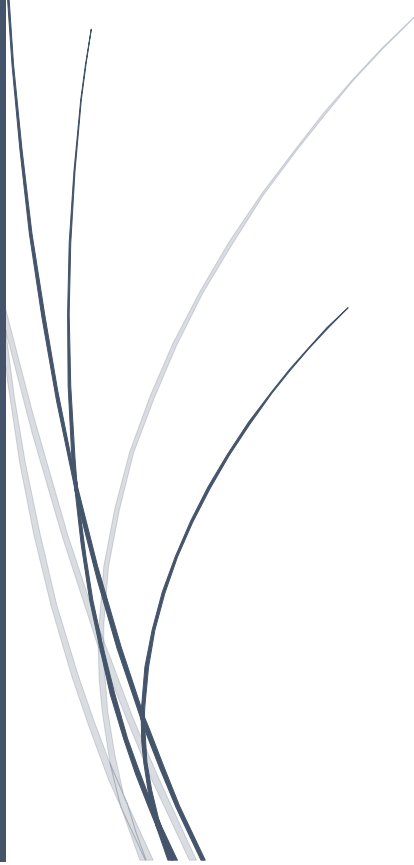
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Chapter 4

**HUMAN ORIENTATION,
CONCEPT AND
APPLICABILITY TO
LIBRARIES**



Chapter 4

Human Orientation, Concept and Applicability to Libraries

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CHAPTER 4

HUMAN ORIENTATION, CONCEPT AND APPLICABILITY TO LIBRARIES

4.1 Introduction

It was observed from the review of literature that the concept of human orientation science was applied to various areas like transport, health and banking sectors in India, till the time of present study.

Hence the present chapter portrays the contribution of two pioneering scholars who promoted the concept of Human Orientation Science in public areas. Further, the chapter presents the application side features (or applicability of HO science in libraries) as a new concept with the help of in-depth interviews of the experts conducted and explored as a part of the research.

Human Orientation Science is an innovative concept as the term ‘Human Orientation Science’ was coined twenty-six years ago, around the year 1993 by Modak and Patkar. This chapter depicts the contribution of two pioneering scholars who promoted the concept of Human Orientation. S. K. Modak is a specialized expert in transportation regional planning and labour economics, and V. N. Patkar is a specialized expert in Operations Research and land-use planning. They have vast experience as consultants of the signage system for public organizations. With the seminal contribution in this area i.e. publication titled ‘Human orientation: Science and Art’, they have advocated human orientation in all public services. Though the concept of HO science was coined in the year 1993, a few studies were available which focus the application of some of the aspects of HO science using other nomenclature as reviewed (Veatch, 1987) in chapter two. The present chapter describes the focal areas of application of HO science in libraries through interviews of these two scholars. Detailed interviews with both the experts elicit following significant points issues and concerns and further explore the areas of applicability of HO science in libraries.

4.2 Research Tool

In-depth interviews of the two experts were mainly conducted. Following probes were used as key descriptors.

- Need triggered
- Earlier literature seen in the area
- Human Orientation discipline
- Emergence of HO science
- Enunciation of HO Principles
- Publication and contents of the book
- Principles of HO and applicability to libraries
- Methodology of HO science
- Applicability of HO science in Libraries

Many open ended explanatory, clarificatory, exploratory, and amplificatory questions were asked. Facets of application like first time user, navigation, wayfinding, signage, physical environment and space planning, etc were inquired. The answers gave precision and clarity as well as direction to research.

4.2.1 Sharing of Experiences: Need triggered

The train journey in Mumbai triggered the need for advocating humanely oriented surroundings in public places in India. In the year 1978 when the authors came to Mumbai for their respective jobs from Nagpur and Delhi, as the new users of the suburban trains in Mumbai, authors were disoriented about the directions while climbing the bridges. Since in case of absence East-West directional signage, while climbing the steps towards foot-over bridges passengers do not feel sure about which is East side or West side of the railway station. Another disturbing factor was that there was no assistance provided by railways in the train to inform on which side of the rail coach the next halting station platform would be. The systems and arrangements provided at public places in India lack user-friendliness. An absence and quality of signage made the life of common man in cities miserable. This pricking concern made them share their experiences as neighbours in the late 1970s.

4.2.2 Nascent Stage

At the same time, at an international level, particularly in the U.S.A., a movement called 'Human Systems Management' (HSM) was launched. Milan Zeleny, a pioneer in this area was contacted and related research studies were reviewed published through a quarterly international journal entitled, *Human Systems Management*, launched in 1980. Zeleny (1988) stressed two complementary facets. One aspect was to optimize and improve the design, management, and performance of any system that serves the people like transport, bank, and hospital or any public place. The other aspect was to manage every system 'humanely'.

At the same time, authors came across a research paper related to transport terminals mainly focusing on the 'visibility indices'. According to Braaksma and Cook (1980), changes in layout or signage can be evaluated in terms of visibility and thus human orientation. Visibility indices facilitate passengers at the airport to find out 'where is what'. Due to the application of visibility indices, passengers were able to locate all the required destinations at the airport right at the entrance. This research paper triggered the initial idea of human orientation.

4.2.3 Human Orientation discipline

According to the experts, the movement called 'Human systems management' led by Milan Zeleny has been the motive behind the emergence of Human Orientation discipline.

4.2.3.1 Human Systems Management

One of the seminal contributions by Zeleny (2005) has been his insight that in many real-life decision situations it is important to design an optimal system, rather than optimizing a given system. According to Zeleny (2005) decision makers need to always evaluate and re-evaluate the system as well as its environment and always be open to seeking opportunities to plan more efficiently and effectively. It is crucial to never take the current system for granted over time. The system will most likely require adjustment, not only due to changes in the legal and competitive environments but also because the goals and objectives of the organization evolve with time.

This is applicable to libraries also since over the period of time, due to technological advancements and changing demands of library users, libraries have converted themselves from learning spaces to community spaces. Thus, there is a need to evaluate and re-evaluate the transforming system of modern libraries.

According to Zeleny (2017) Human Systems Management (HSM) has redefined itself incorporating information technology, knowledge and wisdom management, network organization and human issues of the new economy among its areas of interest. Its three main components, Human-Systems-Management have been meshed and integrated to form a unified organism of thought. Humans are the source of knowledge and systems interactions. The system refers to an integrated whole rather than to separate functioning of specialized parts. Management refers to human coordination of human action in all their effective modes and forms. All three components are equally important. HSM is about the autonomous and purposeful human beings and their interactions with human-created tools of technology and systems - they create it, but do not become it.

Thus HSM focused on better indomitable creativity, innovation and knowledge enhancement concern with the management of both human and technological embedding in system or environment.

At a time when a very few people knew or cared what 'human systems' were about and the need of their management, Modak and Patkar realized and visualized its functional applicability not only for technological embedding but also to make the surrounding or built environments more accessible and user-friendly by discovering Human Orientation Science.

4.2.4 The emergence of Human Orientation Science as a Discipline

At the same time a well known quarterly international journal entitled, Human Systems Management was launched in 1980. The journal fostered HSM and continued promoting HO Science.

Being experts in transportation and regional planning, Modak and Patkar started observing passengers' behaviour while searching for destinations at public transport terminals. In the initial surveys, they observed the rail passengers and noted down the

spots on which they were confused. Their queries with the fellow passengers and responses thereof were systematically noted and analysed. Their analysis revealed the absence of design and sensitivity in many instances to assist the passenger by the service provider. In fact, it also surfaced through their discussions that there was no awareness about the existence of such problems by the railway staff.

The survey led the scholars giving insights into the practices followed in the developed world where ergonomic physical settings eliminating discomfort and inconveniences at a little cost by adopting the scientific human orientation approach and made them promote HO Science by enunciating its principles.

4.2.5 The enunciation of HO principles

They next expanded the scope of their observation-based surveys to cover many other public places like hospitals, theatres, and banks. They also examined the workplaces, residences, household goods, consumer products and equipments. They found a commonality pervading all those provisions namely, a lack of user perspective being taken into account while organizing and operating those services and/or products. That steered them to the enunciation of the commonly applicable twenty principles of the Human Orientation Science.

4.2.6 Publication of Book

They had carried out such survey-based studies and tested their HO principles in varied places like the transport terminal, bank, hospital, museum and so on in the period 1978-93. This experience of about 15 years convinced them that their principles were sound enough and they should be consolidated in the book form to provide an overall view of the HO science as a subject and its applications to guide the designer and producers of products and services. In the meantime, apart from reading across the subjects and reviewing the wide amount of literature, they had sounded their ideas through publishing research papers and chapters, presentations, talks and discussions to sharpen them further. Thus the book titled 'Human Orientation: Science and Art' was published in 1993 cumulating the experiences and nineteen principles of Human Orientation Science. The new Science of human orientation is propounded in this book with the objective of removing shortcomings in the product designs and faults in planning artefacts, work environment, and living

spaces, which result in disorientation, confusion, frustration and uncertainty in everyday life of people.

The book 'Human Orientation: Science and Art' discussed how human orientation is an art as well as science. Further, the authors provided definition of the discipline, with its scope, method of study and nineteen principles of human orientation science. Through a series of examples, authors have identified the deficiencies in the guidance system at public places. In the last chapter, the authors have provided case studies of three public places namely Victoria Rail Terminus, St. George's Hospital and Prince of Wales Museum at Mumbai to highlight the basic approach, the main findings, and relatively low-cost recommendations. These case studies help the readers to visualize the real-life situations, which cause inconveniences and irritations and suggest improvements in human orientation aspects in these public places.

In the new book titled Human Orientation Science (2013), one more principle has been added, which additionally discussed the regulation of queue system and also the research methodology to conduct research while planning and designing pictogram or signage as per the need of built environments and public places.

4.2.7 Principles of HO: applicability to libraries

The twenty Human Orientation principles are based on very keen observation of surroundings, extensive personal experience and intensively intuitive thinking on the root causes of disorientation, inconvenience, confusion, uncertainty and irritation that common people undergo every day. The twenty principles which form the foundation of Human Orientation Science are well explained by the experts. According to these principles Human orientation goes much beyond disciplines like ergonomics which basically deals with interaction between man and machine, kinesics which concerns itself with non-verbal communication, semiotics or semiology which concentrates on finer aspects of sign languages, ekistics which focus on human dimension in architectural design and psychology and sociology which look into the human mind and societal behavior. Its speciality lies in the fact that it lays emphasis on applications and practical aspects. It is also an art which tries to blend individual good with collective good. It traces the origin of irritation and discomfort in everyday life and prescribes a remedy to eliminate it or circumvent it. According to Modak and

Patkar (1993), the term Human Orientation is more inclusive and wider in connotation, which incorporates some aspects of Semiology, Ergonomics, and Cybernetics. It takes into consideration from the human orientation angle, not only directional boards and signs but also wayfinding products and situations.

The twenty principles are universally applicable. Even products and services designers, service providers and managers in the private sector can benefit by applying these HO principles and the approach.

Following are the twenty principles which form the foundation of HO science.

4.2.7.1 First-time visitor

According to this principle, it is presumed that every person visiting a public place is arriving there for the first time and the guidance sign should be designed in such distinct way that the person is not required to make any additional inquiries while finding his way. E.g. university libraries or academic libraries receive freshers or new library users every year. The unfamiliar or unexplored environment creates more tension among first-time library users. Therefore library guidance system should be designed keeping in view the needs of first-time visitors. For example, if a site map is displayed at the entrance of the library building showing the floors, sections, departments, facilities, etc. the first time visitors can also move ahead with surety to the desired location.

4.2.7.2 Location of sign

Location of the sign should be done by identifying the points where visitors tend to get confused and need assistance for choosing the correct direction. E.g. In large libraries information sources are stored in departments that often encompass large open spaces, sometimes, floors. Therefore the placement of appropriate signage at every required point or location is essential. For Example, library floor maps should be available near the main entrance as well as the entry point of each floor of the library.

4.2.7.3 Choice of language and word sets

The choice of words should be simple to understand with the meaning people associate with it. The words should be kept limited in number. E.g. Browsing area, Circulation counter, etc can be a confusing terms for the first time user.

4.2.7.4 Size of letters and color combination

As per the fourth principle of HO science, the color of letters and the background color of the board should be in contrast with each other. Size of letters should be decided on the basis of a distance from which the display board is likely to be read. Selection of a different color is not enough; they should also be in contrast with each other. Experts suggested the use of Johannes Itten's 'Color Wheel' for color contrast in different color combinations. According to the fourth principle of HO science height of letters should be in the proportionate distance for good visibility. Use of smaller font size will result in a lack of readability even though the signs are visible. For height of letters and the distance for good visibility they provided the table, for instance height of letters should be three inches for good visibility from 30 feet. Ben-Bassat, (2013), defined ergonomically designed signs as signs comply with three ergonomic principles of design: sign-content compatibility, familiarity, and standardization. He explained three ergonomic guidelines for the design of traffic signs in order to increase driver comprehension: familiarity – the extent to which the driver is familiar with the sign; compatibility – a combination of three principles (spatial compatibility, conceptual compatibility and physical representation), all relating to how the sign is perceived by the driver; and standardization – the extent to which the codes used for different parameters, such as color and shape, are consistent for all signs. In large libraries signage with bigger font size and with appropriate colour contrast is essential to facilitate more visibility and readability.

4.2.7.5 Height of display

The information display boards should not be fixed so high that either they escape the attention of the visitor or can be read only by upward stretching of a neck. Boards should be fixed at viewer's eye-level. Display information on board horizontally to facilitate ease of readability by a natural sideways movement of eyes. Therefore preferably sign placement should be at eye level so that it can be noticed and read

easily. For instance, if the line of sight is 10 feet, the letter height should approximately be 3/8 inch, if it is 25 feet then 5/8 inch. Libraries serve a wide spectrum of information seekers of varied ages, backgrounds, and educational levels. Therefore, the height of the display should be suitable to make displays clearly visible to all kind of users.

Boards which are vertically placed taller results in difficulty in viewing as the upward angle is difficult owing to the shrinkage effect on the view of normal letters. This affects the user's readability. Letters appear sufficiently large when viewed from close range, but look shortened when they are viewed from the upper angle. In such situations, it is advisable, in the interest of human orientation, to display the information in horizontal spread to facilitate its readability by natural sideways movement of eyes.

4.2.7.6 A Separate display for each function

Use of separate display board describing each function is advisable. Use of common boards for different facilities, defeat the very purpose of providing display boards as per the sixth principle of HO science. E.g. libraries provide different services to users. It is essential to highlight the functional area for the respective service with the separate display such as Reprography section, photocopy service.

4.2.7.7 Universal applicability of symbols

Standardized symbols should be used for easy identification. For universal applicability, symbols should have two characteristics: readability and quick identifiability. E.g. universal sign of libraries is used and recommended globally. Countries like India which have a plethora of languages in different regions should preferably use symbols as it is the most acceptable way of conveying messages as per the seventh principle of human orientation science. As per universal norms, the regulatory or policy kind of signs are shown in circular shapes, the warning or danger-signalling signs in equilateral triangles and informative or guiding signs should be in square shapes, as described in the seventh principle of HO.

4.2.7.8 One word, one function

It is necessary that one specific word or word-set should be consistently used to describe a specific function or a message. E.g. Words or functions like Book lending or Issue-Return counter or circulation counter is used by libraries to describe the lending function. Therefore one specific word should be used on every signage to describe one particular function to avoid confusion among users.

4.2.7.9 Not to dilute the importance of main information

The existence of less important information in between or in close proximity to main information should be avoided as it draws away from the attention of visitor from the main message. If you are leading the visitor to Membership counter, the signage boards like 'Photocopying services available on the 3rd floor from 11.00 a.m. to 2.00p.m. will distract the first time user in the library.

4.2.7.10 No overload of information

According to the tenth principle of HO science voluminous information about rules and regulations, terms and conditions and Do's and Don'ts may result in ignorance of information. The quantity of information the visitors may be willing to read should be taken into consideration. Overload of information may result in neglecting information. Lengthy notices regarding baggage counter like 'Readers are requested to deposit their belongings like big bags, umbrellas and books here' should be avoided. Instead, pictorial description with the signage 'Baggage Counter' will not confuse the newcomer. Librarians being information professionals may tend to provide overloaded information resulting in anxiety and distraction.

4.2.7.11 Utility more than artistry

The message that is intended to be carried should always be considered more important than beauty and artistry. Functional utility criterion should be given more importance than barely making display attractive. Major and minor signs in an exterior and interior sign system separate information by sign size, shape and placement, and yet also create an identity through similarities of size and shape, layout type size and placement. Aesthetically, the shape and sizes of signs are related

to each other to present information consistently. E.g. Libraries with cultural heritage either avoid placement of signage or design the signage in the more artistic form to exhibit their heritage status of library building. Such artistic signs may get neglected or its visibility may get affected.

4.2.7.12 Use of suggestive word sets

Instead of implicit word-sets simple word-sets or symbols can be used for easy understanding. For example instead of the word 'restroom', use of a simple word like 'washroom' or use of a universal symbol of male/female indicators for washroom will be easy to identify for users. Keywords for OPAC searching like 'ornithology' may not provide a clear understanding. Instead the use of simple words like 'birds study' will be easy to understand by a layman or any library user.

4.2.7.13 Order of display

Avoid administrative terms in the initial word-sets of a display. The order of any information provided on display boards should be in conformity with the convenience of readers while the requirement of providers of service should get secondary importance. Signs and displays should be placed logically i.e. progressive from general to specific. In case of academic libraries users use photocopy service for academic purpose only. Forms for students for photocopying should be designed neatly and the copyright rules should follow the personal information.

4.2.7.14 Avoid technical jargon

Simple word-sets should be used for better understanding by common people instead of the use of technical terms. E.g. Instead of the term Documentation Centre, if we use the terms Indexing and abstracting, it will not be confusing for the first time user of the library. Use of the term late fine instead of overdue charges will be desirable.

The third, twelfth and fourteenth principle of human orientation science says that the choice of the set of words on signs should be in conformity with the meaning people associate with it.

4.2.7.15 Avoid handwritten information on boards

Handwritten information may not be legible enough; it may confuse the reader because letters and numbers sometimes look similar. E.g. Notices for orientation programmes in libraries should be printed in legible fonts.

4.2.7.16 Oral information to supplement signage

Sign or display information should be supplemented with oral announcements wherever necessary and possible. Though silence is advisable in reading areas, this can be done for the foyer where a welcoming announcement with directional instructions can be given. Special users need audible signage at certain points such as elevators.

4.2.7.17 Avoid distraction at staircases

As per the seventeenth principle of HO science, from the safety angle, preferably no distracting or eye-catching display boards, signs or pictures should be hung in staircases, as when a person is moving up and down staircases, he has to be more careful in taking steps. Leaving spaces completely blank on all staircase walls are desirable. If circumstances are compelling, only portrait frames may be hung on landing wall facing upstairs movement but never on walls facing downstairs movement. In some heritage libraries, there are photo frames and statues of well-known authors and writers. Placement of the same to the adjoining wall of staircases or near the staircases will distract library users while using staircases.

4.2.7.18 Layout of forms

The layout and the format of the forms and slips to be filled by users should be neat and simple. A complicated layout should be avoided. Enough space should be provided wherever required. E.g. in case of libraries where still manual system is followed, users need to fill printed slips for issuing books within library premises as well as for photocopying of library material. In such slips, users need to fill class numbers and accession numbers on the provided slips. Such words with technical jargon on forms and slips create confusion among library users.

4.2.7.19 Distinguishing between similar sides

Users should be able to distinguish the front and back side of the object. If we apply this to library situations, it is advisable to stick the cover page of the books and blurb after binding.

4.2.7.20 Regulation of queue system

Movement of persons standing in a queue should be regulated in an anti-clockwise direction. The counters or booking offices should preferably be located on the right side of the entrance. This applies to the circulation counter of the libraries.

Thus, to make a user or newcomer more comfortable in a new environment is the main aim of HO science. Therefore, according to principles of HO, the researcher should give more weightage to first-time visitors by just observing their behaviour.

4.2.8 The methodology of HO Science

Modak (2013) suggests the following research methodology for HO Science:

According to him, HO Science chooses to concentrate on the mental process. Its basic methodology is to think intensively as well as sympathetically about other people, observe their actions, facial gestures and behavior very carefully, to anticipate what may be transpiring in their minds, to tie the connections between them and the situations resulting in stress and strains and then work out a strategy which leads to the right solution.

Steps of study and research in HO science, suggested by Modak (2013) are -

- 1) Empathy
- 2) Anticipation
- 3) Identification
- 4) Way towards solution

Empathy means stepping into the role of the other person to get a feel of what may be going on in the mind of the concerned person i.e. thinking for others through 'You Attitude'.

Once this stage is reached effort is made to envision his thought sequence and anticipate the confusion, irritation, inconvenience or uncertainty that the person may be facing in dealing with the situation.

Reasonable anticipation of various possible difficulties smoothens the process of problem identification.

Normally, a solution automatically suggests itself unless the situation is so complex as to defy solution.

According to experts (2013), the HO science believes in a multi-dimensional thought process which comes to grips with problems relating to wayfinding at public places, the usage of things, the physical settings and the situations created around to respond to social and psychological needs.

Thus to apply HO Science, one must have a sympathetic attitude, keen power of observation, broad-based thinking skill and ability to perceive and ponder from the point of view of others. Hence keen observation of people along with user studies or surveys will be the best alternative tool to discover peoples' social and psychological expectations and needs from a particular system design or a physical setting or services.

4.2.9 Applicability of HO in Library Science: Experts' views

Libraries serve as knowledge centres as well as a communication hub where people gather and where information comes alive through various forms of information sources and services. In other words, libraries now see success being linked to their role as public places and destinations. The HO science is related to navigation or wayfinding at public places, the usage of things, the physical settings and the situations created around us to respond to social and psychological needs. According to the subject experts, quite a few attempts to incorporate human orientation aspects in system design for libraries were made by Pollet and Haskell (1979) through studies on signage systems in libraries in developed countries.

They suggested that human orientation science will definitely play an important role here to anticipate and draw out causes of difficulties and irritations experienced by both users of the library as well as library staff in their day to day work.

In order to apply HO science principles in the (physical) libraries, Patkar suggested that librarians map the library activities and service delivery modes against those principles appropriately. That would reveal the gaps and shortcomings. The HO principles would also prompt the possible solutions. User surveys and user studies could further supplement in identifying the problems to execute the necessary actions and check again with the users in due course to validate their usefulness.

He further suggested that similar surveys will have to be designed also for digital libraries. Actions and steps there will be of entirely different nature like improving the look and navigation scheme of the library website.

According to Modak visibility is always low between book stacks of libraries. Further, in the case of libraries, he has observed that the shelves in the libraries are very high, and the books are shelved right from the bottom till the ceiling. Users prefer searching and referring books which are at eye level and easily accessible to search. Therefore a survey should be conducted to find out users' behaviour and preferences while searching for books on the shelves. Since users are not able to read the titles of books shelved on higher shelves and even those shelved at the too lower level. Modak further specified that there are Laws of Library science by Dr S. R. Ranganathan viz., 'Books are for use' and 'Every user has his/her book'. Therefore it should be a topic of research for library professionals to compare the visibility level and ease and comfort level of library shelves from the point of view of users.

They have provided a number of examples with illustrations to apply HO science in academic institutions and its libraries. Display of site map and floor maps at the entrance of the college building to indicate the location of the principal's office, library, staff room, etc. to avoid time-consuming inquiries at the entrance gate is one such suggestion (Modak, 2003, p.50). Another example explained by them is about excessive commercialization and attractive packaging. Due to excessive commercialization manufacturers and publishers often do attractive packaging of their products, yet after removing this attractive packaging the real product may create

confusion while using or searching the same product or information source in case of libraries. For example, in the case of hardcover books having book jackets, the publishers often make the book jackets more attractive and colourful. But when the jackets are removed the plain hardcover of both sides makes it difficult for readers to search for the same book. Further, they suggested that Library Science researchers can study and survey the visibility and utility of library signage system in different types of libraries.

4.3 Conclusion

According to the experts, there are many gaps awaiting to be filled by putting a step towards applying HO principles in many public places in India including libraries. They specified that human minds should be trained to anticipate or identify the situation where a state of indecision, confusion, and discomfort is encountered by people but how that skill of intuition can be developed for capturing human orientation angle is yet to be discovered. According to them by assuming that no product, process or system is perfect, analyzing complaints, examining product specifications, visualizing the difficulties in their usage and then altering or creating better designs will aid in capturing and measuring HO angles.

In the case of libraries, the scope is immense to observe and measure HO angles and principles. Libraries are unique in their own way in the sense that their floor plans and architectural designs are totally different according to the type of library. Libraries 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 create an additional problem. Many of them are of the same size and shape. They are stored in large number of linear feet of shelving. Even though the collection is organized with the help of a 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 differentiating features 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.

In any 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. It happens when the students move from schools to colleges and colleges to universities. In schools they hardly use libraries and if they use, they are too small. In addition, every year libraries add new users. Users unfamiliar with the libraries engage in wayfinding and navigation and this process can be either aided or frustrated by the environment they encounter. Application of HO principles in libraries will help in creating a comprehensive, clear and consistent visual communication system with concise messaging. 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 observing the user behavior, by visualizing their reactions to the surroundings of libraries, librarians can make their libraries more accessible and user-friendly.

These interviews offered valuable insight with reference to the research on human orientation in libraries. Everybody accepts that a Customer is a King, the customer has so far seemed to have been restricted to be a passive recipient of products and services from libraries. Library professionals need to apply 'you attitude' to find out customer perspectives and need to facilitate user-friendly and welcoming libraries.

Citation:

(Rakshikar, N., & Powdwal, S. (2019). Human Orientation: Origin, Concept and Applicability to Libraries-Dialogue with Pioneers. *Library Herald*, 57(3), 298-314.)

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Chapter 5

**QUANTITATIVE DATA
ANALYSIS AND FINDINGS**

Chapter 5

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CHAPTER 5

QUANTITATIVE DATA ANALYSIS AND FINDINGS

SECTION –I RESPONSE FROM LIBRARY USERS: PERSONALITY FACET

5.1 Introduction

Information behavior is a key research area in both librarianship and information science and this concept encompasses a wide array of information behavior 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 the library, information, and resources, helping users find the information they might miss otherwise.

The present chapter focuses on the wayfinding experiences of university library users in Mumbai by conducting a user study on the wayfinding behavior of university library users through a questionnaire. It further illustrates the physical facilities and services provided by libraries as per the opinions of university librarians gathered through a questionnaire and personal interaction with librarians.

This research adopts Golledge's two-pronged approach (Golledge, 1979, p.20) and takes into consideration both physical and psychological aspects studying facets of human orientation provided by university libraries. The views and opinions were gathered from library users as well as librarians. Quantitative or physical aspects are covered in the present chapter. The chapter is divided into two sections. First section deals with the user's responses, and the next section deals with the librarians' views and opinions. The sub-sections of users' questionnaire responses are divided as per the facets of Human orientation science.

The first section presents the analysis and findings of the user study conducted through the user's questionnaire, and opinions of university librarians were presented in the second section by analyzing the librarian's questionnaire. The present chapter focused on the personality facet of PMEST. Section I explored users' opinions and experiences about available guidance system and Section II explored university librarians' views and constraints faced by them while facilitating humanely oriented library.

Psychological aspects based on qualitative records are covered in the next chapter. The primary qualitative data was collected through selective user interviews, selective user observations and the university library's building observations are covered in next chapter. The sixth chapter focused on Energy and Time facet in section I, Matter facet in section II and Space facet in section III, and Personality, time and space dimension of PMEST in section IV.

University libraries are housed in huge buildings on widespread university campuses. They receive and serve varied type of library users every year. Every user has his/her own navigation and wayfinding experience. Navigation services communicate optimal routes to users by providing sequences of instructions for these routes. Every single instruction guides the way-finder from one decision point to the next. To explore the wayfinding experiences of users, the researcher seeks information through conducting a user study of university library users. This is because such studies are directly related to library users contributing to the exploration of university library users' experience of wayfinding and their opinion about the available guidance system. The findings of such a study will aid in improving the guidance system in university libraries.

SECTION – I: USERS STUDY ANALYSIS

5.2 Wayfinding

Wayfinding accepts the goal of trying to understand human spatial orientation and behavior processes. Improved wayfinding cues result in lessening 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 the library as a public place. The present section covers library users' opinions regarding wayfinding experiences obtained. Since the question was multiple choice one; hence percentage of case were also considered.

5.2.1 Sources used for wayfinding inquiry:

Table 5.1: Sources of Inquiry for Wayfinding within Campus

Sources of inquiry	Responses		Percent of Cases
	Percent	N	
Inquiry of routes with passerby	41.4%	187	57.01%
Personal inquiry at counter	25.7%	116	35.36%
Directional signs	16.4%	74	22.56%
Campus map as source of inquiry	12.6%	57	17.37%
Other source of inquiry	4.0%	18	5.48%
Total	100.0%	452	138%

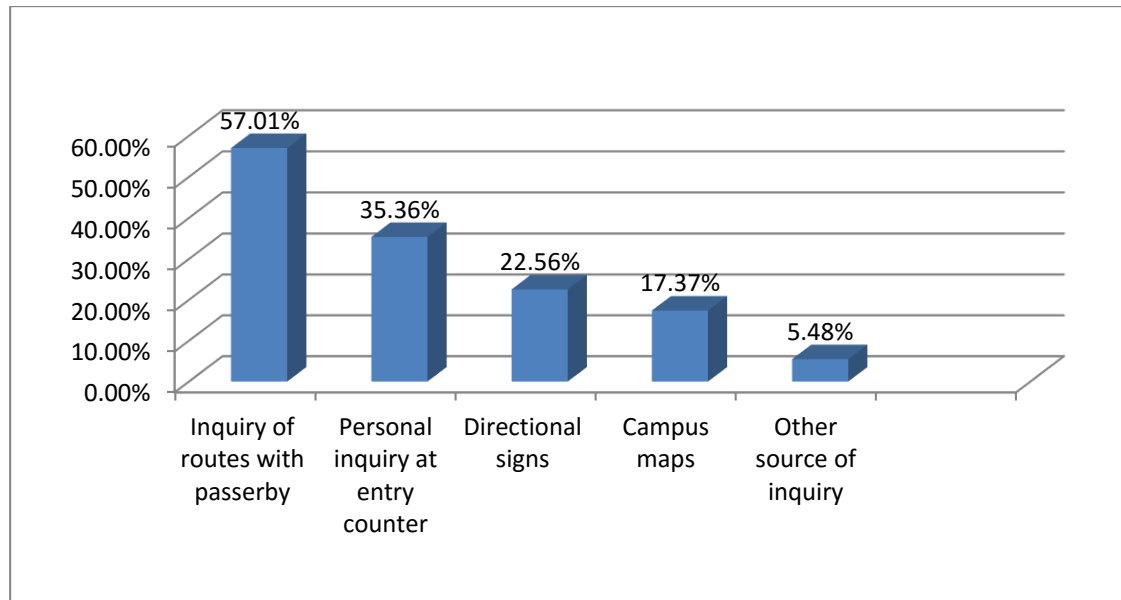


Figure 5.1: Sources of Inquiry for Wayfinding

Figure 5.1 (Table 5.1) 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 was the highest, i.e. 57.01%, followed by personal inquiry at the counter while wayfinding to specify exactly 35.36%. Very few users, i.e. 22.56%, use

directional signs and 17.37% of users use campus maps for wayfinding. Information kiosks were not available in any university campuses out of ten. In the case of one university, information kiosk was available near the library entrance; however, it was not in working condition, as shown in Table 6.12. Hence participants didn't used information kiosk as a wayfinding tool under the study. In the case of other sources, help from friends (5.48%) was the highest source of inquiry used for wayfinding.

Table 5.1 (A): University-wise Sources Used for Wayfinding within Campus

Inquiry sources	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
						Campus map	Library 1		
	Library 2	27	.07	.267	.051	-.03	.18	0	1
	Library 3	28	.14	.356	.067	.00	.28	0	1
	Library 4	26	.04	.196	.038	-.04	.12	0	1
	Library 5	23	.09	.288	.060	-.04	.21	0	1
	Library 6	100	.35	.479	.048	.25	.45	0	1
	Library 7	29	.03	.186	.034	-.04	.11	0	1
	Library 8	23	.17	.388	.081	.01	.34	0	1
	Library 9	31	.06	.250	.045	-.03	.16	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.17	.379	.021	.13	.22	0	1
Directional signs	Library 1	26	.31	.471	.092	.12	.50	0	1
	Library 2	27	.33	.480	.092	.14	.52	0	1
	Library 3	28	.39	.497	.094	.20	.59	0	1
	Library 4	26	.50	.510	.100	.29	.71	0	1
	Library 5	23	.17	.388	.081	.01	.34	0	1
	Library 6	100	.20	.402	.040	.12	.28	0	1
	Library 7	29	.14	.351	.065	.00	.27	0	1
	Library 8	23	.09	.288	.060	-.04	.21	0	1
	Library 9	31	.10	.301	.054	-.01	.21	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.23	.419	.023	.18	.27	0	1

Inquiry sources	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Inquiry of routes with passerby	Library 1	26	.50	.510	.100	.29	.71	0	1
	Library 2	27	.52	.509	.098	.32	.72	0	1
	Library 3	28	.25	.441	.083	.08	.42	0	1
	Library 4	26	.62	.496	.097	.41	.82	0	1
	Library 5	23	.48	.511	.106	.26	.70	0	1
	Library 6	100	.73	.446	.045	.64	.82	0	1
	Library 7	29	.55	.506	.094	.36	.74	0	1
	Library 8	23	.39	.499	.104	.18	.61	0	1
	Library 9	31	.71	.461	.083	.54	.88	0	1
	Library 10	15	.40	.507	.131	.12	.68	0	1
	Total	328	.57	.496	.027	.52	.62	0	1
Information kiosk	Library 1	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 2	27	0.00	0.000	0.000	0.00	0.00	0	0
	Library 3	28	0.00	0.000	0.000	0.00	0.00	0	0
	Library 4	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	0.00	0.000	0.000	0.00	0.00	0	0
	Library 7	29	0.00	0.000	0.000	0.00	0.00	0	0
	Library 8	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 9	31	0.00	0.000	0.000	0.00	0.00	0	0
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	0.00	0.000	0.000	0.00	0.00	0	0
Personal inquiry	Library 1	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 2	27	.19	.396	.076	.03	.34	0	1
	Library 3	28	.36	.488	.092	.17	.55	0	1
	Library 4	26	.31	.471	.092	.12	.50	0	1
	Library 5	23	.39	.499	.104	.18	.61	0	1
	Library 6	100	.38	.488	.049	.28	.48	0	1
	Library 7	29	.52	.509	.094	.32	.71	0	1
	Library 8	23	.30	.470	.098	.10	.51	0	1

Inquiry sources	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
	Library 9	31	.45	.506	.091	.27	.64	0	1
	Library 10	15	.67	.488	.126	.40	.94	0	1
	Total	328	.35	.479	.026	.30	.41	0	1
Other source of inquiry	Library 1	26	.23	.652	.128	-.03	.49	0	2
	Library 2	27	.15	.456	.088	-.03	.33	0	2
	Library 3	28	.11	.315	.060	-.01	.23	0	1
	Library 4	26	.08	.392	.077	-.08	.24	0	2
	Library 5	23	.13	.344	.072	-.02	.28	0	1
	Library 6	100	.11	.469	.047	.02	.20	0	3
	Library 7	29	.24	.786	.146	-.06	.54	0	4
	Library 8	23	.39	1.033	.215	-.06	.84	0	3
	Library 9	31	.06	.250	.045	-.03	.16	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.14	.531	.029	.09	.20	0	4

Note: 0- Not ticked, 1- Ticked

The mean score of the responses indicates that the campus map was highly used by Library 6 for finding a way around the campus (Table 5.1(A)). Information kiosks were not used by participants of any library as kiosks were not available in any of the library under the study according to the observational findings (Table 6.12). Personal inquiry for wayfinding was heavily used by Library 10 due to the absence of guidance tools within the campus (Table 6.12). In the case of other sources of inquiry, participants had taken the help of friends or inquired at the security counter. The participants of Library 8 greatly used other sources of inquiry.

Though other sources and signs were available for wayfinding in all the libraries, the total mean scores of the responses shows that Inquiry of routes with passerby (.57) and personal inquiry as a source of inquiry was heavily used by users (.35). Thus the findings from the total mean scores represent that available signage was inadequate for satisfying wayfinding inquiries of users (Table 5.1(A)).

5.2.2 Availability, Visibility and Readability of Campus Map

Through maps, visitors obtain a vision about places they had never seen or imagined. Table 5.2 describes the scenario of availability, visibility and readability of campus maps.

Table 5.2: Availability, Visibility, and Readability of Campus Map

Particulars	Responses		Responses	
	Yes	Percent	No	Percent
Available	190	57.9	138	42.1
Visible	166	87.36%	24	12.63%
Readable	159	83.68%	31	16.31%

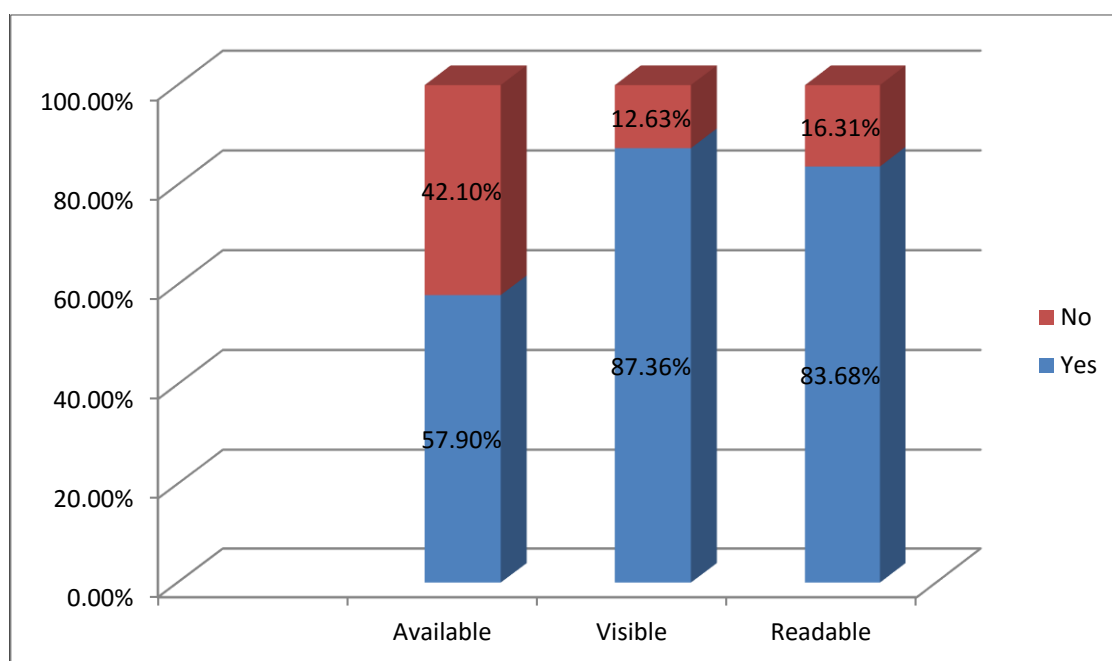


Figure 5.2: Existence, Visibility, and Readability of Campus Map

Table 5.2/Figure 5.2 revealed that 57.9% of participants opined that campus map was available either at the university entrance or at decision points. However, 42.10% of participants replied that the campus map was not available in the university libraries in Mumbai.

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, out of those, 87.36% agreed that it was visible and 83.68% agreed that campus maps were readable. The remaining merely 12.63% of participants opined that the campus map was not visible, and in case of readability, 16.31% opined that the campus map was not readable.

5.2.3 The Utility of Campus Map

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.

Table 5.3: Utility of Campus Map

Particulars	Responses	
	N	Percent
Where am i going	84	44.2%
How i will get..	106	55.8%
Total	190	100.0%

Although 57.9% (190) participants opined that campus map was available either at the entrance of university or at decision points, from that merely 55.8% participants agreed that campus map was helpful to answer 'How I will get there', and 44.2% participants agreed that the campus map was helpful to answer 'where am I going'. (Table 5.3).

Table 5.3 (A): Library-wise Availability, Readability, Visibility and Utilities of Campus Maps

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Lower Bound		
Campus map at the entrance	Library 1	26	1.00	0.000	0.000	1.00	1.00	1	1
	Library 2	27	.41	.501	.096	.21	.61	0	1
	Library 3	28	.21	.418	.079	.05	.38	0	1
	Library 4	26	.38	.496	.097	.18	.59	0	1
	Library 5	23	.48	.511	.106	.26	.70	0	1
	Library 6	100	.96	.197	.020	.92	1.00	0	1
	Library 7	29	.28	.455	.084	.10	.45	0	1
	Library 8	23	.87	.344	.072	.72	1.02	0	1
	Library 9	31	.03	.180	.032	-.03	.10	0	1
	Library 10	15	.07	.258	.067	-.08	.21	0	1
	Total	328	.58	.494	.027	.53	.63	0	1
Visibility of campus map	Library 1	26	.81	.402	.079	.65	.97	0	1
	Library 2	27	2.04	1.224	.236	1.55	2.52	0	3
	Library 3	28	2.54	.922	.174	2.18	2.89	0	3
	Library 4	26	2.19	1.059	.208	1.76	2.62	0	3
	Library 5	23	1.96	1.147	.239	1.46	2.45	0	3
	Library 6	100	1.03	.460	.046	.94	1.12	0	3
	Library 7	29	2.31	1.168	.217	1.87	2.75	0	3
	Library 8	23	1.17	.778	.162	.84	1.51	0	3
	Library 9	31	2.94	.359	.065	2.80	3.07	1	3
	Library 10	15	2.87	.516	.133	2.58	3.15	1	3
	Total	328	1.77	1.081	.060	1.65	1.89	0	3
Readability of campus map	Library 1	26	.85	.368	.072	.70	.99	0	1
	Library 2	27	2.11	1.121	.216	1.67	2.55	0	3
	Library 3	28	2.57	.836	.158	2.25	2.90	1	3
	Library 4	26	2.19	1.059	.208	1.76	2.62	0	3
	Library 5	23	1.87	1.254	.262	1.33	2.41	0	3

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Lower Bound		
	Library 6	100	.95	.539	.054	.84	1.06	0	3
	Library 7	29	2.31	1.168	.217	1.87	2.75	0	3
	Library 8	23	1.13	.815	.170	.78	1.48	0	3
	Library 9	31	2.94	.359	.065	2.80	3.07	1	3
	Library 10	15	2.87	.516	.133	2.58	3.15	1	3
	Total	328	1.75	1.106	.061	1.63	1.87	0	3
Campus map utility to answer where am I going	Library 1	26	.58	.504	.099	.37	.78	0	1
	Library 2	27	1.89	1.396	.269	1.34	2.44	0	3
	Library 3	28	2.46	1.071	.202	2.05	2.88	0	3
	Library 4	26	2.00	1.327	.260	1.46	2.54	0	3
	Library 5	23	1.78	1.347	.281	1.20	2.37	0	3
	Library 6	100	.42	.554	.055	.31	.53	0	3
	Library 7	29	2.31	1.168	.217	1.87	2.75	0	3
	Library 8	23	.83	.984	.205	.40	1.25	0	3
	Library 9	31	2.90	.539	.097	2.71	3.10	0	3
	Library 10	15	2.87	.516	.133	2.58	3.15	1	3
	Total	328	1.49	1.320	.073	1.35	1.63	0	3
Campus map utility to answer How I will get..	Library 1	26	.50	.510	.100	.29	.71	0	1
	Library 2	27	2.11	1.121	.216	1.67	2.55	0	3
	Library 3	28	2.50	1.000	.189	2.11	2.89	0	3
	Library 4	26	2.12	1.177	.231	1.64	2.59	0	3
	Library 5	23	1.83	1.302	.272	1.26	2.39	0	3
	Library 6	100	.55	.557	.056	.44	.66	0	3
	Library 7	29	2.28	1.222	.227	1.81	2.74	0	3
	Library 8	23	.87	.968	.202	.45	1.29	0	3
	Library 9	31	2.94	.359	.065	2.80	3.07	1	3
	Library 10	15	2.80	.775	.200	2.37	3.23	0	3
	Total	328	1.56	1.267	.070	1.42	1.70	0	3

Note: 0- No, 1-Yes, 3-Not Applicable/Not available

The total mean score for the factor, the existence of campus maps, represents that in the case of a few universities, there was an absence of availability of campus maps (.58) at the entrances of the campuses. In the case of visibility (1.77) and readability (1.75), the total mean scores of respondents highlights that excluding a few libraries, participants replied satisfactorily about visibility and readability of campus maps (Table 5.3(A). As per observational findings, only in three university campuses, campus maps were available yet major participants from all the libraries replied positively about the availability of campus map and responded that it might be available, but they have not seen the same (Table 6.23).

In the case of the utility of campus maps total mean score of directional based support maps (1.56) was higher as compared to location-based supportive maps (1.49). It represented that, the utility of campus map to answer How I will get at a particular location, i.e. maximum maps with directional based support services were available at the entrances or within the campuses of university libraries.

5.2.4 Time Required to Reach Library from Campus Gate

Effective signage within the university campus will minimize the time in inquiries while reaching the library for new visitors. However, the time requirement of way finders from the campus gate to the library also depends upon the distance between the campus entrances till the library. Yet, the existence of a guidance system within the campus will affect time requirement; hence the question was raised about the same.

Table 5.4: Time Required Reaching Library from Campus Gate

Reaching Time	Frequency	Percent
Less than five minutes	148	45.1
Within five to ten minutes	72	22.0
More than ten minutes	108	32.9
Total	328	100.0

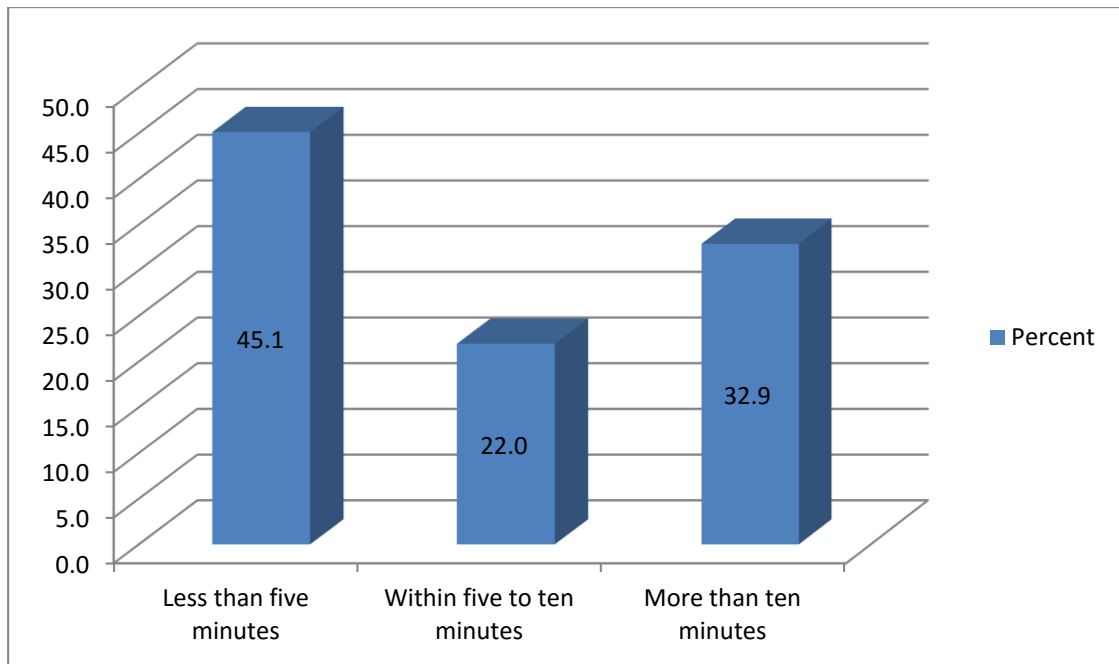


Figure 5.3: Time Required Reaching Library from Campus Gate

Figure 5.3 represents that 45.1% of participants were able to reach the library from the campus gate within less than five minutes. However, 22% of participants required more than five minutes up to ten minutes to reach the library. However, 32.9% of participants required more than ten minutes to reach the library from the university campus gates (Table 5.4).

On the other hand, as per the field observation of the researcher, all the university libraries under research are at the average walkable distance of five minutes from the entrance of the campuses.

5.2.5 Number of Times Stop for Directional Guidance

The 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 the library.

Table 5.5: 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	

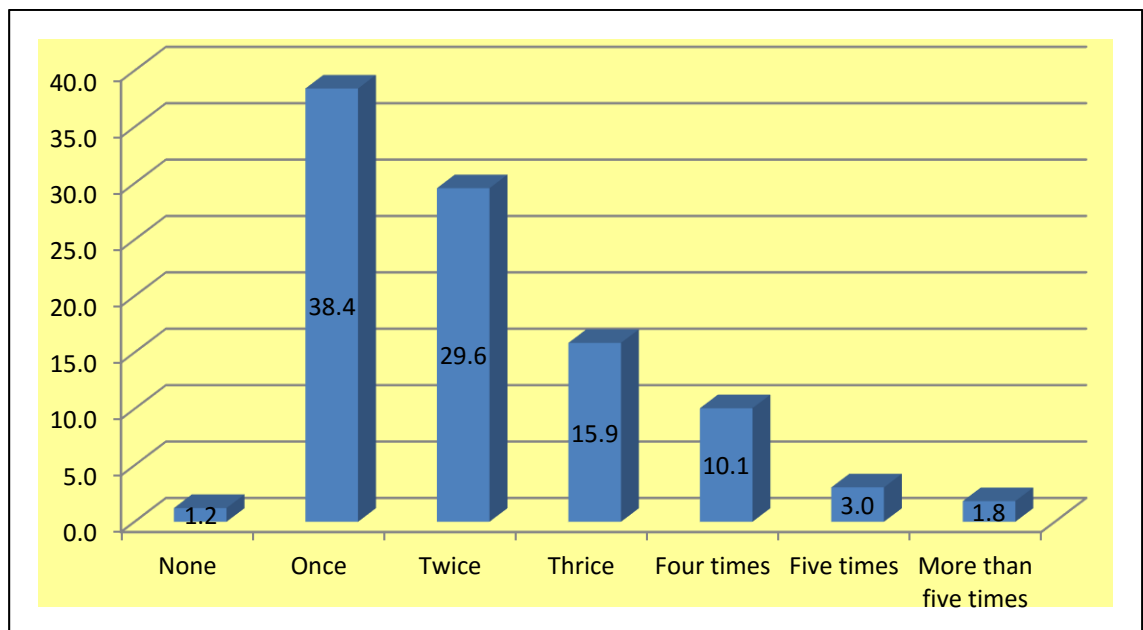


Figure 5.4: Number of Times Stop for Directional Guidance

In the case of numbers of stop for directional guidance taken by users were measured, the following results emerged. Figure 5.4/ (Table 5.5) highlights that maximum that is 38.4% visitors of university libraries stopped once 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. Merely 1.2% of participants replied that they did not stop for the directional guidance while finding their way in the library as well as during the information search process.

Table 5.5 (A): Number of times stopped for directional inquiry – Library-wise

Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
					Library 1	26		
Library 2	27	1.67	.920	.177	1.30	2.03	0	5
Library 3	28	1.39	1.066	.201	.98	1.81	0	6
Library 4	26	1.85	.732	.143	1.55	2.14	1	3
Library 5	23	1.52	.898	.187	1.13	1.91	1	4
Library 6	100	2.59	1.280	.128	2.34	2.84	1	6
Library 7	29	1.93	1.361	.253	1.41	2.45	0	5
Library 8	23	2.48	1.123	.234	1.99	2.96	1	4
Library 9	31	2.13	1.284	.231	1.66	2.60	1	5
Library 10	15	2.53	1.846	.477	1.51	3.56	1	6
Total	328	2.12	1.246	.069	1.98	2.25	0	6

Note: 0-None, 1-Once, 2-Twice, 3-Thrice, 4-Four times, 5- Five times, 6- More than five times

The mean score of the user’s frequency of stopping for directional inquiry highlights that participants of Library 6, Library 10 and Library 8 stopped the maximum time for directional inquiry from the library gate till the actual destination and the information source. However, the total mean score (2.12) represents that maximum participants from all the libraries stopped for at least twice for directional inquiry from the library gate till the actual destination and the information source (Table 5.5(A)).

5.2.6 Sources Used for Instructional Help

There were various sources and guides used by the readers that help them in wayfinding.

Table 5.6: Sources Used for Instructional Help in Library Building

Particulars	Responses		Percent of Cases
	N	Percent	
Library staff	186	44.4%	56.7%
Other library users	119	28.4%	36.2%
Library guides	43	10.3%	13.1%
No help was required	40	9.5%	12.1%
Instructional manuals	22	5.3%	6.7%
Other	9	2.1%	2.8%
Total	419	100.0%	128.1%

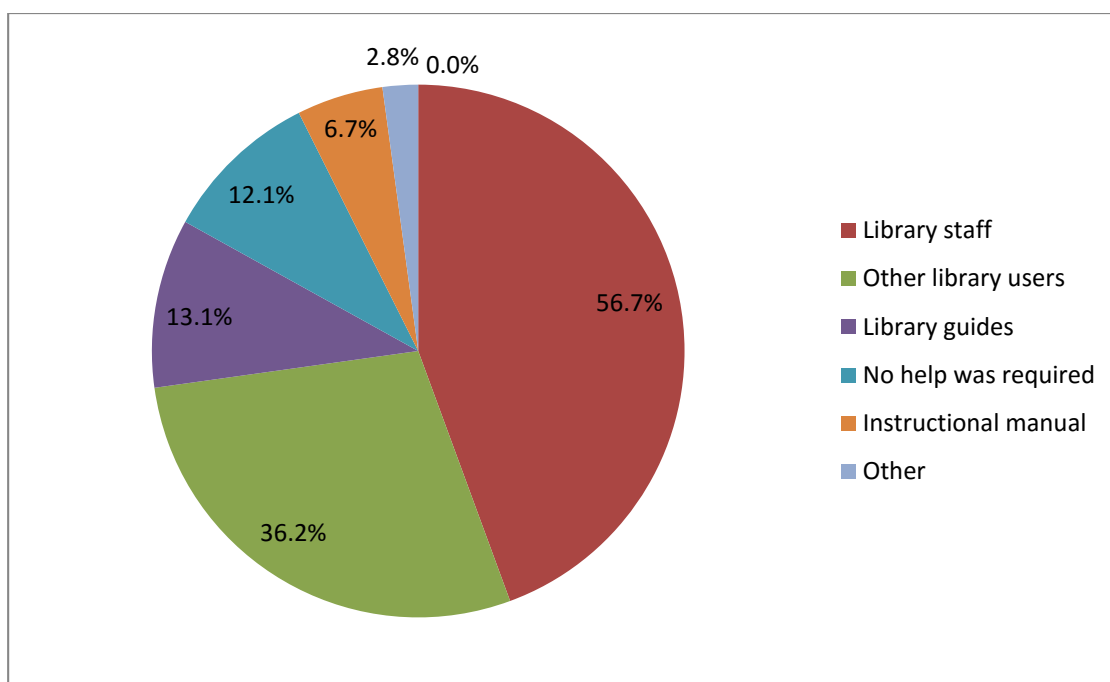


Figure 5.5: Sources Used for Instructional Help

The use is shown in Table 5.6 while moving around in the library, and while searching for information sources, 56.7% of library users consulted library staff for the instructional help till reaching the destination or source. 36.2% of library users taken other library users help for the same. 13.1% of participants noted that they used instructional manuals available at the library counters. Very few users, to be exact 12.1% users able to find their way and required information source without any help. In the case of others, they have taken the help of seniors and friends.

Table 5.6 (A): Library-wise Sources Used for Instructional Help

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Instructional manual	Library 1	26	.08	.272	.053	-.03	.19	0	1
	Library 2	27	.07	.267	.051	-.03	.18	0	1
	Library 3	28	.07	.262	.050	-.03	.17	0	1
	Library 4	26	.08	.272	.053	-.03	.19	0	1
	Library 5	23	.09	.288	.060	-.04	.21	0	1
	Library 6	100	.09	.288	.029	.03	.15	0	1
	Library 7	29	.07	.258	.048	-.03	.17	0	1
	Library 8	23	.04	.209	.043	-.05	.13	0	1
	Library 9	31	0.00	0.000	0.000	0.00	0.00	0	0
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.07	.251	.014	.04	.09	0	1
Library guides	Library 1	26	.12	.326	.064	-.02	.25	0	1
	Library 2	27	.11	.320	.062	-.02	.24	0	1
	Library 3	28	.04	.189	.036	-.04	.11	0	1
	Library 4	26	.23	.430	.084	.06	.40	0	1
	Library 5	23	.04	.209	.043	-.05	.13	0	1
	Library 6	100	.24	.429	.043	.15	.33	0	1
	Library 7	29	.07	.258	.048	-.03	.17	0	1
	Library 8	23	.09	.288	.060	-.04	.21	0	1
	Library 9	31	0.00	0.000	0.000	0.00	0.00	0	0
	Library 10	15	.07	.258	.067	-.08	.21	0	1
	Total	328	.13	.338	.019	.09	.17	0	1
Library Staff	Library 1	26	.58	.504	.099	.37	.78	0	1
	Library 2	27	.48	.509	.098	.28	.68	0	1
	Library 3	28	.43	.504	.095	.23	.62	0	1
	Library 4	26	.54	.508	.100	.33	.74	0	1

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
						Library 5	23		
Library 6	100	.58	.496	.050	.48	.68	0	1	
Library 7	29	.62	.494	.092	.43	.81	0	1	
Library 8	23	.35	.487	.102	.14	.56	0	1	
Library 9	31	.68	.475	.085	.50	.85	0	1	
Library 10	15	.60	.507	.131	.32	.88	0	1	
Total	328	.57	.496	.027	.51	.62	0	1	
Other library users	Library 1	26	.23	.430	.084	.06	.40	0	1
	Library 2	27	.26	.447	.086	.08	.44	0	1
	Library 3	28	.25	.441	.083	.08	.42	0	1
	Library 4	26	.31	.471	.092	.12	.50	0	1
	Library 5	23	.22	.422	.088	.04	.40	0	1
	Library 6	100	.47	.502	.050	.37	.57	0	1
	Library 7	29	.31	.471	.087	.13	.49	0	1
	Library 8	23	.39	.499	.104	.18	.61	0	1
	Library 9	31	.52	.508	.091	.33	.70	0	1
	Library 10	15	.33	.488	.126	.06	.60	0	1
	Total	328	.36	.482	.027	.31	.42	0	1
No help was required	Library 1	26	.12	.326	.064	-.02	.25	0	1
	Library 2	27	.26	.447	.086	.08	.44	0	1
	Library 3	28	.25	.441	.083	.08	.42	0	1
	Library 4	26	.12	.326	.064	-.02	.25	0	1
	Library 5	23	.04	.209	.043	-.05	.13	0	1
	Library 6	100	.09	.288	.029	.03	.15	0	1
	Library 7	29	.03	.186	.034	-.04	.11	0	1
	Library 8	23	.22	.422	.088	.04	.40	0	1
	Library 9	31	.10	.301	.054	-.01	.21	0	1
	Library 10	15	.07	.258	.067	-.08	.21	0	1
	Total	328	.12	.328	.018	.09	.16	0	1

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Other	Library 1	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 2	27	.07	.385	.074	-.08	.23	0	2
	Library 3	28	.04	.189	.036	-.04	.11	0	1
	Library 4	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 5	23	.17	.576	.120	-.08	.42	0	2
	Library 6	100	.04	.197	.020	.00	.08	0	1
	Library 7	29	.14	.441	.082	-.03	.31	0	2
	Library 8	23	.04	.209	.043	-.05	.13	0	1
	Library 9	31	.03	.180	.032	-.03	.10	0	1
	Library 10	15	.13	.516	.133	-.15	.42	0	2
	Total	328	.06	.292	.016	.03	.09	0	2

Note: 0-Not ticked, 1- Ticked

As per Table 5.6(A), the total mean score for instructional manuals (.07) represents that very few libraries provided instructional manuals. It was observed during field observation that only a single library provided instructional manuals (Chapter 6, Table 6.25). Further, library guides (0.13) were inadequate. Library 5 has the highest mean in the case of approaching staff for instructional help due to the absence of a signage system. Library 9 has the highest mean in taking help from other library users due to poor signage system and absence of location of sources in OPAC.

The total mean score of library staff (.57) and other library users (.36) as a source of instructional help was very high, which indicates that the existing signs and other wayfinding tools were not sufficient in all the libraries for participants to confidently accomplishing tasks of wayfinding and information search process. Further, the total mean of instructional manuals and library guides represents that participants in all the libraries rarely used both (Table 5.6(A)).

5.2.7 Utility of Available Wayfinding System to Provide Direction

The available sign system should be effective and interactive. Besides, signs should be placed at the right location at decisive points to provide the right direction.

Table 5.7: Utility of Available Wayfinding System to Provide Direction

Particulars	Frequency	Percent
Yes	208	63.4
No	120	36.6
Total	328	100.0

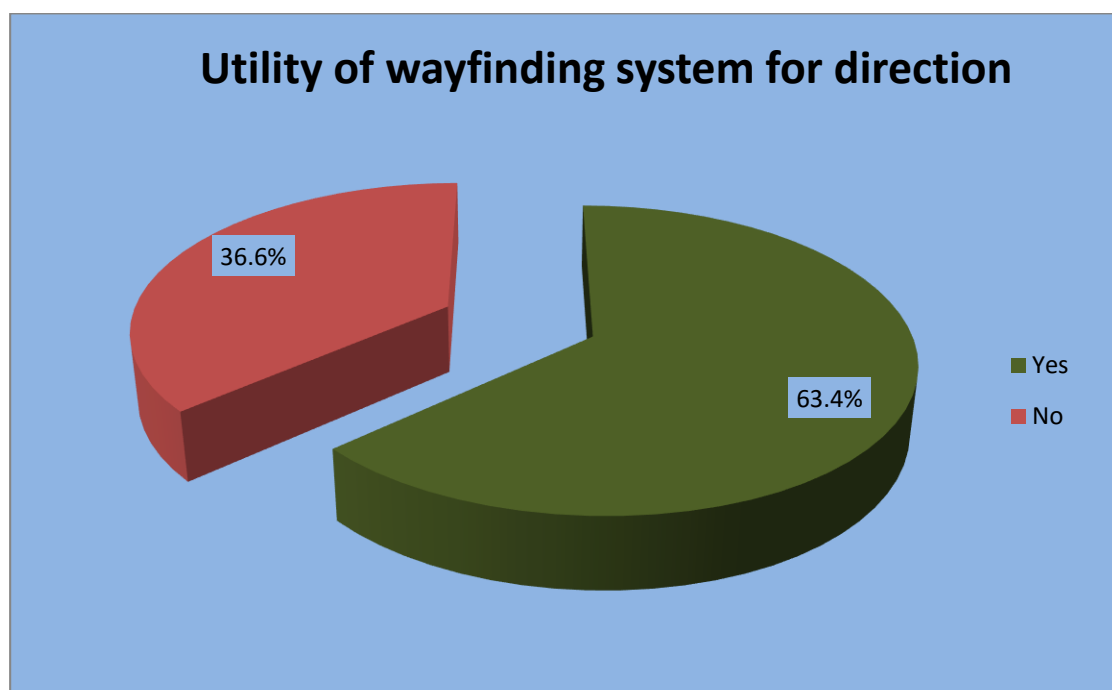


Figure 5.6: Utility of Available Wayfinding System

While exploring views regarding the utility of available wayfinding system, Figure 5.6 presents that 63.4% of library users were of the opinion that the available guidance system provides the right direction in university libraries in Mumbai. However, 36.6% replied that the available guidance system does not provide the right direction in university libraries in Mumbai (Table 5.7).

Table 5.7 (A): Library-wise Utility of Available Wayfinding System to Provide Direction

Libraries	Count			Total
		Yes	No	
Library 1	Count	21	5	26
	% of Total	6.4%	1.5%	7.9%
Library 2	Count	23	4	27
	% of Total	7.0%	1.2%	8.2%
Library 3	Count	14	14	28
	% of Total	4.3%	4.3%	8.5%
Library 4	Count	17	9	26
	% of Total	5.2%	2.7%	7.9%
Library 5	Count	11	12	23
	% of Total	3.4%	3.7%	7.0%
Library 6	Count	60	40	100
	% of Total	18.3%	12.2%	30.5%
Library 7	Count	21	8	29
	% of Total	6.4%	2.4%	8.8%
Library 8	Count	16	7	23
	% of Total	4.9%	2.1%	7.0%
Library 9	Count	18	13	31
	% of Total	5.5%	4.0%	9.5%
Library 10	Count	7	8	15
	% of Total	2.1%	2.4%	4.6%
Total	Count	208	120	328
	% of Total	63.4%	36.6%	100.0%

Table 5.7 (A) presents that Library 3, Library 5 and Library 10 received more negative responses, which indicate that the signage system in these libraries was inadequate to provide the right direction while wayfinding. Thus, out of ten libraries in three libraries utility of signage system was not up to the mark to provide right direction while wayfinding.

5.2.8 Need of instructional help and utility of available wayfinding system

Wayfinding tools should be available at the right location and at the decisive points to provide right direction. The descriptive statistics showing the relationship between need of participants to take assistance from other users while reaching from library gate till the destination or an information source.

Table 5.7 (B) Instructional help from other users and utility of available wayfinding system – Correlation

		Consulted for help from library gate till destination/information source- other library users	Available wayfinding system reminds user in proceeding in right direction
Consulted for help from library gate till destination/information source- other library users	Pearson Correlation	1	.177
	Sig. (2-tailed)		.001
	N	328	328
Available wayfinding system reminds user in proceeding in right direction	Pearson Correlation	.177	1
	Sig. (2-tailed)	.001	
	N	328	328

The obtained r value was .177, which is less than .3, signifies a weak positive relationship between need of instructional help opted by participants from other users and utility of available wayfinding system to reminds user in proceeding in right direction. The p value is .001 which means it is significant at .05 level.

5.2.9 Opinion on Wayfinding Problems

The effectiveness of the wayfinding system in the library clearly indicates the physical character of the library, including the responsiveness of library staff and environment. Such physical aspects affect the user's ability while navigating and using library resources efficiently. Table 5.8 describes user experience and opinion about wayfinding problems.

Table 5.8: Experienced Wayfinding Problem - Library-Wise

Libraries	Count	Experienced wayfinding problem		Total
		Yes	No	
Library 1	Count	7	19	26
	% of Total	2.1%	5.8%	7.9%
Library 2	Count	13	14	27
	% of Total	4.0%	4.3%	8.2%
Library 3	Count	12	16	28
	% of Total	3.7%	4.9%	8.5%
Library 4	Count	13	13	26
	% of Total	4.0%	4.0%	7.9%
Library 5	Count	8	15	23
	% of Total	2.4%	4.6%	7.0%
Library 6	Count	60	40	100
	% of Total	18.3%	12.2%	30.5%
Library 7	Count	10	19	29
	% of Total	3.0%	5.8%	8.8%
Library 8	Count	14	9	23
	% of Total	4.3%	2.7%	7.0%
Library 9	Count	8	23	31
	% of Total	2.4%	7.0%	9.5%
Library 10	Count	8	7	15
	% of Total	2.4%	2.1%	4.6%
Total	Count	153	175	328
	% of Total	46.6%	53.4%	100.0%

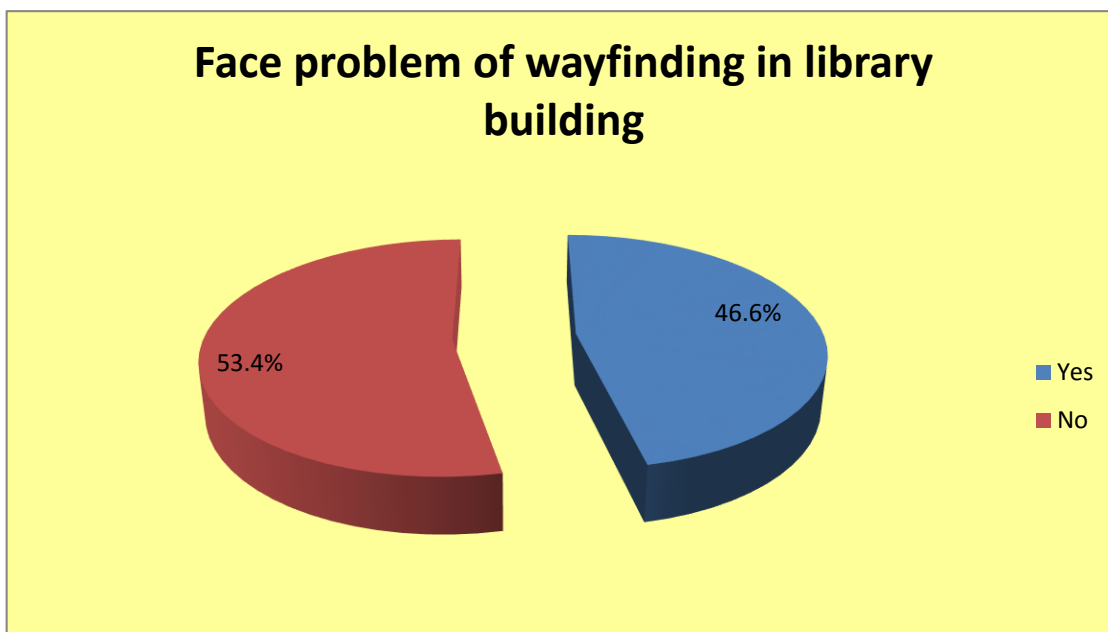


Figure 5.7: Opinion on Wayfinding Problems

When asked about experience and opinion about wayfinding problems, 46.6 % of users opined that they face problems while finding their way. Whereas, 53.4% of participants do not face the problem of wayfinding.

Table 5.8(A) indicates that a participant of Library 2, Library 4, Library 6 and Library 8 has the high wayfinding problems, which represent the poor signage system of the libraries. In Library 4, Library 6 and Library 8 use of temporary signs was higher than the permanent signs; hence there was a clutter of signs observed during the field visits. Hence all these libraries lack in providing directional signage (Table 6.13, Section 2). However though major number of participants, i.e. 53.4%, agreed that they didn't face any wayfinding problems yet; from the total participants 46.6% of participants, faced wayfinding problems.

The nominal variable to test the hypothesis was whether participants face any wayfinding problems while using university library, with the category yes or no. The sample of 328 first-year users was surveyed. The null hypothesis is university library users are not facing any problem or confusion while searching different service departments of university libraries. That is not a single user from university libraries is facing any problem or confusion while searching different service departments. However, the responses are in two categories. Therefore the expected frequencies for each category will be 50% for each category. Hence, the observational frequencies and the expected frequencies for each category will be as following:

Table 5.8 (A): Opinion on Wayfinding Problems: Observational Frequency and Expected Frequency

Existence of Problem	Observational Frequency	Percent	Expected Frequency	Percent	Residual
Yes	153	46.6	164	0	-11
No	175	53.4	164	100	11
Total	328	100.0	328	100.0	

As per the observed frequency 153 (46.6%) that is $f=153$ participants faced problem or confusion while searching different service departments, and 175(53.4%) $f=175$ do not faced problem or confusion while searching different service departments. Whereas according expected frequency from the total 328 participants 164 participants expected to say no and 164 expected to reply yes. Thus the residual or the difference was 11.

Table 5.8 (B): Experienced wayfinding problem - Chi-Square Test

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.106	9	0.009
Likelihood Ratio	22.653	9	0.007
Linear-by-Linear Association	0.499	1	0.48
N of Valid Cases	328		

The data was analyzed using Chi-Square for the ten libraries. The Degree of freedom is 9. The results obtained through Chi-Square test with the 95% of confidence level indicate that the value of Pearson Chi-Square was $X^2 =22.106$, $p=0.009$, which was statistically significant at 0.05 level (Table 5.8(B)).

5.2.10 Self-guidance Level in Finding a Way around Campus

Good and self-explanatory signage helps explain the facilities and answers visitors' questions before they ask through providing effective self-guidance.

Table 5.9: Self-Guidance Level in Finding a way around Campus

Particulars	Frequency	Percent
Below 20%	13	4.0
21% - 49%	20	6.1
50% -74%	99	30.2
75% - 99%	121	36.9
100%	75	22.8
Total	328	100.0

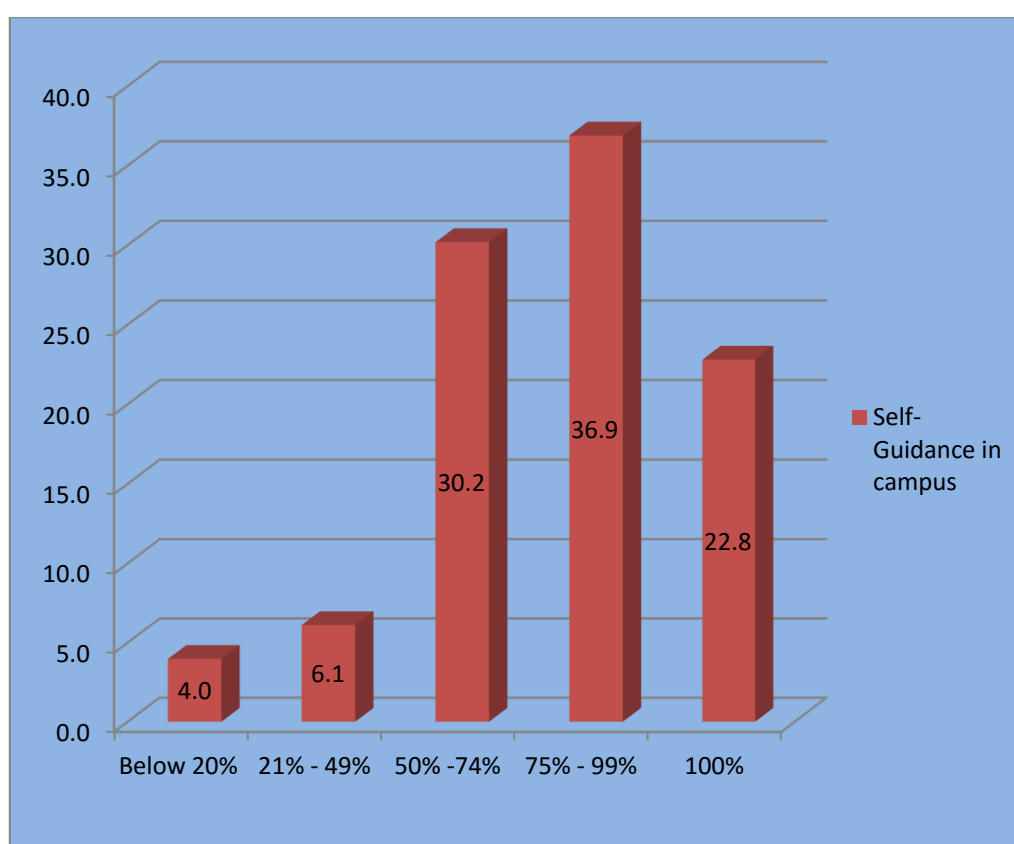


Figure 5.8: Self-Guidance in Finding way around Campus

As per Figure 5.8, only 36.9% of library visitors said that 75% - 99% degree of self-guidance was provided through available signage guidance system, while 30.2% argued that 50% -74% degree of self-guidance was provided, 22.8% agreed that 100 % degree of self-guidance was provided, 6.1% of library users were of the opinion that 21% - 49% degree of self-guidance was provided and 4.0% of library users opined that below 20% degree of self-guidance was provided through available signage guidance system while moving around the campus (Table 5.9).

5.2.11 Degree of Self-guidance for Locating Library

On widespread university campuses, visitors have to search and find the library building within the campus through the available guidance system.

Table 5.10: Self-Guidance for Locating Library

Particulars	Frequency	Percent
Below 20%	13	3.9
21% - 49%	15	4.6
50% -74%	76	23.2
75% - 99%	115	35.1
100%	109	33.2
Total	328	100

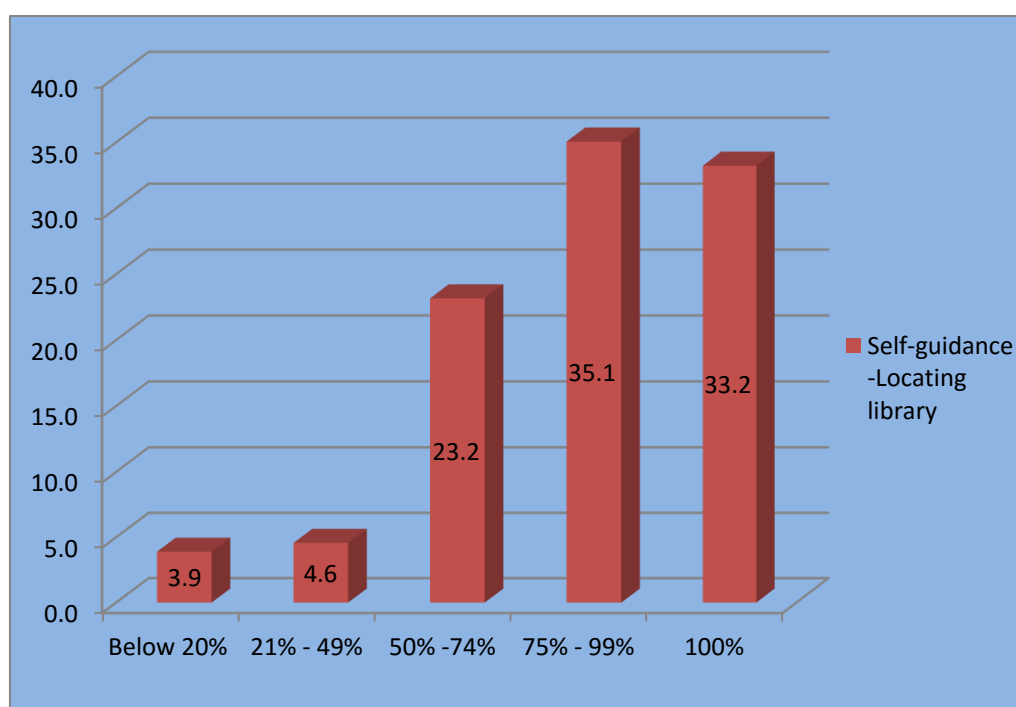


Figure 5.9: Self-Guidance for Locating Library

In the case of locating library, 33.2% of participants expressed that 100% degree of self-guidance was provided, whereas according to 35.1% respondents, 75%-99% degree of self-guidance was provided, while 23.2% of participants informed 50% - 74% degree of self-guidance was provide, 4.6% participants were of the opinion that 21%-49% degree of self-guidance was provided and 3.9% participants pin-pointed below 20% degree of self-guidance was provided for locating and finding library building through the available cues. (Table 5.10, Figure 5.9)

5.2.12 Self-guidance for Awareness of Different Departments

Appropriate signage aid library users in self-guidance. Users can move confidently from the entrance to the required source of information if the right signage is available at every decision points. To assess the appropriateness of the available signage, participants were asked about the degree of self-guidance provided through the available signage in locating the library, its departments as well as sources and services.

Table 5.11: Self-Guidance for Awareness of Different Departments

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

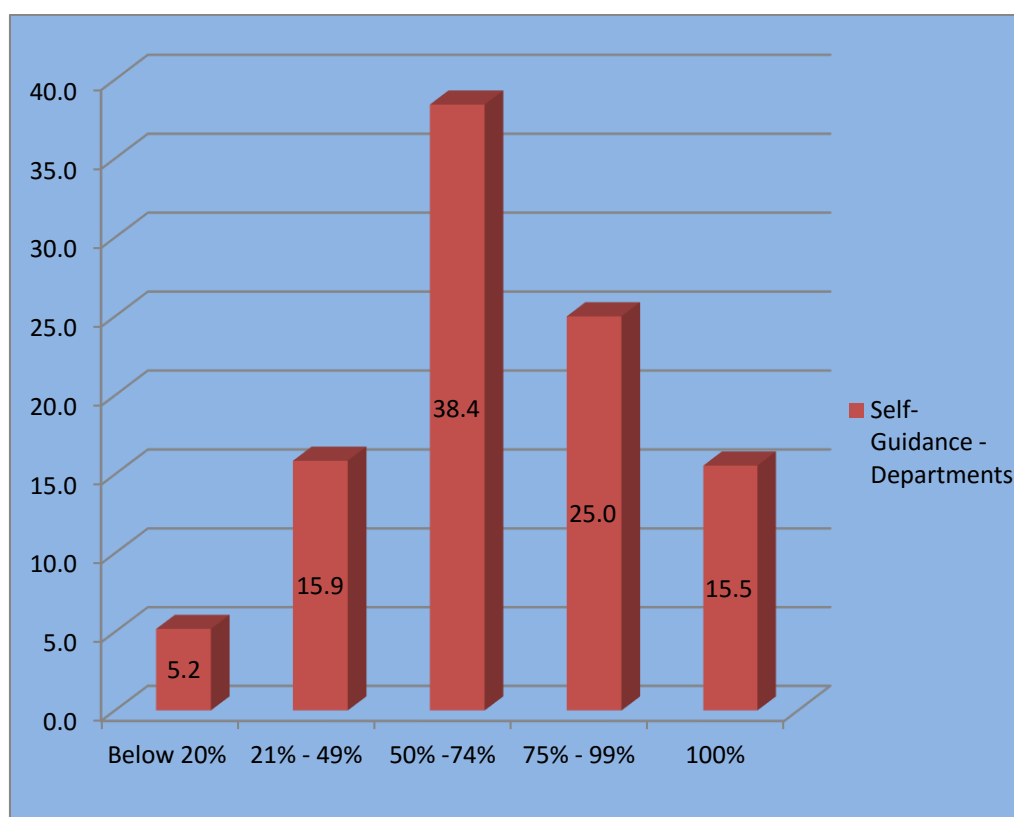


Figure 5.10: Self-Guidance in Locating Different Departments

In case of awareness and locating departments, 38.4% of participants had an 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 an opinion that 21%-49% degree of self-guidance provided and 5.2% participants had an opinion that below 20% degree of self-guidance provided through the available guidance system (Table 5.11, Figure 5.10).

5.2.13 Self-guidance for Ease in Use of OPAC

OPAC helps users to find the precise information source from the huge library collection and also provides information about other related sources with their locations.

Table 5.12: Self-Guidance for Ease in Use of OPAC

Particulars	Frequency	Percent
Not available	23	7.0
Below 20%	23	7.0
21% - 49%	40	12.2
50% -74%	90	27.5
75% - 99%	89	27.1
100%	63	19.2
Total	328	100

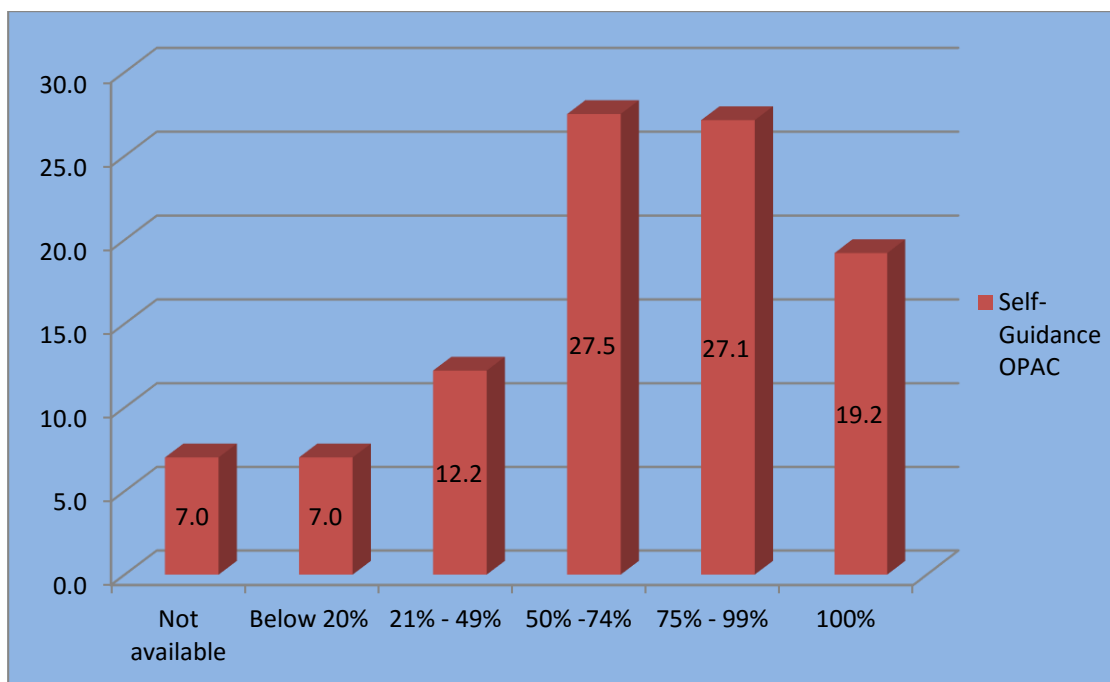


Figure 5.11: Self-Guidance for Ease in Use of OPAC

Figure 5.11 highlights that 27.5% respondents replied that 50%-74% degree of self-guidance was provided. Only 27.1% participants were of the opinion that 75% -99% degree of self-guidance was provided, 19.2 % participants were of the opinion that 100% degree of self-guidance was provided, 12.2% respondents answered that 21% - 49% degree of self-guidance was provided and 7.0% participants specified that below 20% degree of self-guidance was provided for ease in use of OPAC. Whereas 7.0 % of respondents replied that OPAC was not available in the library as the library was not automated until the time of the study (Table 5.12, Figure 5.11).

5.2.14 Self-guidance in Use of Computer Resources

With technological developments, university libraries have different forms of collection, including computer resources such as audio-visual material, e-books, e-journals, and databases. Hence adequate instructional displays and signs are essential to direct users for the effective use of computer resources. The level of self-guidance provided by available display system in the case of the use of computer resources, are presented below:

Table 5.13: Self-Guidance in Use of Computer Resources

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

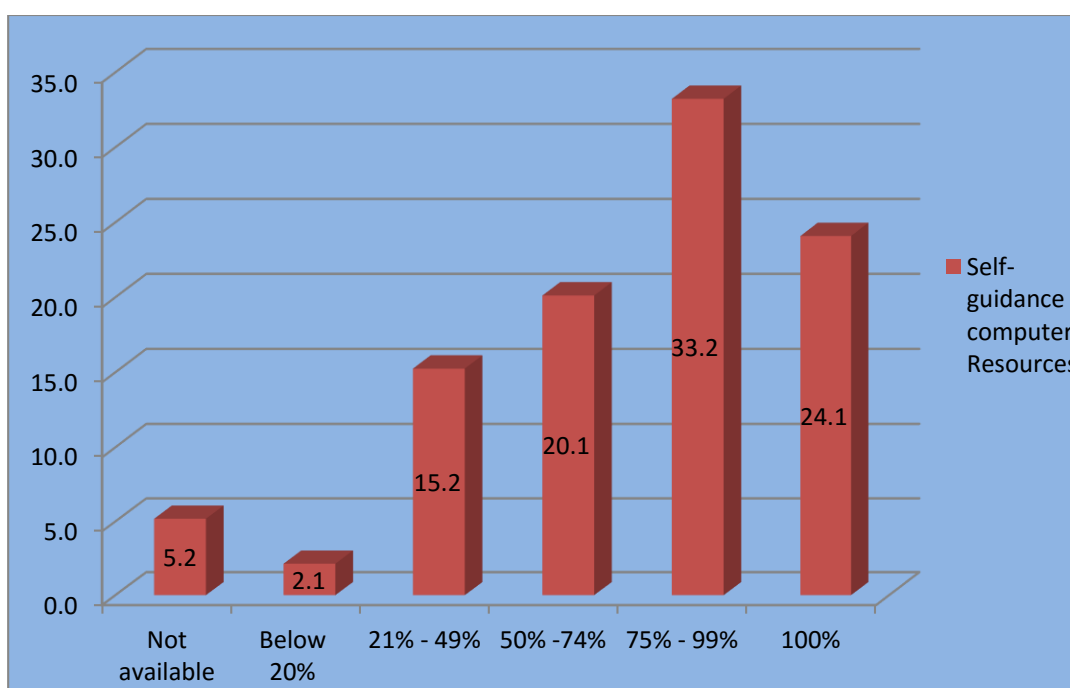


Figure 5.12: Self-Guidance in Use of Computer Resources

However, only 33.2% participants were of the opinion that 75% -99% of self-guidance was provided, 24.1% respondents replied that 100% self-guidance was provided, 20.1% participants were of the opinion that 50%-74% of self-guidance was provided, 15.2% respondents answered that 21%-49% of self-guidance was provided and 2.1% participants replied that below 20% of self-guidance was provided in identifying and being comfortable in the use of computer resources. Whereas 5.2% of respondents replied that computer resources were not available in the library as the library was not automated (Table 5.13, Figure 5.12).

5.2.15 Self-Guidance in Searching and Finding Printed Sources in Stacks

The printed sources are stored in stacks; hence 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 5.14: Self-Guidance in Searching and Finding Printed Sources in Stacks

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

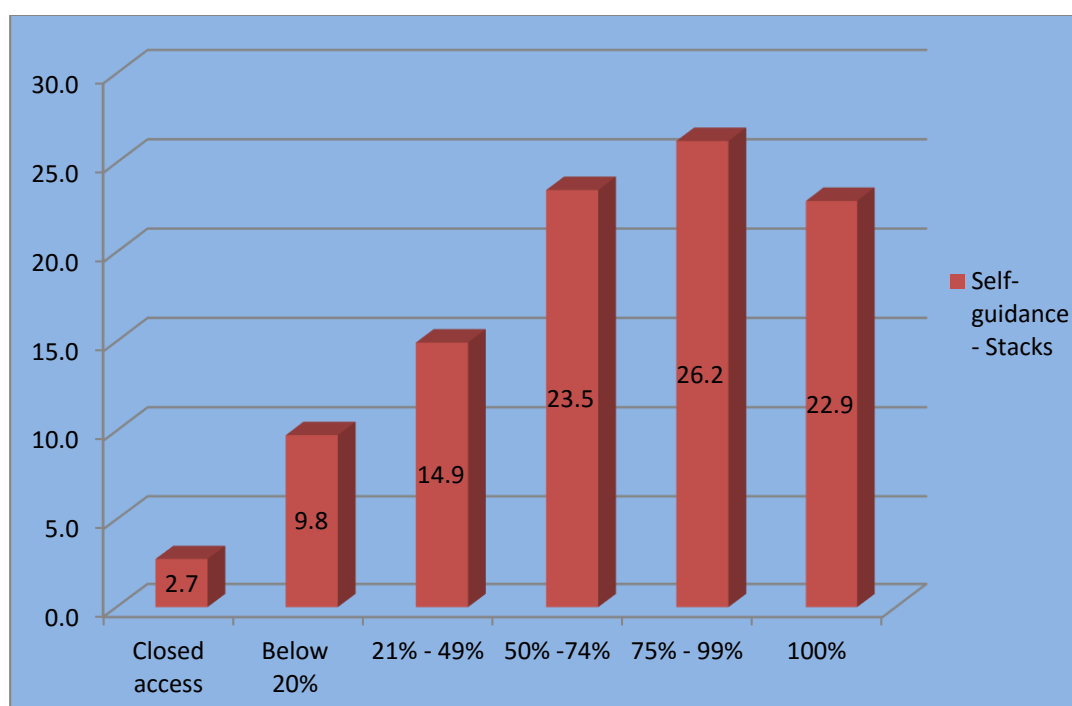


Figure 5.13: Self-Guidance in Searching Sources in Stacks

In case of ease and convenience in searching and finding printed sources in stacks, 26.2% of participants had an opinion that 75%-99% of self-guidance was provided, 23.5% of respondents opined 50%-74% of self-guidance was provided, 22.9% of

participants revealed that 100% self-guidance was provided, 14.9% of participants had an opinion that 21%-49% of self-guidance was provided and 9.8% participants had an opinion that below 20% of self-guidance was provided through the available guidance system while searching printed sources in stacking area. Whereas 2.7% of respondents replied that entry inside the stacking area was not permitted as the library had closed access. (Table 5.14, Figure 5.13).

Table 5.14 (A): Library-wise Degree of self-guidance in wayfinding and information search

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Able to find way around campus	Library 1	26	3.96	1.076	.211	3.53	4.40	1	5
	Library 2	27	3.70	1.031	.198	3.30	4.11	1	5
	Library 3	28	4.36	.911	.172	4.00	4.71	1	5
	Library 4	26	3.81	.895	.176	3.45	4.17	2	5
	Library 5	23	3.39	1.530	.319	2.73	4.05	1	5
	Library 6	100	3.53	.834	.083	3.36	3.70	1	5
	Library 7	29	3.38	1.178	.219	2.93	3.83	1	5
	Library 8	23	3.65	.487	.102	3.44	3.86	3	4
	Library 9	31	3.81	1.138	.204	3.39	4.22	1	5
	Library 10	15	3.60	.986	.254	3.05	4.15	1	5
	Total	328	3.69	1.018	.056	3.58	3.80	1	5
Able to locate the library	Library 1	26	4.15	1.008	.198	3.75	4.56	2	5
	Library 2	27	4.07	1.035	.199	3.66	4.48	1	5
	Library 3	28	4.71	.535	.101	4.51	4.92	3	5
	Library 4	26	3.73	1.116	.219	3.28	4.18	1	5
	Library 5	23	3.48	1.620	.338	2.78	4.18	1	5
	Library 6	100	3.77	.839	.084	3.60	3.94	2	5
	Library 7	29	3.76	1.154	.214	3.32	4.20	1	5
	Library 8	23	3.65	.647	.135	3.37	3.93	2	5
	Library 9	31	3.87	1.231	.221	3.42	4.32	1	5
	Library 10	15	3.93	1.100	.284	3.32	4.54	1	5
	Total	328	3.89	1.046	.058	3.78	4.00	1	5

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
						Became aware of different dept	Library 1		
	Library 2	27	3.33	1.074	.207	2.91	3.76	1	5
	Library 3	28	3.71	.897	.169	3.37	4.06	3	5
	Library 4	26	3.46	.761	.149	3.15	3.77	2	5
	Library 5	23	2.65	1.496	.312	2.01	3.30	1	5
	Library 6	100	3.24	1.006	.101	3.04	3.44	1	5
	Library 7	29	3.14	1.156	.215	2.70	3.58	1	5
	Library 8	23	3.13	.815	.170	2.78	3.48	1	4
	Library 9	31	3.13	1.231	.221	2.68	3.58	1	5
	Library 10	15	3.73	1.100	.284	3.12	4.34	1	5
	Total	328	3.30	1.073	.059	3.18	3.42	1	5
Found ease in use of OPAC	Library 1	26	3.96	.958	.188	3.57	4.35	2	5
	Library 2	27	3.81	1.039	.200	3.40	4.23	1	5
	Library 3	28	3.54	1.201	.227	3.07	4.00	1	5
	Library 4	26	4.08	.796	.156	3.76	4.40	2	5
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	3.29	1.166	.117	3.06	3.52	1	5
	Library 7	29	2.72	1.099	.204	2.31	3.14	1	5
	Library 8	23	2.91	1.041	.217	2.46	3.36	1	5
	Library 9	31	3.71	1.131	.203	3.29	4.12	1	5
	Library 10	15	2.87	1.457	.376	2.06	3.67	1	5
	Total	328	3.18	1.430	.079	3.03	3.34	0	5
Identify n comfortable in use of computer resources	Library 1	26	4.00	.849	.166	3.66	4.34	2	5
	Library 2	27	4.22	.934	.180	3.85	4.59	2	5
	Library 3	28	3.57	1.289	.244	3.07	4.07	1	5
	Library 4	26	4.04	.871	.171	3.69	4.39	2	5
	Library 5	23	.70	1.396	.291	.09	1.30	0	5
	Library 6	100	3.46	1.068	.107	3.25	3.67	2	5
	Library 7	29	3.45	.985	.183	3.07	3.82	1	5
	Library 8	23	3.26	.964	.201	2.84	3.68	1	5
	Library 9	31	4.23	.845	.152	3.92	4.54	3	5
	Library 10	15	3.00	1.363	.352	2.25	3.75	1	5
	Total	328	3.46	1.338	.074	3.32	3.61	0	5

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Searching and finding sources in stacks was easy & convenient	Library 1	26	3.85	1.190	.233	3.37	4.33	1	5
	Library 2	27	3.85	.949	.183	3.48	4.23	1	5
	Library 3	28	3.57	1.317	.249	3.06	4.08	1	5
	Library 4	26	3.50	1.273	.250	2.99	4.01	2	5
	Library 5	23	1.17	1.403	.293	.57	1.78	0	5
	Library 6	100	3.34	1.281	.128	3.09	3.59	1	5
	Library 7	29	3.21	1.177	.218	2.76	3.65	1	5
	Library 8	23	3.09	1.203	.251	2.57	3.61	1	5
	Library 9	31	3.61	1.202	.216	3.17	4.05	1	5
	Library 10	15	3.20	1.265	.327	2.50	3.90	1	5
	Total	328	3.29	1.372	.076	3.14	3.44	0	5

Note: 5- 100% self-guidance, 4 – 75% self-guidance, 3- 50% self-guidance, 2- 25% self-guidance, 1 – Below 20% self-guidance

University-wise responses indicate that users of Library 3 were more comfortable while finding a way around the campus and able to locate the library easily. However, in the case of Library 3, the library was located near the campus entrance, and the building was easily visible from the campus gate. In case of awareness of different departments, Library 1 and Library 10 had the highest mean as physical settings, and the arrangement of Library 1 was appropriate for the visibility of different departments. Besides, the use of glass between the walls of the ground floor facilitates more visibility to the sections and services provided on the floor. In the case of Library 10, the library was too small. All the sections and services, including the stacking area, were available within one central hall; hence users were aware of different departments and sections.

In the case of OPAC use participants of Library 4 has the highest mean. It indicates that participants of Library 4 were comfortable with the use of OPAC. However, the total mean associated with ease in use of OPAC was the lowest total mean as compared to the other factors related to the degree of self-guidance in wayfinding and

information search. It indicates that self-guidance was lacking in the case of facilitating OPAC instructions in all libraries.

In the case of identifying and being comfortable in the use of computerized and online sources, participants of Library 9 were highly self-guided in using computerized sources. The mean of Library 5 was the lowest mean in this category as OPAC, as well as other computerized sources and services were not available in this library due to an incomplete automation process.

In the case of ease and convenience in searching and finding sources in stacks, users of Library 1 and Library 2 were significantly self-guided than other libraries as the stack end signs of those libraries were adequate. Besides, Library 2 provides a display for 'How to locate a book guide', with the basic ten main divisions with class numbers and subject headings as per the Dewey Decimal Classification scheme. (Chapter 6- Table 6.12)

The five-point Likert scale was considered an interval scale. The mean is very significant. From 0 to 1.8, it means below 20% self-guidance, from 1.81 to 2.60, it means 25% self-guidance. From 2.61 to 3.40, it means 50% self-guidance; from 3.41 to 4.20, it means 75% self-guidance; from 4.21 to 5 it means 100% self-guidance (Warmbrod, 2014).

Looking at the overall total mean scores for the degree of self-guidance in wayfinding and information search, the factor, locating and identifying the library buildings achieved the highest degree of self-guidance (3.89), which represents 75% degree of self-guidance was provided in the case of all libraries. Whereas, the factor experiencing ease in use of OPAC (3.18), provided the lowest degree of self-guidance, followed by factor ease and convenience in searching and finding sources in stacks (3.29), which represents 50% degree of self guidance was provided, in the case of all libraries. It demonstrates a need to make improvements in the available signage system for OPAC use and the stacking areas (Table 5.14 (A)).

5.2.16 Reasons behind Problems of Wayfinding

Poor signage system or an absence of adequate signs results in a lack of self-guidance and self-orientation of library users.

Table 5.15: Problems of Wayfinding: Reasons

Particulars	Responses		Percent of Cases
	N	Percent	
Absence of directional signs	226	29.7%	68.9%
Absence of floor maps	182	23.9%	55.4%
Absence of building map	132	17.3%	40.2%
Confusing building map	55	7.2%	17.1%
Physical design	52	6.8%	16.7%
Artistic effect of architecture	44	5.8%	13.4%
Confusion of layout of library	39	5.1%	11.8%
Confusion of available signage	31	4.1%	9.4%
Other	1	.1%	.3%
Total	762	100.0%	233.2%

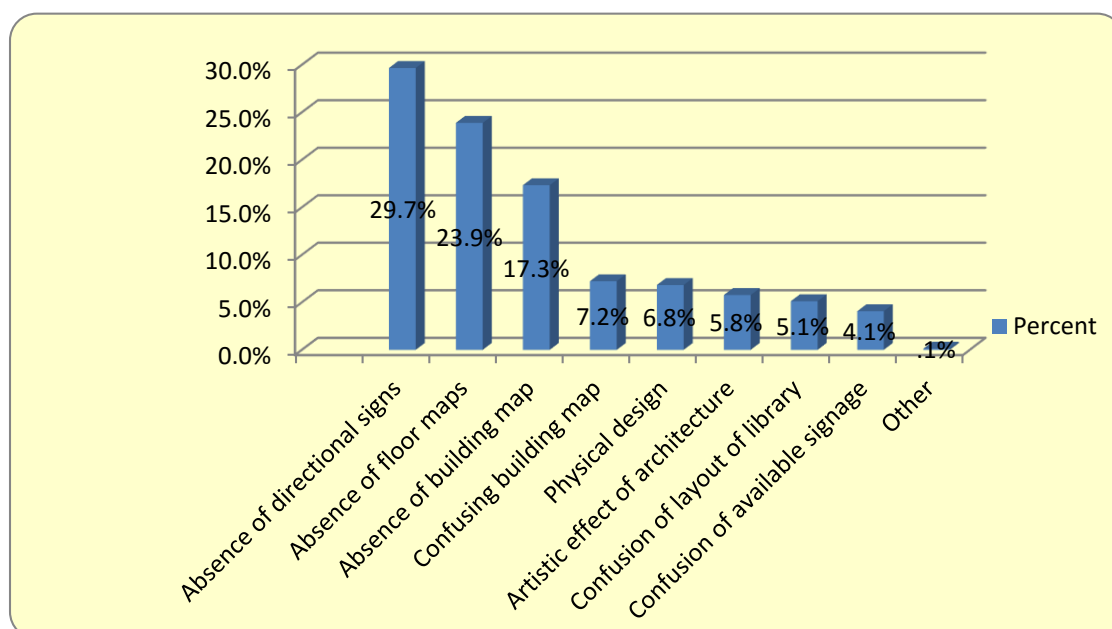


Figure 5.14: Reasons Behind the Problem of Wayfinding

Table 5.15 indicates that signage systems of university libraries in Mumbai lack in providing self-guidance for wayfinding and information search. Hence to improve the available guidance system, participant's 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 (Figure 5.14).

Table 5.15 (A): Reasons behind the problem of wayfinding – Library-wise

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Absence of building map	Library 1	26	.23	.430	.084	.06	.40	0	1
	Library 2	27	.26	.447	.086	.08	.44	0	1
	Library 3	28	.50	.509	.096	.30	.70	0	1
	Library 4	26	.15	.368	.072	.01	.30	0	1
	Library 5	23	.61	.499	.104	.39	.82	0	1
	Library 6	100	.31	.465	.046	.22	.40	0	1
	Library 7	29	.59	.501	.093	.40	.78	0	1
	Library 8	23	.04	.209	.043	-.05	.13	0	1
	Library 9	31	.81	.402	.072	.66	.95	0	1
	Library 10	15	.87	.352	.091	.67	1.06	0	1
Total	328	.40	.491	.027	.35	.46	0	1	

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Absence of directional signs	Library 1	26	.23	.430	.084	.06	.40	0	1
	Library 2	27	.52	.509	.098	.32	.72	0	1
	Library 3	28	.36	.488	.092	.17	.55	0	1
	Library 4	26	.69	.471	.092	.50	.88	0	1
	Library 5	23	.96	.209	.043	.87	1.05	0	1
	Library 6	100	.76	.429	.043	.67	.85	0	1
	Library 7	29	.79	.412	.077	.64	.95	0	1
	Library 8	23	.61	.499	.104	.39	.82	0	1
	Library 9	31	.97	.180	.032	.90	1.03	0	1
	Library 10	15	.87	.352	.091	.67	1.06	0	1
	Total	328	.69	.464	.026	.64	.74	0	1
Absence of floor maps	Library 1	26	.42	.504	.099	.22	.63	0	1
	Library 2	27	.15	.362	.070	.00	.29	0	1
	Library 3	28	.57	.504	.095	.38	.77	0	1
	Library 4	26	.35	.485	.095	.15	.54	0	1
	Library 5	23	.74	.449	.094	.54	.93	0	1
	Library 6	100	.66	.476	.048	.57	.75	0	1
	Library 7	29	.48	.509	.094	.29	.68	0	1
	Library 8	23	.39	.499	.104	.18	.61	0	1
	Library 9	31	.87	.341	.061	.75	1.00	0	1
	Library 10	15	.60	.507	.131	.32	.88	0	1
	Total	328	.55	.498	.027	.50	.61	0	1
Artistic effect of architecture	Library 1	26	.31	.471	.092	.12	.50	0	1
	Library 2	27	.11	.320	.062	-.02	.24	0	1
	Library 3	28	.04	.189	.036	-.04	.11	0	1
	Library 4	26	.19	.402	.079	.03	.35	0	1
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	.19	.394	.039	.11	.27	0	1
	Library 7	29	.03	.186	.034	-.04	.11	0	1
	Library 8	23	.04	.209	.043	-.05	.13	0	1

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
						Library 9	31		
Library 10	15	.07	.258	.067	-.08	.21	0	1	
Total	328	.13	.341	.019	.10	.17	0	1	
Confusing building map	Library 1	26	.15	.368	.072	.01	.30	0	1
	Library 2	27	.07	.267	.051	-.03	.18	0	1
	Library 3	28	.04	.189	.036	-.04	.11	0	1
	Library 4	26	.23	.430	.084	.06	.40	0	1
	Library 5	23	.04	.209	.043	-.05	.13	0	1
	Library 6	100	.35	.479	.048	.25	.45	0	1
	Library 7	29	.17	.384	.071	.03	.32	0	1
	Library 8	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 9	31	.03	.180	.032	-.03	.10	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.17	.374	.021	.13	.21	0	1
Confusion due to available signage	Library 1	26	.12	.326	.064	-.02	.25	0	1
	Library 2	27	.07	.267	.051	-.03	.18	0	1
	Library 3	28	0.00	0.000	0.000	0.00	0.00	0	0
	Library 4	26	.12	.326	.064	-.02	.25	0	1
	Library 5	23	.09	.288	.060	-.04	.21	0	1
	Library 6	100	.14	.349	.035	.07	.21	0	1
	Library 7	29	.10	.310	.058	-.01	.22	0	1
	Library 8	23	.09	.288	.060	-.04	.21	0	1
	Library 9	31	.03	.180	.032	-.03	.10	0	1
	Library 10	15	.07	.258	.067	-.08	.21	0	1
	Total	328	.09	.293	.016	.06	.13	0	1
Confusion of layout of library	Library 1	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 2	27	.15	.362	.070	.00	.29	0	1
	Library 3	28	0.00	0.000	0.000	0.00	0.00	0	0
	Library 4	26	.04	.196	.038	-.04	.12	0	1
	Library 5	23	.09	.288	.060	-.04	.21	0	1

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
						Library 6	100		
Library 7	29	.14	.351	.065	.00	.27	0	1	
Library 8	23	.13	.344	.072	-.02	.28	0	1	
Library 9	31	.16	.374	.067	.02	.30	0	1	
Library 10	15	.27	.458	.118	.01	.52	0	1	
Total	328	.12	.324	.018	.08	.15	0	1	
Physical design	Library 1	26	.15	.368	.072	.01	.30	0	1
	Library 2	27	.30	.465	.090	.11	.48	0	1
	Library 3	28	.04	.189	.036	-.04	.11	0	1
	Library 4	26	.23	.430	.084	.06	.40	0	1
	Library 5	23	.09	.288	.060	-.04	.21	0	1
	Library 6	100	.21	.409	.041	.13	.29	0	1
	Library 7	29	.14	.441	.082	-.03	.31	0	2
	Library 8	23	.09	.288	.060	-.04	.21	0	1
	Library 9	31	.13	.341	.061	.00	.25	0	1
	Library 10	15	.13	.352	.091	-.06	.33	0	1
	Total	328	.16	.380	.021	.12	.21	0	2
Other problem of wayfinding	Library 1	26	.04	.196	.038	-.04	.12	0	1
	Library 2	27	.19	.681	.131	-.08	.45	0	3
	Library 3	28	.07	.378	.071	-.08	.22	0	2
	Library 4	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	.08	.800	.080	-.08	.24	0	8
	Library 7	29	0.00	0.000	0.000	0.00	0.00	0	0
	Library 8	23	.22	1.043	.217	-.23	.67	0	5
	Library 9	31	0.00	0.000	0.000	0.00	0.00	0	0
	Library 10	15	.87	2.295	.593	-.40	2.14	0	7
	Total	328	.10	.759	.042	.02	.19	0	8

Note: 0-Not ticked, 1- Ticked

Statistics of Table 5.15(A) indicate that as per the participant's views, there was an absence of a library building map as well as an absence of directional signage in the case of Library 9, Library 10 and Library 5. Further library floor maps were not available in the case of Library 5 and Library 9. Library 6 provides a paper printed more signs, including building map with the A4 size paper, resulting less visibility and readability; hence participants opined that wayfinding was affected due to a confusing building map (Table 6.13). Participants of Library 1 and Library 4 were of the opinion that wayfinding was affected due to confusing signs.

User participants of Library 10 opined that Confusing of the layout of the library was the barrier for wayfinding as the library space was not designed specifically for a library in the case of Library 10. The library was temporarily housed in a parent building at the time of the study. It was informed by the In-charge Librarian that it will be shifted to another building after the completion of the construction of the library building. Even the mean for other problems of wayfinding was high in the case of this library, as the library was housed temporarily in a parent building shelf locations with OPAC service was not provided to the users; hence, it was difficult for users to find and locate the required information sources.

In case of the physical design of building, users of Library 6 were of the opinion that wayfinding confusion was due to the physical design of the library. The library is in modular design with different wings and floors. Therefore it's it isn't easy to understand the physical layout of the library for novice users.

The total mean scores for the factors, absence of directional signs was high, i.e. (.69), followed by factor, absence of floor maps (.55), followed by the factor absence of building maps (.40), which reflects that those factors were the strongest factors behind the problem of wayfinding. The absence of directional signage has the highest total mean, which indicates that the addition of directional signs was needed in all the libraries. Thus the results indicate that there was a presence of confusion and uncertainty among participants due to wayfinding problems such as the absence of building map, absence of directional signs, absence of floor maps, artistic effect of architecture, confusing building map, and due to other wayfinding problems.

5.3 Signage and Displays (Visual Guidance System)

A well planned visual communication or signage system provides architectural cues in navigation and wayfinding in any built structure. The visual guidance system is dependent on the eye and the brain. The concern here is not with the extremes of visual functioning but with how visual information can best be transferred within the limits of good design and sound economics for all library users. Considering this factor, the question was raised to user participants regarding the existence or availability of signs, the characteristics of signage, the height of placement, color contrasting features and its utility in providing direction and guidance.

5.3.1 Sign Characteristics - Ability to Aid till Destination

The key to good signage is to establish a systematic pattern of major and minor identification, direction and instruction information so that it will assist users in moving on the right path and thus will be able to aid them till reaching the desired destination in the library. The following table shows the ability to aid till destination provided by available signage.

Table 5.16: Sign Characteristics - Ability to Aid till Destination

Particulars	Frequency	Percent
Not available	17	5.2
Strongly agree	21	6.4
Agree	120	36.6
Neither agree nor disagree	51	15.5
Disagree	61	18.6
Strongly disagree	58	17.7
Total	328	100

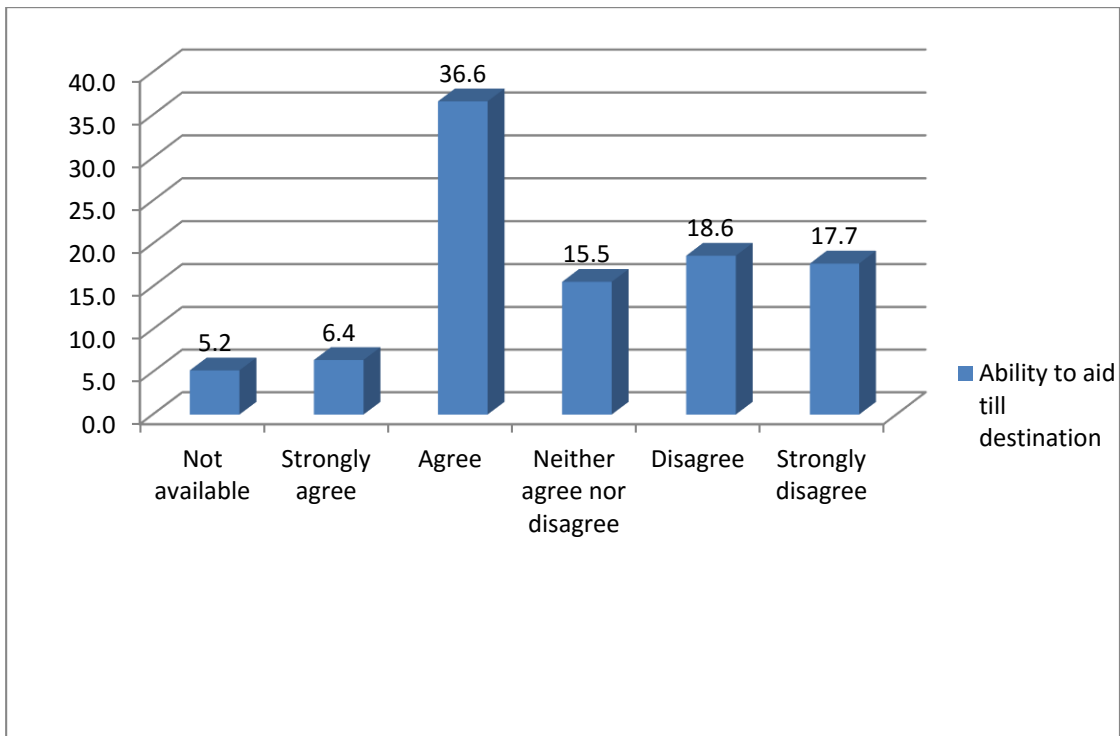


Figure 5.15: Sign Characteristics - Ability to Aid till Destination

In case responses regarding providing the right direction till destination, it was revealed that merely 36.6% of participants agreed, 6.4% of participants were strongly agreed, 15.5% participants were neither agreed nor disagreed, 18.6% disagreed, and 17.7% strongly disagreed regarding the ability of sign characteristics to aid till destination. Further, 5.2% opined that signage was not available.

5.3.2 Sign Characteristics - Readability

The readability of signs depends upon the typography, size, and spacing between the letters. Each typeface has its proportions, which affects the space around them, which in turn contribute to the final degree of readability. Further spacing affects legibility. Hence spacing and layout should be taken into consideration while deciding the maximum number of letters that can be used per line.

Table 5.17: Sign Characteristics - Readability

Particulars	Frequency	Percent
Not available	17	5.2
Strongly agree	24	7.3
Agree	161	49.1
Neither agree nor disagree	53	16.2
Disagree	49	14.9
Strongly disagree	24	7.3
Total	328	100

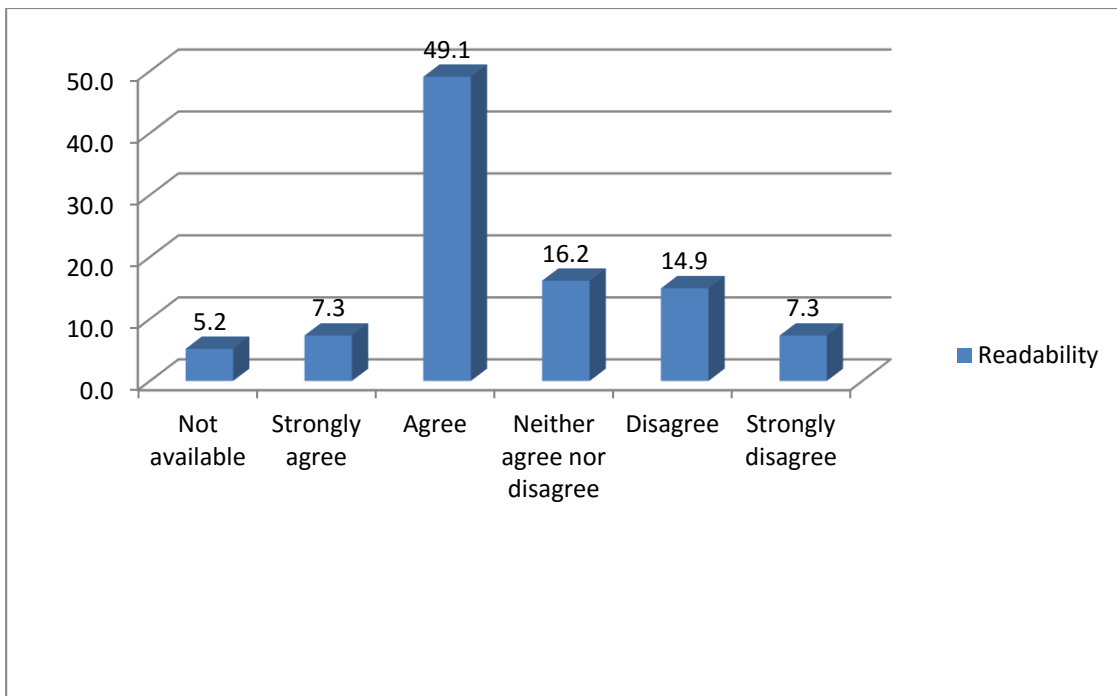


Figure 5.16: Sign Characteristics- Readability

Regarding the readability of signs, 49.1% agreed, and 7.3% were strongly agreed that signs were readable; however, 16.2% were participants were neither agreed nor disagreed, 14.9% disagreed, and 7.3% were strongly disagreed about the readability characteristic of signage. However, 5.2% of participants opined that signage was not available (Table 5.17). It highlights that 56.4% participants (49.1+ 7.3=56.4%) agreed that signs were readable.

5.3.3 Sign Characteristics - Self-Explanatory

The word-sets used for signs should be easy and simple to understand by a layperson. The use of technical words or words with jargon should be avoided while designing signs to signify straightforward meanings. Table 5.18 describes the scenario:

Table 5.18: Sign Characteristics - Self-Explanatory

Particulars	Frequency	Percent
Not available	17	5.2
Strongly agree	33	10.1
Agree	105	32.0
Neither agree nor disagree	46	14.0
Disagree	75	22.8
Strongly disagree	52	15.9
Total	328	100.0

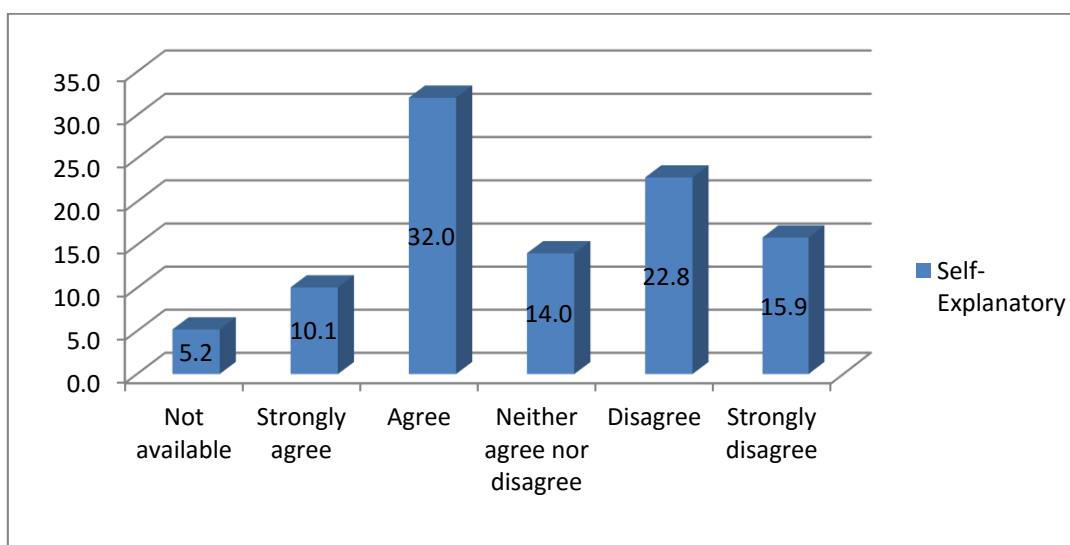


Figure 5.17: Sign Characteristics- Self-Explanatory

In the case of self-explanatory as a sign characteristic, 10.1% of participants strongly agreed, 32.0% agreed, 14.0% neither agreed nor disagreed, 22.8 % disagreed, 15.9 % strongly disagreed for the Self-Explanatory quality of signs in university libraries in Mumbai. However, 5.2% of participants reported that signs were not available in the university library.

Table 5.18/Figure 5.17 highlights that below 50% participants agreed on availability of self-explanatory signs, which indicates there is need to improve sign quality to facilitate self-explanatory signage.

5.3.4 Sign Characteristics – Visibility

Signs should be placed appropriately at decision points to be visible. Placement of sign at appropriate height is also an important factor for its visibility. Further color contrast, lightening, and visual acuity are the factors to be considered while checking the visibility of signs.

Table 5.19: Sign Characteristics - Visibility

Particulars	Frequency	Percent	Cumulative Percent
Not available	18	5.5	5.5
Strongly agree	31	9.5	14.9
Agree	153	46.6	61.6
Neither agree nor disagree	40	12.2	73.8
Disagree	59	18.0	91.8
Strongly disagree	27	8.2	100.0
Total	328	100.0	

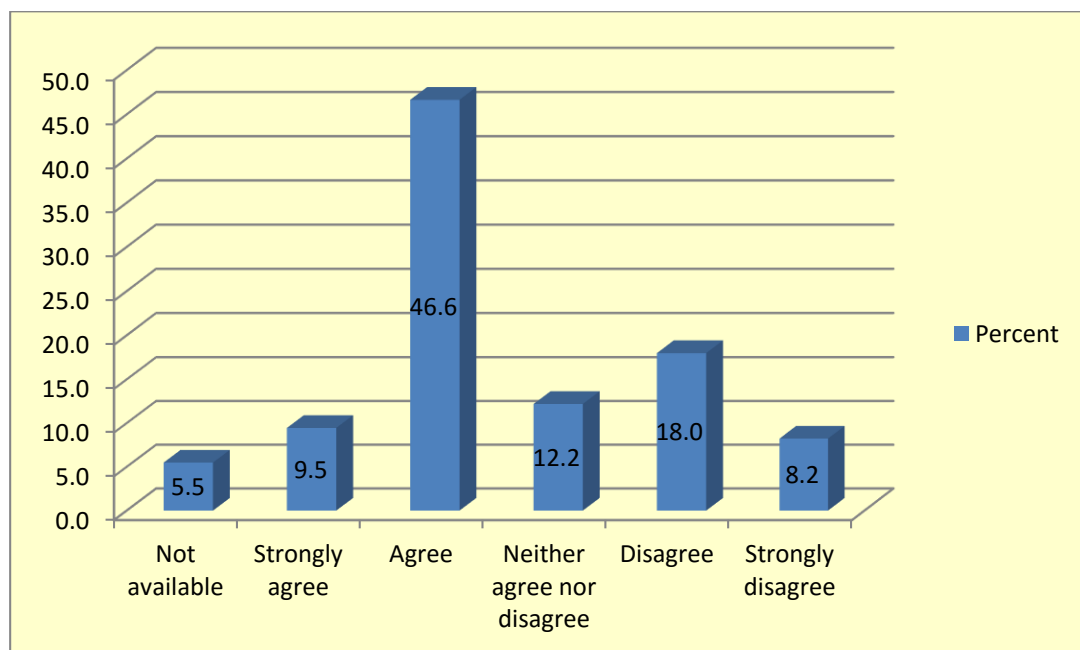


Figure 5.18: Sign Characteristics- Visibility

Regarding the visibility of signs, 46.6% were agreed, 9.5% strongly agreed, 12.2% neither agreed nor disagreed, 18.0% disagreed, and 8.2% strongly disagree with the statement that signs were visible in university libraries in Mumbai. However, 5.5% of participants replied that signs were not available in university libraries. It indicated that more than 50% of participants agreed that signage was visible.

Table 5.19 (A): Sign Characteristics- Descriptive

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Ability to aid till destination	Library 1	26	3.35	1.129	.221	2.89	3.80	1	5
	Library 2	27	3.33	1.209	.233	2.86	3.81	1	5
	Library 3	28	3.04	1.478	.279	2.46	3.61	1	5
	Library 4	26	2.65	1.129	.221	2.20	3.11	1	5
	Library 5	23	1.04	1.492	.311	.40	1.69	0	5
	Library 6	100	2.88	1.233	.123	2.64	3.12	1	5
	Library 7	29	3.21	1.146	.213	2.77	3.64	1	5
	Library 8	23	3.57	.896	.187	3.18	3.95	1	5
	Library 9	31	1.97	1.224	.220	1.52	2.42	0	5
	Library 10	15	2.60	1.844	.476	1.58	3.62	0	5
	Total	328	2.80	1.395	.077	2.65	2.95	0	5
Readability	Library 1	26	3.85	.834	.164	3.51	4.18	2	5
	Library 2	27	3.74	.984	.189	3.35	4.13	1	5
	Library 3	28	3.75	1.076	.203	3.33	4.17	1	5
	Library 4	26	3.77	.908	.178	3.40	4.14	1	5
	Library 5	23	1.09	1.443	.301	.46	1.71	0	4
	Library 6	100	3.12	.998	.100	2.92	3.32	1	5
	Library 7	29	3.66	.857	.159	3.33	3.98	1	5
	Library 8	23	3.57	.788	.164	3.22	3.91	1	5
	Library 9	31	2.52	1.338	.240	2.03	3.01	0	4
	Library 10	15	2.53	1.846	.477	1.51	3.56	0	5
	Total	328	3.19	1.289	.071	3.05	3.33	0	5

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Self-explanatory	Library 1	26	3.81	1.021	.200	3.40	4.22	2	5
	Library 2	27	3.52	1.189	.229	3.05	3.99	1	5
	Library 3	28	3.14	1.407	.266	2.60	3.69	1	5
	Library 4	26	3.19	1.132	.222	2.74	3.65	2	5
	Library 5	23	1.13	1.576	.329	.45	1.81	0	4
	Library 6	100	2.69	1.269	.127	2.44	2.94	1	5
	Library 7	29	3.10	1.175	.218	2.66	3.55	1	5
	Library 8	23	3.26	1.054	.220	2.81	3.72	1	5
	Library 9	31	2.00	1.211	.218	1.56	2.44	0	4
	Library 10	15	2.53	1.922	.496	1.47	3.60	0	5
	Total	328	2.82	1.423	.079	2.67	2.97	0	5
Visibility of signs	Library 1	26	3.81	.981	.192	3.41	4.20	2	5
	Library 2	27	3.56	1.086	.209	3.13	3.99	1	5
	Library 3	28	3.75	1.143	.216	3.31	4.19	1	5
	Library 4	26	3.54	1.067	.209	3.11	3.97	1	5
	Library 5	23	1.09	1.564	.326	.41	1.76	0	5
	Library 6	100	3.24	1.093	.109	3.02	3.46	1	5
	Library 7	29	3.55	.910	.169	3.21	3.90	1	5
	Library 8	23	3.30	1.185	.247	2.79	3.82	1	5
	Library 9	31	2.48	1.288	.231	2.01	2.96	0	4
	Library 10	15	2.33	1.839	.475	1.32	3.35	0	5
	Total	328	3.15	1.353	.075	3.00	3.29	0	5

Note: 5- Strongly Agree, 4-Agree, 3-Neutral, 2-Disagree, 1-Strongly Disagree, 0-Not available

Table 5.19(A) highlight that Library 8 has the highest mean for the sign characteristic of the ability to aid till destination. In the case of other characteristics such as readability, visibility and self-explanatory, Library 1 had the highest mean. Library 5, Library 9 and Library 10 had lower mean scores for all sign characteristics, as it was seen that those libraries provided scanty signs (Table 6.13).

The five-point Likert scale was considered an interval scale. The mean is very significant. From 0 to 1.8, it means strongly disagree, from 1.81 to 2.60, it means disagree. From 2.61 to 3.40, it means neutral; from 3.41 to 4.20, it means agree; from 4.21 to 5 it means strongly agree.

The total mean scores of the features of sign characteristics such as, ability to aid till destination were (2.80), and for the characteristic self-explanatory signage, it was (2.82), as well as for readability (3.19) and visibility (3.15) which represents that majority of participants were neutral about the sign characteristics to facilitate direction, readability, self-explanatory and visibility. Thus, total mean scores for the sign characteristics represents that the available signage in all the university libraries in Mumbai lacks in aiding users to reach till desired destinations, facilitating self-explanatory signage, readability as well as visibility.

5.3.5 Addition of wayfinding tools for directional guidance

A good signage system is not just a collection of signs that put up as the need arises. Rather it should be able to guide, direct and inform library users as they move inside the library building and spaces. The solution is to present wayfinding information by an interrelated system that integrates messages and directional patterns and combines them with the architecture in a visually coordinated sequence. This pattern can be facilitated through systematic placement of directional arrows, signs, department lists, pictorial signs, etc.

Table 5.20: Need of Additional Signs

Particulars	Responses		Percent of Cases
	N	Percent	
Directional Arrows	195	28.6%	59.4%
Directional signs	244	35.8%	74.3%
Departmental lists	137	20.1%	41.7%
Pictorial Signs	105	15.4%	32.0%
Other	1	0.1%	.3%
Total	682	100.0%	207.7%

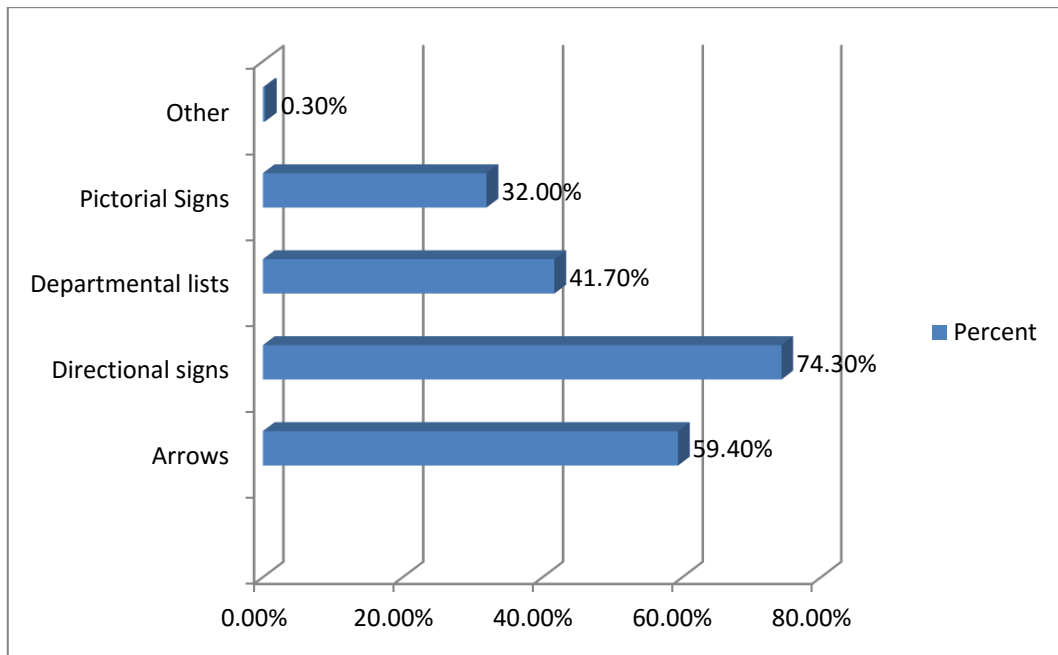


Figure 5.19: Requirements of Sign Categories

University campuses are widespread with the number of departmental buildings. Appropriate signage aid users to navigate within the campus and locating the library confidently. Hence participants were asked to give their perceptions regarding the need for additional signs. It was a multiple-choice question. Therefore according to the percent of cases, 59.4% suggested the addition of directional arrows, 74.3% recommended the addition of directional signs, 41.7% were of the opinion that departmental list sign should be added, 32.0% of participants recommended the addition of pictorial signs, and .3% of participants opined addition of audio signs, Braille signs, maps as well as floor indicators in the other category.

Table 5.20 (A): Need of Additional Signs – Library-Wise

Sign Types	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Directional arrows	Library 1	26	.50	.510	.100	.29	.71	0	1
	Library 2	27	.52	.509	.098	.32	.72	0	1
	Library 3	28	.54	.508	.096	.34	.73	0	1
	Library 4	26	.69	.471	.092	.50	.88	0	1
	Library 5	23	.83	.388	.081	.66	.99	0	1
	Library 6	100	.60	.492	.049	.50	.70	0	1
	Library 7	29	.41	.501	.093	.22	.60	0	1
	Library 8	23	.48	.511	.106	.26	.70	0	1
	Library 9	31	.68	.475	.085	.50	.85	0	1
	Library 10	15	.80	.414	.107	.57	1.03	0	1
	Total	328	.59	.492	.027	.54	.65	0	1
directional signs-Maps, Floor maps, Directories	Library 1	26	.65	.485	.095	.46	.85	0	1
	Library 2	27	.74	.447	.086	.56	.92	0	1
	Library 3	28	.68	.476	.090	.49	.86	0	1
	Library 4	26	.65	.485	.095	.46	.85	0	1
	Library 5	23	1.00	0.000	0.000	1.00	1.00	1	1
	Library 6	100	.81	.394	.039	.73	.89	0	1
	Library 7	29	.52	.509	.094	.32	.71	0	1
	Library 8	23	.61	.499	.104	.39	.82	0	1
	Library 9	31	.81	.402	.072	.66	.95	0	1
	Library 10	15	.87	.352	.091	.67	1.06	0	1
	Total	328	.74	.437	.024	.70	.79	0	1
Department Lists & Department Identification signs	Library 1	26	.38	.496	.097	.18	.59	0	1
	Library 2	27	.41	.501	.096	.21	.61	0	1
	Library 3	28	.11	.315	.060	-.01	.23	0	1
	Library 4	26	.04	.196	.038	-.04	.12	0	1
	Library 5	23	.43	.507	.106	.22	.65	0	1

Sign Types	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
	Library 6	100	.56	.499	.050	.46	.66	0	1
	Library 7	29	.34	.484	.090	.16	.53	0	1
	Library 8	23	.13	.344	.072	-.02	.28	0	1
	Library 9	31	.77	.425	.076	.62	.93	0	1
	Library 10	15	.60	.507	.131	.32	.88	0	1
	Total	328	.42	.494	.027	.36	.47	0	1
Pictorial Signs	Library 1	26	.19	.402	.079	.03	.35	0	1
	Library 2	27	.15	.362	.070	.00	.29	0	1
	Library 3	28	.36	.488	.092	.17	.55	0	1
	Library 4	26	.31	.471	.092	.12	.50	0	1
	Library 5	23	.17	.388	.081	.01	.34	0	1
	Library 6	100	.39	.490	.049	.29	.49	0	1
	Library 7	29	.28	.455	.084	.10	.45	0	1
	Library 8	23	.35	.487	.102	.14	.56	0	1
	Library 9	31	.42	.502	.090	.24	.60	0	1
	Library 10	15	.40	.507	.131	.12	.68	0	1
		Total	328	.32	.467	.026	.27	.37	0
Other	Library 1	26	.04	.196	.038	-.04	.12	0	1
	Library 2	27	.07	.385	.074	-.08	.23	0	2
	Library 3	28	0.00	0.000	0.000	0.00	0.00	0	0
	Library 4	26	.12	.588	.115	-.12	.35	0	3
	Library 5	23	.17	.834	.174	-.19	.53	0	4
	Library 6	100	0.00	0.000	0.000	0.00	0.00	0	0
	Library 7	29	.17	.928	.172	-.18	.53	0	5
	Library 8	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 9	31	0.00	0.000	0.000	0.00	0.00	0	0
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
		Total	328	.05	.408	.023	.00	.09	0

Note: 0- Not Needed , 1 – Need to be added

University-wise statistics as presented by Table 5.20(A), highlight that users of Library 5, Library 9 and Library 10 were of the opinion that all categories of signs were needed around the campus. Further, it was also observed during the field visits that within the library building, these libraries provided inadequate signage (Table 6.13). There was an absence of signs in Library 5. Library 6 was a huge and widespread library with a widespread campus; hence users of Library 6 were of the opinion that building maps, floor maps, directories, department identification signs as well as pictorial signs should be added to improve wayfinding. In the case of others, few participants suggested adding audio signs and floor indicators.

The total mean for the addition of directional signs such as campus maps, floor maps, and directories (.74) followed by directional arrows (.59) was the highest mean which indicates that maximum participants from all the libraries insisted more on the need of putting directional signs such as campus maps, floor maps, directories as well as directional arrows (Table 5.20(A)).

5.3.6 Visibility and identifiability of library entrance

The entrance of the library building should be appealing and welcoming; for this, the entrance must be visible and identifiable. Hence users were asked about the visibility and identifiability of the library entrance.

Table 5.21: Visibility of Library Entrance

Particulars	Frequency	Percent
Yes	236	72.0
No	91	27.7
Not applicable	1	.3
Total	328	100.0

Table 5.21 presents that 72% of participants agreed that the library entrance was visible and identifiable. However, 27.7% of participants opined that it was not visible and identifiable. One participant was visually disabled. As per the field observation, all the university library buildings were visible even though few libraries were located

in parent institutional buildings; however, 50% of libraries were not identifiable due to absence of library name signs (Table 6.25).

5.3.7 Existence of library map at the entrance

Library entrance can be made more welcoming by placing library building identification sign as well as library building map at or near the entrance. However, 72.3% of participants were of the opinion that the library building map was not available at the entrance of the library. It was observed that 40% (4) libraries were difficult to locate and identify due to absence of library building map at the entrance (Table 6.26).

Table 5.22: Existence of Library Building Map at Entrance

Particulars	Frequency	Percent	Cumulative Percent
No	237	72.3	100.0
Yes	90	27.4	27.7
Not applicable	1	.3	.3
Total	328	100.0	

Table 5.22 (A): Library-Wise Existence of Building Map at Entrance

University Name	Count	Library map at entrance			Total
		Not applicable	Yes	No	
Library 1	Count	0	8	18	26
	% of Total	0.0%	2.4%	5.5%	7.9%
Library 2	Count	1	7	19	27
	% of Total	.3%	2.1%	5.8%	8.2%
Library 3	Count	0	5	23	28
	% of Total	0.0%	1.5%	7.0%	8.5%
Library 4	Count	0	9	17	26
	% of Total	0.0%	2.7%	5.2%	7.9%
Library 5	Count	0	2	21	23
	% of Total	0.0%	.6%	6.4%	7.0%
Library 6	Count	0	41	59	100
	% of Total	0.0%	12.5%	18.0%	30.5%
Library 7	Count	0	6	23	29
	% of Total	0.0%	1.8%	7.0%	8.8%
Library 8	Count	0	8	15	23
	% of Total	0.0%	2.4%	4.6%	7.0%
Library 9	Count	0	2	29	31
	% of Total	0.0%	.6%	8.8%	9.5%
Library 10	Count	0	2	13	15
	% of Total	0.0%	.6%	4.0%	4.6%
Total	Count	1	90	237	328
	% of Total	.3%	27.4%	72.3%	100.0%

Cross-tabulation of library-wise existence of building map at the entrance shows that in case of all the libraries, major participants, i.e. total 72.3%, pointed out that library building map was not available at the entrance (Table 5.22 (A)).

5.3.8 Height of available signs for visibility and readability

Placement of signs at appropriate height is an important factor for the visibility and readability of signs. From the standard placement of signs, maps and directories, people consciously perceive a reliable pattern of information and orientation cues. People quickly learn to look for signs at reliably repeated heights. Therefore the designers should be instructed to follow the standards related to height while placing the major and minor signs in directional, identification and policy signs.

Table 5.23: Height of Existing Signage

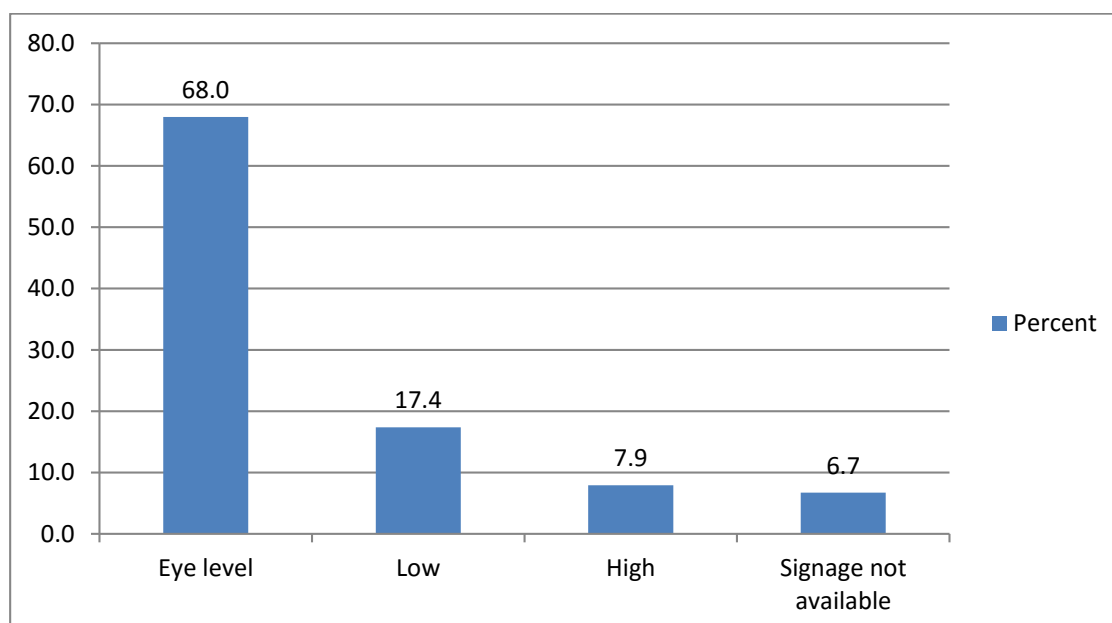
Particulars	Frequency	Percent	Cumulative Percent
Eye Level	223	68.0	74.7
Low	57	17.4	100.0
High	26	7.9	82.6
Signage not available	22	6.7	6.7
Total	328	100.0	

Users' opinions were sought regarding the height of existing signage. 68% of participants opined that signs were placed at an appropriate height for the visibility and readability of signs. In contrast, 17.4% of participants were of the opinion that signs were placed at a low level, and 7.9% of participants replied that it was placed at a high level. However, 6.7% of users opined that signs were not available inside the library, as signs were scanty in three libraries (Table 6.16).

Table 5.23 (A): Height of Existing Signage – Library-Wise

Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Library 1	26	1.35	.745	.146	1.05	1.65	1	3
Library 2	27	1.26	.712	.137	.98	1.54	0	3
Library 3	28	1.32	.723	.137	1.04	1.60	1	3
Library 4	26	1.27	.604	.118	1.03	1.51	1	3
Library 5	23	.61	1.033	.215	.16	1.06	0	3
Library 6	100	1.35	.672	.067	1.22	1.48	1	3
Library 7	29	1.55	.827	.154	1.24	1.87	1	3
Library 8	23	1.83	.984	.205	1.40	2.25	1	3
Library 9	31	1.71	1.189	.213	1.27	2.15	0	4
Library 10	15	2.27	1.100	.284	1.66	2.88	0	3
Total	328	1.41	.880	.049	1.31	1.50	0	4

Note: 0- No signage, 1- Appropriate, 2 - High, 3 – Low



Note: 0= No Signage, 1= Eye Level, 2= High, 3= Low

Figure 5.20: Height of Existing Signage

Descriptive findings associated with height of existing signage highlights that in more than 60% libraries placement of signage was fairly accurate i.e. at or near eye level. However, in the remaining (40%) libraries, signs were placed either at a low level or at a high level, which resulted in low visibility and readability of signage.

Findings from mean table of responses of participants regarding the placement height of existing signage indicate that the existence of uncertainty among readers due to placement of available signage at inappropriate height (Table 5.23 (A)).

5.3.9 Readability of signs

The readability and legibility of signs depend upon the factors such as space between the letters and words, stroke width and height of the letters, as well as the font type or typeface. Besides, the readability enables the observer to correctly perceive the information provided through words or sentences grouped.

Table 5.24: Readability of Signs

Particulars	Frequency	Percent	Cumulative Percent
Yes	236	72.0	75.3
No	81	24.7	100.0
No Signage	11	3.4	3.4
Total	328	100.0	

The question of readability was raised to participants to find out the legibility provided through signs through the size of the sign and font. 72% of participants agreed that signs were readable, whereas 24.7% of participants replied that signs lacked readability.

Table 5.25: Preference of Font Size

Particulars	Frequency	Percent	Cumulative Percent
Appropriate	168	51.2	51.2
Bigger size	150	45.7	97.0
Smaller size	10	3.0	100.0
Total	328	100.0	

Further, it was asked to the participants about their preference for the font size to be readable. 45.7% (150) participants expressed that bigger font sizes should be provided on signs for better readability (Figure 5.21).

Table 5.25 (A): Library-Wise Readability of Font Size- Library-Wise

Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Library 1	26	1.12	.326	.064	.98	1.25	1	2
Library 2	27	.96	.192	.037	.89	1.04	0	1
Library 3	28	1.00	0.000	0.000	1.00	1.00	1	1
Library 4	26	1.04	.196	.038	.96	1.12	1	2
Library 5	23	1.43	.843	.176	1.07	1.80	0	2
Library 6	100	1.29	.456	.046	1.20	1.38	1	2
Library 7	29	1.31	.471	.087	1.13	1.49	1	2
Library 8	23	1.26	.449	.094	1.07	1.46	1	2
Library 9	31	1.26	.575	.103	1.05	1.47	0	2
Library 10	15	1.33	.816	.211	.88	1.79	0	2
Total	328	1.21	.485	.027	1.16	1.27	0	2

Note: 0= Appropriate, 1=Bigger size, 2= Smaller Size

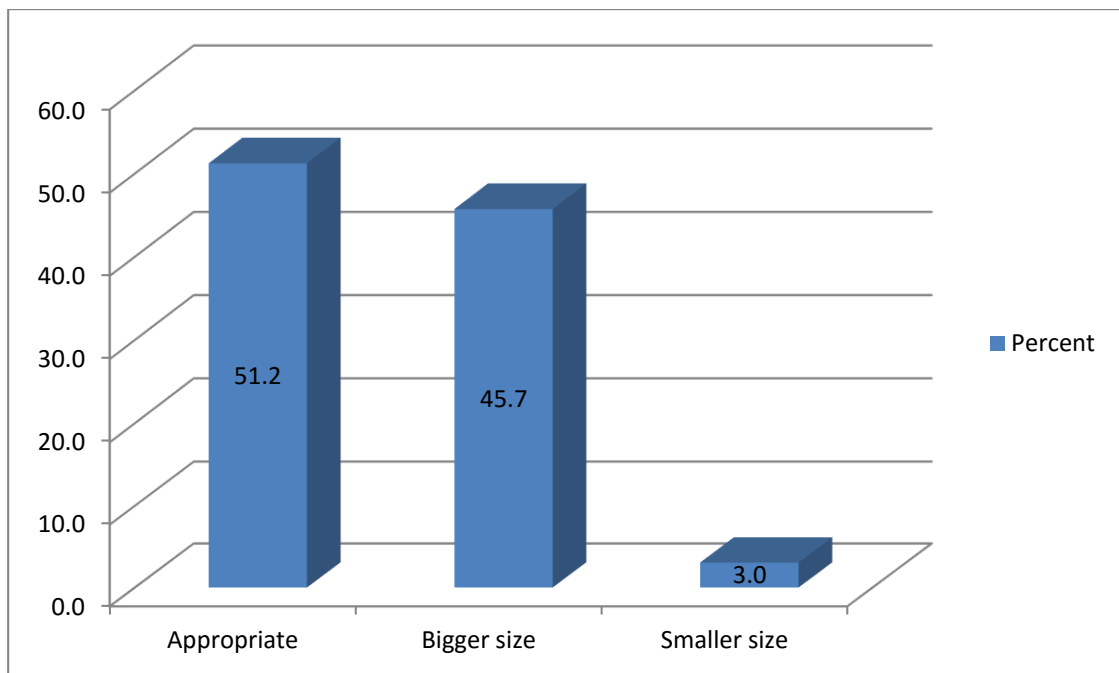


Figure 5.21: Preferable Font Size for Readability

The mean table of library-wise responses for opinions on the readability of font size illustrated that only Library 2 provided appropriate font size. Remaining library users expected bigger font size in signs. Thus descriptive findings indicate that very few libraries provided appropriate font size for readability of signage in the case of university libraries in Mumbai (Table 5.25(A)).

Letter should be two or three times larger than the minimum size necessary for a person with normal vision to read the message. It is advisable that guidance system in libraries must use a vision standard well below 20/20 (Visual Acuity) if they are to serve the needs of all patrons (Wechsler, 1979, p. 36)

5.3.10 Character type preference

The style of printing and the typeface used for signs also relates to the speed and ease with which a sign can be read. Hence the preference for the character type was asked to users.

Table 5.26: Character Type Preference

Particulars	Frequency	Percent	Cumulative Percent
All capital letters	236	72.0	72.3
Sentence case	77	23.5	100.0
All small letters	14	4.3	76.5
Not applicable	1	.3	.3
Total	328	100.0	

Table 5.26 shows that maximum, i.e. 72% of participants noted their preference for all capital letters on signs, 23.5% of participants were of the opinion that sentence case should be used while designing signs. Very few specifically, 4.3% of participants, opined the preference for all small letters.

5.3.11 Color scheme and contrast on signs

The intensities of color next to each other create different effects; in addition, the degree of contrast between different colors and their sign panel backgrounds affect or aid the readability.

Table 5.27: Color Scheme and Contrast on Signs

Particulars	Frequency	Percent	Cumulative Percent
Yes	220	67.1	69.5
No	100	30.5	100.0
Not applicable	8	2.4	2.4
Total	328	100.0	

Users' responses about preferability of existing color scheme and contrast on signs reveal that 67.1% of participants were of the opinion that it was appropriate and convenient for readability, whereas 30.5% of participants opined that it was not suitable for readability (Table 5.27).

Table 5.27 (A): Libraries and Colour Scheme Convenience

Libraries	Count	Colour scheme – convenient			Total
		Not applicable	Yes	No	
Library 1	Count	0	22	4	26
	% of Total	0.0%	6.7%	1.2%	7.9%
Library 2	Count	1	23	3	27
	% of Total	.3%	7.0%	.9%	8.2%
Library 3	Count	0	23	5	28
	% of Total	0.0%	7.0%	1.5%	8.5%
Library 4	Count	0	25	1	26
	% of Total	0.0%	7.6%	.3%	7.9%
Library 5	Count	3	5	15	23
	% of Total	.9%	1.5%	4.6%	7.0%
Library 6	Count	0	58	42	100
	% of Total	0.0%	17.7%	12.8%	30.5%
Library 7	Count	0	22	7	29
	% of Total	0.0%	6.7%	2.1%	8.8%
Library 8	Count	0	17	6	23
	% of Total	0.0%	5.2%	1.8%	7.0%
Library 9	Count	3	18	10	31
	% of Total	.9%	5.5%	3.0%	9.5%
Library 10	Count	1	7	7	15
	% of Total	.3%	2.1%	2.1%	4.6%
Total	Count	8	220	100	328
	% of Total	2.4%	67.1%	30.5%	100.0%

University-wise statistics for the user’s responses about the opinion of color scheme and contrast on signs revealed that participants of Library 5, Library 6 and Library 10 were not satisfied with the existing color scheme of signs, as Library 5 and Library 10 had provided very few signs and in Library 6 many temporary paper printed black and white signs were provided (Table 5.27(A)).

Thus the overall feedback for all the libraries indicates that major participants, i.e. 67.1% were of the opinion that color scheme and color contrast on signs was appropriate and convenient for readability.

5.3.12 Color preferences

Although the preference of color is a subjective matter, therefore a precise definition is difficult still, visual communication would suffer both aesthetically and practically while reading signs without appropriate color contrast. Table 5.28 indicates the scenario

Table 5.28: Color Preferences

Particulars	Frequency	Percent	Cumulative Percent
Appropriate	122	37.2	37.2
Black on white	88	26.8	64.0
Blue on white	38	11.6	83.8
Black on yellow	27	8.2	72.3
Green on white	9	2.7	86.6
White on black	22	6.7	93.3
White on blue	16	4.9	98.2
White on green	5	1.5	99.7
Red on white	1	.3	100.0
Total	328	100.0	

The use of suitable color contrast on signs can aid or improve readability. Hence user’s opinions were sought about their preferences for colors on signs. 37.2% of participants were satisfied with the existing color scheme and contrast available on the signboards. For other participants, black on white and blue on white were the most preferred color alternatives.

5.3.13 Utilities of arrows for direction

Arrows, as indicators of direction, may not seem ambiguous in intent, yet they are often used ambiguously. Specifically, there is a problem when arrows are used pointing downward or upward to indicate "straight-ahead" because they could also be interpreted as pointing to something directly below or above the sign, or even to a change of level. To standardize the usage and eliminate ambiguity, the Department of Transportation suggests that movement straight ahead be represented by a downward arrow, with straight horizontal arrows to indicate sideways movement. For changes of level (by stairs or escalators) diagonal arrow should be used.

It is preferable to provide arrows with signs at the point where the change of direction occurs so that the direction indicated is completely clear. Hence users were asked about whether the existing arrows signify proper directions till the library building and inside the library.

Table 5.29: Utility of Existing Arrows

Particulars	Frequency	Percent	Cumulative Percent
Yes	146	44.5	47.3
No	171	52.1	99.4
Not available	11	3.3	100.0
Total	328	100.0	

Table 5.29 presents 44.5% of participants agreed upon that the existing arrows signify proper directions, yet 52.1% of participants were of the opinion that existing arrows do not signify proper directions.

Studies indicated that arrows should be placed to the left of other symbols, which are, in turn, a place to the left of the words on the sign (Ashley et al., 1973, pp.165-166).

The results obtained through responses of participants indicate the ineffectiveness of existing directional arrows with the unavailability of directional cues, which ultimately results in uncertainty among library users.

5.3.14 Use of sources for wayfinding for deciding and physically reaching the destination

To facilitate users ease and confidence while moving in the library building entails a lot of information to be absorbed at different times and in different places. Accordingly, the guidance tools should be available for users to decide the route and move ahead confidently. Therefore it was asked to the users which wayfinding tools they had used to decide their routes and paths to evaluate the utility and aptness of available signage in wayfinding. In addition, which wayfinding tools aided users while reaching the desired destinations was asked.

Table 5.30: Use of Sources for Wayfinding Exploit by Users

Particulars	Wayfinding tools used for deciding destination			Wayfinding tools used while physically reaching destination		
	Responses		Percent of Cases	Responses		Percent of Cases
	N	Percent		N	Percent	
Counter inquiry	223	60.9%	67.9%	219	37.5%	66.7%
Other users help	91	24.9%	27.7%	288	49.3%	87.8%
Instructional signs	49	13.4%	14.9%	70	12.0%	21.3%
Other sources	3	.8%	.9%	7	1.2%	2.1%
Total	366	100.0%	111.4%	584	100.0%	177.9%

Users opted for multiple sources of inquiry while reaching till destinations; hence the percentage of cases was taken into consideration. As shown in Table 5.30, 67.9% of participants inquired at the counter for deciding routes and destination, 27.7% of participants taken other users help while deciding destination, and merely 14.9% of participants decided their locations with the help of instructional signs. Other sources, i.e.9%, include help taken from friends for deciding route till destination. Whereas 66.7% of participants inquired at the counter, major participants, specifically 87.8%, had taken other users help while physically reaching till destination. Merely 21.3% of participants were able to reach till destination with the help of available instructional signs. The comparison highlights that while deciding destination maximum participants that is 67.9% approached inquiry counter, whereas while physically

reaching till desired destination, maximum participants that is 87.8% users taken other users help as a wayfinding alternative.

Table 5.30 indicates that instructional signs were insufficient for participants for deciding the route or path for their destination; hence they approached the staff and other library users and friends as sources of inquiry while wayfinding.

Findings indicates that instructional signboards were not used significantly by the participants for deciding their desired destinations, or only instructional signboards were not sufficient for users to decide the route or path.

Table 5.30 (A): Sources of Inquiry Used for Physically Reaching Till Destination – Library-Wise

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Counter Inquiry	Library 1	26	.38	.496	.097	.18	.59	0	1
	Library 2	27	.59	.501	.096	.39	.79	0	1
	Library 3	28	.54	.508	.096	.34	.73	0	1
	Library 4	26	.38	.496	.097	.18	.59	0	1
	Library 5	23	.83	.388	.081	.66	.99	0	1
	Library 6	100	.82	.386	.039	.74	.90	0	1
	Library 7	29	.69	.471	.087	.51	.87	0	1
	Library 8	23	.74	.449	.094	.54	.93	0	1
	Library 9	31	.55	.506	.091	.36	.73	0	1
	Library 10	15	.87	.352	.091	.67	1.06	0	1
	Total	328	.67	.472	.026	.62	.72	0	1
Other Users	Library 1	26	.92	.272	.053	.81	1.03	0	1
	Library 2	27	.81	.396	.076	.66	.97	0	1
	Library 3	28	.82	.390	.074	.67	.97	0	1
	Library 4	26	.92	.272	.053	.81	1.03	0	1
	Library 5	23	.91	.288	.060	.79	1.04	0	1
	Library 6	100	.95	.219	.022	.91	.99	0	1
	Library 7	29	.72	.455	.084	.55	.90	0	1

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
	Library 8	23	.91	.288	.060	.79	1.04	0	1
	Library 9	31	.77	.425	.076	.62	.93	0	1
	Library 10	15	.87	.352	.091	.67	1.06	0	1
	Total	328	.88	.328	.018	.84	.91	0	1
Instructional Signs	Library 1	26	.12	.326	.064	-.02	.25	0	1
	Library 2	27	.19	.396	.076	.03	.34	0	1
	Library 3	28	.18	.390	.074	.03	.33	0	1
	Library 4	26	.35	.485	.095	.15	.54	0	1
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	.30	.461	.046	.21	.39	0	1
	Library 7	29	.07	.258	.048	-.03	.17	0	1
	Library 8	23	.35	.487	.102	.14	.56	0	1
	Library 9	31	.23	.425	.076	.07	.38	0	1
	Library 10	15	.07	.258	.067	-.08	.21	0	1
		Total	328	.21	.410	.023	.17	.26	0
Other	Library 1	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 2	27	0.00	0.000	0.000	0.00	0.00	0	0
	Library 3	28	.04	.189	.036	-.04	.11	0	1
	Library 4	26	.08	.392	.077	-.08	.24	0	2
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	.02	.141	.014	-.01	.05	0	1
	Library 7	29	.07	.258	.048	-.03	.17	0	1
	Library 8	23	.04	.209	.043	-.05	.13	0	1
	Library 9	31	.03	.180	.032	-.03	.10	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
		Total	328	.03	.181	.010	.01	.05	0

Note: 0-Not ticked, 1-Ticked

Table 5.30(B) also indicates that the total mean of other users as a source of guidance tool was used highly by the users of all the libraries. The inquiry counter as a

wayfinding tool was used highly by Library 5 and Library 10, as seen during the field observation that signs were scanty in those libraries (Table 6.16). As a result, inquiry counter was heavily used instead of instructional signs. The total mean of instructional signs as a source of guidance tool was very low, which represents that available instructional signs were insufficient for wayfinding.

The total mean score for inquiry from other users (.88) was highest as compared to the use of other available inquiry sources while physically reaching till destination, which indicates that although the signs were available in all the libraries, the signage system was insufficient for self-orientation of users; hence they had taken help of other users while wayfinding and while physically reaching till destination.

5.4 OPAC

For many years in the past, before the emergence of search engines, library catalogs were the only information-seeking tool. With the advent of computers and ICT, academic library OPACs are losing ground to online search engines, though academic librarians have devotedly produced good cataloging records for the clients to use. Hence library OPACs should be interactive with an alternative interfaces and should be able to provide optimum search strategies.

Library OPAC should be user-friendly and self-oriented for its optimum use. OCLC identified three major trends in the needs of today's information consumers. They are self-service (moving to self-sufficiency), satisfaction, and seamlessness (De Rosa et al., 2005). Users do not always realize what they are searching for or are even able to explain which types of problems they face when coming into a library or while searching for an online public access catalog (OPAC) of the library. Hence user opinions were sought regarding their experiences of using OPAC, the level of satisfaction as per users' outlook, whether they face any problem while using OPAC and in their own opinion, which guiding tools and instructional tools should be added for self-oriented OPACs.

5.4.1 Use of OPAC

While observing the use of OPAC and exploring the views and problems regarding its user-friendliness, the prior usage of OPAC by users was considered appropriate.

Hence, users who had initially used library OPAC for at least once or twice were taken for the study.

Table 5.31: OPAC Use

Particulars	Frequency	Percent
Used OPAC	266	81.1
No	39	11.9
Not Available	23	7.0
Total	328	100.0

The responses revealed that 81.1% of participants had used OPAC, only 11.9% of participants were not familiar and did not use OPAC, further 7.0% of participants from one of the library users under study replied that OPAC was not available in the library due to incomplete library automation process of the said library (Table 5.31).

5.4.2 Self-orientation and satisfactory aspects of OPAC

OPACs are created and provided by libraries for making users aware of the library collection. With the computerized retrieval system, users can search for the best alternatives from the available library collection on a required subject on their own. In order to identify the problems faced by users while using OPACs, series of questions were asked to users to assess the level of satisfaction provided by OPAC in case of user-friendliness, ease in operating and visibility of search results. This was a multiple-choice question with Likert scale.

Table 5.32: OPAC - Level of Satisfaction

Particulars	Never used/ Not Available	Below 20%	21% - 49%	50% - 74%	75% - 99%	100%	Total
User-friendliness	62	3	10	70	100	83	328
Percentage	18.9	.9	3.0	21.3	30.5	25.3	100.0
Ease in operating	62	1	18	81	82	84	328
Percentage	18.9	.3	5.5	24.7	25.0	25.6	100.0
Visibility of search results	62	4	40	73	77	72	328
Percentage	18.9	1.2	12.2	22.3	23.5	22.0	100.0

5.4.2.1 User-friendliness of OPAC

Libraries consider user-friendliness as an important criterion to assess and evaluate any software. Table 5.32 shows users perceptions about the user-friendliness of OPAC which highlights that only 30.5% of participants were of the opinion that 75%-99% level of user-friendliness was provided, 25.3% of participants replied that 100% level of user-friendliness was facilitated by OPAC; however, 21.3% of respondents opined that 50%-74% level of user-friendliness provided, 3.0% participants replied that 21%- 49% level of user-friendliness provided, .9 respondents were of the view that below 20% level of user-friendliness was facilitated by OPAC. Further, 18.9% of participants replied that they never used OPAC or it was not available in the library.

5.4.2.2 Ease in operating OPAC

In the case of OPAC, the number of operations and clicks should be minimum and easy to execute to proceed further till ultimate information retrieval. The OPAC system should be self-explanatory for users. Hence users were asked about the level of ease facilitated by OPAC in operations. 25.0% participants were of the opinion that 75%-99% level of ease was experienced, 25.6% of participants replied that 100% level of ease was provided while operating, 24.7% respondents opined that 50% -74% level of user-friendliness facilitated. However, 5.5% of participants replied that 21% - 49% level of ease was provided and .3% of respondents opined that below 20% level of ease was provided in use and operations of OPAC. Further, 18.9% of participants replied that they never used OPAC or it was not available in the library.

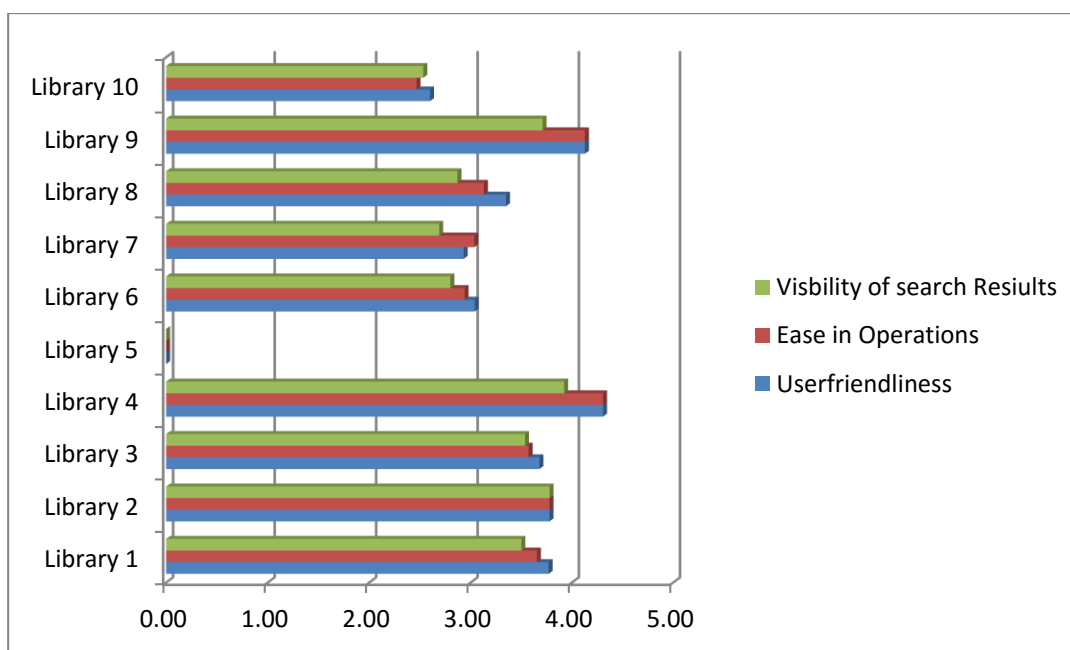
5.4.2.3 Visibility of search results

Different library automation software provide different sequences of operations for information search and retrieval through OPAC. In the case of many of the software, OPACs are user-friendly and easy to operate, but the visibility of search results is low in the case of some software. User's opinions were sought regarding the visibility of search results from the libraries under study. According to the responses of participants, 23.5% agreed that 75%-99% level of visibility was provided, 22.3% participants opined that 50%-74% level of visibility was facilitated, 22.0% respondents agreed that 100% visibility was provided for search results, 12.2% participants replied that 21% - 49% visibility was facilitated, however, 1.2% of respondents opined that below 20% visibility was provided in search results of OPAC. Further, 18.9% of participants replied that they never used OPAC or it was not available in the library.

Table 5.32 (A): Level of Satisfaction through OPAC Features – Library-Wise

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
User-friendliness of OPAC	Library 1	26	3.77	1.423	.279	3.19	4.34	0	5
	Library 2	27	3.78	1.761	.339	3.08	4.47	0	5
	Library 3	28	3.68	1.541	.291	3.08	4.28	0	5
	Library 4	26	4.31	.549	.108	4.09	4.53	3	5
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	3.04	1.657	.166	2.71	3.37	0	5
	Library 7	29	2.93	1.557	.289	2.34	3.52	0	5
	Library 8	23	3.35	1.265	.264	2.80	3.89	0	5
	Library 9	31	4.13	1.118	.201	3.72	4.54	0	5
	Library 10	15	2.60	1.993	.515	1.50	3.70	0	5
	Total	328	3.20	1.748	.097	3.01	3.39	0	5
Ease in operations	Library 1	26	3.65	1.468	.288	3.06	4.25	0	5
	Library 2	27	3.78	1.761	.339	3.08	4.47	0	5
	Library 3	28	3.57	1.597	.302	2.95	4.19	0	5
	Library 4	26	4.31	.549	.108	4.09	4.53	3	5
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	2.94	1.663	.166	2.61	3.27	0	5
	Library 7	29	3.03	1.476	.274	2.47	3.60	0	5
	Library 8	23	3.13	1.180	.246	2.62	3.64	0	5
	Library 9	31	4.13	1.088	.195	3.73	4.53	0	5
	Library 10	15	2.47	1.959	.506	1.38	3.55	0	5
	Total	328	3.13	1.742	.096	2.94	3.32	0	5
Visibility of results	Library 1	26	3.50	1.449	.284	2.91	4.09	0	5
	Library 2	27	3.78	1.761	.339	3.08	4.47	0	5
	Library 3	28	3.54	1.551	.293	2.93	4.14	0	5
	Library 4	26	3.92	.744	.146	3.62	4.22	2	5
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	2.80	1.688	.169	2.47	3.13	0	5
	Library 7	29	2.69	1.491	.277	2.12	3.26	0	5
	Library 8	23	2.87	1.180	.246	2.36	3.38	0	5
	Library 9	31	3.71	1.296	.233	3.23	4.19	0	5
	Library 10	15	2.53	1.995	.515	1.43	3.64	0	5
	Total	328	2.96	1.730	.096	2.77	3.15	0	5

Note: 0-Not Applicable/ Not available 1 = Below 20% level of satisfaction , 2 = 21%-49% level of satisfaction, 3 = 50%-74% level of satisfaction, 4 = 75%-99% level of satisfaction, 5 = 100% level of satisfaction



Note: 0-Not Applicable/Not Available, 1 = Below 20% level of satisfaction , 2 = 21%-49% level of satisfaction, 3 = 50%-74% level of satisfaction, 4 = 75%-99% level of satisfaction, 5 = 100% level of satisfaction

Figure 5.22: Level of Satisfaction through OPAC Features

Library OPAC is the best tool to facilitate access to information sources. It allows users to search for information through various attributes. Hence for the optimum utilization of OPAC services, it should be user-friendly, easy to operate and should facilitate search results in a readable and visible format. University-wise responses of participants indicated that participants of Library 4 were highly satisfied with the user-friendliness and ease of OPAC as well as the visibility provided by the OPAC search results. In Library 5, OPAC was not available, as the library was not automated its entire collection till the time of the study. The total mean for the feature visibility of search results was the lowest mean, which highlights that according to all the library users excluding Library 4, visibility of search results was low in the case of OPAC results.

The five-point Likert scale was considered an interval scale. The mean is very significant. From 0 to 1.8, it means below 20% level of satisfaction, from 1.81 to 2.60, it means 25% level of satisfaction. From 2.61 to 3.40, it means 50% level of satisfaction; from 3.41 to 4.20, it means 75% level of satisfaction; from 4.21 to 5 it means 100% level of satisfaction (Warmbrod, 2014).

The total mean score for the feature user-friendliness of OPAC (3.20) was highest among other features, which represents that overall 50% user-friendliness was facilitated by OPAC, followed by feature ease of operation (3.13) again represents that 50% ease of operation was facilitated during the use of OPAC. However total mean for visibility of results is the lowest (2.96) which represents that 50% visibility of results was provided through the search results. The scenario represents that all the libraries in Mumbai, excluding Library 4, user-friendly OPAC interfaces were provided; however, there was a need to improve the visibility of search results of OPAC (Table 5.32(A)).

5.4.2.4 Use of OPAC and Ease in Operations

Ease in operations of OPAC improves user-friendliness. It is expected that the OPAC interface should be available within minimum clicks as well as with spontaneous operations to facilitate ease in operations.

Table 5.32 (B): Use of OPAC and Ease in Operations – Correlation

		Used OPAC	Ease in Operation
OPAC Use	Pearson Correlation	1	-.203
	Sig. (2-tailed)		.000
	N	328	328
Ease in Operation	Pearson Correlation	-.203	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained r value for the variable use of OPAC and the provision of ease on operations was $-.203$ which is less than to $-.3$, signified weak negative relationship between the use of OPAC with ease in operations of OPAC. The p value was $.000$, which means it is significant at $.05$ level. The user responses and the negative r value highlight that, university libraries in Mumbai lack in facilitating ease in operations of OPACs which indicate the downfall and a negative correlation between the two variables.

The research study is conducted especially on first-time users who are not much familiar with the library and its OPAC, hence the obtained r value is negative. Further, findings indicated that maximum participants feel confusion (45.4%), challenging (33.2%), frustrating (21.6%), during information search process, which may result in library anxiety while using OPAC at initial stage (Table 5.48). The relationship between two variables can also change over time and may have periods of positive correlation as well, when those new users will use OPAC frequently, they may experience ease in operations while using OPAC and over the period of time there may be a positive correlation. Thus the frequent use of OPAC over the time will lead to ease in operations while using OPACs.

5.4.2.5 Use of OPAC and User-friendly OPAC - Correlation

User-friendly OPAC facilitate smooth interface for user input and system output. A good interface allows interactivity to library users while using OPACs. The correlation between use of OPAC and user-friendliness of OPAC shows the following results:

Table 5.32 (C): Use of OPAC and User-Friendly OPAC – Correlation

		Used OPAC	User-friendliness of OPAC
OPAC Use	Pearson Correlation	1	-.207
	Sig. (2-tailed)		.000
	N	328	328
User-friendliness of OPAC	Pearson Correlation	-.207	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained r value for the variable use of OPAC and the provision of user-friendly OPAC was $-.207$ which is less than to $-.3$, signified weak negative relationship between the use of OPAC with user-friendly OPAC. The p value was $.000$ which

means it is significant at .05 level. The user responses and the negative r value highlight that, university libraries in Mumbai lack in facilitating user-friendly OPACs.

The research study is conducted especially on first-time users who are not much familiar with the library and its OPAC, hence the obtained r value is negative. Further, findings indicated that maximum participants feel confusing (45.4%), challenging (33.2%), frustrating (21.6%), during information search process, which may result in library anxiety while using OPAC at initial stage (Table 5.48). The relationship between two variables can also change over time and may have periods of positive correlation as well, when those new users will use OPAC frequently, they may experience that OPAC user-friendly and over the period of time there may be a positive correlation. Thus the frequent use of OPAC over the time will lead to user-friendly OPACs.

5.4.2.6 Visibility of Search Results

OPACs allow users to search for information through various attributes. However, search results should be facilitated in a readable and visible format. The findings of correlation between use of OPAC and visibility of search results are presented in the following table.

Table 5.32 (D): Use of OPAC And Visibility of Search Results – Correlation

		Used OPAC	Visibility of results
Used OPAC	Pearson Correlation	1	-.194
	Sig. (2-tailed)		.000
	N	328	328
Visibility of results	Pearson Correlation	-.194	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained r value for the variable use of OPAC and the provision of visibility of search results was $-.194$ which is less than to $-.3$, signified a weak negative relationship between the use of OPAC and the visibility of search results. The p value

was .000 which means it is significant at .05 level. The user responses and the *r* value highlight that, university libraries in Mumbai lack in facilitating visibility of OPAC search results which indicate the downfall and a negative correlation between the two variables, which ultimately affect the ease of use of OPAC, while carrying out circulation processes and operations in the case of university libraries.

5.4.3 Trouble in OPAC use

OPAC should be user-friendly and easy to use for its optimum utilization by the users. The level of ease and comfort while using OPAC depends on the availability of instructions and the environment provided for OPAC use.

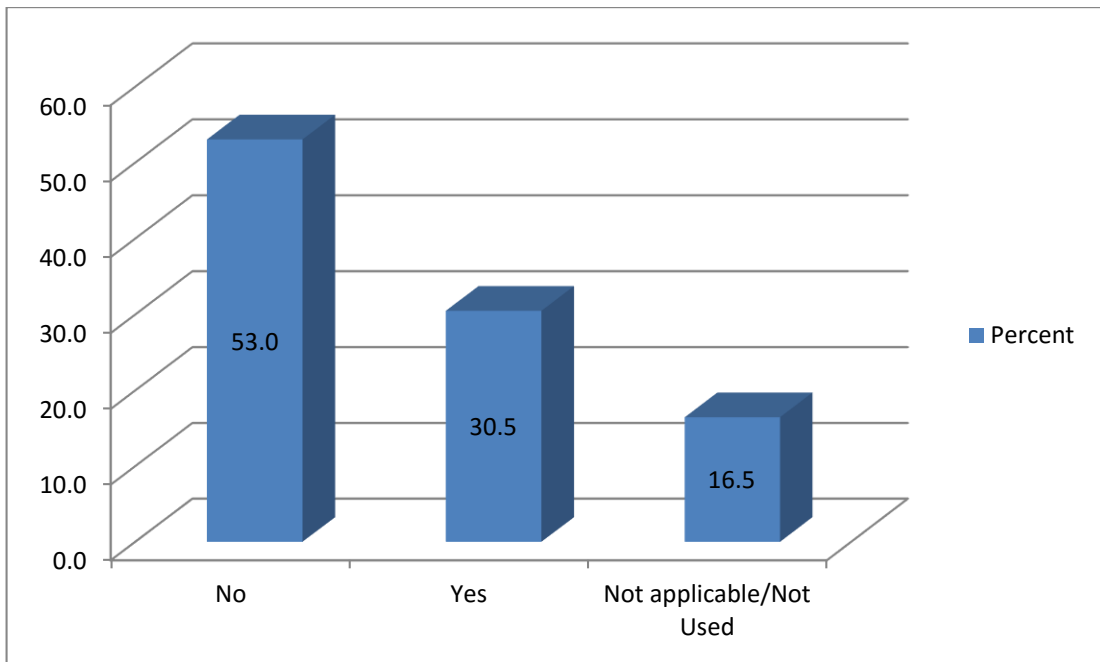
Table 5.33: Faced Trouble in OPAC Use

Particulars	Frequency	Percent	Cumulative Percent
Yes	100	30.5	47.0
No	174	53.0	100.0
Not applicable	54	16.5	16.5
Total	328	100.0	

Hence question was raised for the users about whether they faced trouble while accessing OPAC. 53.0% (174) participants replied that they did not face any trouble; however, 30.5% (100) participants opined that they faced trouble while using OPAC. 16.5% of participants never used OPAC (Table 5.33) / (Figure 23).

Table 5.33 (A): Faced Trouble in OPAC Use – Library-Wise

Libraries	Count	Faced trouble in OPAC use			Total
		Not applicable	Yes	No	
Library 1	Count	2	8	16	26
	% of Total	.6%	2.4%	4.9%	7.9%
Library 2	Count	3	5	19	27
	% of Total	.9%	1.5%	5.8%	8.2%
Library 3	Count	3	11	14	28
	% of Total	.9%	3.4%	4.3%	8.5%
Library 4	Count	0	4	22	26
	% of Total	0.0%	1.2%	6.7%	7.9%
Library 5	Count	22	1	0	23
	% of Total	6.7%	.3%	0.0%	7.0%
Library 6	Count	14	37	49	100
	% of Total	4.3%	11.3%	14.9%	30.5%
Library 7	Count	4	11	14	29
	% of Total	1.2%	3.4%	4.3%	8.8%
Library 8	Count	2	12	9	23
	% of Total	.6%	3.7%	2.7%	7.0%
Library 9	Count	1	6	24	31
	% of Total	.3%	1.8%	7.3%	9.5%
Library 10	Count	3	5	7	15
	% of Total	.9%	1.5%	2.1%	4.6%
Total	Count	54	100	174	328
	% of Total	16.5%	30.5%	53.0%	100.0%



Note: 0= Not Applicable, 1= Yes, 2= No

Figure 5.23: Trouble in OPAC Use

University-wise opinions of participants highlight that users of Library 5 had never used OPAC as it was not available, further 30.5% of library users, excluding Library 4 and Library 9, faced trouble while using OPAC.

The descriptive findings show that users of more than 50% libraries did not face any trouble while accessing and using OPACs; however, in the case of a few libraries, users faced trouble while using OPAC which affect user-friendliness in OPAC use and operations as per Table 5.33(A).

Table 5.34: Description of Problems Faced While Using OPAC

Particulars	Frequency	Percent	Cumulative Percent
Not faced any problem	243	74.1	74.1
Not mentioned the problem	40	12.2	97.9
Computer not working due to no internet	7	2.1	79.9
Difficult to use	7	2.1	82.0
Difficult to search through exact title	4	1.2	85.7
Only list of books without shelf location	4	1.2	100.0
Can not log in sometimes	3	.9	76.8
Availability of books was unclear	3	.9	77.7
Lack of proper guidance	3	.9	83.2
Numbering system	2	.6	74.7
Lacks in keyword specific searches	2	.6	75.3
Password of computer not known	2	.6	75.9
Improper shelving	2	.6	98.5
Unaware of how to run OPAC	2	.6	84.5
Department wise searching is not provided	1	.3	82.3
Not specific about journals and books	1	.3	83.5
Low visibility of search results	1	.3	83.8
Unavailability of instructions	1	.3	98.8
Total	328	100.0	

To explore what kind of troubles users faced, participants were asked to elaborate on the problems faced by them while using OPAC. Table 5.56 describes various troublesome situations faced by participants. Though 74.1% of participants didn't face any problem in OPAC use, the remaining 25.9% of participants face trouble while accessing and operating OPACs. Thus major problems faced by participants were disconnected internet resulted in non-connectivity to OPAC, difficulty in log-in, availability of books was unclear, difficulty in using the software, lack of proper guidance, poor in providing search strategies, inaccessibility due to password protected terminals and so on.

5.4.4 Opinions to facilitate self-oriented OPAC

Academic libraries try to facilitate easy to operate online catalogues with more successful catalog searches. To facilitate a more user-friendly catalog as per users' expectations, it is essential to identify what users expect from this service. Users' opinions were sought about their expectations to make the OPACs more self-oriented and user-friendly.

Table 5.35: Opinions to Facilitate Self-Oriented OPAC

Particulars	Responses		Percent of Cases
	N	Percent	
OPAC manuals near terminals	157	27.5%	47.8%
Instructional video on OPAC terminals	141	24.7%	42.9%
Guidance chart for OPAC	132	23.1%	40.2%
Personal guidance for OPAC use	89	15.6%	27.1%
Enlarge window OPAC search results	51	8.9%	15.5%
other requirements for OPACs	1	.2%	.3%
Total	571	100.0%	173.8%

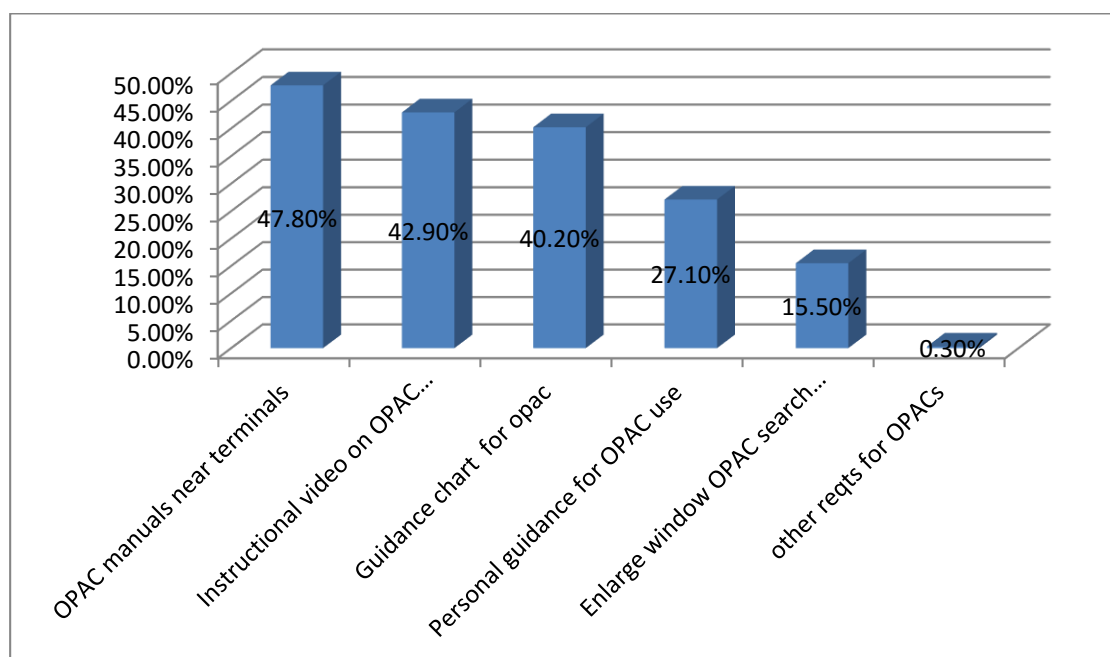


Figure 5.24: Opinions to Facilitate Self-Oriented OPAC

Table 5.35 shows that a maximum, i.e. 47.8% (157) participants were of the opinion that OPAC manuals should be facilitated and the manuals should be available near OPAC terminals. Further 42.9% of participants opined that instructional videos should be available on OPAC terminals, 40.2% respondents replied that printed guidance charts should be made available near OPAC terminals, 27.1% participants were of the opinion that personal guidance should be provided if required by users and 15.5% participants suggested that provision should be available to enlarge the search results obtained through OPAC. Other suggestions include the availability of Braille manual (.3%), availability of uninterrupted network services and need for regular maintenance of OPAC terminals.

Studying the findings according to percentage of cases, participants from all the libraries were of the opinion that it was essential to facilitate manuals preferably near OPAC terminals (55.7%). Further, the facility of instructional videos on OPAC terminals (50.0%) and printed guidance charts (46.8%) will aid in self-oriented OPAC use.

5.4.5 Opinion about availability of OPAC manuals

The OPAC interface should be preferably swift enough to use without reading instructions, manuals, tips, or help screens. Yet in the case of university libraries where new users are enrolled every year, OPAC manuals should be made available for users to get familiar with the OPAC interface. Users were asked whether the OPAC manual was available near the terminals.

Table 5.36: Availability of OPAC Manual

Particulars	Frequency	Percent	Cumulative Percent
No	264	80.5	98.8
Yes	37	11.3	18.3
OPAC not available	23	7.0	7.0
OPAC not used	4	1.2	100.0
Total	328	100.0	

Responses of participants' highlight that major that is 80.5% (264) participants replied that OPAC manuals were not available in the library. Very few specifically, 11.3%

(37) respondents, agreed that it was available near OPAC terminals. Therefore, further those users were asked whether the OPAC manual was used by them and how far it was easy to understand. Out of that, 11.3% (37), respondents 10.06% (33) used the manuals, and 9.75% (32) agreed that it was easy to understand to follow the provided instructions.

5.5 Shelving

In the digital era, though library professionals and users have shifted towards digital resources and e-resources, still printed information sources are the major part of the library collection which is still preferable by the academic community as it is the best alternative for continuous and prolonged reading.

Users expect books on an appropriate shelf in the book stacks when the book status is shown as 'available' in OPACs. Proper shelving as per the classification scheme with accurate shelf indicators will result in making information sources available more quickly and effortlessly for users. Facilitating proper shelving is a continuous process. Hence in the present section of the questionnaire, users were asked questions about their experiences while searching for information sources in the stacking areas.

5.5.1 Time required for searching information source in stacks

Library OPACs should be able to indicate the availability status of books in the library. If the locations of books are provided with bibliographic details through OPACs, the information searching time of users can be saved. Further, with the accurate shelving of books, finding information sources on stacks will be quick and simple. Hence users were asked about the time required for them to search information source in stacks after noting bibliographic details and leaving OPAC terminals.

Table 5.37: Time Taken to Find Information Source

Particulars	Frequency	Percent
Less than 1 minute	23	7.0
1-4 minutes	69	21.0
5-8 minutes	74	22.6
9-12 minutes	58	17.7
12+ minutes	104	31.7
Total	328	100.0

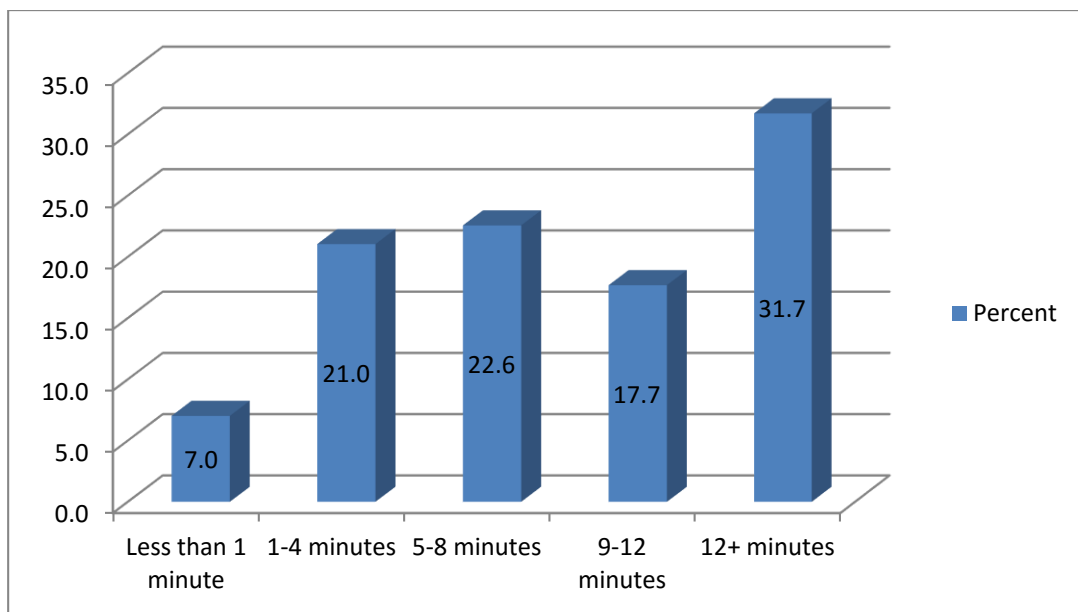
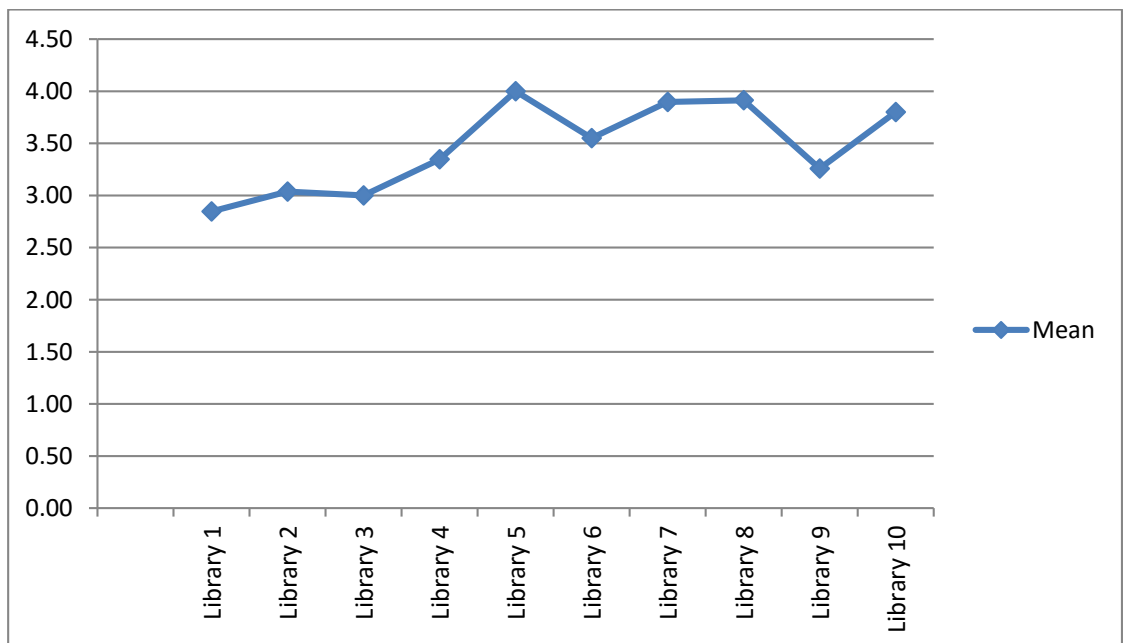


Figure 5.25: Time Taken to Find Information Source

Table 5.37/Figure 5.25 presents that maximum participants pointedly 31.7% spent more than 12 minutes, 22.6% respondents spent 5-8 minutes, 17.7% of participants required 9-12 minutes to locate and find the books or information sources in the stacking area after leaving OPAC terminals. Very few users, specifically 21.0% and 7.0% participants were able to find the books in the stacks within 1-4 minutes and less than one minute respectively. It highlights that maximum participants spent more time in stacking area for information source search.

Table 5.37 (A): Time Taken to Find Source in Stacking-Mean

Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval - Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Library 1	26	2.85	1.317	.258	2.31	3.38	1	5
Library 2	27	3.04	1.454	.280	2.46	3.61	1	5
Library 3	28	3.00	1.466	.277	2.43	3.57	1	5
Library 4	26	3.35	.936	.183	2.97	3.72	2	5
Library 5	23	4.00	1.087	.227	3.53	4.47	2	5
Library 6	100	3.55	1.344	.134	3.28	3.82	1	5
Library 7	29	3.90	1.319	.245	3.39	4.40	1	5
Library 8	23	3.91	1.041	.217	3.46	4.36	2	5
Library 9	31	3.26	1.316	.236	2.78	3.74	1	5
Library 10	15	3.80	1.082	.279	3.20	4.40	2	5
Total	328	3.46	1.315	.073	3.32	3.60	1	5



Note: 1= Less than 1 minute, 2= 1-4 minutes, 3= 5-8 minutes, 4=9-12 minutes, 5= 12+ minutes

Figure 5.26: Time Taken to Find Source in Stacking - Mean

The mean score of time required by participants to find the source in stacking area in university libraries indicates that users of Library 5, Library 7, Library 8 and Library 10 required more time for physically searching books in stacking areas. Library 5 has complete closed access with manual card catalog system, Library 7 provided partial closed access that is closed access to undergraduate students and open access to post graduate and Ph D students. In case of Library 8 a few stack end signs were overwritten resulted in lack of readability. Whereas in case of Library 10 signs were scanty, including for stacking area signage (Table 6.28)

The total mean scores for the time taken to find a source in stacking (3.46) by average users shows users required 9 to 12 minutes to find information sources in case of all the libraries in Mumbai (Table 5.37(A)).

It highlights that in the case of users of all the libraries, stacking area signage need to be more specific and accurate, and stacking signs should provide general as well as specific information about stacking arrangements.

5.5.2 Success in finding books on stacks

In the case of respondents who required more than 12 minutes for searching books in stacking were further inquired about whether they were able to find the required information source in stacking after spending the time for searching.

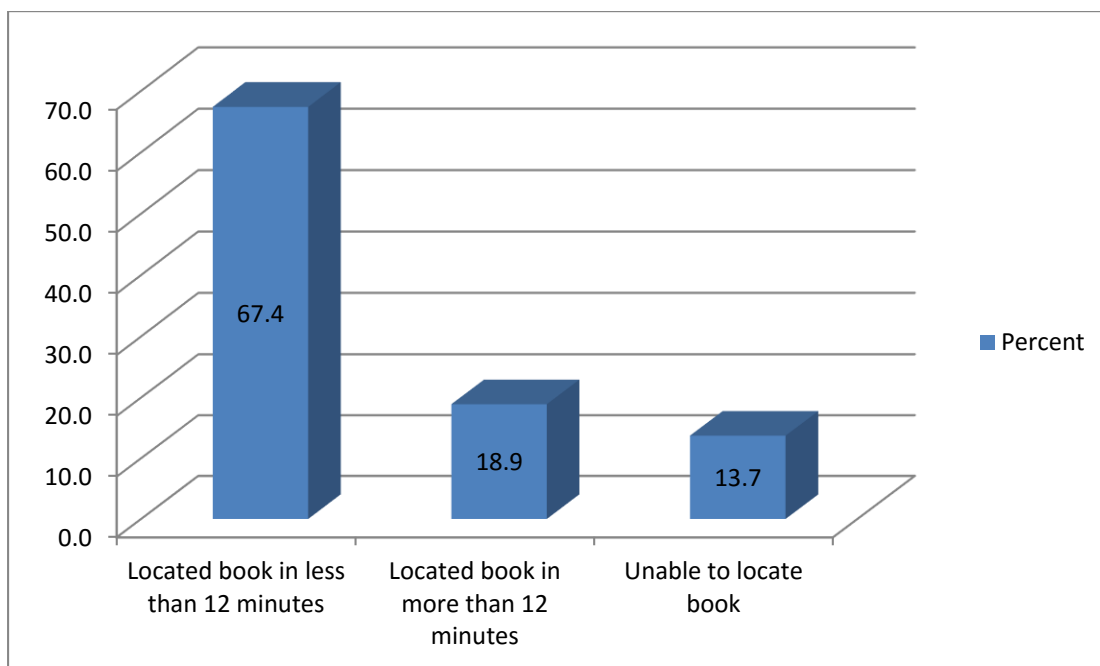
Table 5.38: Success in Finding Books on Stacks

Particulars	Frequency	Percent	Cumulative Percent
Located book in less than 12 minutes	221	67.4	67.4
Yes	62	18.9	86.3
No	45	13.7	100.0
Total	328	100.0	

Table 5.38 presents that, 18.9% (62) participants were able to find the required sources; however, 13.7% (45) participants were unable to locate and find the books in stacks even after spending more than 12 minutes for a physical search of books.

Table 5.38 (A): Library-Wise Success in Finding Books on Stacks

Libraries	Count	Located before 12 minutes	Source was found after spending more than 12 minutes		Total
			Yes	No	
Library 1	Count	23	2	1	26
	% of Total	7.0%	.6%	.3%	7.9%
Library 2	Count	19	4	4	27
	% of Total	5.8%	1.2%	1.2%	8.2%
Library 3	Count	22	5	1	28
	% of Total	6.7%	1.5%	.3%	8.5%
Library 4	Count	23	3	0	26
	% of Total	7.0%	.9%	0.0%	7.9%
Library 5	Count	13	6	4	23
	% of Total	4.0%	1.8%	1.2%	7.0%
Library 6	Count	59	25	16	100
	% of Total	18.0%	7.6%	4.9%	30.5%
Library 7	Count	14	7	8	29
	% of Total	4.3%	2.1%	2.4%	8.8%
Library 8	Count	15	3	5	23
	% of Total	4.6%	.9%	1.5%	7.0%
Library 9	Count	23	4	4	31
	% of Total	7.0%	1.2%	1.2%	9.5%
Library 10	Count	10	3	2	15
	% of Total	3.0%	.9%	.6%	4.6%
Total	Count	221	62	45	328
	% of Total	67.4%	18.9%	13.7%	100.0%



Note: 0= Not Applicable, 1=Yes, 2= No

Figure 5.27: Success in Finding Books on Stacks

University-wise statistics, as shown in Table 5.38(A), presents that participants unable to find books on stacks even after spending more than twelve minutes was a major problem reported by participants of Library 7, Library 5, Library 6 and Library 8.

Taking into consideration the feedback of participants regarding success of locating and finding sources in relation to time, it was found that maximum users required more than 12 minutes (18.9%) whereas remaining that is 13.7% users were unable to find required source even after spending more than 12 minutes (Table 5.38(A)). In case of all the libraries, the total mean scores for the time taken to find books in stacking area by maximum users, shows users required 9 to 12 minutes to find information sources (Figure 5.26).

5.5.3 Finding information sources solely without assistance

Library users use classified arrangement on open shelves in two main ways: 1. to search for works on a particular subject within a discipline; 2. to locate specific items, the position of which on the shelves is defined by a call number (Fabbrizzi, 2014). In order to encourage users to use the classified arrangement on open stacks to their optimum level, a signage system is essential. The stacking area should be welcoming

with accurate stack end signage, shelf label holders, shelf spine labels and symbols or pictorial signs for depicting different subjects on shelves. The presence of appropriate signage will aid users in finding information sources on their own in stacking areas. Hence participants were asked about whether they were able to locate and find information sources on their own, that is, without taking assistance of library staff.

Table 5.39: Able to Find Resources without Assistance

Particulars	Frequency	Percent	Cumulative Percent
Yes	156	47.6	47.6
No	172	52.4	100.0
Total	328	100.0	

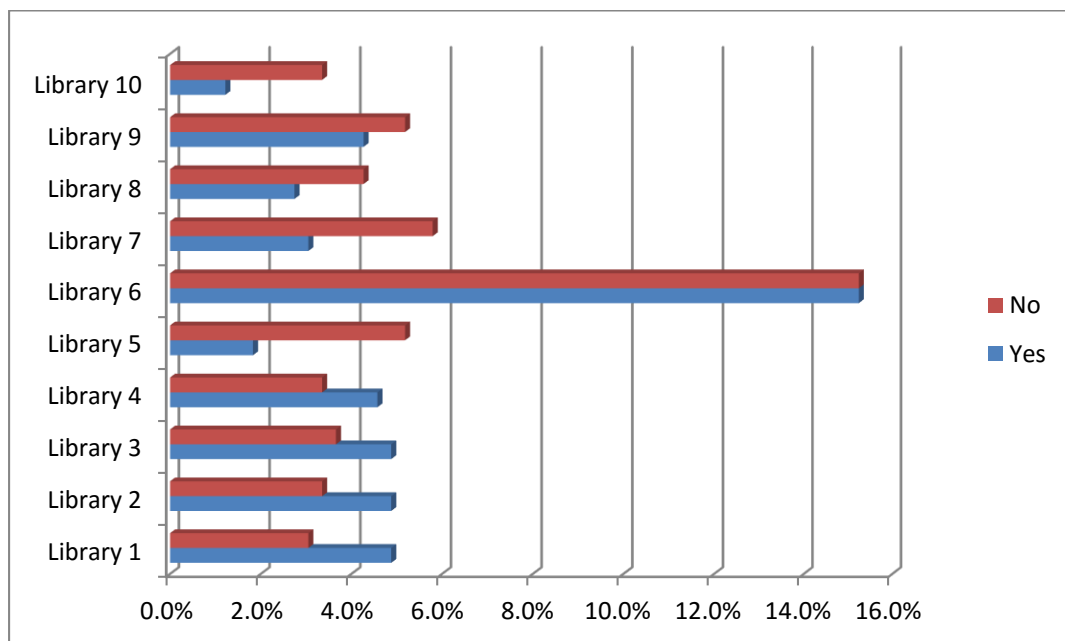
Table 5.39 indicates that 47.6% of participants were able to search and find required information sources on their own; however, more that is 52.4%, participants replied that they were unable to locate and find information sources on their own.

The findings indicate that maximum participants (52.4%) were unable to locate and find information sources on their own, that is, without taking assistance of library staff in case of university libraries in Mumbai. Thus it shows that existing signage was insufficient to aid users in finding information sources on their own in stacking areas (Table 5.39). Observational findings highlight that shelving map and a display for floor-wise splits in shelving order was available only in one university out of ten. In addition, a signs for electric switches near shelving areas was available only in the Library 2 (Table 6.28).

Table 5.39 (A): Library-Wise Finding Information Sources Without Assistance

Libraries	Count	Able to find resource solely		Total
	Percent	Yes	No	
Library 1	Count	16	10	26
	% of Total	4.9%	3.0%	7.9%
Library 2	Count	16	11	27
	% of Total	4.9%	3.4%	8.2%
Library 3	Count	16	12	28
	% of Total	4.9%	3.7%	8.5%
Library 4	Count	15	11	26
	% of Total	4.6%	3.4%	7.9%
Library 5	Count	6	17	23
	% of Total	1.8%	5.2%	7.0%
Library 6	Count	50	50	100
	% of Total	15.2%	15.2%	30.5%
Library 7	Count	10	19	29
	% of Total	3.0%	5.8%	8.8%
Library 8	Count	9	14	23
	% of Total	2.7%	4.3%	7.0%
Library 9	Count	14	17	31
	% of Total	4.3%	5.2%	9.5%
Library 10	Count	4	11	15
	% of Total	1.2%	3.4%	4.6%
Total	Count	156	172	328
	% of Total	47.6%	52.4%	100.0%

Note: 1= Yes, 2= No



Note: 1= Yes, 2= No

Figure 5.28: Able to Find Resources Solely

Further university wise statistics highlight that major participants of Library 5, Library 7 and Library 10 were unable to locate and find the required information sources on their own. Library 5 has complete closed access with manual card catalog system, Library 7 provided partial closed access that is closed access to undergraduate students and open access to post graduate and Ph D students. Whereas in case of Library 10 signs were scanty, including for stacking area signage (Table 6.28)

5.5.4 Time requirement, success in locating sources and ability to find resource solely

The provision of bibliographic details with the locations of books in OPAC with the accurate shelving will lead to quickly finding information sources on stacks. Further, appropriate signage will lead to self-orientation in finding information sources successfully. Hence the correlation was tested among the variables like, time taken to find source from OPAC till stacking and success in finding source, ability to find resources solely with time taken to find source from OPAC till stacking and success in finding source with finding resources solely which complete the circulation processes and operations.

Table 5.39 (B): Time Requirement, Success in Locating Sources and Ability to Find Resource Solely –Correlations

		Time taken to find source from OPAC till stacking	Success in finding source	Able to find resource solely
Time taken to find source from OPAC till stacking	Pearson Correlation	1	.703	.376
	Sig. (2-tailed)		.000	.000
	N	328	328	328
Success in finding source	Pearson Correlation	.703	1	.332
	Sig. (2-tailed)	.000		.000
	N	328	328	328
Able to find resource solely	Pearson Correlation	.376	.332	1
	Sig. (2-tailed)	.000	.000	
	N	328	328	328

After the use of OPAC and noting down the bibliographic details of the desired information source, it's expected by the users that they should be able to locate and find the required information source within a minimum time. If the library has appropriate visual guidance and a humanely oriented system, users will be able to find the desired information sources within a minimum time. To assess the ease of use provided by university libraries in the processes and operations related to physically searching printed sources in stacks, participants were asked about the time taken by them in locating and finding information sources after leaving the OPAC terminal till physically finding the required information source.

Findings revealed that the obtained r value for the variable, time taken to find source from OPAC till stacking, the result was .703 which is more than .5, signified strong positive relationship between the time taken to find source from OPAC till stacking, with success in finding source, which ultimately result in the ease of use in circulation processes and operations in the case of university libraries. The p value was .000 which means it is significant at .05 level.

Welcoming atmosphere, with appropriate stack end signage, aid users in finding information sources solely in stacking areas. Hence participants were asked whether they were able to locate and find information sources solely. The obtained r value obtained for ability to find sources solely, the result was .376 which is more than .3, signified weak positive relationship between ability to find resources solely with time taken to find source from OPAC till stacking, which ultimately result in the ease of use in circulation processes and operations in the case of university libraries. The p value was .000 which means it is significant at .05 level.

Accurate shelving and appropriate signage in the shelving area will result in quickly locating and finding information sources on stacks. Hence participants were asked about whether they were successful in finding information sources. In case of r value obtained for success in finding source, the result was .332 which is more than .3, signified weak positive relationship between success in finding source with finding resources solely, which ultimately result in the ease of use in circulation processes and operations in the case of university libraries. The p value was .000 which means it is significant at .05 level.

5.5.5 Shelving order

In an open-access system, open shelves are traditionally not staffed; therefore, user-friendly shelving of books with efficient signage is crucial to make the printed collection accessible to users. Book finding experience of user can affect user perception of the library. The experience of the inability to find the required book on the desired location may discourage users from coming to the library. Hence participants were asked about their views on shelving order.

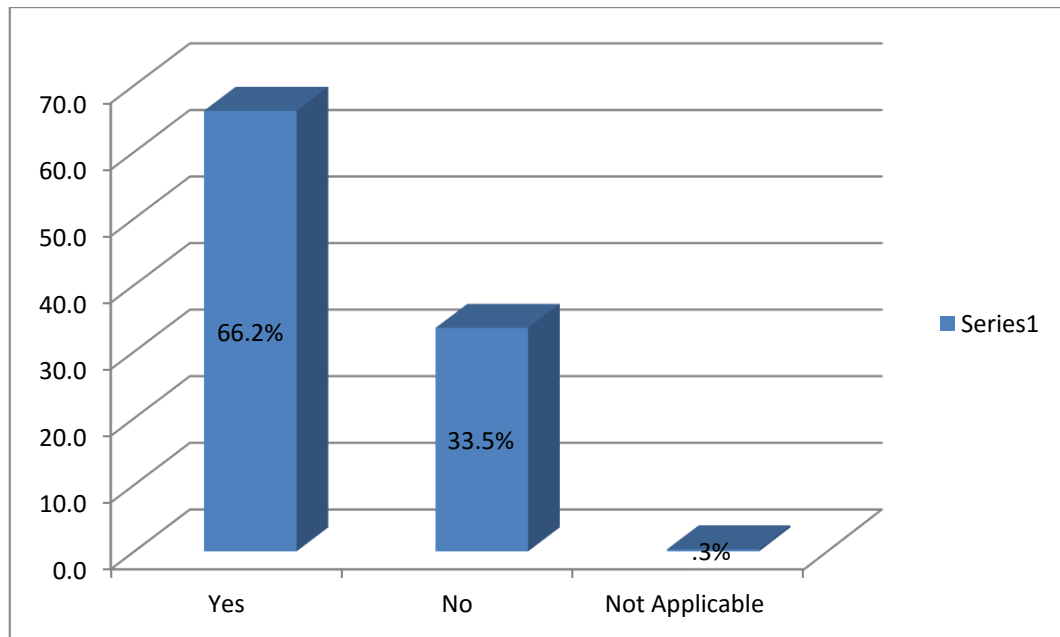
Table 5.40: User-Friendly Shelving Order

Particulars	Frequency	Percent
Yes	217	66.2
No	110	33.5
Not applicable (Special User)	1	.3
Total	328	100.0

Table 5.40 indicate that 66.2% of participants opined that shelving was appropriate, while 33.5% of participants replied that shelving was not appropriate. One special user only used the Braille collection from the Braille department and never used printed books.

Table 5.40 (A): Libraries and User-Friendly Shelving

Libraries	Count	Shelving was appropriate			Total
		Not applicable	Yes	No	
Library 1	Count	0	23	3	26
	% of Total	0.0%	7.0%	.9%	7.9%
Library 2	Count	1	21	5	27
	% of Total	.3%	6.4%	1.5%	8.2%
Library 3	Count	0	23	5	28
	% of Total	0.0%	7.0%	1.5%	8.5%
Library 4	Count	0	25	1	26
	% of Total	0.0%	7.6%	.3%	7.9%
Library 5	Count	0	11	12	23
	% of Total	0.0%	3.4%	3.7%	7.0%
Library 6	Count	0	58	42	100
	% of Total	0.0%	17.7%	12.8%	30.5%
Library 7	Count	0	15	14	29
	% of Total	0.0%	4.6%	4.3%	8.8%
Library 8	Count	0	15	8	23
	% of Total	0.0%	4.6%	2.4%	7.0%
Library 9	Count	0	20	11	31
	% of Total	0.0%	6.1%	3.4%	9.5%
Library 10	Count	0	6	9	15
	% of Total	0.0%	1.8%	2.7%	4.6%
Total	Count	1	217	110	328
	% of Total	.3%	66.2%	33.5%	100.0%



Note: 0=Not Applicable, 1=Yes, 2= No

Figure 5.29: Libraries and User-Friendly Shelving

Table 5.40(A) indicate that major participants of Library 5, Library 6, Library 7 and Library 10 opined that shelving was not appropriate.

The findings revealed that according to Table 5.40(A), major, i.e. 52.4% of participants replied that they were unable to locate and find information sources on their own. Hence even though major participants, i.e. 66.2% from Table 5.40(A), opined that shelving order and arrangement was appropriate, yet major, i.e. 52.4% of participants replied that they were unable to locate and find information sources on their own. Thus the findings revealed that all libraries were lacking in providing effective stacking signage in stacking areas.

5.5.5.1 User-friendly Shelving in individual Libraries

User-friendliness of shelving depends upon the accuracy of shelving order, with revised stack end signs, shelf markers, etc. Table 5.41 elaborates user-friendly shelving according to individual libraries.

Table 5.41: User-Friendly Shelving in Individual Libraries

Libraries	User-friendly Shelving						Total	
	Not applicable	Percentage	Yes	Percentage	No	Percentage	Frequency	Percentage
Library 1	0	0.0%	23	88.4%	3	11.6%	26	100%
Library 2	1	3.8%	21	77.7%	5	18.5%	27	100%
Library 3	0	0.0%	23	82.1%	5	17.9%	28	100%
Library 4	0	0.0%	25	96.1%	1	3.9%	26	100%
Library 5	0	0.0%	11	47.9%	12	52.1%	23	100%
Library 6	0	0.0%	58	58%	42	42%	100	100%
Library 7	0	0.0%	15	51.8%	14	48.2%	29	100%
Library 8	0	0.0%	15	65.2%	8	34.8%	23	100%
Library 9	0	0.0%	20	64.6%	11	35.4%	31	100%
Library 10	0	0.0%	6	40%	9	60%	15	100%
Total	1	.3%	217	66.2%	110	33.5%	328	100.0%

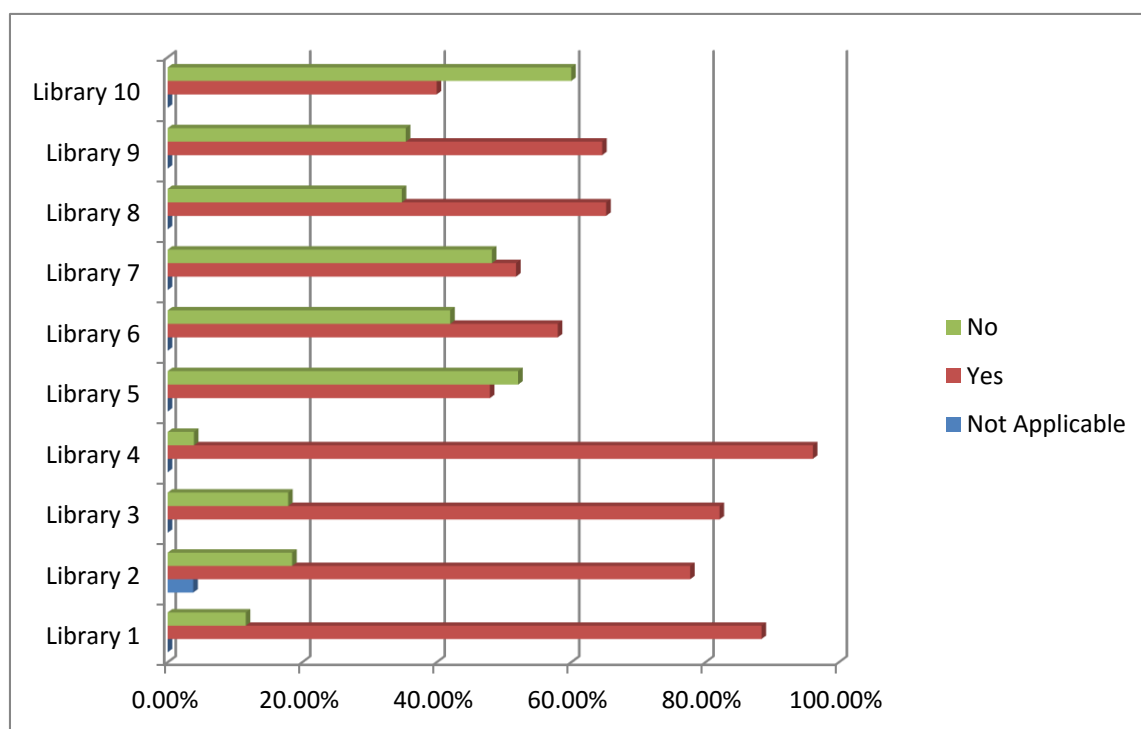


Figure 5.30: Individual Library-Wise - User-Friendly Shelving

Table 5.41/ Figure 5.30 illustrates that maximum (96.1%) users from Library 4 were agreed that shelving was user-friendly followed by Library 1 (88.4%), Library 3 (82.1%) and Library 2 (77.7%). Library 5 and Library 10 provided low user-friendliness in case of shelving, as Library 5 has closed access, whereas in case of Library 10 signs were scanty, including for stacking area signage (Table 6.28).

The next sub-section discusses and describes the physical and psychological barriers were faced by university library users while using large libraries as due to such barriers, users may need to spend prolonged time searching for information sources.

5.6 Physical and psychological barriers

Novice users are unaware of physical settings, collection and devices of the libraries. Users unfamiliar with the library engage in wayfinding and navigation and may spend prolonged time searching for information sources, and this process can be either aided or frustrated by the environment they encounter. Therefore it was essential to explore whether such physical and psychological barriers were faced by university library users while using large libraries. The present section of the questionnaire was divided into two sections. In the first section, questions were raised on the awareness of users about the physical arrangement and library collection and services they acquired through library orientation and instruction programmes. In the second section, questions were asked about users' behavioural experiences and psychological barriers as well as the level of satisfaction achieved through finding and obtaining library material.

5.6.1 Library instructions and library orientation

University library users belong to varied age groups, backgrounds, and educational levels. Many of them do not have experience of using academic libraries; some may have never visited a large library before. In addition, every year, such libraries add new users. Library orientation to users makes novice users familiar with the library collection and services as well as aid in increasing their proficiency in finding and using information sources at an optimum level. Through library orientation programs, library professionals provide life-long self-education and library skills. How well people are made aware of the academic skills and the library's collection and services

and its impact on their ability to use library facilities to accomplish information needs successfully depends also on the quality of orientation given, as well as the presence of users for orientation programs. Hence in the present section of the questionnaire, users were asked questions about the type of library orientation provided to them, the level of awareness they acquired through library orientation in using library sources and facilities, computerized resources, and awareness about the academic skills.

5.6.1.1 Attendance at library orientation

Almost all the university libraries offer library orientation programs for new users to make users familiar and aware of the library settings, collection and services. In the case of the present study, out of ten universities observed one does not conduct library orientation due to the non-appointment of the librarian; the remaining nine provide library orientation to users every year. However, attending library orientation programs is not mandatory for students; therefore a few students tend to remain absent for such instruction programs. Hence participants were asked about whether they had attended the library orientation program.

Table 5.42: Library-Wise Users Attending Orientation

Libraries	Count	Attended library Orientation			Total
		Not provided	Yes	No	
Library 1	Count	0	22	4	26
	% of Total	0.0%	6.7%	1.2%	7.9%
Library 2	Count	0	26	1	27
	% of Total	0.0%	7.9%	.3%	8.2%
Library 3	Count	0	25	3	28
	% of Total	0.0%	7.6%	.9%	8.5%
Library 4	Count	0	25	1	26
	% of Total	0.0%	7.6%	.3%	7.9%
Library 5	Count	0	2	21	23
	% of Total	0.0%	.6%	6.4%	7.0%
Library 6	Count	1	69	30	100
	% of Total	.3%	21.0%	9.1%	30.5%
Library 7	Count	0	21	8	29
	% of Total	0.0%	6.4%	2.4%	8.8%
Library 8	Count	0	18	5	23
	% of Total	0.0%	5.5%	1.5%	7.0%
Library 9	Count	0	27	4	31
	% of Total	0.0%	8.2%	1.2%	9.5%
Library 10	Count	7	4	4	15
	% of Total	2.1%	1.2%	1.2%	4.6%
Total	Count	8	239	81	328
	% of Total	2.4%	72.9%	24.7%	100.0%

Table 5.42 highlights that a maximum, i.e.72.9% (239) participants had attended library orientation programmes; however, 24.7% (81) replied that they had not attended orientation programmes. Further, 2.4% (8) participants informed that the orientation program was not provided to them due to the non-appointment of a librarian at one university. Cross tabulation indicates that major participants of Library 5 and Library 10 were either did not attended library orientation, or it was not provided by the respective libraries. Yet, the finding shows a positive result that maximum libraries (72.9%) provided library orientation programmes for the novice users of respective libraries.

5.6.1.2 Library orientation and ability to solely find sources

University libraries enrolled new users every year; hence it is necessary to provide library orientation every year after the enrolments. Library orientation helps new users to get acquainted and familiarized with the library collection and services. Hence it was assessed whether any correlation exists between participants who attended library orientation with their efficiency in finding the information sources solely.

Table 5.43: Library Orientation and Ability to Solely Find Sources

Particulars	Library orientation	Solely find sources
Not provided	2.4%	0%
Yes	72.9%	47.6%
No	24.7%	52.4%
Total	100.0	100

Table 5.43 shows the figure of participants who attended library orientation and participants who were able to find the information sources solely. Though 24.7% of participants did not attended library orientation yet, 52.4% participants were able to find sources solely, it represents that library orientation is not only the factor in finding sources, those libraries may have provided good signage.

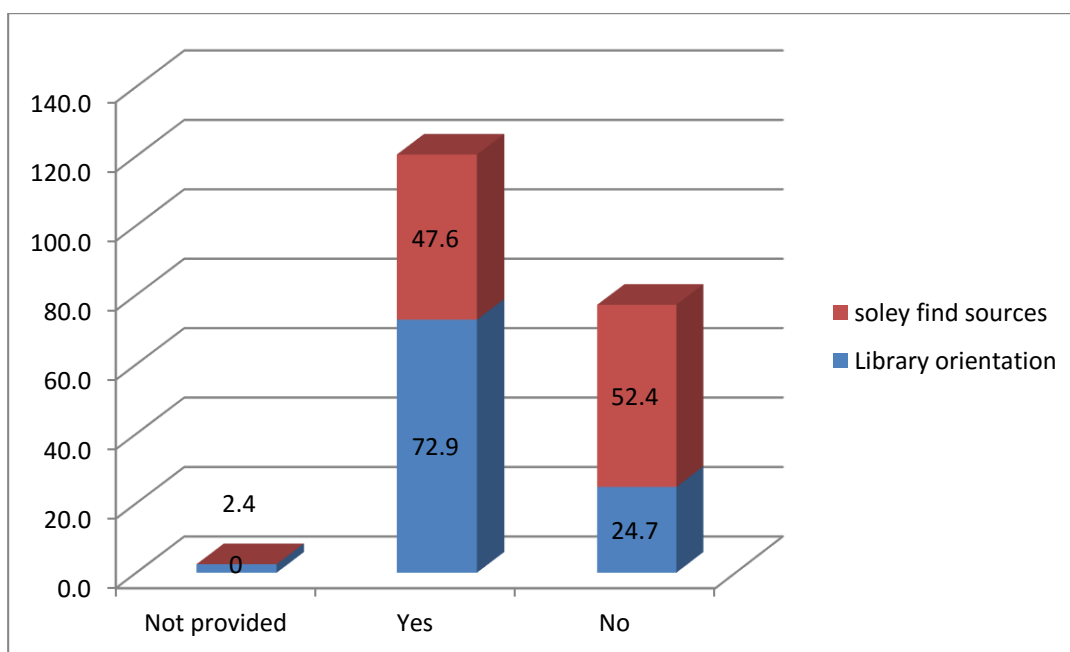


Figure 5.31: Library Orientation and Ability to Solely Find Sources

The comparative analysis shows that though 72.9% of participants attended library orientation, however only 47.6% of participants were able to find the required information sources on their own. The Figure 5.31 illustrates that there is a need to provide in-depth library orientation to users with the use of multiple orientation techniques to provide maximum self-orientation and familiarity with the libraries.

5.6.1.3 Type of library orientation

Libraries provided different types of orientation programs; they are variedly called as library orientation, library orientation workshop, user education workshop, video library tour, etc.

A first step to be proficient with information literacy skills is the process of understanding how to find, analyze and use information. For many years libraries are providing face-to-face instructions and library tour as a part of the library orientation program. However, with the advent of information and communication technology, there is diversity in the forms of library collection and services. Therefore tour formats have been changed with the emergence of various technologies. Hence a multiple choice question was raised about the type of library orientation provided to users by the libraries.

Table 5.44: Types of Library Orientation

Particulars	Responses		Percent of Cases
	N	Percent	
Oral instructions	115	32.2%	35.06%
PPT presentation & instructions	91	25.5%	27.7%
Physical tour	71	19.9%	21.6%
Library tour & staff introduction	63	17.6%	19.2%
User education workshop	11	3.1%	3.3%
Video library tour	5	1.4%	1.5%
Other	1	.3%	0.3%
Total	357	100.0%	108.6%

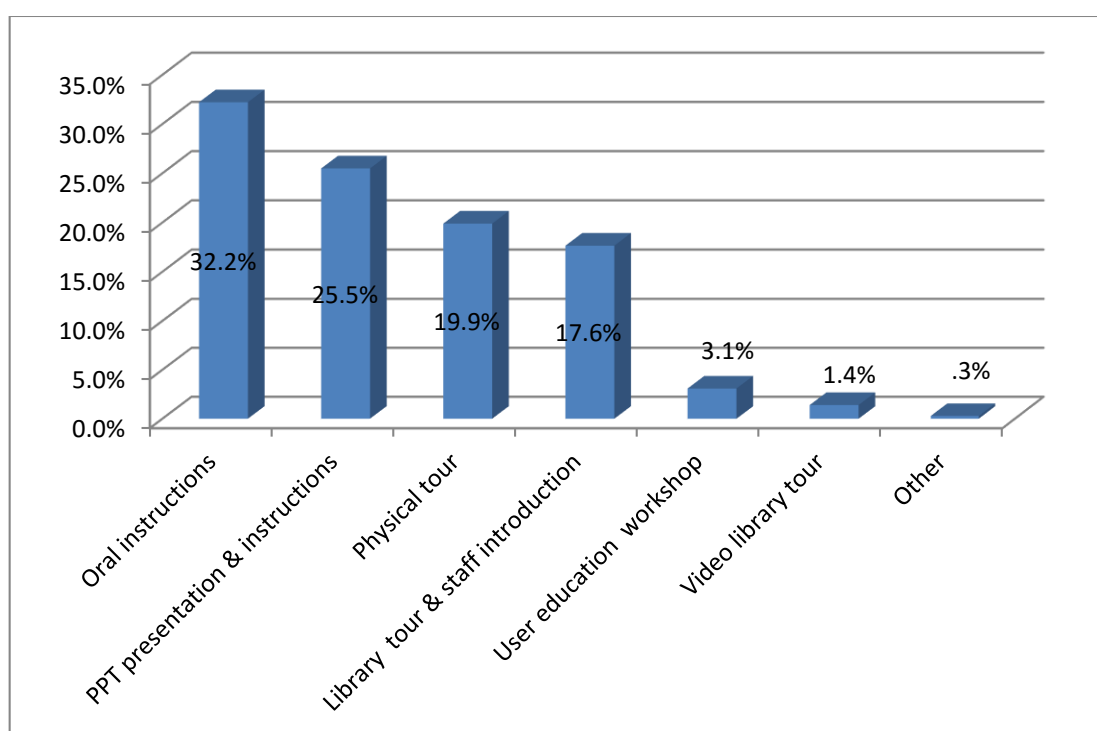


Figure 5.32: Types of Library Orientations

The responses about the type of library orientation show that 32.2% of participants informed that oral instructions were provided, 25.5% of respondents replied that instructions were provided with PPT presentations, 19.9% participants opined that physical tour was organized as a part of orientation, very few, i.e. 3.1% respondents replied that user education workshop was provided and only 1.4% participants opined that video library tour was made available. In the case of other modes of orientation,

.3% of participants replied that printed library guides were provided. This question was a multiple choice question, as libraries often provide different types of orientation programmes together like oral instructions as well as a library tour. Hence responses as per the percentage of cases show that libraries had provided library orientation by concurrently delivering different types of orientation programmes.

Table 5.44 (A): Types of Library Orientation – Library-Wise

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Oral instructions	Library 1	26	.62	.752	.148	.31	.92	0	2
	Library 2	27	.52	.580	.112	.29	.75	0	2
	Library 3	28	.86	.591	.112	.63	1.09	0	2
	Library 4	26	.69	.549	.108	.47	.91	0	2
	Library 5	23	.09	.288	.060	-.04	.21	0	1
	Library 6	100	.25	.435	.044	.16	.34	0	1
	Library 7	29	.48	.509	.094	.29	.68	0	1
	Library 8	23	.26	.449	.094	.07	.46	0	1
	Library 9	31	.48	.508	.091	.30	.67	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.41	.545	.030	.35	.47	0	2
Physical tour	Library 1	26	.65	.745	.146	.35	.95	0	2
	Library 2	27	.41	.572	.110	.18	.63	0	2
	Library 3	28	.25	.645	.122	.00	.50	0	2
	Library 4	26	.31	.549	.108	.09	.53	0	2
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	.35	.479	.048	.25	.45	0	1
	Library 7	29	.21	.412	.077	.05	.36	0	1
	Library 8	23	.09	.288	.060	-.04	.21	0	1
	Library 9	31	.06	.250	.045	-.03	.16	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.27	.502	.028	.21	.32	0	2

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Library orientation tour & staff introduction	Library 1	26	.62	.752	.148	.31	.92	0	2
	Library 2	27	.63	.565	.109	.41	.85	0	2
	Library 3	28	.32	.670	.127	.06	.58	0	2
	Library 4	26	.46	.582	.114	.23	.70	0	2
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	.18	.386	.039	.10	.26	0	1
	Library 7	29	.14	.351	.065	.00	.27	0	1
	Library 8	23	.09	.288	.060	-.04	.21	0	1
	Library 9	31	.06	.250	.045	-.03	.16	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.24	.490	.027	.19	.30	0	2
PPT & instructions	Library 1	26	.85	.675	.132	.57	1.12	0	2
	Library 2	27	.26	.526	.101	.05	.47	0	2
	Library 3	28	.57	.690	.130	.30	.84	0	2
	Library 4	26	.69	.549	.108	.47	.91	0	2
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	.07	.256	.026	.02	.12	0	1
	Library 7	29	.24	.435	.081	.08	.41	0	1
	Library 8	23	.52	.511	.106	.30	.74	0	1
	Library 9	31	.65	.486	.087	.47	.82	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.33	.527	.029	.28	.39	0	2
User education workshop	Library 1	26	.35	.745	.146	.05	.65	0	2
	Library 2	27	.07	.385	.074	-.08	.23	0	2
	Library 3	28	.25	.645	.122	.00	.50	0	2
	Library 4	26	.23	.514	.101	.02	.44	0	2
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	.03	.171	.017	.00	.06	0	1

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
	Library 7	29	0.00	0.000	0.000	0.00	0.00	0	0
	Library 8	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 9	31	.06	.250	.045	-.03	.16	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
	Total	328	.09	.369	.020	.05	.13	0	2
Video library tour	Library 1	26	.46	.761	.149	.15	.77	0	2
	Library 2	27	.07	.385	.074	-.08	.23	0	2
	Library 3	28	.21	.630	.119	-.03	.46	0	2
	Library 4	26	.08	.392	.077	-.08	.24	0	2
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	0.00	0.000	0.000	0.00	0.00	0	0
	Library 7	29	0.00	0.000	0.000	0.00	0.00	0	0
	Library 8	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 9	31	.03	.180	.032	-.03	.10	0	1
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
		Total	328	.07	.347	.019	.03	.11	0
Other	Library 1	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 2	27	.04	.192	.037	-.04	.11	0	1
	Library 3	28	0.00	0.000	0.000	0.00	0.00	0	0
	Library 4	26	0.00	0.000	0.000	0.00	0.00	0	0
	Library 5	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 6	100	0.00	0.000	0.000	0.00	0.00	0	0
	Library 7	29	.07	.371	.069	-.07	.21	0	2
	Library 8	23	0.00	0.000	0.000	0.00	0.00	0	0
	Library 9	31	.06	.359	.065	-.07	.20	0	2
	Library 10	15	0.00	0.000	0.000	0.00	0.00	0	0
		Total	328	.02	.165	.009	.00	.03	0

Note: 0- Not Provided, 1- Provided, 2-Not Attended/Applicable

University-wise responses indicate that major participants of Library 5 and Library 10 replied that any type of library orientation was not provided to them by the library. The total mean of different types of library orientations indicates that maximum libraries provided oral instructions (.41), followed by PPT presentations with instructions (.33), physical library tour (.27), library tour along with staff introduction (.24) and by combining multiple types of orientation programs. However, the total mean of user education workshop (.09) and video library tour (.07) highlights that very few libraries were provided such types of orientation programs.

5.6.1.4 Effect of library orientation (Post-orientation awareness of physical settings and facilities)

Libraries provide different types of orientation programs for novice users to familiarize users with the sources, services and staff. In-depth library orientation has a positive impact on the awareness and usage of information sources of libraries. To measure the impact of library orientation, participants were asked for their opinions on whether the library orientation aids them in finding a way around campus, whether they feel comfortable while using the library, and whether they feel connected with the library staff. Further, participants were asked about post-orientation awareness of sources and facilities of the library, awareness of computer sources, and whether they were able to identify academic skills required for information searching and retrieval. Table 5.45 describes the opinions on post-orientation awareness of physical settings and facilities of users.

Table 5.45: Post-Library Orientation Familiarity with Library

Particulars	Not applicable	Percentage	Strongly agree	Percentage	Agree	Percentage	Neither agree nor disagree	Percentage	Disagree	Percentage	Strongly disagree	Percentage	Total
Find way in campus	79	24	29	9	98	30	32	10	60	18	30	9	328
Feel comfortable while using library	79	24	45	14	111	34	35	11	35	11	23	7	328
Feel connected with staff	79	24	42	13	98	30	58	18	34	10	17	5	328
Become aware of source and facilities of library	79	24	50	15	135	41	26	8	23	7	15	5	328
Become aware of computer sources	79	24	51	16	111	34	24	7	44	13	19	6	328
Identified academic skills	79	24	37	11	91	28	42	13	61	19	18	5	328

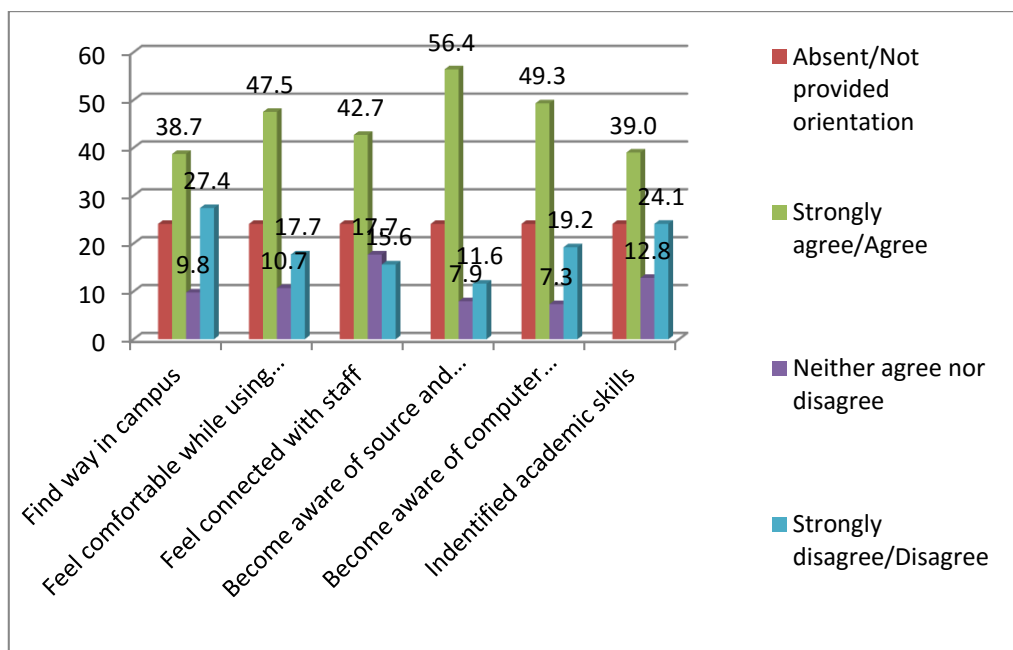


Figure 5.33: Post-Library Orientation Familiarity with Library

The responses of participants revealed that, 38.7% of participants agreed (29.9% Agreed + 8.8% strongly agreed), that they were able to find a way around the campus; however, 27.4% disagreed (18.3% + 9.1%), further 9.8% of participants opined that they neither agreed nor disagreed that library orientation aids them in finding a way around the campus. 24.1% were either absent for orientation programme, or orientation was not provided to them by the library.

Library orientation programmes tend to increase users familiarity with the library and its resources which results inconvenience while using the library. Therefore participants were asked whether they feel comfortable while using the library after attending library orientation programmes. 47.5% of participants agreed, (33.8% + 13.7%) that they feel comfortable while using library after information literacy programmes. However, 17.7% of respondents disagreed, (10.7% + 7.0) with the statement that they feel comfortable while using the library. Further, after orientation sessions, 10.7% of participants neither agreed nor disagreed that there was convenience in using the library.

Library orientation is the most common technique used to connect library staff with library users. Many libraries provide physical library tour with oral instructions or PPT presentations to familiarize with the library environment and to introduce staff to new users. While responding on whether users feel connected with staff, 42.7% of participants agreed (29.9% +12.8%) to this statement. However, 15.6% of participants

disagreed (10.4% + 5.2%) that they feel connected with the staff. Further, 17.7% of respondents neither agreed nor disagreed with the statement regarding feeling connected with library staff after library orientation.

University libraries are housed in large buildings, and the information sources are stored in different formats in such multi-storied buildings on different floors, sections, sub-sections and departments. Hence, librarians provide orientation instructions through different techniques to familiarise users with various sources and facilities available in the library. Therefore participants were asked about their familiarity with locating different sources and facilities available in the library. 56.4% of participants replied that they were agreed (41.2% + 15.2%) about the given statement; however, 11.6% of respondents disagreed (7.0 % + 4.6%), further 7.9% of participants neither agreed nor disagreed on the statement about awareness of different sources and facilities available in the library.

Printed information sources were the major form of collection in academic libraries for many years. Later with the advent of the internet and technological developments, many new forms of computerized information sources emerged. With the changing scenario and demand of users', libraries started acquiring printed as well as computerized and online information sources. This necessitates libraries to facilitate in-depth user education to make users acquainted with the hybrid library collection. The question was raised regarding users familiarity while locating and using computerized resources in the library. 49.3% of participants opined that they agreed (33.8% + 15.5%), whereas 19.2% respondents replied that they were disagreed (13.4% + 5.8%) with the statement about awareness and use of computerized sources. Further, 7.3% of respondents neither agreed nor disagreed that they became aware of computerized sources after attending library orientation.

Academic skills required to library users mainly include producing a written assignment, right from planning, selecting search tools and techniques, reading and critical thinking, and writing up and referencing. User education workshops or in-depth information literacy programmes aid in improving academic skills. While responding on the identification of academic skills, 39% of respondents agreed (27.7% + 11.3%) that they were acquainted with the academic skills. However, 24.1% of participants disagreed (18.6% + 5.5%); further, 12.8% of respondents neither agreed nor disagreed about the identification of academic skills after orientation programmes.

Table 5.45 (A): Post-Library Orientation Familiarity with Library– Mean

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Find way in campus	Library 1	26	3.42	1.677	.329	2.75	4.10	0	5
	Library 2	27	3.26	1.534	.295	2.65	3.87	0	5
	Library 3	28	3.54	1.347	.254	3.01	4.06	0	5
	Library 4	26	2.88	1.306	.256	2.36	3.41	0	5
	Library 5	23	.26	.915	.191	-.13	.66	0	4
	Library 6	100	2.09	1.700	.170	1.75	2.43	0	5
	Library 7	29	2.10	1.423	.264	1.56	2.64	0	5
	Library 8	23	2.61	1.616	.337	1.91	3.31	0	4
	Library 9	31	2.45	1.630	.293	1.85	3.05	0	5
	Library 10	15	1.60	1.844	.476	.58	2.62	0	4
	Total	328	2.40	1.737	.096	2.21	2.59	0	5
Feel comfortable	Library 1	26	3.58	1.677	.329	2.90	4.25	0	5
	Library 2	27	3.63	1.445	.278	3.06	4.20	0	5
	Library 3	28	2.86	1.627	.307	2.23	3.49	0	5
	Library 4	26	3.69	1.158	.227	3.22	4.16	0	5
	Library 5	23	.30	1.020	.213	-.14	.75	0	4
	Library 6	100	2.33	1.848	.185	1.96	2.70	0	5
	Library 7	29	2.55	1.549	.288	1.96	3.14	0	5
	Library 8	23	2.78	1.565	.326	2.11	3.46	0	5
	Library 9	31	3.10	1.680	.302	2.48	3.71	0	5
	Library 10	15	1.73	2.017	.521	.62	2.85	0	5
	Total	328	2.64	1.823	.101	2.45	2.84	0	5
Feel connected with staff	Library 1	26	3.27	1.663	.326	2.60	3.94	0	5
	Library 2	27	3.52	1.451	.279	2.94	4.09	0	5
	Library 3	28	3.21	1.475	.279	2.64	3.79	0	5
	Library 4	26	3.62	1.169	.229	3.14	4.09	0	5
	Library 5	23	.30	1.020	.213	-.14	.75	0	4
	Library 6	100	2.23	1.763	.176	1.88	2.58	0	5
	Library 7	29	2.90	1.633	.303	2.28	3.52	0	5
	Library 8	23	2.87	1.546	.322	2.20	3.54	0	5

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
						Library 9	31		
Library 10	15	1.67	1.877	.485	.63	2.71	0	4	
Total	328	2.63	1.777	.098	2.43	2.82	0	5	
Aware of sources	Library 1	26	3.38	1.651	.324	2.72	4.05	0	5
	Library 2	26	3.73	1.511	.296	3.12	4.34	0	5
	Library 3	28	3.39	1.370	.259	2.86	3.92	0	5
	Library 4	26	3.88	1.071	.210	3.45	4.32	0	5
	Library 5	23	.17	.576	.120	-.08	.42	0	2
	Library 6	100	2.53	1.888	.189	2.16	2.90	0	5
	Library 7	29	3.00	1.711	.318	2.35	3.65	0	5
	Library 8	23	3.09	1.593	.332	2.40	3.78	0	5
	Library 9	31	3.35	1.704	.306	2.73	3.98	0	5
	Library 10	15	1.60	1.957	.505	.52	2.68	0	5
	Total	327	2.83	1.849	.102	2.62	3.03	0	5
Aware of computer sources	Library 1	26	3.54	1.679	.329	2.86	4.22	0	5
	Library 2	27	3.78	1.476	.284	3.19	4.36	0	5
	Library 3	28	2.86	1.508	.285	2.27	3.44	0	5
	Library 4	26	3.85	1.190	.233	3.37	4.33	0	5
	Library 5	23	.17	.576	.120	-.08	.42	0	2
	Library 6	100	2.22	1.779	.178	1.87	2.57	0	5
	Library 7	29	2.97	1.658	.308	2.33	3.60	0	5
	Library 8	23	2.91	1.649	.344	2.20	3.63	0	5
	Library 9	31	3.19	1.759	.316	2.55	3.84	0	5
	Library 10	15	1.73	2.052	.530	.60	2.87	0	5
	Total	328	2.68	1.844	.102	2.48	2.88	0	5
Identify academic skills	Library 1	26	3.35	1.696	.333	2.66	4.03	0	5
	Library 2	27	3.44	1.450	.279	2.87	4.02	0	5
	Library 3	28	3.04	1.427	.270	2.48	3.59	0	5
	Library 4	26	3.31	1.258	.247	2.80	3.82	0	5
	Library 5	23	.22	.736	.153	-.10	.54	0	3
	Library 6	100	2.13	1.733	.173	1.79	2.47	0	5

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
	Library 7	29	2.41	1.500	.279	1.84	2.98	0	5
	Library 8	23	2.78	1.536	.320	2.12	3.45	0	4
	Library 9	31	2.87	1.586	.285	2.29	3.45	0	5
	Library 10	15	1.53	1.959	.506	.45	2.62	0	5
	Total	328	2.48	1.745	.096	2.30	2.67	0	5

Note: 0-Not applicable/Available, 1- Strongly Disagree, 2- Disagree, 3- Neither agree nor Disagree, 4- Agree, 5- Strongly Agree

Library-wise responses indicate that the total mean of awareness aspects such as finding a way around the campus and identification of academic skills were higher than other factors. Library 5 and Library 10 had the lowest means in all the aspects of awareness after orientation programmes as these libraries were not provided library orientation.

The total mean scores for aspects such as awareness for locating sources and facilities (2.83) and aware of computer resources (2.68) were highest as compared to other aspects associated with post-library orientation familiarity with respective libraries. Other aspects had lower mean scores, such as felt connected with library staff (2.63), felt comfort while using the library (2.64), and for the factor identified academic skills (2.48) and able to find a way in the campus (2.40). It indicates that the library orientation programmes help in increasing familiarity among users about the library sources, services and facilities; however, libraries should provide in-depth library orientation.

5.6.1.5 Attendance of library orientation program and post-library orientation familiarity in finding way around campus

Libraries provide different types of orientation programs for novice users to familiarize users with the sources, services and staff. The correlation between library orientation program and participants opinions on whether the library orientation aids them in finding a way around campus represents the following result:

Table 5.45 (B): Post-Library Orientation Familiarity in Finding Way Around Campus –Correlation

		Attended library orientation program	Find way in campus
Attended library orientation program	Pearson Correlation	1	-.496
	Sig. (2-tailed)		.000
	N	328	328
Find way in campus	Pearson Correlation	-.496	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained r value for the variable attendance of library orientation program and able to find way in the campus was $-.496$ which is more than to $-.30$, signified weak negative relationship between the attendance of library orientation program and able to find way in the campus. The p value was $.000$, which means it is significant at $.05$ level.

5.6.1.6 Attendance of library orientation program and post-library orientation experience of comfort while using library

To measure the impact of library orientation, participants were asked for their opinions on whether they feel comfortable while using the library after the orientation program. The result obtained though correlation between attendance of library orientation program and participants' opinions on experience of comfort while using library are as following:

Table 5.45 (C):Post-Library Orientation Experience of Comfort While Using Library –Correlation

		Attended library orientation program	Feel comfortable
Attended library orientation program	Pearson Correlation	1	-.517
	Sig. (2-tailed)		.000
	N	328	328
Feel comfortable	Pearson Correlation	-.517	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained *r* value for the variable attendance of library orientation program and experience of comfort while using library was $-.517$ which is more than to $-.50$, signified a moderate negative relationship between the attendance of library orientation program and experience of comfort while using library. The p value was $.000$, which means it is significant at $.05$ level.

5.6.1.7 Attendance of library orientation program and post-library orientation experience of feeling connected with library staff

To measure the impact of library orientation, participants were asked for their opinions on whether they feel connected with library staff after the orientation program. The result obtained though correlation between attendance of library orientation program and participants’ opinions on feeling connected with library staff are presented below:

Table 5.45 (D): Post-Library Orientation Experience of Feeling Connected with Library Staff – Correlation

		Attended library orientation program	Feel connected with library staff
Attended library orientation program	Pearson Correlation	1	-.524
	Sig. (2-tailed)		.000
	N	328	328
Feel connected with library staff	Pearson Correlation	-.524	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained r value for the variable attendance of library orientation program and feeling connected with library staff was $-.524$ which is more than to $-.50$, signified a moderate negative relationship between the attendance of library orientation program and experience of feeling connected with library staff. The p value was $.000$, which means it is significant at $.05$ level.

5.6.1.8 Attendance of library orientation program and post-library orientation for awareness in locating Information sources and facilities

To measure the impact of library orientation, participants were asked for their opinions on post-library awareness for locating information sources and facilities. The correlations are further explained in chapter seven. The result obtained though correlation between attendance of library orientation program and participants' opinions on post-library awareness for locating information sources and facilities are presented below:

Table 5.45 (E):Post-Library Orientation for Awareness in Locating Information Sources and Facilities- Correlation

		Attended library orientation program	Awareness for locating sources and facilities
Attended library orientation program	Pearson Correlation	1	-.540
	Sig. (2-tailed)		.000
	N	328	327
Awareness for locating sources and facilities	Pearson Correlation	-.540	1
	Sig. (2-tailed)	.000	
	N	327	327

University libraries are housed in large buildings, and the information sources are stored in different formats in such multi-storied buildings on different floors, sections, sub-sections and departments. Hence, librarians provide orientation instructions through different methods to familiarise users with various sources and facilities available in the library. Therefore participants were asked about their familiarity with locating different sources and facilities available in the library.

The obtained *r* value for the variable attendance of library orientation program and post-library awareness for locating information sources and facilities was -.540 which is more than to -.50, signified a moderate negative relationship between the attendance of library orientation program and post-library awareness for locating information sources and facilities. The *p* value was .000, which means it is significant at .05 level.

5.6.1.9 Attendance of library orientation program and post-library orientation for awareness in locating computerized sources

To measure the impact of library orientation, participants were asked for their opinions on post-library awareness for locating computerized sources. The result obtained though correlation between attendance of library orientation program and participants' opinions on post-library awareness for locating computerized sources are presented below:

Table 5.45 (F): Post-Library Orientation for Awareness in Locating Computerized Sources – Correlation

		Attended library orientation program	Awareness of computer sources
Attended library orientation program	Pearson Correlation	1	-.518
	Sig. (2-tailed)		.000
	N	328	328
Awareness of computer sources	Pearson Correlation	-.518	1
	Sig. (2-tailed)	.000	
	N	328	328

The advent of the internet and technological developments necessitates libraries to facilitate in-depth user education to make users acquainted with the hybrid library collection.

The obtained r value for the variable attendance of library orientation program and post-library awareness for locating computerized sources was $-.518$ which is more than to $-.50$, signified a moderate negative relationship between the attendance of library orientation program and post-library awareness for locating computerized sources. The p value was $.000$, which means it is significant at $.05$ level.

5.6.1.10 Attendance of library orientation program and post-library orientation for identifying academic skills

Academic skills required to library users mainly include producing a written assignment, right from planning, selecting search tools and techniques, reading and critical thinking, and writing up and referencing.

Table 5.45 (G): Post-Library Orientation for Identifying Academic Skills – Correlation

		Attended lib orient program	Identify academic skills - lib orient
Attended library orientation program	Pearson Correlation	1	-.497
	Sig. (2-tailed)		.000
	N	328	328
Identify academic skills	Pearson Correlation	-.497	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained r value for the variable attendance of library orientation program and post-library orientation for identifying academic skills was $-.497$ which is more than to $-.30$, signified a weak negative relationship between the attendance of library orientation program and post-library orientation for identifying academic skills. The p value was $.000$, which means it is significant at $.05$ level.

5.6.1.11 Post-orientation importance and awareness of library resources and services

Library orientations create awareness of personal support services and resources to be used at optimum level by the users. Today information is available in different formats. In addition, different types of printed sources, electronic form of journals packaged as databases, e-journals, e-thesis and dissertations and many more are made available by libraries.

Table 5.46: Post-Orientation Importance of Information Sources and Services

Particulars	Books		Catalogue		Circulation counter		Printed thesis		E-journals		Databases		AV material	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
No opinion	1	.3	7	2.1	7	2.1	13	4.0	6	1.8	5	1.5	11	3.4
Essential	80	24.4	111	33.8	129	39.3	73	22.3	92	28.0	93	28.4	134	40.9
Very important	241	73.5	186	56.7	152	46.3	218	66.5	218	66.5	210	64.0	89	27.1
Somewhat Important	6	1.8	21	6.4	35	10.7	22	6.7	11	3.4	20	6.1	88	26.8
Not important	0	0.0	3	.9	5	1.5	2	.6	1	.3	0	0.0	6	1.8
Total	328	100	328	100	328	100	328	100	328	100	328	100	328	100

Table 5.47: Post-Orientation Importance V/S Awareness of Information Sources and Services

Particulars	Important		Awareness	
	N	Percentage	N	Percentage
Books	327	99.7%	318	97.8%
Catalog	318	96.9%	260	80.0%
Circulation counter	316	96.3%	239	73.5%
Printed theses	313	95.5%	237	72.9%
E-journals	321	97.9%	199	61.2%
Databases	323	98.5%	179	55.1%
A/V materials	311	94.8%	86	26.5%
Average	318	97.1%	217	66.7%

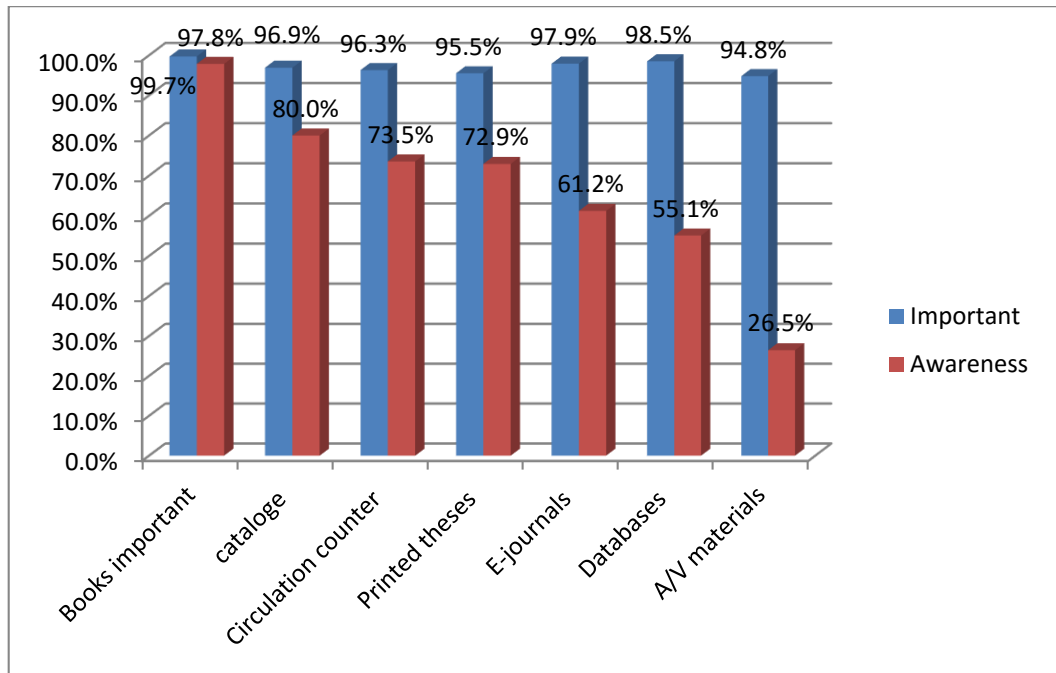


Figure 5.34: Post-Orientation Importance of Information Sources and Services

Due to the availability of information sources in multiple formats, it's essential for libraries to create awareness among users about the techniques of effectively using such myriad formats. Hence users were asked for awareness as well as importance among them about various forms of information sources. This was a multiple-choice question. The importance of sources was asked by using a five-point Likert scale. Further, overall importance was calculated by summing of essential, very important and somewhat important responses to compare importance with the awareness level. The comparison indicates that major, i.e. 99.7% (327) participants replied that books were important; however, 97.8% (318) participants were well aware of books as information sources. 96.9% (318) participants opined that catalogues were important however 80.0% (260) respondents were aware of using catalogue or OPACs. Regarding the circulation counter, 96.3% (316) respondents agreed that the circulation counter was important, yet 73.5% (239) participants were aware of the circulation counter. It was noted by 95.5% (313) participants that printed theses were important for academic purpose, but only 72.9% (237) respondents agreed that they were aware of printed theses collection. In the case of e-journals, 97.9% (321) participants were of the opinion that e-journals were important as information sources for their study; however, only 61.2% (199) participants were aware of e-journals as sources of information. 98.5% (323) participants opined that databases were important as an

information source, yet merely 55.1% (179) respondents were aware of databases. In the case of audiovisual material, 94.8% (311) participants noted that it was an important information source, yet only 26.5% (96) respondents were aware of audiovisual material as a source of information available in the library even after the library orientation session (Figure 5.34).

User opinions about awareness and importance of various information sources, post-library orientation revealed that average participants from all libraries were not aware of library resources (66.7%) even though they feel those sources were important (97.1%). This indicates that there is a need to provide in-depth library orientations with user education workshops. Besides, the provision of video tours will aid the users who are absent for library orientation programmes. Another reason may be that participants may not be considering user orientation programmes useful. Therefore, there is a need to make participants aware of the importance of attending various library orientation programmes.

5.6.2 Psychological barriers and satisfaction

Anecdotes highlight that library professionals have seen and noted some students feel more comfortable while using libraries than others. Large libraries often generate awe in the minds of new potential users due to their size, complexity as well as unfamiliar tools and technology. While entering large unexplored libraries like university libraries, novice users often feel anxiety and confusion. Library anxiety has been studied by librarians, and found the need for patron orientation. Therefore questions were asked about the same. The present sub-section describes the user responses regarding psychological state of mind and opinions about their satisfaction while obtaining different library materials.

5.6.2.1 Behavioral search experiences

The solution of wayfinding problems does not end by just providing legible signage; rather, users behavioral patterns should be taken into account while planning and designing better signage. Hence participants were asked about their behavioral search experiences while wayfinding and searching for information sources in libraries. Behavior of participants changed as per the situations and their experiences while searching and navigating in libraries. Hence it was a multiple-choice question to

select multiple expressions or behavior as per the users' experiences. Following Table 5.48 displays the same.

Table 5.48: Behavioral Search Experiences

Behavior	Responses		Percent
	N	Percent of Cases	
Confusing	149	45.4%	21.5%
Easy	120	36.6%	17.3%
Challenging	109	33.2%	15.7%
Frustrating	90	27.4%	13.0%
Dis-oriented	71	21.6%	10.2%
Baffled	63	19.2%	9.1%
Feeling lost in library	62	18.9%	8.9%
Surprising	28	8.5%	4.0%
Other search experiences	2	.6%	.3%
Total	694	211.6%	100.0%

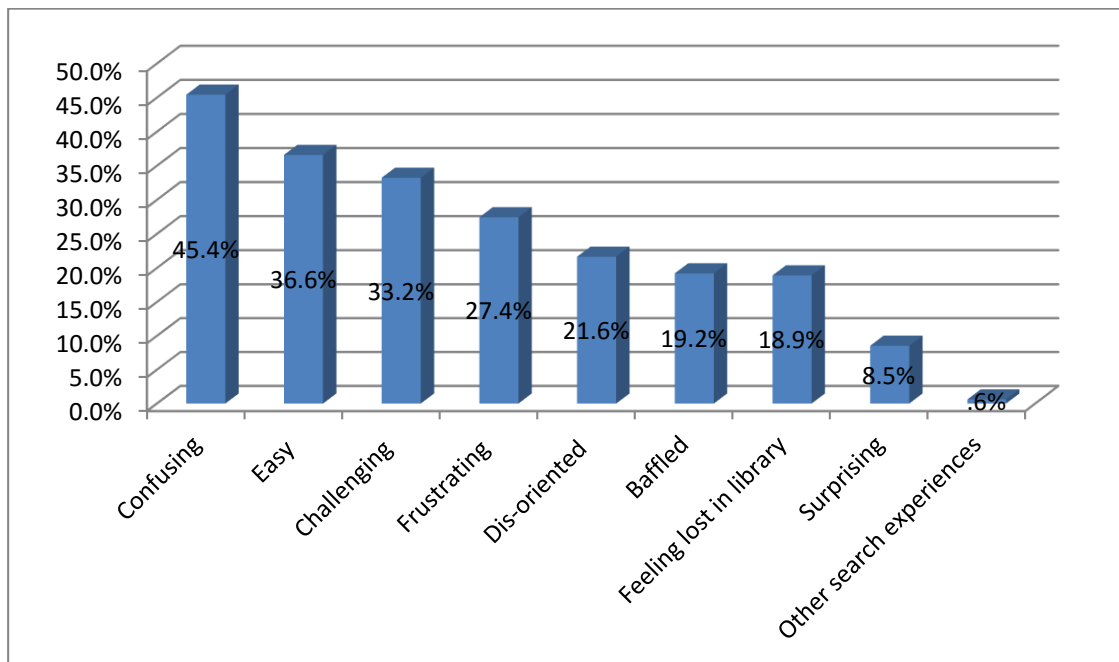


Figure 5.35: Behavioral Search Experiences

Figure 5.35 represents that maximum, i.e. 45.4% of participants were confused, though 36.6% of respondents replied that they feel an ease in wayfinding and while searching information sources, 33.2% of participants opined that information source search was challenging for them. Further, 27.4% of participants felt frustrating, 21.6% of participants felt disoriented, 19.2% of participants noted that they baffled while moving around and searching required sources in the library. 18.9% of participants feel as if they had lost in the library, only 8.5% of participants feel surprising either while using OPAC, while wayfinding in libraries or while physically searching information sources in the stacking area. In the case of other search experiences, few participants replied that it was easy to use the library for them after daily visits.

Table 5.48 (A): University-Wise Users' Behavior – Library-Wise

Behavior	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10	Total
Easy	.65	.48	.43	.46	.22	.35	.24	.17	.35	.27	.37
Surprising	.04	.15	.04	.12	.13	.10	.07	.04	.10	0.00	.09
Challenging	.23	.15	.21	.23	.30	.41	.24	.57	.39	.47	.33
Confusing	.23	.48	.36	.23	.48	.57	.45	.52	.45	.47	.45
Baffled	0.00	.04	.29	.08	.52	.24	.14	.26	.16	.07	.19
Feeling lost	.08	.22	.11	.08	.13	.32	.10	.22	.13	.13	.19
Frustrating	.19	.15	.21	.35	.52	.30	.21	.26	.32	.13	.27
Dis-oriented	.04	.15	.04	.12	.13	.30	.21	.35	.29	.40	.22
Other search experiences	0.00	0.00	0.00	0.00	0.00	.03	0.00	0.00	.03	0.00	.01

Note: 0= No, 1= Yes,

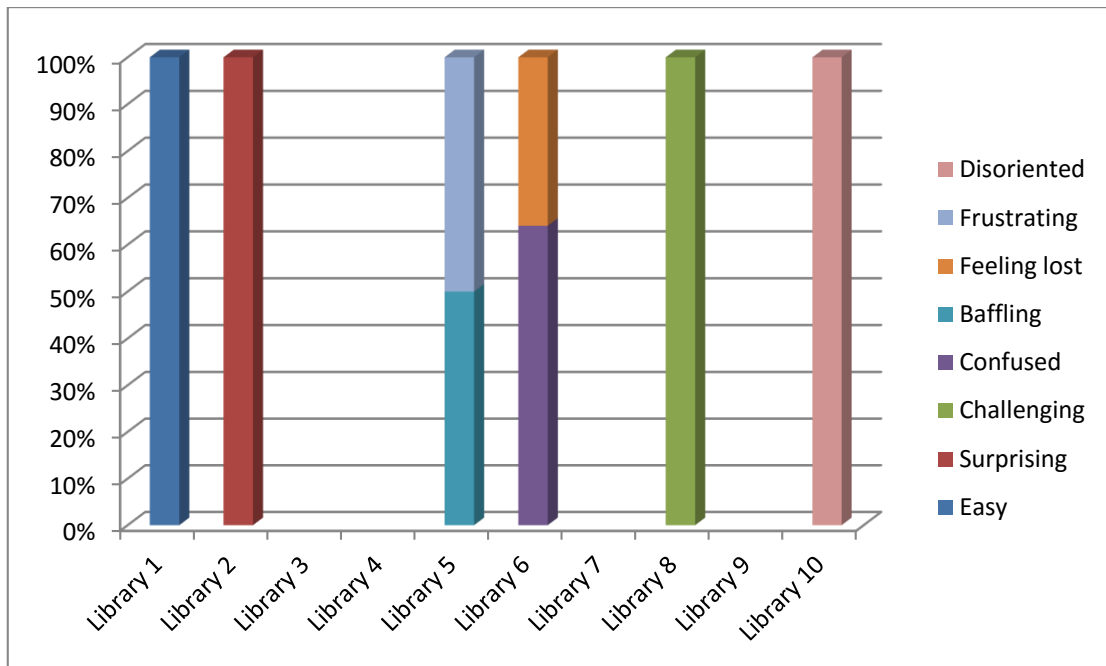


Figure 5.36: Library-Wise Highest Mean Chart for Behavior

Mean table represents that participants of Library 2 felt ease (.65) while navigating and using library for information searching. Library-wise highest mean scores represent that maximum users (.57) of Library 6 experienced more confusion and lost (.32). Library 6 possess, total 22 signs, out of which 9 signs were temporary, which may be resulting in confusion among users (Table 6.13). The use of glass partitions instead of walls in some areas may be the reason behind ease of use in case of Library 2. Maximum users (.57) of Library 8 experienced challenging while using library. Though Library 8 placed sufficient signs (23) inside the library (Table 6.13), those signs lacked visibility due to placement of signs above eye level hanged to the ceiling (Table 6.29). In case of Library 5 maximum users experienced frustration (.52) and baffled (.52) while wayfinding and searching information. Library 5 is multi-storied building and had placed only 4 signs with closed access. Major participants (.40) from Library 10 felt dis-oriented. This library possessed only 3 signs inside the library (Table 6.13). It was housed in a temporary place during the time of field visit, it was supposed to shift in the new building as the establishment of the present university in Mumbai was recent that in the year 2015. Major participants from Library 2 feel surprising (.15), however, on an average, participants from all the libraries were amazed and surprised as novice users.

The mean behavioral pattern of participant's highlights that excluding Library 1 and Library 4, major users of remaining all the libraries were confused. Major users of all libraries, excluding Library 2 and Library 7 feel the process of information searching was challenging. Major users of library 1 and library 2 felt an ease while navigating and finding information sources and service areas due to availability of glass partitions in Library1 and good signage in Library 2. The mean value of frustrating and baffling behavior indicates that maximum participants of Library 5 felt frustrating and baffling while navigating and using library sources and services. Major users, excluding Library 1 and Library 3, felt disoriented during their information search process. Major participants of Library 6 felt that they had lost in the library. On an average, few participants from all the libraries reported that they were surprised while moving around and searching information sources.

The total mean scores associated with behavioral search experiences of participants from all the libraries represents that maximum participants (.45%) were confused while moving around and searching information sources in university libraries in Mumbai.

5.6.2.2 Satisfaction with finding and obtaining library materials

Exploring psychological effects and barriers is indispensable to assess how far users were satisfied while finding and obtaining information sources in physical library settings. This was inquired through using a Likert scale based question for reporting their satisfaction regarding finding and obtaining different library material and services

Table 5.49: Satisfaction with Finding and Obtaining Library Materials

Particulars	Not Applicable/Not available	Percentage	Very satisfied	Percentage	Somewhat satisfied	Percentage	Neither satisfied nor dissatisfied	Percentage	Somewhat dissatisfied	Percentage	Strongly dissatisfied	Percentage	Total
Books	0	0	121	36.9	136	41.5	19	5.8	37	11.3	15	4.6	328
Catalog	6	1.8	93	28.4	116	35.4	42	12.8	38	11.6	33	10.1	328
Circulation counter	0	0	102	31.1	122	37.2	50	15.2	36	11.0	18	5.5	328
E-journals	0	0	83	25.3	95	29.0	41	12.5	70	21.3	39	11.9	328
A/V material	2	0.6	29	8.8	65	19.8	67	20.4	65	19.8	100	30.5	328
Databases	0	0	76	23.2	91	27.7	55	16.8	67	20.4	39	11.9	328
Printed theses	0	0	89	27.1	98	29.9	53	16.2	59	18.0	29	8.8	328

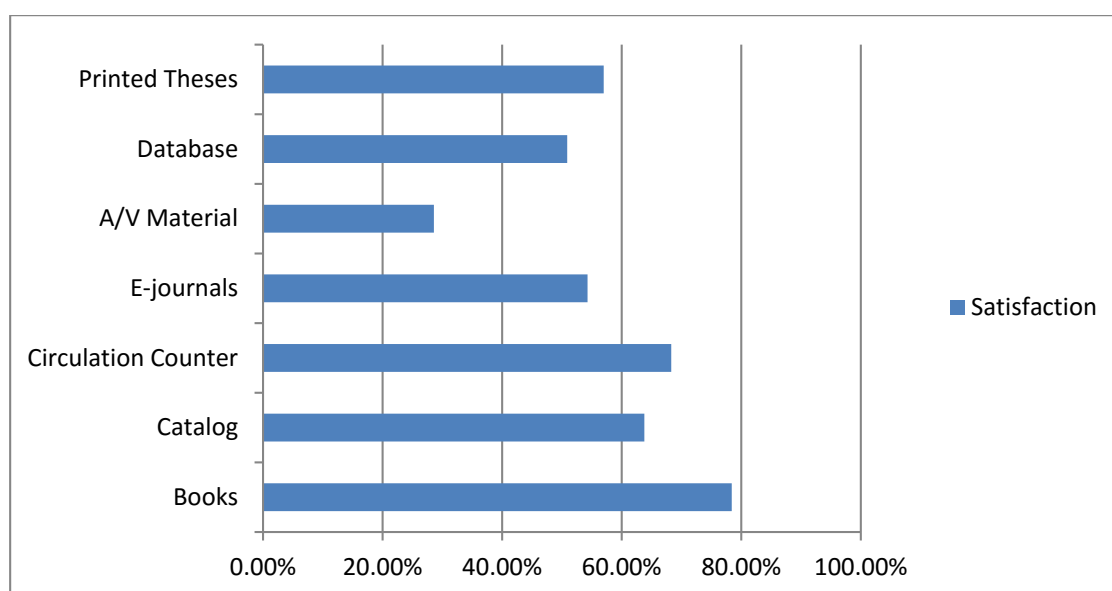


Figure 5.37: Satisfaction with Finding and Obtaining Library Materials

Figure 5.37 highlights that though information sources are available in multiple formats in the present hi-tech society, printed books are still treated as an important information source in academic libraries. The responses of participants revealed that

78.4% of participants were (41.5% +36.9%) satisfied in case of finding and using books. However, 15.9% (11.3% + 4.6%) of participants were dissatisfied while finding and using books; further, 5.8% of participants noted that they were neither satisfied nor dissatisfied regarding locating and using books.

New users often tend to turn towards the library catalog to find out the availability of required information sources, and where to search for the same in the library. At this stage, identifying and using the OPAC terminals or catalog card cabinets plays a crucial role in the user's information search process. In large libraries, the placement and arrangement of the most important information tool- the catalog can also cause a problem if signage is inadequate and catalog manual or explanatory material is confusing. Further online catalog module should be user-friendly and easy to operate for the effective use of OPACs. The responses about the satisfaction of using catalog revealed that 63.8% of participants were satisfied (35.4% + 28.4%) in locating and using catalog. However, 21.7% of participants were dissatisfied (11.6% + 10.1%) with the library catalogue. Furthermore, 12.8% of participants noted that they were neither satisfied nor dissatisfied with finding and using OPACs.

A well-designed library building often provides circulation counters prominently near the entrance or at the reception desk clearly visible from the main entrance with the clearly identifiable sign for the circulation counter to answer basic frequently asked questions from users. Therefore participants were asked whether they feel satisfied while locating and finding the circulation counter of the library. 68.3% of participants were satisfied (37.2% +31.1%) in locating and using the circulation counter. However, 16.5% of participants were dissatisfied (11.0% + 5.5%) in the case of the library circulation counter, further 15.2% of participants noted that they were neither satisfied nor dissatisfied regarding finding and using circulation counters.

E-journals are often made available by libraries through packaged databases still many printed journals are available in libraries in electronic formats. Some journal subscribers provide remote access facility while other e-journals may provide IP based access. Users should make aware of the availability of such journals in both formats and how to access such journals in electronic formats for its effective use. In this regard, 97.9% of participants replied that e-journals were important sources of information for academic purpose. Still, 54.3% of participants stated that they were

satisfied (29.0% + 25.3%) after knowing about e-journals and after using e-journals. Remaining that is 33.2% of respondents were dissatisfied (21.3% + 11.9%) with accessing and using e-journals. In addition, 12.5% of participants mentioned that they neither satisfied nor dissatisfied about access and use of e-journals.

Almost all the libraries possess audio visual collection however, users often unaware of A/V material due to the absence of signs for such collection. Although 94.8% of participants replied that A/V sources were important, very few, that is, 28.6% of participants, agreed that they were satisfied (19.8% + 8.8%) with the A/V material available in the library. However, major participant, that is 50.3% of respondents were dissatisfied (30.5% + 19.8%) regarding the use of the A/V collection. Further, 12.5% of participants replied that they were neither satisfied nor dissatisfied with the A/V material.

Databases as an information source in libraries can be accessible for users from computer labs or library terminals. It's essential to facilitate instruction guides near such terminals for effective use of databases, even though it has been explained through library orientations. Participants were asked about their satisfaction with using databases. 50.9% of participants were satisfied (27.7% +23.2%) in case of use of the database. However, 37.9% of participants dissatisfied (18.0% +19.9%) while using databases. Further, 16.8% of respondents were neither agreed nor disagreed regarding the use of databases.

Theses are available in electronic format through many educational consortiums and databases; still, in many universities, printed theses collection was not yet available in fully digitized form. Hence the participants were asked about their satisfaction with finding and using printed theses. 57% of participants were satisfied, (29.9% + 27.1%) in case use of theses. However, 29.2% of participants dissatisfied (20.4% + 8.8%) while using printed theses. Further, 16.2% of respondents were neither agreed nor disagreed regarding the use of printed theses.

Table 5.49 (A): Satisfaction of Finding Information Sources- Mean

Sources	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
A/V material	Library 1	26	2.77	1.210	.237	2.28	3.26	1	5
	Library 2	27	3.52	1.051	.202	3.10	3.93	1	5
	Library 3	28	2.71	1.675	.316	2.06	3.36	1	5
	Library 4	26	2.85	1.223	.240	2.35	3.34	1	5
	Library 5	23	1.52	.846	.176	1.16	1.89	1	3
	Library 6	100	2.32	1.340	.134	2.05	2.59	1	5
	Library 7	29	2.52	1.299	.241	2.02	3.01	1	5
	Library 8	23	2.70	1.063	.222	2.24	3.16	1	5
	Library 9	31	2.84	1.344	.241	2.35	3.33	1	5
	Library 10	15	1.93	1.486	.384	1.11	2.76	0	5
	Total	328	2.55	1.351	.075	2.40	2.70	0	5
Books	Library 1	26	4.08	.977	.192	3.68	4.47	2	5
	Library 2	27	4.41	.971	.187	4.02	4.79	2	5
	Library 3	28	4.29	.937	.177	3.92	4.65	1	5
	Library 4	26	4.38	.898	.176	4.02	4.75	1	5
	Library 5	23	3.13	1.456	.303	2.50	3.76	1	5
	Library 6	100	3.76	1.215	.122	3.52	4.00	1	5
	Library 7	29	4.34	.553	.103	4.13	4.56	3	5
	Library 8	23	3.61	1.118	.233	3.13	4.09	1	5
	Library 9	31	4.23	1.055	.190	3.84	4.61	1	5
	Library 10	15	3.20	1.082	.279	2.60	3.80	1	5
	Total	328	3.95	1.136	.063	3.82	4.07	1	5
Catalogue	Library 1	26	3.88	1.071	.210	3.45	4.32	1	5
	Library 2	27	4.00	1.301	.250	3.49	4.51	1	5
	Library 3	28	3.61	1.423	.269	3.06	4.16	1	5
	Library 4	26	4.31	.838	.164	3.97	4.65	1	5

Sources	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
	Library 5	23	1.30	1.105	.230	.83	1.78	0	4
	Library 6	100	3.41	1.349	.135	3.14	3.68	1	5
	Library 7	29	3.86	.875	.163	3.53	4.19	2	5
	Library 8	23	3.48	1.039	.217	3.03	3.93	1	5
	Library 9	31	4.32	.748	.134	4.05	4.60	2	5
	Library 10	15	2.80	1.568	.405	1.93	3.67	0	5
	Total	328	3.54	1.376	.076	3.39	3.69	0	5
Circulation Counter	Library 1	26	3.23	1.336	.262	2.69	3.77	1	5
	Library 2	27	3.93	1.238	.238	3.44	4.42	1	5
	Library 3	28	4.14	1.177	.223	3.69	4.60	1	5
	Library 4	26	4.54	.761	.149	4.23	4.85	2	5
	Library 5	23	3.04	1.364	.285	2.45	3.63	1	5
	Library 6	100	3.63	1.203	.120	3.39	3.87	1	5
	Library 7	29	4.38	.494	.092	4.19	4.57	4	5
	Library 8	23	3.57	.945	.197	3.16	3.97	2	5
	Library 9	31	4.03	.875	.157	3.71	4.35	2	5
	Library 10	15	3.13	.834	.215	2.67	3.60	1	4
		Total	328	3.77	1.162	.064	3.65	3.90	1
Databases	Library 1	26	3.50	1.105	.217	3.05	3.95	1	5
	Library 2	27	4.11	1.121	.216	3.67	4.55	2	5
	Library 3	28	3.61	1.257	.238	3.12	4.09	1	5
	Library 4	26	4.23	.908	.178	3.86	4.60	2	5
	Library 5	23	1.74	1.054	.220	1.28	2.19	1	4
	Library 6	100	2.90	1.352	.135	2.63	3.17	1	5
	Library 7	29	3.69	1.168	.217	3.25	4.13	1	5
	Library 8	23	3.04	1.065	.222	2.58	3.50	1	4
	Library 9	31	3.77	1.230	.221	3.32	4.23	1	5

Sources	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
	Library 10	15	3.13	1.125	.291	2.51	3.76	1	5
	Total	328	3.30	1.340	.074	3.16	3.45	1	5
E-journals	Library 1	26	3.73	1.116	.219	3.28	4.18	1	5
	Library 2	27	4.37	.926	.178	4.00	4.74	2	5
	Library 3	28	4.00	1.186	.224	3.54	4.46	1	5
	Library 4	26	4.19	.849	.167	3.85	4.54	2	5
	Library 5	23	1.70	1.063	.222	1.24	2.16	1	5
	Library 6	100	2.84	1.369	.137	2.57	3.11	1	5
	Library 7	29	3.59	1.268	.236	3.10	4.07	1	5
	Library 8	23	2.91	.949	.198	2.50	3.32	1	4
	Library 9	31	3.87	1.176	.211	3.44	4.30	1	5
	Library 10	15	3.13	1.246	.322	2.44	3.82	1	5
		Total	328	3.34	1.370	.076	3.20	3.49	1
Printed Theses	Library 1	26	3.88	1.071	.210	3.45	4.32	2	5
	Library 2	27	4.30	.823	.158	3.97	4.62	2	5
	Library 3	28	4.21	1.166	.220	3.76	4.67	1	5
	Library 4	26	4.04	.958	.188	3.65	4.43	1	5
	Library 5	23	2.17	1.154	.241	1.67	2.67	1	5
	Library 6	100	3.07	1.328	.133	2.81	3.33	1	5
	Library 7	29	3.76	1.023	.190	3.37	4.15	1	5
	Library 8	23	3.17	.937	.195	2.77	3.58	1	4
	Library 9	31	4.03	1.110	.199	3.63	4.44	1	5
	Library 10	15	2.60	1.454	.375	1.79	3.41	1	5
		Total	328	3.48	1.299	.072	3.34	3.63	1

Note: 1- Strongly Dissatisfied, 2-Somewhat Dissatisfied, 3- Neutral, 4- Somewhat Satisfied 5- Strongly Satisfied

Table 5.49(A) highlights that the totals mean of audiovisual material was the lowest. Observational analysis indicates that major participants from all the universities were unsatisfied in locating, finding and using A/V sources, as signs were absent for locating A/V collection in eight libraries out of ten libraries (Table 6.28). The mean of Library 5 was lowest in case of other sources of information, as the library provided closed access to the printed collection, further due to lack of automation, databases, e-journals, and A/V sources were not provided by the library till the time of visit. Table 5.49(A) highlights that due to the absence of a sign for the circulation counter many users were unaware about the contextual meaning of circulation counter, or they were unsatisfied with the services provided by circulation counter. Observational findings also highlight the absence of signs for service departments in five libraries out of ten (Table 6.26). In the case of printed theses collection, participants of Library 5 were unsatisfied due to closed access and the absence of online searching facility for the printed theses. Library 10 was a new university library. Hence printed theses collection was not available in their library collection.

The total mean scores for the satisfaction of finding information sources in all the libraries highlights that the total mean of audiovisual material was the lowest. It indicates that major participants (2.55) from all the universities were unsatisfied in locating, finding and using A/V sources due to the absence of signage for locating A/V collection in eight libraries out of ten libraries. The total mean score were less than four in case of finding and obtaining different library material and sources. It represents that very few participants from all libraries were strongly satisfied while finding and obtaining different library material and services, hence major remaining participants from all libraries given mixed and somewhat unsatisfactory feedback regarding finding and obtaining different library material and services (Table 5.49 (A)).

5.7 Library environment and space planning

Study of humans, their built environments, and space planning need to be considered together to facilitate better library services and ease in functions and processes. Though ergonomics has been applied to environmental design, there is a need to study environmental psychology, which deals with the built environment as atmosphere and ambience, affecting user behaviour in built environments like libraries during the information search process.

History has proved that only considering ergonomic aspects is not sufficient in the case of built environments. Human orientation science emerged for studying and integrating Semiology, ergonomics and environmental psychology together. Hence all the aspects considered together in the present study of wayfinding, signage, physical and psychological barriers, including library instructions, user behavior and aspects related to environment and space planning.

5.7.1 Ease in identifying and using physical space and services

Library space planning enables to organize easily recognizable entranceways, different sections, service areas, pathways and browsing areas. In addition, for making the library environment more humanely oriented, it is essential to make the facilities, sections and services, more visible and recognizable by adding appropriate signage. Table 5.50 describes the degree of ease in identifying and using physical spaces and services experienced by users.

Table 5.50: Ease in Identifying and Using Physical Space and Services

Particulars	Below 20% Ease in identification of diff parts/sections/services/facilities	21 - 49% Ease in identification of diff parts/sections/services/facilities	50% -74% Ease in identification of diff parts/sections/services/facilities	75%-99% Ease in identification of diff parts/sections/services/facilities	100% Ease in identification of diff parts/sections/services/facilities	Total
Ease in finding objects/sections/ser	10	14	96	126	82	328
Percent	3.0	4.3	29.3	38.4	25.0	100.0
Ease in finding basic amenities	11	34	103	99	81	328
Percent	3.4	10.4	31.4	30.2	24.7	100.0
Ease in finding books on shelves	28	75	63	88	74	328
Percent	8.5	22.9	19.2	26.8	22.6	100.0

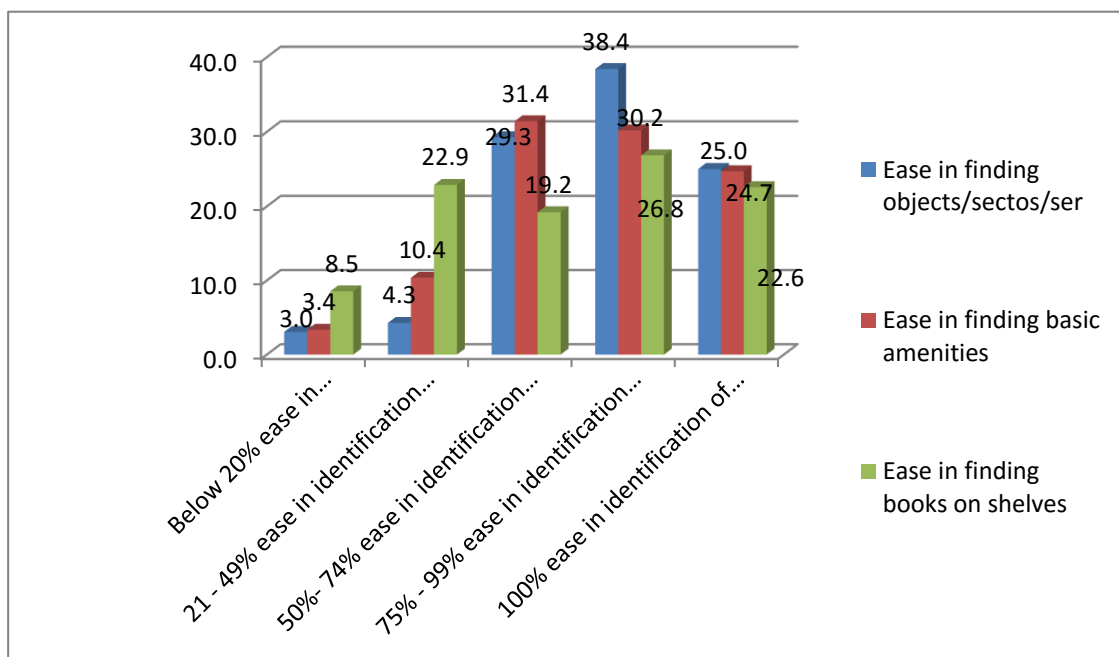


Figure 5.38: Ease in Identifying and Using Physical Space and Services

Space is an important factor in human orientation science. Hence users were asked about their opinion on the level of ease in identifying different parts of the library and relating these parts/ sections. When users asked regarding their opinions about ease in finding objects, sections and services, 38.4% of participants replied that 75%-99% ease was experienced. 29.3% respondents opined that 50-74% ease was experienced, 25.0% participants agreed that 100% ease was provided, 4.3% participants replied that 25-49% ease was provided, and 3.0% respondents replied that below 20% ease was facilitated in finding objects, sections and services.

Large libraries provide basic amenities like elevators, restrooms, drinking water, refreshment area, music room, etc. Appropriate signage for such amenities results in ease in finding and best utilization of available amenities and facilities. Users opinion on ease in finding basic amenities and facilities revealed that 31.4% of participants agreed that 50-74% ease was experienced, 30.2% respondents replied that 75%-99% ease was experienced, 24.7% participants opined that 100% ease was provided, 10.4% of participants replied that 21-49% ease was provided and 3.4% respondents replied that below 20% ease was facilitated in finding basic amenities and facilities.

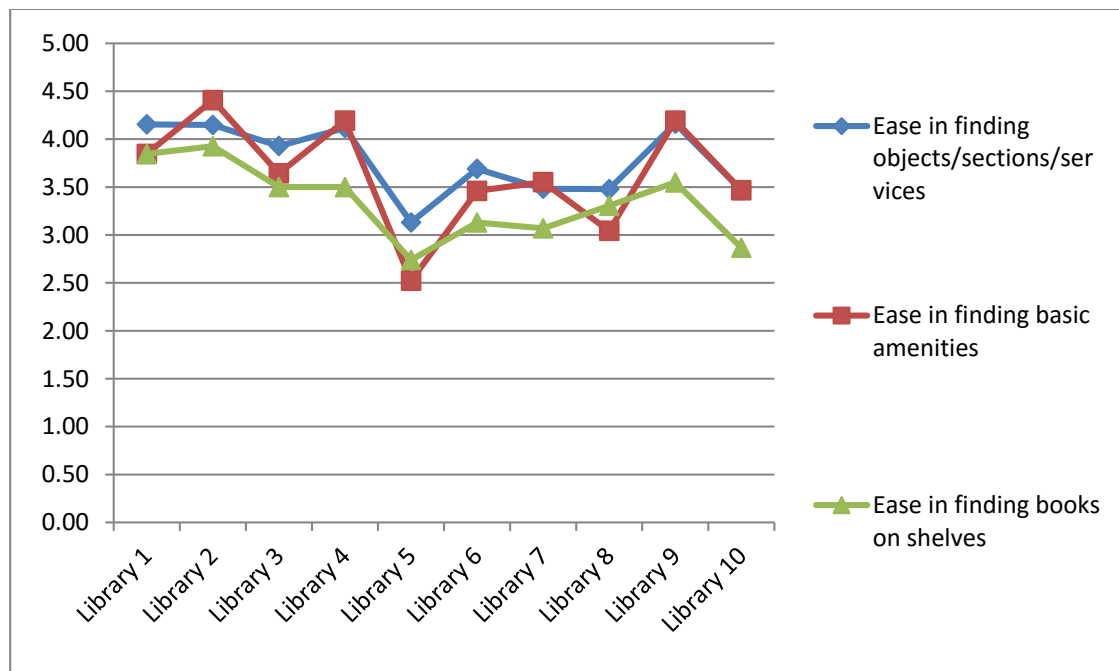
In the case of shelving areas, the physical arrangement of books, floor wise splits in the collection layout complexity of the library, incorporating visibility and connectivity between shelves can affect the efficiency of users while locating and finding required information sources on shelves. Li and Klippel argued that “In libraries, the layout created by book stacks (long rows of bookshelves and narrow corridors) increases layout complexity and decreases visibility at the same time” (Li & Klippel, 2012, p.24). Anecdotes and experience show that users experience difficulty in understanding classified arrangement and finding and locating books in libraries (Hegarty, 2014). Hence users were asked about their opinions regarding ease in locating and finding printed information sources in stacking areas. Responses revealed that 26.8% of participants agreed that 75%-99% ease was experienced, 22.9% respondents replied that 21-49% ease was experienced, 22.6% participants opined that 100% ease was provided, 10.4% of participants replied that 21-49% ease was provided and 19.2% respondents replied that 50-74% ease was experienced and 8.5% participants replied that below 20% ease was facilitated in finding and locating required books on shelves.

Table 5.50 (A): Ease in Identifying and Using Physical Space and Services – Mean

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Ease in finding objects/sections/services	Library 1	26	4.15	.675	.132	3.88	4.43	3	5
	Library 2	27	4.15	.818	.157	3.82	4.47	2	5
	Library 3	28	3.93	1.016	.192	3.53	4.32	1	5
	Library 4	26	4.12	.766	.150	3.81	4.42	3	5
	Library 5	23	3.13	1.456	.303	2.50	3.76	1	5
	Library 6	100	3.69	.961	.096	3.50	3.88	1	5
	Library 7	29	3.48	.688	.128	3.22	3.74	3	5
	Library 8	23	3.48	.846	.176	3.11	3.84	1	5
	Library 9	31	4.16	.860	.154	3.85	4.48	3	5
	Library 10	15	3.47	1.060	.274	2.88	4.05	1	5
Total	328	3.78	.971	.054	3.68	3.89	1	5	
Ease in finding basic amenities	Library 1	26	3.85	.925	.181	3.47	4.22	2	5
	Library 2	27	4.41	.636	.122	4.16	4.66	3	5
	Library 3	28	3.64	1.283	.242	3.15	4.14	1	5
	Library 4	26	4.19	.694	.136	3.91	4.47	3	5
	Library 5	23	2.52	1.163	.242	2.02	3.02	1	5
	Library 6	100	3.46	.989	.099	3.26	3.66	1	5
	Library 7	29	3.55	.985	.183	3.18	3.93	2	5
	Library 8	23	3.04	.767	.160	2.71	3.38	1	5
	Library 9	31	4.19	.980	.176	3.83	4.55	2	5
	Library 10	15	3.47	.990	.256	2.92	4.02	2	5
Total	328	3.63	1.068	.059	3.51	3.74	1	5	

Particulars	Libraries	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Ease in finding books on shelves	Library 1	26	3.85	1.047	.205	3.42	4.27	1	5
	Library 2	27	3.93	.781	.150	3.62	4.23	2	5
	Library 3	28	3.50	1.347	.255	2.98	4.02	1	5
	Library 4	26	3.50	1.241	.243	3.00	4.00	2	5
	Library 5	23	2.74	1.630	.340	2.03	3.44	1	5
	Library 6	100	3.13	1.331	.133	2.87	3.39	1	5
	Library 7	29	3.07	1.193	.222	2.62	3.52	1	5
	Library 8	23	3.30	1.063	.222	2.84	3.76	2	5
	Library 9	31	3.55	1.312	.236	3.07	4.03	1	5
	Library 10	15	2.87	1.187	.307	2.21	3.52	1	5
	Total		328	3.32	1.282	.071	3.18	3.46	1

Note: 1= below 20%, 2= 21-49%, 3=50-74%, 4=75-99%, 5=100%



Note: 1= below 20%, 2= 21-49%, 3=50-74%, 4=75-99%, 5=100%

Figure 5.39: Ease in Identifying and Using Physical Space and Services

University-wise means of responses highlight that the degree of ease in finding material, sections and services, ease in finding basic amenities, as well as ease in finding books on shelves provided by Library 5 and Library 10, were not satisfactory. As in the case of Library 5, there was the absence of signage, in addition, a manual card catalogue system was followed with the closed access to the library collection. In the case of Library 10, due to the non-appointment of the librarian as well as library building was planned to shift the library in the immediate future, very few signs were provided.

The five-point Likert scale was considered an interval scale. The mean is very significant. From 0 to 1.8, it means below 20% level of satisfaction, from 1.81 to 2.60, it means 25% level of satisfaction. From 2.61 to 3.40, it means 50% level of satisfaction; from 3.41 to 4.20, it means 75% level of satisfaction; from 4.21 to 5 it means 100% level of satisfaction (Warmbrod, 2014).

The total mean scores for factor ease in finding objects, sections and services were highest (3.78) among all other factors, which indicated that 75% level of satisfaction was experienced by users while finding and locating objects, sections and services. Thus it was not much complex with the help of available signage. However, participant's feedback revealed that finding books on shelves was more challenging for maximum participants (3.32) from all the libraries and provided 50% level of satisfaction. Thus the descriptive findings and total mean scores represent the inadequacy of existing directional as well as identification signs in shelving areas among all the libraries, which also proved through the observational findings of locating books and journals on shelves (Table 6.26 and Table 6.28).

5.7.2 Ease in finding basic amenities and difficulty in searching information

Library users mainly visit libraries to get the required information sources. During this process, users move around through different sections and departments, and use different facilities and amenities provided by library. The correlation of variables such as ease in finding basic amenities with the opinions on difficulty in searching information, ease in finding objects/sections/services with the opinions on difficulty in searching information, and ease in finding books on shelves with the opinions on difficulty in searching information during the information search process are presented in the following tables:

Table 5.50 (B):Ease in Finding Basic Amenities and Difficulty in Searching Information – Correlation

		Ease in finding basic amenities	Difficulty in searching information
Ease in finding basic amenities	Pearson Correlation	1	.241
	Sig. (2-tailed)		.000
	N	328	328
Difficulty in searching information	Pearson Correlation	.241	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained *r* value for the variable ease in finding basic amenities was .241 which is less than .3, signified weak positive relationship between extent of convenience experienced by the readers while finding basic amenities with difficulty in searching information and the extent of convenience provided by libraries though human orientation measures. The p value was .000 which means it is significant at .05 level.

5.7.3 Ease in finding objects/sections/services and difficulty in searching information

The ease in finding objects/sections/services with the opinions on difficulty in searching information is presented in Table 5.50(C).

Table 5.50 (C) Ease in Finding Objects/Sections/Services and Difficulty in Searching Information – Correlation

		Ease in finding objects/sections/services	Difficulty in searching information
Ease in finding objects/sections/services	Pearson Correlation	1	.370
	Sig. (2-tailed)		.000
	N	328	328
Difficulty in searching information	Pearson Correlation	.370	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained r value for the variable ease in finding objects/sections/services was .370 which is more than .3, signified weak positive relationship between extent of convenience experienced by the readers while locating and using objects/sections/services with difficulty in searching information and the extent of convenience provided by libraries though the practice of human orientation. The p value was .000 which means it is significant at .05 level.

5.7.4 Ease in finding books on shelves and difficulty in searching information

The ease in finding books on shelves with the opinions on difficulty in searching information during the information search process is presented in Table 5.50(D).

Table 5.50 (D): Ease in Finding Books on Shelves and Difficulty in Searching Information – Correlation

		Ease in finding books on shelves	Difficulty in searching information
Ease in finding books on shelves	Pearson Correlation	1	.442
	Sig. (2-tailed)		.000
	N	328	328
Difficulty in searching information	Pearson Correlation	.442	1
	Sig. (2-tailed)	.000	
	N	328	328

The obtained r value for the variable ease in finding books on shelves was .442 which is more than .3, signified a weak positive relationship between extent of convenience experienced by the readers while finding books on shelves with difficulty in searching information and the extent of convenience provided by libraries through human orientation measures. The p value was .000 which means it is significant at .05 level.

5.7.5 Physical information source searching opinions

After exploring user's opinions about the level of ease in finding sections, departments and services as well as amenities and books on shelves, users were further asked about whether they face any difficulty while physically searching information sources in the library.

Table 5.51: Difficulty in Searching Information

Libraries	Count	Difficulty in searching info		Total
		Yes	No	
Library 1	Count	6	20	26
	% of Total	1.8%	6.1%	7.9%
Library 2	Count	6	21	27
	% of Total	1.8%	6.4%	8.2%
Library 3	Count	14	14	28
	% of Total	4.3%	4.3%	8.5%
Library 4	Count	13	13	26
	% of Total	4.0%	4.0%	7.9%
Library 5	Count	16	7	23
	% of Total	4.9%	2.1%	7.0%
Library 6	Count	59	41	100
	% of Total	18.0%	12.5%	30.5%
Library 7	Count	15	14	29
	% of Total	4.6%	4.3%	8.8%
Library 8	Count	13	10	23
	% of Total	4.0%	3.0%	7.0%
Library 9	Count	12	19	31
	% of Total	3.7%	5.8%	9.5%
Library 10	Count	11	4	15
	% of Total	3.4%	1.2%	4.6%
Total	Count	165	163	328
	% of Total	50.3%	49.7%	100.0%

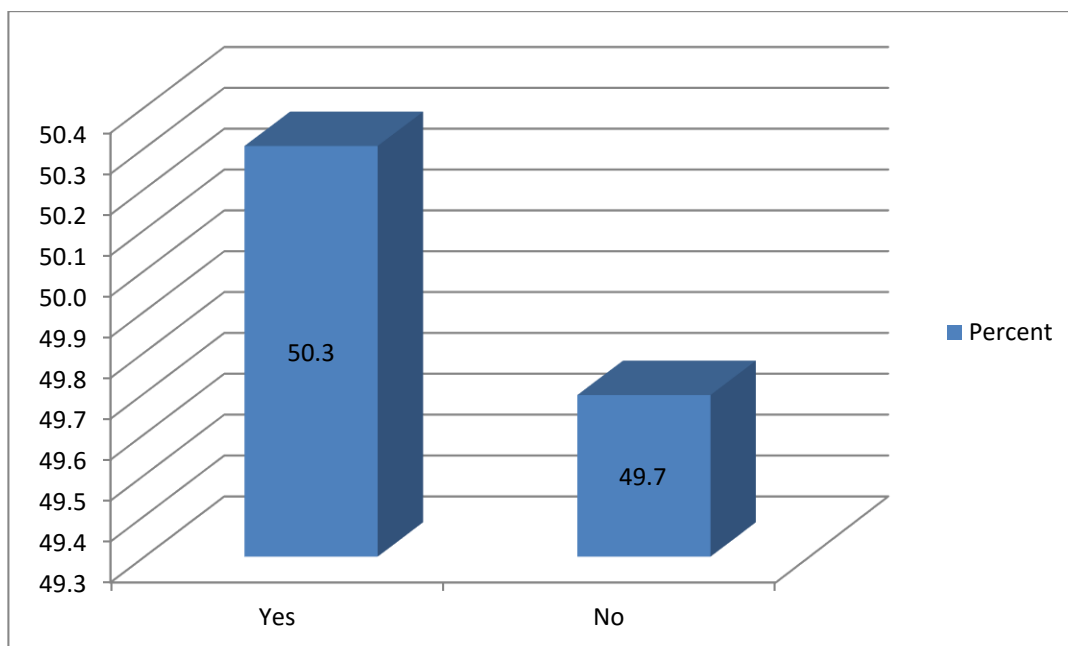


Figure 5.40: Difficulty in Searching Information

Table 5.51 highlights that 50.3% of participants opined that they experienced difficulty while physically searching information sources in the library. University-wise descriptive indicates that major users of Library 5 and Library 10 face difficulty while physically searching information sources in the library (Figure 5.40).

The total results for the responses regarding opinions about experience of difficulty in searching information reveal that maximum participants (50.3%) from selective libraries faced difficulty searching information due to the absence of sufficient signage in stacking areas of libraries at the time of study.

5.7.6 User opinions on expected improvements for finding sources in stacks

In ancient times the identity and superiority of university libraries have been described by their collection and number of members or users. The traditional pattern of orientation and offering library services no longer provides realistic aims for addressing successfully the changing demand of the academic user community. With the advancement of ICT, libraries are acquiring new forms of the collection as per user needs; however, in the case of the stacking areas, the environment is unwelcoming for users.

Table 5.52: Opinions on Expected Improvements for Stacking Areas

Particulars	Responses		Percent of Cases
	N	Percent	
Floor location in OPAC	186	31.3%	56.7%
Chart of call numbers & subject heading near OPAC	177	29.8%	53.9%
Additional subject heading on stacks	159	26.8%	48.4%
Stack end signs at eye level	67	11.3%	20.4%
Other areas need improvement	5	.8%	1.5%
Total	594	100.0%	180.9%

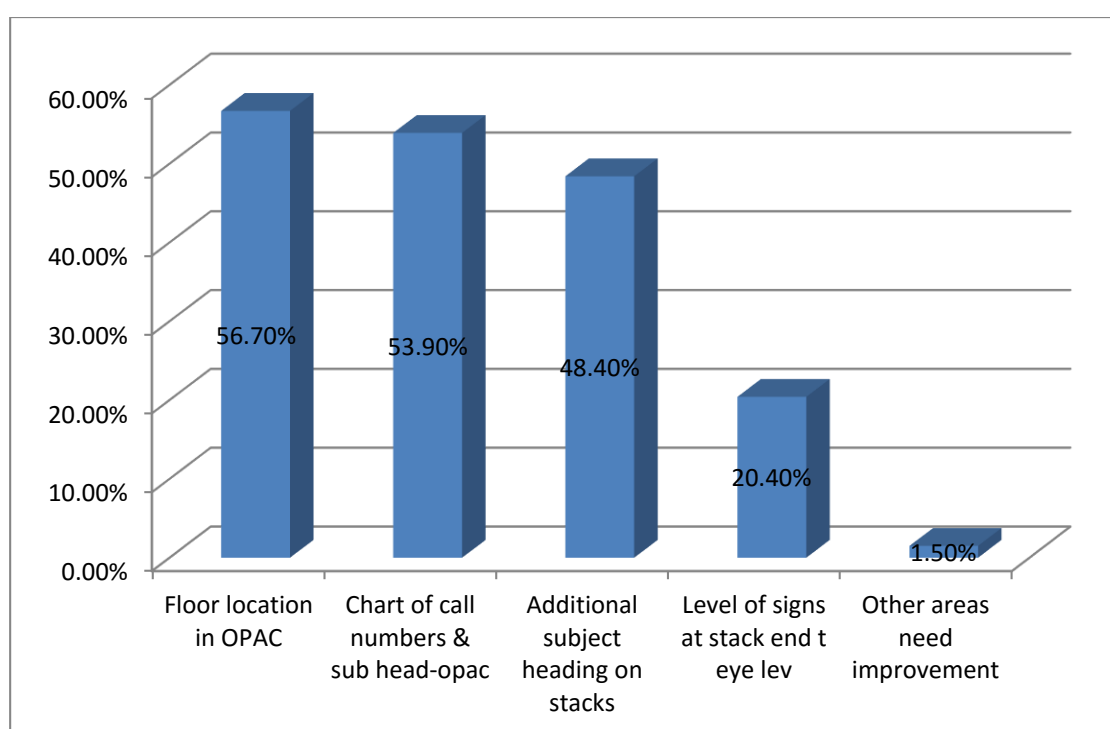


Figure 5.41: Opinions on Required Improvements for Stacking Areas

Users were asked about their opinions on the improvement of stacking areas to make shelves easily accessible for them. It was a multiple-choice question; hence percent of cases were taken into consideration. The maximum that is 56.7% users expected that floor location should be available in OPAC search results for the printed sources, 53.9% noted that display chart of call numbers and subject headings should be made

available near OPAC terminals, respondents 48.4% participants replied that there should be the provision of additional subject headings signs on stacks, 20.4% respondents expect that stack end signs should be provided at eye level so that it will be more visible and readable. In the case of other 1.5% participants suggested views such as OPAC should be available with an effective search engine.

Opinions on required improvements for stacking areas from all the libraries highlights that existing signage in the stacking areas among all the libraries was not satisfactory; hence there is a need to improve the existing signage in case of stacking areas in case of all the libraries. Maximum participants expect floor location in OPAC, chart of call numbers & subject heading near OPAC, additional subject heading on stacks were expected by more than 50% participants. Others expects signs of stack end at eye level, OPAC with an effective search engine, a good ventilation system in stacking areas, open access to all books with OPAC and appropriate shelving order. The provision of Braille charts and instructions was suggested by one of the special user. The desired improvements to facilitate better searching will ultimately lead to human orientation and user-friendliness.

According to the users expectations opinions on required improvements in stacking areas were included in the Model (Figure 7.1).

5.7.7 Satisfaction of environmental aspect of the library building

Human life has inevitably become more complex with every change in the technosphere, and hence need to be mentally prepared to make requisite changes among us.

Information from environmental design can be used to make libraries more useful and functional. This is accomplished by making library environments more human oriented. The environmental ambiance within the library building has an impact on the use of the library. Table 5.53 shows the satisfaction level of results of environmental aspects of library building.

Table 5.53: Satisfaction of Environmental Aspect of Library Building

Particulars	Strongly satisfied	Percentage	Satisfied	Percentage	Neither satisfied nor dissatisfied	Percentage	Dissatisfied	Percentage	Strongly dissatisfied	Percentage	Total	Percentage
Air Ventilation	91	27.7	140	42.7	45	13.7	30	9.1	22	6.7	328	100
Design to control temperature	78	23.8	145	44.2	42	12.8	40	12.2	23	7.0	328	100
Height of roof	99	30.2	174	53.0	33	10.1	15	4.6	7	2.1	328	100
Sufficient natural light	91	27.7	167	50.9	31	9.5	26	7.9	13	4.0	328	100
Welcoming atmosphere	97	29.6	147	44.8	37	11.3	32	9.8	15	4.6	328	100

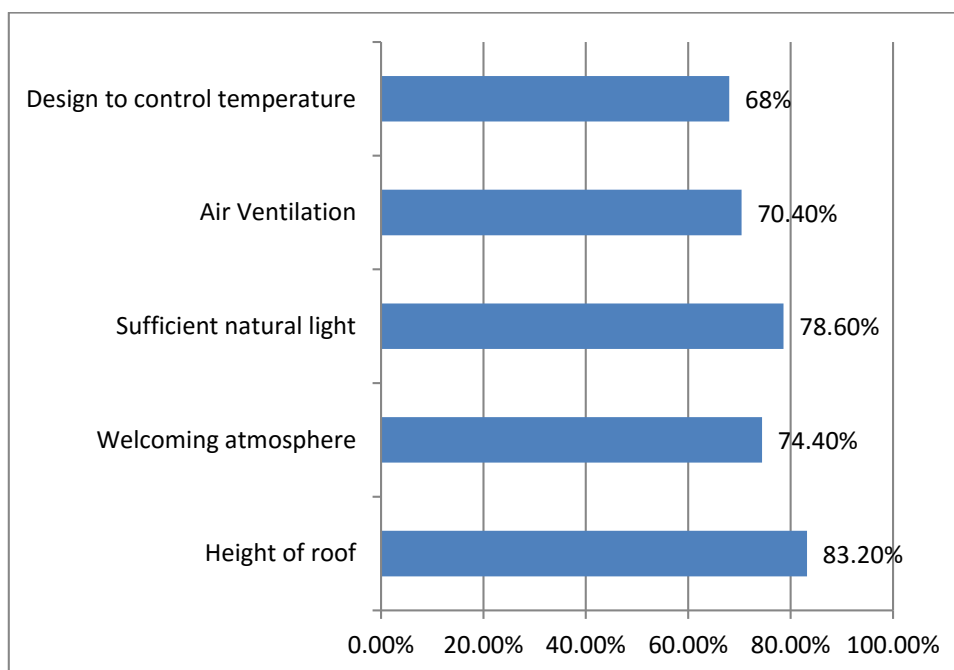


Figure 5.42: Satisfaction of Environmental Aspect of Library Building

Hence considering environmental ambiance as an important aspect of human orientation science, users were inquired about their opinions on library environmental

factors such as air ventilation, design to control temperature, roof height, provision of natural light and welcoming atmosphere.

In the case of opinions on the provision of air ventilation, 70.4% of participants were satisfied (42.7%+27.7%). 15.8% of participants shown dissatisfaction (9.1% + 6.7%) with the available provision of air ventilation. However, 13.7% of respondents noted that they were neither satisfied nor dissatisfied.

In the case of opinions regarding space design to control temperature, 68% participants were satisfied (44.2% + 23.8%), yet, 19.2% of participants shown dissatisfaction (12.2% + 7.0%). However, 12.8% of respondents noted that they were neither satisfied nor dissatisfied.

Regarding opinions on available height of the roof major, to be specific, 83.2% of participants were satisfied, (53.0% + 30.2%), still 6.7% of participants shown dissatisfaction (4.6% + 2.1%). However, i.e. 10.1% of respondents noted that they were neither satisfied nor dissatisfied.

Availability of natural light in the library is always preferable for reading and other learning processes. About the provision of natural light, 78.6% of participants were satisfied (50.9% + 27.7%), though 11.9% of participants shown dissatisfaction (7.9% + 4.0%) with the available provision of natural light. However, 9.5% of respondents replied that they were neither satisfied nor dissatisfied.

A welcoming atmosphere of the library not only attracts the regular visitors but also to the potential readers towards the library. In this regard, 74.4% of participants were satisfied, (44.8% + 29.6%) yet, 14.4% of participants shown dissatisfaction (9.8% + 4.6%) regarding the welcoming atmosphere provided by the library. However, 11.3% of respondents replied that they were neither satisfied nor dissatisfied.

The opinions from all the libraries on library environmental factors such as air ventilation, design to control temperature, roof height, provision of natural light and welcoming atmosphere collectively revealed that maximum participants or users were satisfied with the environmental ambiance within the respective libraries under the study. Yet, librarians should advise the planners and architecture's to plan library building as per (Bureau of Indian Standards, 1989) IS 1553 (1989): Design of Library

Buildings, IS 2672 : 1966 Code of practice for library lighting, and IS 11460 : 1985 Code of practice for fire safety of libraries and archives, for implementation of recommended environmental factors while constructing or renovating existing library buildings.

5.8 Conclusion

The study has brought to the fore the present scenario regarding human orientation provided by university libraries in Mumbai. Further, it focused on user's outlook related to their wayfinding experiences, their perceptions about available signage system, the extent of awareness and information literacy facilitated by the orientation programs provided to them and analyzed their behavioral experiences as well as the degree of satisfaction from the physical space and the library environment. Further, the study seeks to gather user's opinions to improve the signage system, spatial navigation system, accessibility and environmental ambience and further recommended a library signage model (Figure 7.1).

The next section of the present chapter deals with the librarian's opinions and perceptions regarding the measures taken by libraries to facilitate humanely oriented libraries.

CHAPTER V – SECTION II

RESPONSE FROM LIBRARIANS: PERSONALITY FACET

5.9 Introduction

University libraries are an indispensable part of academics. Users from different departments are majorly dependent on library resources to complete their course requirements. In this scenario, it is expected that university libraries should be well equipped and enriched in terms of resources and services with adequate indicators, clues and signs for those resources and services. Therefore a survey of university librarians in Mumbai was conducted to find out university library's types, establishment years, independent building provisions, building construction norms, budget provisions, availability of different amenities and various space provisions, etc.

Further questions were raised about the budget allocation for signage, frequency of signage and space audit, type of library orientation provided, different study spaces and facilities provided by libraries, average special users received by university libraries, provision of guidance system for all users including special users as well as facilities and assistive devices provided for such users. The survey of university librarians and libraries will provide a clear picture of university libraries that would support understanding the study's findings.

5.10 Profile of Librarians and Libraries

This section includes information about librarians' qualifications, their total work experience and their work experience in the present university libraries in Mumbai.

5.10.1 Demographic Profile of Library professionals

This section gives information on ten university librarians' demographic characteristics like sex, qualifications and experience. It was found that 90% of respondents were male librarians, whereas very less, i.e. only 10% of respondents

were female librarians (Figure 5.43). Data corroborate the fact that the library profession is dominated by male candidates in the case of university libraries.

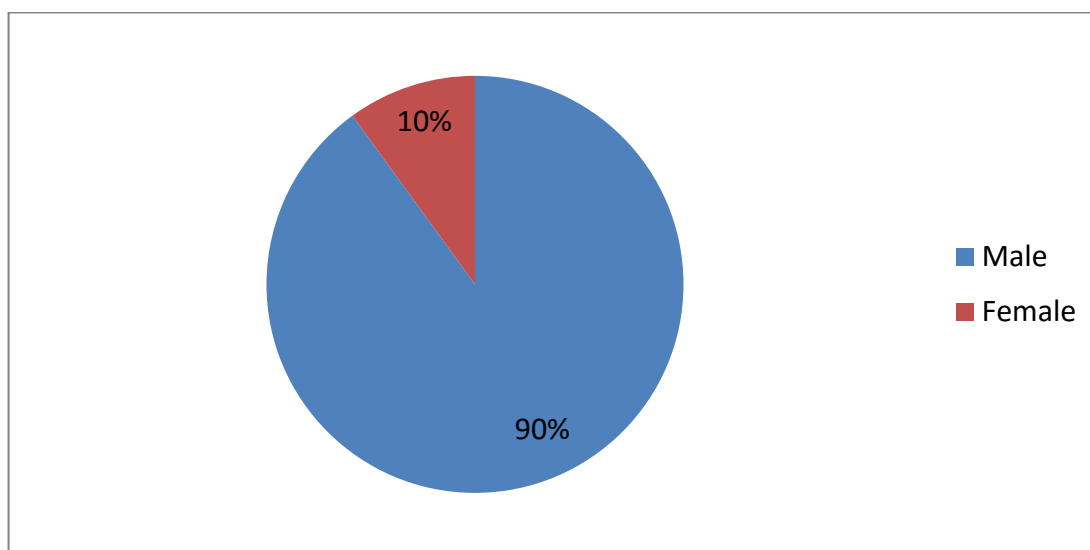


Figure 5.43: Gender-Wise Distribution Of Librarians

5.10.2 Librarians' Qualifications

University Grants Commission provides special consideration through grants like Development Assistance Grant, Special Development Grant, etc. for the development of university libraries that enabled a few new universities to construct functionally planned libraries. The role of the librarian is extremely important as only the librarian can define, in detail, the function and operations of the library and conduct the suitable space planning for effective root trafficking. 50% of university librarians in this study possessed M. L. I. Sc. with Ph. D. degree, 40% of university librarians were qualified with M. L. I. Sc. and 10% that is one of the university librarian was not library science professional. He possessed a degree of Ph. D. in Sociology (Table 5.54) and working as a professor of sociology as well as an In-charge Librarian.

Table 5.54: Qualifications of Librarians

Qualifications	Frequency	Percent
M. L. I. Sc.	4	40.0
M. L. I. Sc., Ph. D.	5	50.0
Ph. D – Sociology	1	10.0
Total	10	100.0

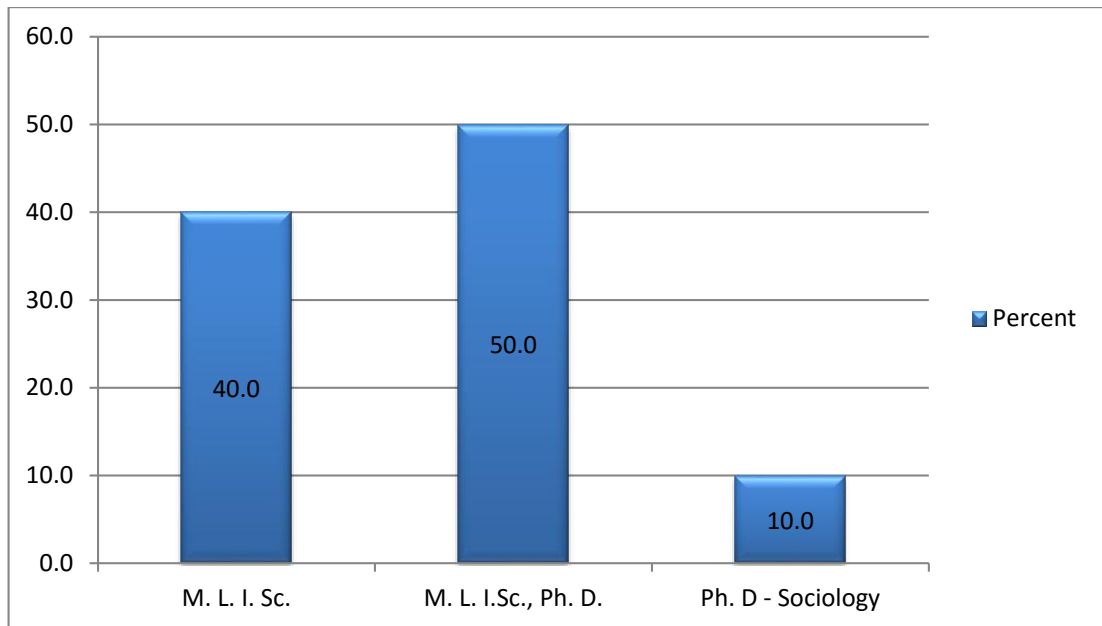


Figure 5.44: Qualifications of Librarians

5.10.3 Librarians' Total Work Experience

The experience of librarians is considered as an essential component while dealing with the wayfinding needs of university library users and interpreting their wayfinding behavior.

Table 5.55: Total Experience of Librarians

Particulars	Frequency	Percent
Less than a Year	1	10.0
11-20 Years	5	50.0
21-30 Years	3	30.0
31-40 Years	1	10.0
Total	10	100.0

Data revealed that 50% of university librarians have 11 to 20 years of total work experience as library professionals. 30% of university librarians have 21 to 30 years of total work experience, and 10% of librarians have 31 to 40 years of work experience as library professionals. 10% of librarians have experience of less than a year as library professionals (Table 5.55).

5.10.4 Librarians' Work Experience in Present University

Experience of the librarian in the present university library is an important facet to understand the changing needs of university library users, as with the changes in space planning and physical settings of a library, there is a need to plan the wayfinding cues and signage as per the new space arrangement and available routes. Data revealed that 50% of university librarians have 1 to 10 years of work experience in the present university. 20% of librarians have 21 to 30 years of experience, and another 20% of librarians have 11 to 20 years of experience. 10% librarians experience of less than a year in the present university library (Table 5.56).

Table 5.56: University Librarians Experience in Present University

Particulars	Frequency	Percent	Cumulative Percent
Less than a Year	1	10.0	10.0
1-10 Years	5	50.0	60.0
11-20 Years	2	20.0	80.0
21-30 Years	2	20.0	100.0
Total	10	100.0	

The statistical information about a span of librarians experience in the present universities revealed that excluding one librarian, all university librarians were well experienced to understand the changing needs of university library users with the changes in space planning and physical settings of a library.

5.11 Universities and University Library Buildings

It presents data about the type of university, establishment year of university, establishment year of a university library, independent building provision, building construction norms and their specifications, presence of librarian when the building was planned and status of geospatial analysis of library building.

5.11.1 Establishment of University

Record of establishment years of university libraries in Mumbai reveals that the oldest university was established during 1851 to 1870. Major universities were established after 1900. Later on, one more university established in the period 2011 to 2018

(Table 5.57). Findings revealed that major universities were established during the 1900 century.

Table 5.57: Establishment Year of Universities and Their Libraries

Year	Establishment of University	Establishment of University Library
1851-1870	2	0
1871-1890	0	2
1891-1910	0	0
1911-1930	2	0
1931-1950	2	2
1951-1970	2	4
1971-1990	1	1
1991-2010	0	0
2011-till 2018	1	1
Total	10	10

5.11.2 Establishment of University Libraries

Establishment of university libraries shows that even though two universities were established during 1851 to 1870, (Table 5.57) the libraries of the same universities, including branch libraries were established during 1871 to 1890. In case of this university both the main library and its branch library were established in the year 1880. It reveals that those university libraries were established more than 20 years later as compared to the establishment years of the respective university. Further, in the case of the other two universities, which established during 1911 to 1930, university libraries were established after a gap of more than 20 years that is during 1951 to 1970. From those main library established in the year 1955 and its branch library established in the year 1968. Other university libraries were established with the establishment of universities.

5.11.3 Types of universities

Table 5.58 shows the type of universities that existed in Mumbai which was studied during the present research. From total responses, 50% were Deemed universities, 40% were state universities including two branch libraries, and 10% were Central universities. Hence due to the existence of varied types of university libraries in Mumbai, the funding system, availability of grants and space provisions differ according to the type of library and the administrative system of each respective library.

Table 5.58: Types of Universities

Particulars	Frequency	Percent	Cumulative Percent
Central University	1	10.0	10.0
Deemed University	5	50.0	60.0
State University	4	40.0	100.0
Total	10	100.0	

5.11.4 Availability of Independent Library Building

If a university library has an independent library building, the space and structural management of the library is direct responsibility of the university librarian. Hence, the respondents were asked whether their library was located in an independent building. Findings revealed that in 70% of universities, libraries were housed in independent building including two branch libraries, within the campuses. However, 30% of university libraries were housed in institutional buildings.

Table 5.59: Independent Library Building

Independent Building	Frequency	Percent	Cumulative Percent
Library Building Available	7	70.0	70.0
Institutional building including library	3	30.0	100.0
Total	10	100.0	

Thus in the case of 70% of libraries in Mumbai, sufficient space and independence was available for respective librarians for space planning as well as arranging the physical settings of the libraries; however, it also depends upon appointment or presence of a librarian at the time constructing or redesigning library buildings and its spaces. (Table 5.59)

5.11.5 Building Construction Norms

In the case of building and construction, standards help to codify best practices, methods and technical requirements to create a safe and sustainable built environment for the community. Various standards are available for construction of library buildings such as IS 1553 (1989): Design of Library Buildings (Indian Standards), National building Code of India 2005, ‘Harmonised Guidelines and Space Standards on Barrier Free Built Environment for Persons with Disability and Elderly Persons, 2016’ and ALA Standards and Guidelines 2003. Therefore, librarians were asked whether the library building was constructed by observing building construction norms.

Table 5.60: Building Construction Norms

Particulars	Frequency	Percent	Cumulative Percent
Yes	3	30	30.0
No	7	70	100.0
Total	10	100	

Findings show that only 30% of library buildings were constructed by following building construction norms, but the librarians did not specify the type of building construction norms followed while planning and building construction. The remaining 70% of library buildings were not constructed as per building construction norms. None of the studied librarians specified that the library was planned and constructed as per specific building construction norms.

5.11.5.1 Specifications of building construction norms followed

As indicated by Table 5.60, only three university librarians were agreed that the university library building was constructed as per the building construction norms. However, when the librarians were asked to specify the building construction norms followed while constructing, all the three university librarians replied that they were not aware of the specification of such norms, and further they replied that such norms are not available while constructing library building (Table 5.61).

Table 5.61: Building Construction Norms- Specifications

Particulars	Frequency	Percent	Cumulative Percent
Not applicable	7	70.0	70.0
Not available	3	30.0	100.0
Total	10	100.0	

None of the studied librarians specified that the library was planned and constructed as per specific building construction norms. This was perhaps, because librarians were appointed much later and were not aware about the history of building construction. Hence they were further asked about their role in planning the library.

5.11.6 Presence of librarian when the building was planned

While constructing a library building architect plays an important role in planning and designing of building, yet the decision of the librarian is important as it is essential while planning wayfinding cues as per the requirement of the physical arrangement of departments and services. The data about the presence of librarian while building construction (Table 5.62) indicated that only one university librarian was actually appointed and available when the university library building was redesigned. 90% of university librarians were appointed later on or joined newly after the retirement of earlier university librarians (Table 5.62).

Table 5.62: Existence of Librarian When Building Planned or Redesigned

Particulars	Frequency	Percent	Cumulative Percent
Yes	1	10.0	10.0
No	9	90.0	100.0
Total	10	100.0	

5.11.7 Geospatial analysis while planning library building

A GIS is a computer system designed to capture, store, manipulate, analyze, manage, and present a variety of spatial and geographical data. This computer system is very important, especially when it comes to planning. It has been used in a variety of industries to help in planning and monitoring. GIS store data that can be relevant in community development. The data can provide insights that can help inform the planning of the community land based on the needs of the community (“Importance of GIS in Planning,” 2018).

In the case of university libraries in Mumbai, geospatial analysis (GIS) was not done in any university library while planning and constructing or even in redesigning university library buildings.

5.12 Wayfinding

Wayfinding problems can be explored by knowing users perceptions regarding their navigational experiences within university library buildings. The present section contains information about whether any user surveys were conducted by university libraries in Mumbai related to wayfinding problems, hindrances faced by users, including special users and conveniences expected by special users.

5.12.1 User Survey for Wayfinding Problems

A library is primarily meant for the users. All its activities and operations taking place in a library are directed towards user satisfaction. In order to achieve the optimal satisfaction of the users, the librarian and the library staff have to keep very close contact with its users, knowing their reading interests, behaviour, information preferences and attitudes towards the library. 'User study' is the means for

systematically examining the characteristics and behaviour of the users of the systems and services. The 'user study' is directly linked with the effectiveness (performance) of the library and information services provided as they aim at the satisfaction of user needs. One benefit of exploring user's navigation needs to provide more effective wayfinding cues through maps, graphics and signage as per their requirements.

Table 5.63: User Survey for Exploring Wayfinding Problems

Particulars	Frequency	Percent	Changes Implemented	Percent
Yes	1	10.0	1	10.0
No	9	90.0	9	90.0
Total	10	100.0	10	100.0

In the case of university libraries in Mumbai, only 10% of libraries had conducted a user survey to find out wayfinding problems faced by users and implemented the changes as per the findings of the wayfinding survey. (Table 5.63)

5.12.2 User survey for Hindrances Face by special users

Any design for a library guidance system should consider the needs of special users. As the designers of libraries plan and design the libraries and its departments and services to answer only the needs of the average person, there was a need to find out the difficulties encountered by special users while using university libraries.

When the university librarians were asked about whether any was survey conducted in the past to find out the hindrances faced by special users, it was revealed that university libraries in Mumbai had never conducted a user survey to find out hindrances faced by special users. However, there are research studies conducted by librarians as discussed in chapter two, section 2.4.3. These studies can be referred by librarians.

5.12.3 User survey for Conveniences of special users

Consideration of the special needs of handicapped patrons will quite probably result in good design, even for the general population. For example, large-size lettering,

high-colour contrast, and consistency in shape and placement of signs, spacious corridors and pathways are features to be incorporated in any guidance system. The extra cost can be held to a minimum by combining special design features for the special uses with those of the basic system. In contrast, planning of convenience facilities such as elevators, a provision of audio signals and Braille signs should be planned at the same time.

When the university librarians were asked whether any survey was conducted in the past to find out the convenience facilities expected by special users, it was revealed that university libraries in Mumbai had never conducted any user survey regarding the needs of special users about required convenience facilities by special users.

5.13 Signage

A good signage system conveys a great deal of information and aids library users in moving without confusion in multi-storeyed library buildings. Hence the present section describes the information about systematic planning of signage, provision of budget allocation for signage, budget heads used by university librarians for acquiring signage in the absence of allocation of budget for signage, signage audit and frequency of conducting signage audit or space audit by university libraries in Mumbai.

5.13.1 Systematic Planning of Signage

Systematic planning of signs should be precisely appropriate to both the library's function and the nature of its surroundings, suitable to the physical settings while enhancing the image of the library. Signs enable people to orient themselves in unfamiliar surroundings to find their way until the required information sources and services easily and they enable users to pleasantly move without confusion.

In the case of university libraries in Mumbai, 70% of libraries implemented systematically planned signage systems; however, 30% of university libraries in Mumbai had not implemented any systematic planned signage systems (Table 5.64).

Table 5.64: Systematically Planned Signage

Particulars	Frequency	Percent
Yes	7	70.0
No	3	30.0
Total	10	100.0

5.13.2 Allocation of budget for signage

Planning and budgeting for the cost of signage and its maintenance require a vision. An academic library receives major budget allocations for acquiring information sources.

Table 5.65: Budget Allocation- Signage

Particulars	Frequency	Percent
Yes	2	20.0
No	8	80.0
Total	10	100.0

Therefore librarians were asked whether any budget allocation was there for acquiring new signs and displays as per the changes occurring in transitional spaces within the university library building. Findings show that 20% of university libraries in Mumbai had provision of allocating budget for acquiring and maintaining signage; however, 80% of libraries do not have any provision for allocating budget authoritatively for acquiring signage (Table 5.65).

5.13.3 Alternative budget strategies for signage

Inflation, along with budget crunch, may strictly restrict or sometimes completely prevent the planning and acquiring of sound visual guidance tools, resulted in the absence of budget allocation for signage planning. But in the case of university libraries, allocation for acquiring budget is provided through other budget heads.

Table 5.66: Alternative Budget Head –Signage

Attributes	Frequency	Percent
Not applicable	2	20.0
General Fund	2	20.0
Maintenance Grants	1	10.0
Miscellaneous	2	20.0
Administrative budget	1	10.0
Not mentioned	2	20.0
Total	10	100.0

Findings revealed that 20% of libraries had an authoritative budget allocation for signage, whereas 20% of university libraries acquire signage through the miscellaneous budget head, other libraries acquire signage from other budget heads such as General Fund (20%), administrative expenditures (10%), and Maintenance Grants (10%). Table 5.66 explains the same. Hence all universities should provide an authoritative budget allocation for planning and implementation of internal library building signage system, Instead of adjusting the expenditure on signage under miscellaneous or any other budget head, it is advisable to plan separate head for signage, while preparing budget.

5.13.4 Signage Audit

Planning and placement of signage is not a one time job. With the growing collection and technological advancements, university libraries change their physical settings and arrangements.

Table 5.67: Signage Audit

Signage Audit	Frequency	Percent	Cumulative Percent
Yes	3	30.0	30.0
No	7	70.0	100.0
Total	10	100.0	

In the case of university libraries in Mumbai, only 30% of libraries conducted signage audit, rest 70% of university libraries never conducted signage audit (Table 5.67). However, university libraries should plan and conduct a signage audit at a frequent interval to update and remove outdated signs. Yet, how to plan and conduct signage audit is not covered in any standards available at present, like ALA Diversity Standards: Cultural Competency for Academic Libraries (2012), National Building Code of India 2005, (Indian Standards)IS 1553 (1989): Design of Library Buildings, ‘Harmonised Guidelines and Space Standards for Barrier-Free Built Environment for Persons with Disability and Elderly Persons’ by Government of India, and IFLA Access to libraries for persons with disabilities – CHECKLIST.

However, any recommended checklist for implementing an effective signage system for library buildings is not yet provided in International standards as well as in (Indian Standards) IS 1553 (1989): Design of Library Buildings.

5.13.4.1 Frequency of conducting signage audit

With the changing demands of users libraries provide new services. Therefore frequently updation as well as removal the outdated signs is always needed. Organizing a recurring signage audit is the best solution to update and remove outdated signs. Therefore for providing systematic signage, it was asked about the frequency of signage audit. The results are shown in Table 5.68.

Table 5.68: Signage Audit - Frequency

Particulars	Frequency	Percent	Cumulative Percent
No signage audit	7	70.0	70.0
Rarely	1	10.0	80.0
Every two years	1	10.0	90.0
Every three years	1	10.0	100.0
Total	10	100.0	

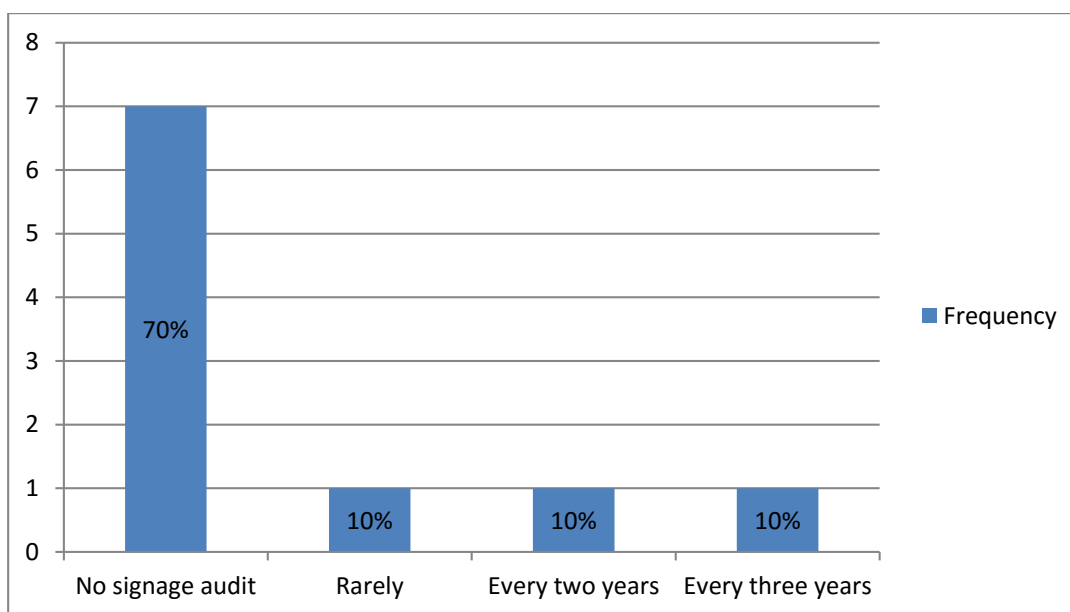


Figure 5.45: Frequency of Signage Audit

In the case of university libraries in Mumbai, 10% of university libraries rarely conducted signage audit, and they conducted the same as a part of space audit, 10% of university libraries conducted the same after every two years, and 10% of libraries conducted signage audit after every three years. Rest 70% of university libraries had never conducted signage audit.

In (Indian Standards) IS 1553 (1989): Design of Library Buildings, an amendment is essential regarding recommended frequency intervals for conducting signage audit in libraries.

5.14 Physical and psychological conveniences

It is necessary to find out physical and psychological conveniences and barriers experienced by users to make libraries more humanely oriented. Such physical and psychological barriers can be minimized by organizing library orientation to novice users and by knowing and solving their access difficulties. Therefore this section covers information about the type of library instruction programs and the type of access provided by university libraries. Further, status of user survey regarding access difficulties conducted by libraries and status of training provided to library staff communication skills or human psychology, which have an ultimate effect on access and use of university libraries, are covered in the present section.

5.14.1 Annual library orientation programs

Library orientation helps new users to get acquainted and familiarize themselves with the library collection and services. University libraries receive new users every year. Therefore it is necessary to provide library orientation every year after the enrolments.

Table 5.69: Yearly Library Orientation

Particulars	Frequency	Percent
Yes	9	90.0
No	1	10.0
Total	10	100.0

In the case of university libraries in Mumbai, 90% of university libraries provide library orientation every year. However, 10% of university libraries do not provide library orientation due to the non-availability of the librarian as the post was vacant at the time of the survey.

5.14.1.1 Forms of library orientation

Library orientation is the best tool to make aware novice users of the library environment and its collection. A physical library tour along with oral instructions as a part of orientation helps to know the basic amenities and facilities available in the library. PPT presentations facilitate additional information about forms of the collection as well as types of services provided by libraries. In-depth user education further helps to maximize the use of library collection, databases and services.

Table 5.70: Type of Library Orientation

Particulars	Responses		Percent of Cases
	N	Percent	
Physical tour	9	37.5%	90%
Oral instruction	7	29.2%	70%
PPT & instructions	5	20.8%	50%
Library Orientation	2	8.3%	20%
Other methods	1	4.2%	10%
Video library tour	0	0.0%	0.0%
Total	24	100.0%	240%

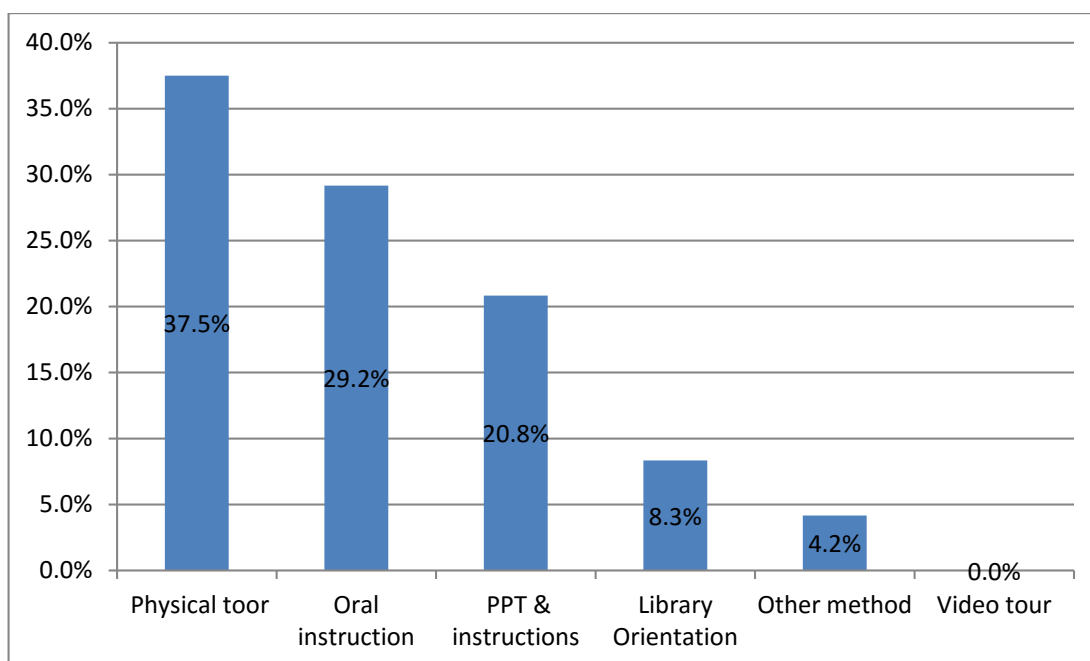


Figure 5.46: Types of Library Orientation

Findings revealed that major university libraries in Mumbai provide multiple forms of library orientation, excluding university Library 10, as the university librarians post was vacant in the said library when surveyed.

In the case of other methods, the Indira Gandhi Institute of Development Research library offers demonstration for the use of databases and e-resources as a part of library orientation.

5.14.2 Type of access

Open access to library offers the freedom to users to choose their required information sources and facilitates multiple choices for users to select the best alternative information source from the available library collection.

Table 5.71: Type of Access

Particulars	Frequency	Percent	Cumulative Percent
Open access	7	70.0	70.0
Closed access	1	10.0	80.0
Partial open access	2	20.0	100.0
Total	10	100.0	

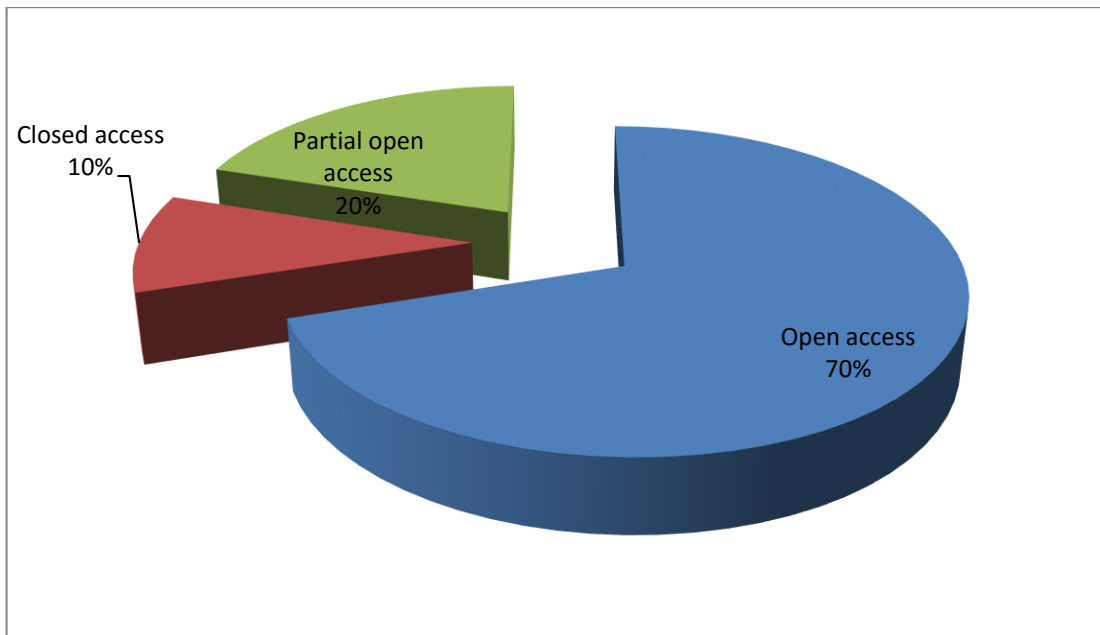


Figure 5.47: Type of Access

Table 5.71/Figure 5.47 shows that 70% of university libraries in Mumbai facilitate open access to the entire library collection. 20% of university libraries provide partial open access to the library collection. To elaborate partial open access as per those libraries, one university library provides closed access to undergraduate students and open access for postgraduates, researchers and staff. The other university library facilitates open access to books and journals, however, closed access to the rare collection, theses and dissertations, audio-visual collection and question papers. Yet, one university library (10%) had closed access for the entire library collection, excluding textbooks. In case of Library 5 maximum users experienced frustration (.52) and baffled (.52) while wayfinding and searching information. Library 5 is multi-storied building and had placed only 4 signs with closed access. In case of Library 7, which provides partial open access, maximum participants experienced confusion (.45) as described in Table 5.48(A). Table 5.49(A) indicated that the mean of Library 5 was lowest in case of search of information sources, as the library provided closed access to the printed collection. Table 5.50(A), highlights that university-wise means of responses for the degree of ease in finding books on shelves provided by Library 5 were not satisfactory (2.74). As in the case of Library 5, there was the absence of signage, in addition, a manual card catalogue system was followed with the closed access to the library collection.

5.14.3 User survey for access difficulties

Libraries are supposed to provide universal access to their collection and services. It is necessary to explore whether any types of access difficulties are faced by its users to eliminate the same.

Table 5.72: User Survey for Access Difficulties

Particulars	Frequency	Percent	Cumulative Percent
Yes	3	30	30
No	7	70	100
Total	10	100	

In the case of university libraries in Mumbai, merely 30% of libraries had conducted a survey to explore access difficulties faced by users. However, 70% of libraries had never planned for conducting a survey for exploring access difficulties.

Further, the question was raised for the librarians who had conducted such access difficulty survey about whether the changes and improvements they applied in libraries after receiving feedback from users.

In Library 2, changes were made in catalogue interface and signage, in the case of Library 7, open access was initiated to Post Graduate students, special space was created for Web OPAC and passwords were sent online to researchers and staff members of databases & e-journals after the survey of access difficulties. In Library 8, Way2SMS service was initiated for disseminating circulation information through cell phones after the access difficulty survey.

5.14.4 Training of communication skills to staff

Communication and interactions among the library staff and its users also play an important role in access and use of the library in the case of novice users. Such users may need more personal assistance or support from staff as compared to regular users. Therefore, possessing good communication skills or acquiring the same through training sessions is necessary, especially for counter staffs who directly serve users.

Table 5.73: Training to Library Staff

Particulars	Frequency	Percent	Cumulative Percent
Yes	7	70.0	70.0
No	3	30.0	100.0
Total	10	100.0	

In this regard, the question was raised to university librarians about whether they provide training related to communication skills, customer relationship management or human psychology to their staff. Table 5.73 represents that 70% of university librarians offer training or send the staff to continuing education programs associated with communication skills. However, in the case of 30% of university libraries, such training was not made available or provided.

5.15 Space Allocation and facilities

Facilitating a comfortable space and relaxing atmosphere is an integral factor of human orientation science. The human need for space varies as per the situation, type of institution or building. Library buildings should provide a calm and relaxing space for their users. Hence this section contains information about the availability of diverse learning spaces, other convenience facilities, other learning spaces, as well as information about provision for space allocation to accommodate future changes in university libraries in Mumbai.

5.15.1 Diverse learning spaces

In addition to the peaceful atmosphere, university libraries need several types of learning spaces to meet the requirements of diverse reading and learning purposes.

Table 5.74: Availability of Learning Spaces

Particulars	Responses		Percent of Cases
	N	Percent	
Cubicle for researchers	6	23.1%	60.0%
General computing lab (Computer Lab)	6	23.1%	60.0%
Group study space for students	6	23.1%	60.0%
Conference hall or informal meeting space	4	15.4%	40.0%
Instructional activities conducted by library staff	3	11.5%	30.0%
Other - E library for Kindle	1	3.8%	10.0%
Other - Music listening and film screening space	1	3.8%	10.0%
Total	27	100.0%	260.0%

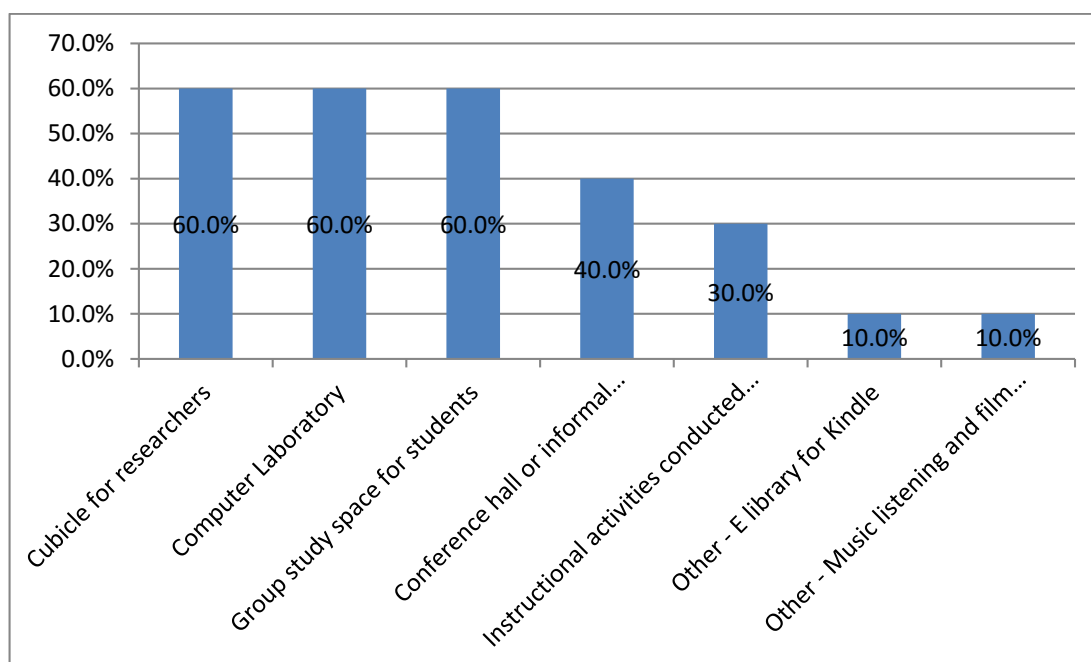


Figure 5.48: Learning Spaces

Findings revealed that in 60% of university libraries in Mumbai, a cubicle for researchers, computer lab inside the library, and group study spaces were available. Only 40% of university libraries in Mumbai had a conference hall or informal meeting space. Merely 30% of university libraries had space for conducting instructional activities by staff for library users. 10% of university libraries also

facilitate other learning spaces such as E-library for Kindle, and 10% of university libraries offer separate space for music listening and film screening.

5.15.2 Other convenience facilities

Convenience facilities such as restrooms, staff food services and a vending machine for tea or coffee is essential for library users who wish to spend long hours in libraries. 75% (9) university libraries have restrooms for male and female; however, only 25% (3) libraries provide space for staff food services and no university library in Mumbai provide the facility of a vending machine for refreshment.

Table 5.75: Other Convenience Facilities

Particulars	Responses		Percent of Cases
	N	Percent	
Restrooms for both male and female	9	75.0%	90%
Staff food services	3	25.0%	30%
Vending Machine	0	0.0%	0.0%
Total	12	100.0%	133.3%

5.15.3 Other learning spaces

University libraries serve the heterogonous community. As a result, library users need different type of learning spaces to serve different purposes of learning, such as discussion rooms, activity room and browsing area.

Table 5.76: Provision of Other Learning Spaces

Particulars	Responses		Percent of Cases
	N	Percent	
Browsing area	8	61.5%	80%
Discussion room/area	3	23.1%	30%
Activity room	1	7.7%	10%
Discussion room on demand	1	7.7%	10%
Total	13	100.0%	130%

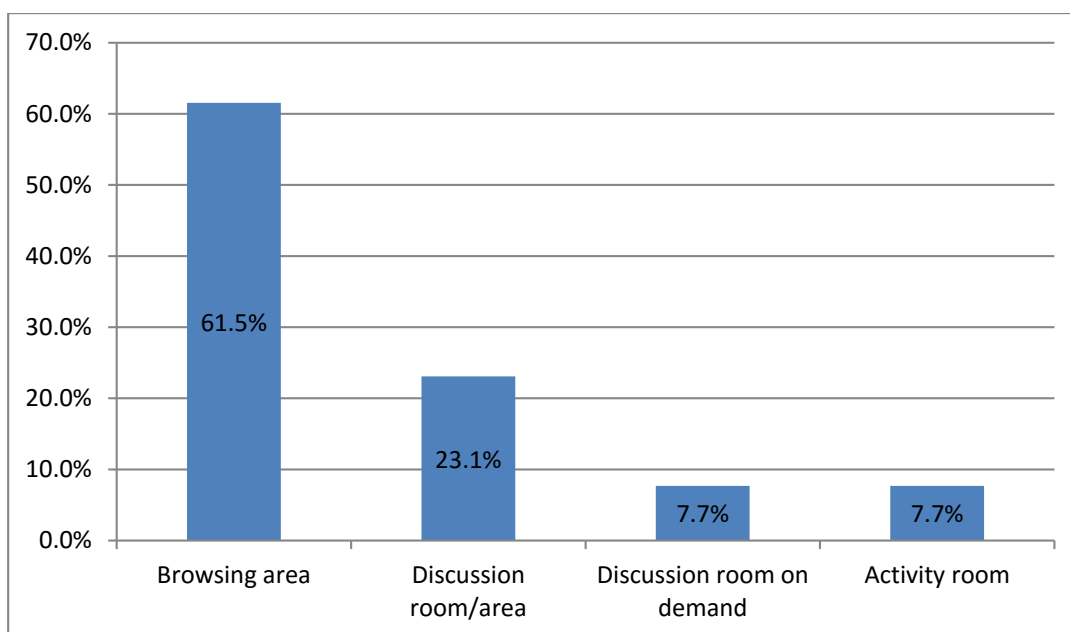


Figure 5.49: Other Learning Spaces

Findings revealed that 61.5% (8) university libraries facilitate browsing area, 23.1% (3) libraries provide discussion area, 7.7% (1) libraries provide activity area and 7.7% (1) libraries provide discussion room on demand from users.

5.15.4 Provision of space allocation to accommodate future changes

The library is a growing organism. In addition to the changing needs of users, libraries need to add and convert their forms of collections. As a result, libraries need to establish different sections or departments to accommodate the changing forms of collection, which results in a space crisis. In the case of a metropolitan city like Mumbai, libraries face a problem of space crunch. Findings revealed that 80% of university libraries have space to accommodate future changes as per the changing requirement of learning spaces. However, 20% (2) university librarians replied that they don't have space to accommodate future changes.

Table 5.77: Space Allocation to Accommodate Future Changes

Particulars	Frequency	Valid Percent	Cumulative Percent
Yes	8	80.0	80.0
No	2	20.0	100.0
Total	10	100.0	

5.16 Facilities for special users

University libraries receive a broad range of library users, including special users. Although the enrolment of such users is less in numbers, it is desirable for libraries to provide universal access to users. The present section includes information about enrolment of special users, availability of convenience and access facilities for special users, assistive devices available for special users, provision of resting room and future plans of university libraries in Mumbai to make libraries humanely oriented.

5.16.1 Yearly Enrolment of special users

Universal access facilitates the required physical environment for persons with disabilities to access and manoeuvre through the physical space of the library. Provisions for universal access will provide freedom for special users to select and enrol in any type of university. To find out enrolments of special users, librarians were asked about enrolment of special users every year.

Table 5.78: Special Users' Yearly Enrolments

Particulars	Frequency	Percent
0	3	30.0
1-5	4	40.0
5-10	3	30.0
Total	10	100.0

Three university libraries had never received special users (30%), whereas four university librarians replied that one to five special users were enrolled every year (40%); further, three university libraries stated that five to ten special users were enrolled every year (30%).

5.16.2 Convenience and access facilities for special users

Special users need alternative access and convenience facilities for navigating within libraries as well as to utilize library services on their own. Different type of special users needs a diverse nature of access and convenience facilities. Multiple-choice questions were asked to find out the related provisions for special users to university librarians.

Table 5.79: Convenience and Access Facilities for Special Users

Particulars	Responses	
	N	Percent
Wheelchair	3	27.3%
Alarm system that combines visual and audio	1	9.1%
Brochure in Braille form	1	9.1%
Handrails on both sides of stairways	1	9.1%
Handrails in long corridors	1	9.1%
Large font signs	1	9.1%
Ramps at the accessible entrances	1	9.1%
Restrooms for disables	1	9.1%
Other facility for special users	1	9.1%
Tactile	0	0.0%
Touch maps	0	0.0%
Total	11	100.0%

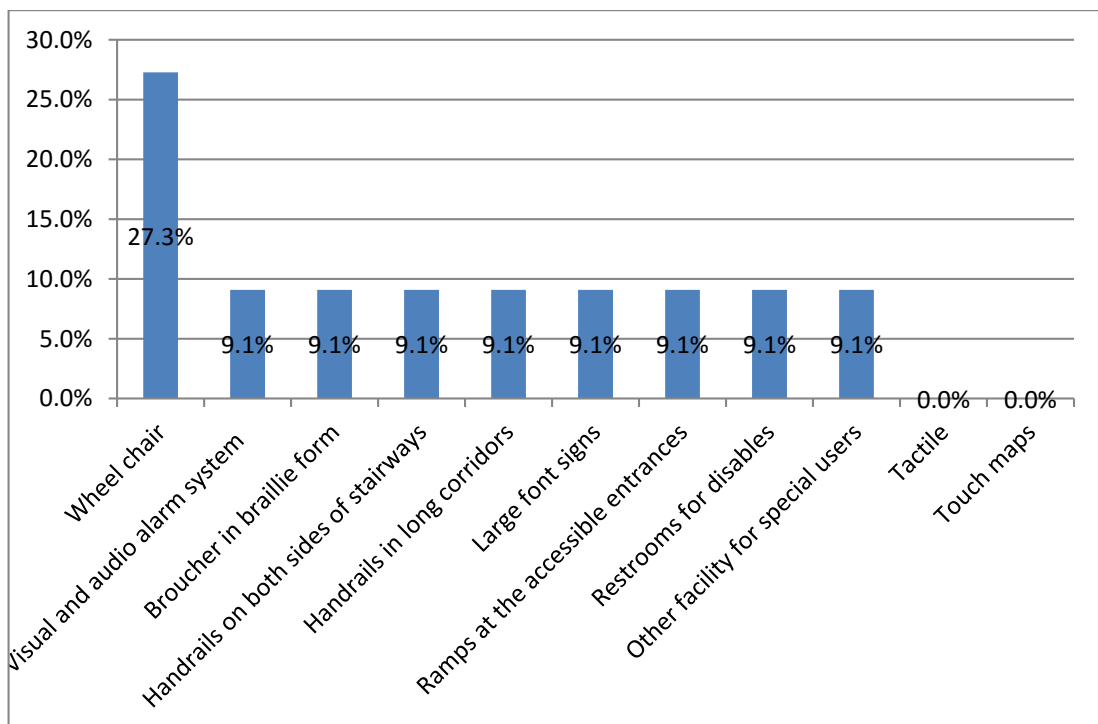


Figure 5.50: Convenience Facilities for Special Users

Librarians' responses revealed that only 27.3% (3) libraries provide wheelchair facility, only 9.1% (1) library from ten university libraries, facilitates alarm system that combines visual and audio, broacher in Braille form, handrails on both sides of stairways, handrails in long corridors, large font signs, ramps at the accessible entrances, restrooms for disables, in addition in one university library facilitates maximum resources on the ground floor for special users. Special users need certain settings in the library and translate these preferences into an attitude of acceptance or rejection. To facilitate universal access it is necessary to provide the essential amenities and environment suitable to all type users such as restrooms for disables. Only TISS library had provided restroom for disables among university libraries in Mumbai. Besides, desirable signages for special users are essential to invite special users towards the libraries and to facilitate them ease and comfort. However, Braille signs for convenience facilities were not available in any of the libraries (Table 6.30).

In the case of other facilities, one university library provides maximum facilities on the ground floor. However, provision of tactile and touch maps was not available in any university library in Mumbai (Table 6.30).

The findings indicate that the provisions made in university libraries in Mumbai for all users, including physically challenged users related to wayfinding indicators and provision for physically accessing library were insufficient and thus university libraries in Mumbai lack to facilitate universal access.

5.16.3 Provision of information sources in alternative formats and assistive devices

Though it is not expected by university libraries to possess all types of specialized equipment for every type of disability, it is essential for university libraries to have basic assistive devices which are frequently needed by special users. Further, if a library budget permits, library staff should be responsive towards making resources accessible and available as and when demanded by special users. Hence the question was raised to university librarians regarding a list of assistive devices available for special users through their libraries.

To facilitate universal access and to promote education and learning for special users, the availability of information sources in alternative formats with the required

assistive devices are essential for libraries. Therefore the question was raised to the university librarians regarding various alternative formats of information sources and assistive devices of learning available with them for special users.

Table 5.80: Assistive Devices

Particulars	Responses	
	N	Percent
Book reading software	1	14.3%
Braille embosser	1	14.3%
CD player	1	14.3%
OCR scanner	1	14.3%
Refreshable Braille display	1	14.3%
Screen reading software	1	14.3%
Tape recorder	1	14.3%
Total	7	100.0%

Findings revealed that since Library 2 has a separate section for special and blind users, all the assistive devices like Book reading software 14.3% (1), Braille embosser 14.3% (1), OCR scanner 14.3% (1), Refreshable Braille display 14.3% (1), Screen reading software 14.3% (1) were available in the said library. Library 7 had a CD player and tape recorder. The available assistive devices were in working condition at the time of the survey. Other assistive devices like Braille keyboard, Braille translator, digital talking books, large monitors, magnifying glass, large print keyboard, pocket accessible Daisy player, screen magnifying software and speech synthesizer were not available in any university library in Mumbai.

The findings indicate that the alternative formats of information sources and assistive devices of learning for special users such as Book reading software, Braille embosser, Braille keyboard, Braille translator, CD-player, Digital talking books, Large monitor, Magnifying glass, Modified, Large print keyboard, OCR scanner, Pocket Accessible Daisy Player/Recorder, Refreshable Braille display, Screen Magnifying software, Screen reading software, Speech synthesizer and Tape recorder were not available in university libraries in Mumbai excluding Library 2. It indicates that university libraries in Mumbai lack to provide universal access as a facet of human orientation

with the availability of alternative formats of information sources and assistive devices of learning for special users in university libraries.

The enrolment of special users depends on the provisions available for them for accessing the libraries as well as on the availability of alternative formats and assistive devices for education and learning. The availability of convenience facilities for access to special users as well as assistive devices will lead to enrolment of special users which will ultimately lead to humanely oriented approach.

5.16.4 Resting room

Providing resting rooms to users in large libraries is a new trend in developed countries to make the user comfortable while spending long hours in libraries. However, due to the space crunch, facility of the resting room was not available in any university library in Mumbai.

5.16.5 Future plans to make libraries humanely oriented

Library building should be compatible to accommodate changes brought through advances due to different technological up-gradation as well as to satisfy changing user demands in future. Hence the question was raised to university librarians about their future plans to make their libraries more humanely oriented.

Table 5.81: Future Plans

Particulars	Responses	
	N	Percent
Planning for disable friendly washrooms	2	28.6%
Planning for an elevator for library building	1	14.3%
Extension of floors for spacious and comfortable library	1	14.3%
Implementing system for visually impaired	1	14.3%
Separate reading room & IT space	1	14.3%
Digital signage	1	14.3%
Total	7	100.0%

As per Table 5.81, 28% (2) librarians planned to facilitate disable-friendly washrooms for the library users, 14.3% (1) library planned to build an elevator for a library building, 14.3% (1) planned the expansion of second and third floor for making library spacious as well as comfortable, 14.1%(1) library planned to implement a system for visually impaired, 14.3% (1) library planned for a separate reading room and IT space, and 14.3%(1) library planned for implementation of digital signage in their respective university libraries in Mumbai.

5.17 Summary of Chapter

Human orientation science emerged for studying and integrating Semiology, ergonomics and environmental psychology together. Hence all the aspects considered together in the present study as per the opinions and expectations of users as well as librarians about wayfinding, signage, physical and psychological barriers including library instructions, user behavior and aspects related to environment and space planning. The desired improvements to facilitate better searching will ultimately lead to human orientation and user-friendliness.

The problem of wayfinding is a genuine concern of the librarian and library users alike. However, it seems insignificant in contrast to the immediate fiscal problems that libraries must solve in order to survive. It is unfortunate that the magnitude of the wayfinding problem cannot be expressed or measured in terms of cost. There is no agreed-upon and direct means of assessing such costs either to the library or its users. However, users may get intimidated due to repeated wayfinding problems; as a result, the effectiveness of library use will be diminished in the short run, and the frequency and volume of use will decline in the long run. Though university librarians in Mumbai were aware and realized the importance of wayfinding, they need financial backup and support from the upper-level authorities of respective universities as findings show that 20% of university libraries in Mumbai had allocated budget for acquiring and maintaining signage; however, 80% of libraries do not have any budget allocation for acquiring signage. In such cases, a few libraries use some part of the miscellaneous budget head; other libraries acquire signage from other budget heads such as General Fund, administrative expenditures, Maintenance Grants and from the yearly budget. Hence it necessitates university librarians in Mumbai to apply low-cost measures to minimize wayfinding problems. In addition, in a metropolitan city

like Mumbai, it is difficult for libraries to grow horizontally due to space crisis. Therefore, a space crisis is a major hurdle behind facilitating universal access to library users, and providing spaces or sections such as resting rooms.

Profile of university librarians and libraries presented an overall picture of university libraries in Mumbai. The demographic profile indicated that university librarians in Mumbai were well qualified and experienced, excluding one university where the post of librarian was vacant at the time of the survey. University libraries were well established however; a problem of wayfinding or human orientation needs of their users were not yet taken into account by major university libraries in Mumbai. Even university funding agencies like UGC and RUSA had not thought about human orientation needs as an immediate fiscal problem. As a result, many libraries in Mumbai do not have provision for allocating budget for acquiring signage. Further, in metropolitan city like Mumbai for university libraries, space crisis is a prime obstacle behind providing glorious spaces or sections as well as in facilitating universal access to library users.

The present chapter analyzed and highlighted physical and quantitative attributes associated with transforming libraries into user-friendly and humanely orientated academic hubs. The next chapter discusses and analyze qualitative attributes and measures applied by libraries to make university libraries humanely orientated.

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Chapter 6

**QUALITATIVE DATA
ANALYSIS AND FINDINGS**

CHAPTER 6

QUALITATIVE DATA ANALYSIS AND FINDINGS

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CHAPTER 6

QUALITATIVE DATA ANALYSIS AND FINDINGS

Section I – Wayfinding behavior analysis of university library users: Energy and Time Facet Analysis

6.1 Introduction

Unexplored surroundings very often result in challenges while navigating and finding the way. Libraries are no exception to this. The size, complexity as well as unfamiliar tools and technology in big libraries often create confusion for new users. For new library users, it is a challenge after knowing that all the necessary information is available in the library, but not knowing how to get it. Observing readers coping with the environment and perceiving their behavior assists in planning and designing an ideal guidance system. Pollet & Haskell (1979) rightly point out that the focus of the guidance system should be on functions and behavior, not on walls and spaces. Hence Human Orientation science cannot be studied entirely barely through quantitative findings and analysis, Accordingly, taking into account the qualitative aspects as well as its associated behavioral aspects of university library users qualitative data analysis was undertaken, which is presented in the current chapter. Wherever applicable, Dr. S. R. Ranganathan's PMEST facet analysis is used.

Human orientation studies help in creating a comprehensive, clear and consistent visual communication system with concise messaging. By studying user reactions to the surroundings of libraries, librarians can make their libraries more accessible and user-friendly. How well people can find their way in libraries has an impact on their ability to successfully use library facilities to fulfil their own information needs. With this need and concern, the present section- I deals with wayfinding experiences and behavior of university library users in Mumbai and focused on Energy and Time facet. It adopts an ethnographic research approach and uses direct observation to determine whether users can successfully navigate varied spaces and find required library materials on their own.

6.2 Execution of user's observation

As mentioned in chapter three from the total respondents 1% population was targeted for observation. Hence five library users from each university library were observed. Including users from all 10 university libraries, a total of 50 library users participated in the study. Participants were observed based on their behavior while navigating and finding a way in university libraries in Mumbai while using OPAC and while physically searching information sources in shelves. Further, the researcher observed the task completion time and their success or failure in completing the required task with or without hints or personal assistance.

As mentioned in chapter 3 the schedule was designed to jot down the descriptions of tasks and details about library users approach and their facial expressions and gestures while navigating and finding their way while reaching towards the required information sources in the libraries. Movements of participants from entry point till the use of OPAC and from OPAC till the required information source were the factors taken into consideration while observing.

The study followed the method adopted by Baker et al. (2015) making a few additions and enhancements. Baker and others (2015) 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 present section explored users' facial expressions and behavior through direct observation while navigating in a variety of spaces and library collection and conducted a cause-effect analysis. All the participants were new users to the library who visited the library first time or a couple of times but were not yet familiar with the facilities, spaces and services of the university libraries. A researcher followed the participant from the entrance of the library and noted their actions, spatial movements and behavior including user's facial expressions in the structured observation schedule with the Average Task Completion Time (ATCT). To aid in observing behavior participants photographs and videos were captured with their due consent. Very few users willingly allowed capturing their photographs and videos. Participants who were not willing to provide their photographs and videos were only observed through noting their actions and behaviors in a structured observation schedule. Users participated in the direct observation with due consent. Use of OPAC, reaching towards stacking area and

essentially finding out the required source of information were the factors considered while observing participants. Besides, situations, where participants have taken hint or assistance from library staff or other users of the library, were also noted.

6.3 Coding and analysis of user observation schedules

While executing the observation process which was coded and analyzed by noting their actions, spatial movements and behavior in the structured observation schedule with the Average Task Completion Time (ATCT).

Users who completed the tasks successfully were coded as (S), and users who needed H hint were coded as (H) and users who took personal assistance from staff were coded as Assistance (A) followed by the Average Task Completion Time (ATCT). Further, participants' expressions and behavior while completing tasks as well as the reasons behind the particular expressions or behavior were noted down. The primary data collected through structured observation schedule as well as through photographs and videos were coded and analyzed using ATLAS ti (Qualitative Data Analysis and Research Software) and SPSS (Version 20), to cross-check its validity and accuracy.

6.4 Results and findings of the study

Each university library had different physical settings and facilities with different subject specializations and forms of collections. Hence the researcher did not allot a particular specified task to the participants as observation was conducted in ten different university libraries in Mumbai. Therefore, participants were observed while navigating and finding their required information sources. The varied tasks taken up by library users ranged from searching library catalogue to gaining photocopies of the material required.

The average time spent by the participants to complete the required tasks was 18.50 minutes, ranging from an average minimum of 2 minutes to a maximum of 33 minutes.

6.4.1 Completion of Tasks

The Success in required task completion is described through Table 6.1.

Table 6.1: Completion of Tasks

Particulars	Frequency	Percentage
Successful	26	52%
Unsuccessful	24	48%
Total	50	100

Out of 50 participants, 26 (52%) participants completed their tasks successfully. However, 24 (48%) participants were not able to complete the required tasks and

6.4.2 Task completion with Hints and Assistance

While completing required tasks very few participants were able to complete the task without assistance or hint. Others had taken assistance or hint from staff or from other users. Details of the same are explained by the Table 6.2.

Table 6.2: Task Completion with Hint/Assistance or Self-Guided

Particulars	Frequency	Percentage	Successful	Percentage
With assistance	35	70.0	14	28.0
With hint	12	24.0	7	14.0
Without assistance or hint	5	10.0	5	10.0
Total	52	102.0	26	5200%

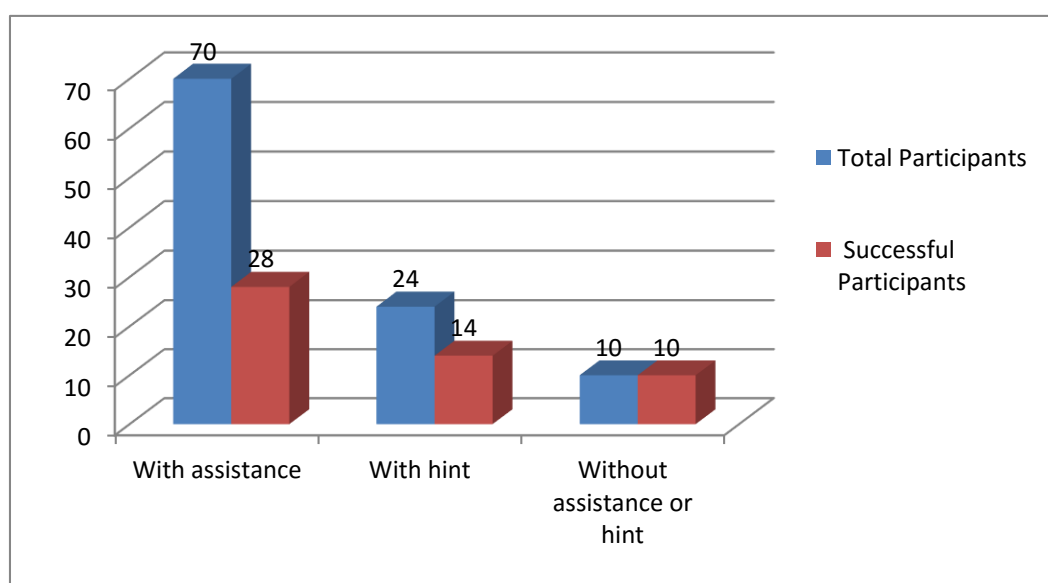


Figure 6.1: Completion of Tasks

Though 26 participants were successful in their tasks, out of 50 participants, 70% (35) had taken the assistance of library staff or from other users of the library while using OPAC or for knowing particular spaces or floors, however, only 28% (14) participants were successful in navigating and finding the required library material. Merely 10% (5) participants out of 26 were able to successfully find the required information sources without assistance or any hint. Out of 50 participants, 24% (12) participants received hints from library staff. However, only 14% (7) participants were successful in navigating and finding the required library material.

Out of ten university libraries 80% participants in three libraries namely IGIDR library (80% - 4), J N Library, (80% - 4) and Karve Library (SNDT Juhu, Branch library (80% - 4), were successful in completing their required tasks.

6.4.3 Requirement of Hint/Assistance

Participants opted hint or assistance while completing information search process. The intentions behind taking hint and assistance were as follows:

Table 6.3: Intentions for Hint/Assistance

Particulars	Assistance	Assistance	Hint	Hint
	Frequency	Percent	Frequency	Percent
No hint/ assistance taken	15	30.0	38	76.0
For OPAC & Info search	14	28.0	2	4.0
Information source Search	12	24.0	6	12.0
OPAC search	9	18.0	3	6.0
For inquiring working	0	0.0	1	2.0
Total	50	100.0	50	100.0

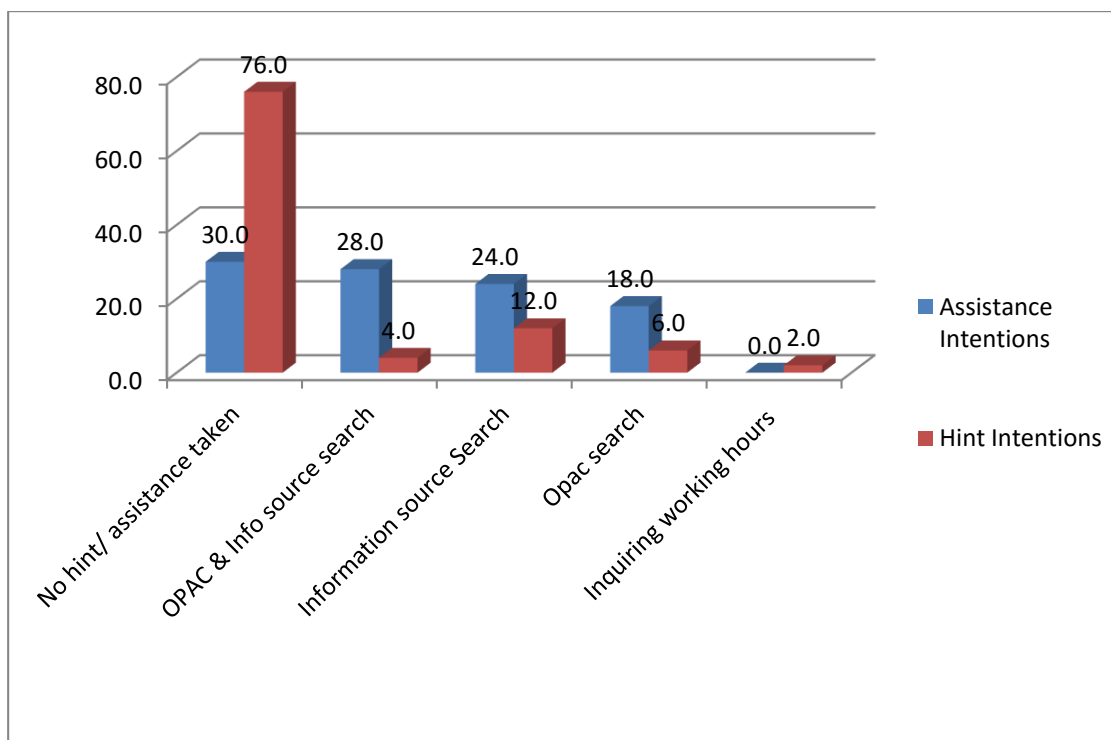


Figure 6.2: Intentions for Hint/Assistance

Out of 50 participants, 70% (35) had taken the assistance of library staff or from other users of the library, from which 28% (14) participants taken assistance for OPAC as well as information source search, 24% (12) participants opted assistance for information source search and 18% (9) participants opt taken assistance while accessing OPAC search.

Out of total 24% (12) participants who received hints, 6% (3) participants taken hint specifically for OPAC search, 12% (6) participants taken hint for information source search, 4% (2) participants opt hint for OPAC search as well as information source search and 2% (1) taken hint for inquiring working hours of the library for Sundays either from library staff or from other users of libraries. (Table 6.3)

6.4.4 Average time for Completing Task (ATCT)

To save the time of reader is one of the important laws of library and information science defined by Dr S R Ranganathan. Hence completion of task within minimum time will reflect the efficiency of the available guidance system of university libraries. Task completion time range is described by the following table:

Table 6.4: Task Completion Time Range

Average Task Completion Time		
Task Completion Time Range	Frequency	Percent
1 to 5 minutes	2	4.0
6 to 10 minutes	9	18.0
11 to 15 minutes	6	12.0
16 to 20 minutes	12	24.0
21 to 25 minutes	14	28.0
26 to 30 minutes	5	10.0
More than 30 minutes	2	4.0
Total	50	100.0

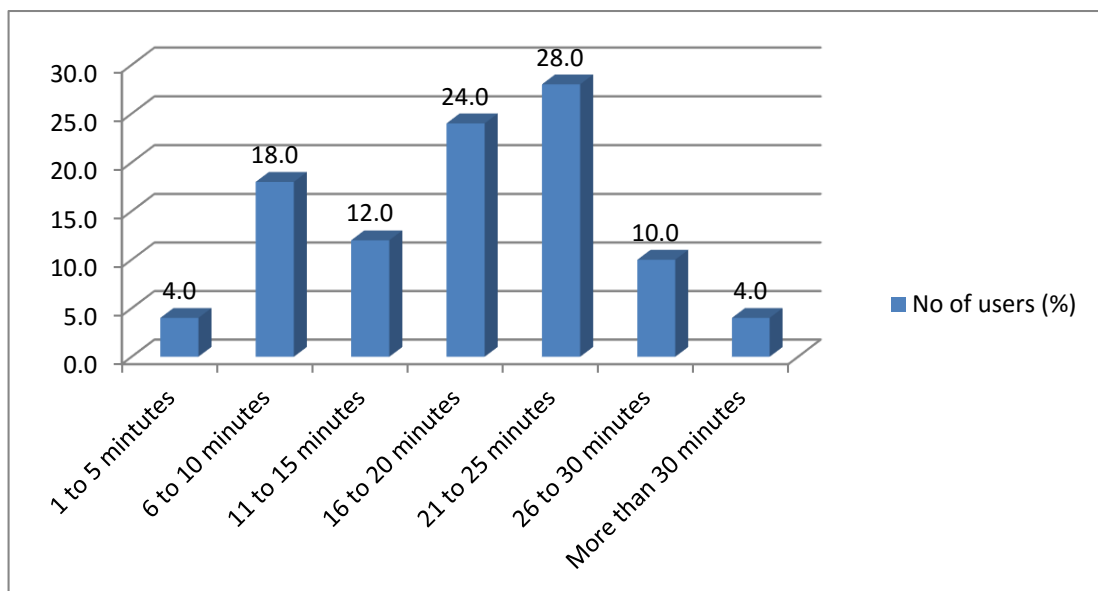


Figure 6.3: Task Completion Time Range

Figure 6.3 highlights that maximum, i.e.28% participants required 21 to 25 minutes to find their way and locate the required information source, 24% participants required 16 to 20 minutes, 18% participants required 6 to 10 minutes, 12% participants spent 11 to 15 minutes, 10% participants spent 26 to 30 minutes, however, 4% participants spent more than 30 minutes, and only 4% participants were able to complete their task within 1 to 5 minutes (Table 6.4).

6.4.5 Time spent for OPAC/ Information Source Search

User-friendly libraries provide more indicators and cues to facilitate comfort and ease, as well as to save the time of library users while using library infrastructure, sources and services. The distribution of time spent for OPAC and information source search is described through Table 6.5.

Table 6.5: Time Spent for OPAC and Information Source Search

Particulars	OPAC Search	Percent	Info Source Search	Percent
	Frequency		Frequency	
1 to 5 minutes	22	44.0	7	14.0
6 to 10 minutes	20	40.0	10	20.0
11 to 15 minutes	2	4.0	16	32.0
16 to 20 minutes	3	6.0	15	30.0
26 to 30 minutes	0	0.0	1	2.0
Not used OPAC/ Closed Access	3	6.0	1	2.0
Total	50	100.0	50	100.0

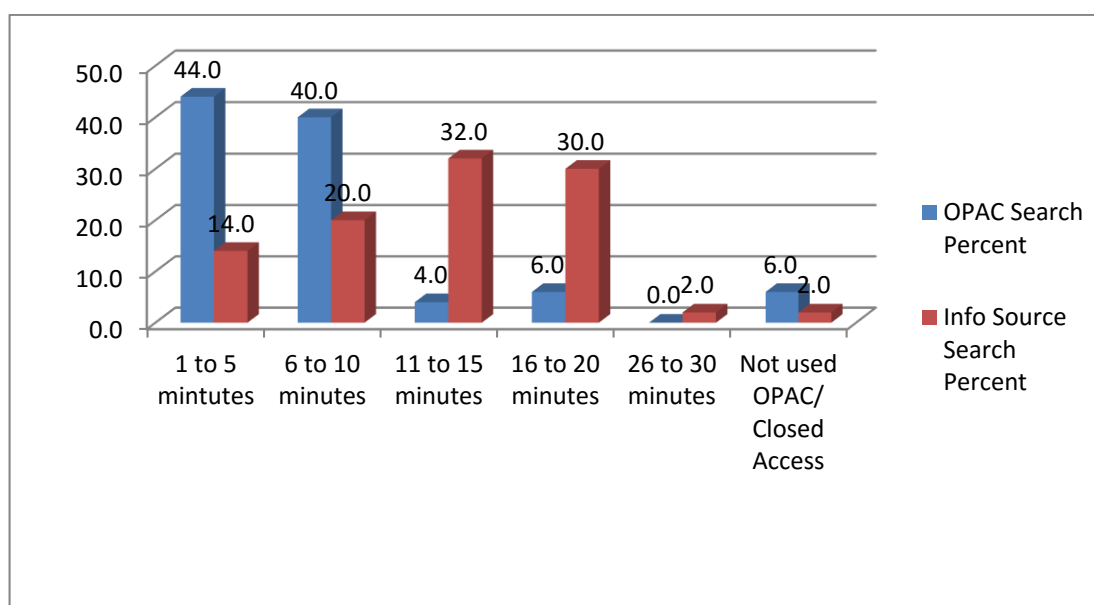


Figure 6.4: Time Spent for OPAC and Information Source Search

Table 6.5/Figure 6.4 shows that 44% (22) participants were able to complete the activity of OPAC search within 1 to 5 minutes, whereas 40% (20) participants required 6 to 10 minutes for searching OPAC, 4% (2) participants required 11 to 15 minutes and 6% (3) participants required 16 to 20 minutes respectively. 6% (3) didn't use OPAC.

In case of information source search, 14% (7) participants able to find required information source within 1 to 5 minutes, 20% (10) participants required 6 to 10 minutes, however maximum i.e. 32% (16) spent 11 to 15 minutes and 30% (15) spent 16 to 20 minutes, 2% (1) required 26 to 30 minutes to search needed information source in the stacking area.

The present findings show that users of university libraries in Mumbai required excessive time to find their way and locate the required information source. Besides, participants also required hints and assistance for accessing OPAC and for searching for information sources in stacking areas. Therefore, university libraries in Mumbai are not yet entirely user-friendly.

6.4.6 Sequences of actions for task completion with Task Completion Time

The table 6.6 shows the steps or sequences of actions taken by participants to find out source details and to search information sources along with the task completion time.

Table 6.6: Series of Actions and Task Completion

List of task and steps followed for the completion	Count and percentage	Average Task Completion Time							Total
		1 to 5 minutes	6 to 10 minutes	11 to 15 minutes	16 to 20 minutes	21 to 25 minutes	26 to 30 minutes	More than 30 minutes	
Browsed OPAC, moved to stack area, searched and located book	Count	2	4	3	2	2	3	0	16
	Percentage	12.5%	25.0%	18.8%	12.5%	12.5%	18.8%	0.0%	100.0%
Browsed OPAC, moved to shelve, failed to search, used OPAC, searched stacks again, located book	Count	0	1	0	1	3	1	0	6
	Percentage	0.0%	16.7%	0.0%	16.7%	50.0%	16.7%	0.0%	100.0%
Browsed OPAC with asst, search n located book, Inquired about location of Journal and theses section	Count	0	1	0	0	0	0	0	1
	Percentage	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Went stacking area, observed stacks, used OPAC, moved stacking, located book	Count	0	0	0	1	1	0	0	2
	Percentage	0.0%	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	100.0%
Inquired circulation counter loc, ask for yearbook, stairs, elevator, fourth floor, stairs for third floor, OPAC in stacking, located yearbook	Count	0	0	0	0	1	0	0	1
	Percentage	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%

List of task and steps followed for the completion	Count and percentage	Average Task Completion Time							Total
		1 to 5 minutes	6 to 10 minutes	11 to 15 minutes	16 to 20 minutes	21 to 25 minutes	26 to 30 minutes	More than 30 minutes	
Moved in shelving, OPAC, first floor stacking, Second floor stacks, located book	Count	0	0	0	1	0	1	0	2
	Percentage	0.0%	0.0%	0.0%	50.0%	0.0%	50.0%	0.0%	100.0%
OPAC Terminal locked, Inquired password, browsed OPAC, first floor & second floor stacking, located two required books	Count	0	0	0	2	1	0	0	3
	Percentage	0.0%	0.0%	0.0%	66.7%	33.3%	0.0%	0.0%	100.0%
Shelving area, moved, staff guided OPAC use, fail to use OPAC, went out from lib	Count	0	0	0	0	1	0	0	1
	Percentage	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Moved in stacking, not had any source detail, selected two books available from shelf	Count	0	1	0	1	0	0	1	3
	Percentage	0.0%	33.3%	0.0%	33.3%	0.0%	0.0%	33.3%	100.0%
Digital lib, used database, OPAC, located back volumes, located books	Count	0	0	1	0	0	0	0	1
	Percentage	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%

List of task and steps followed for the completion	Count and percentage	Average Task Completion Time							Total
		1 to 5 minutes	6 to 10 minutes	11 to 15 minutes	16 to 20 minutes	21 to 25 minutes	26 to 30 minutes	More than 30 minutes	
Inquired about G-series, went first floor through elevator,, search for a mezzanine floor, Inquired, reach through stairs, searched for Electric switches, used OPAC failed in search stacks loc, Searched by moving in stacks.	Count	0	0	0	1	0	0	0	1
	Percentage	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
OPAC, Search journals, basement, switches, moved along, located	Count	0	0	0	0	1	0	0	1
	Percentage	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Used OPAC, Ground floor stacks, basement stacking, searched for Electric switches, first-floor stacking, found one book, second-floor stacking, located book	Count	0	0	1	1	0	0	0	2
	Percentage	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	100.0%
Catalogue cabinet, searched cards, counter with source details, searched in lending collection & located required book	Count	0	1	1	0	1	0	0	3
	Percentage	0.0%	33.3%	33.3%	0.0%	33.3%	0.0%	0.0%	100.0%

List of task and steps followed for the completion	Count and percentage	Average Task Completion Time							Total
		1 to 5 minutes	6 to 10 minutes	11 to 15 minutes	16 to 20 minutes	21 to 25 minutes	26 to 30 minutes	More than 30 minutes	
Inquired about within premises issue, Catalog cab, details provided at the counter, filled slip n issued within premises	Count	0	1	0	0	0	0	0	1
	Percentage	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Inquired for reading room, moved from stairs entered in stacking area, reached first floor, filled form for readers card, cataloge cab,	Count	0	0	0	0	0	0	1	1
	Percentage	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
OPAC, want to use USB, No USB drive to any PC, shelving area, failed to search, found in recent used books	Count	0	0	0	0	1	0	0	1
	Percentage	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Inquired about Lending sec, OPAC, shelving, moved, located book	Count	0	0	0	0	1	0	0	1
	Percentage	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%

List of task and steps followed for the completion	Count and percentage	Average Task Completion Time							Total
		1 to 5 minutes	6 to 10 minutes	11 to 15 minutes	16 to 20 minutes	21 to 25 minutes	26 to 30 minutes	More than 30 minutes	
Used two PC, both out of order, used third, failed to use OPAC, staff assisted, stacking moved along fail	Count	0	0	0	0	1	0	0	1
	Percentage	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Inquired circulation counter about two censuses, moved first-floor stacking, moved along, Inquired passerby, locate one census, unable to locate other	Count	0	0	0	1	0	0	0	1
	Percentage	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Inquired circulation counter about working hours, OPAC, Ground floor stacking, moved along, located book	Count	0	0	0	1	0	0	0	1
	Percentage	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Total Count	Count	2	9	6	12	14	5	2	50
Total	Total Percentage	4.0%	18.0%	12.0%	24.0%	28.0%	10.0%	4.0%	100.0%

The table 6.6 shows that maximum i.e. 32% (16) participants followed the right steps or series of actions to find outsource details and to search information source. However a very few participants i.e. 12.5% (2) were able to complete their task within 1 to 5 minutes whereas a few participants 18.8% (3) spent 26 to 30 minutes for the completion of a task, even though they had followed right series of actions.

12% (6) participants used OPAC and then moved towards shelving area but while moving around the stacking area they have forgotten the source details and used OPAC again for finding source details and again moved to a stack area. Hence libraries should provide OPAC terminals near or inside the stacking area to save library users time.

Many participants 16% (8) unknowingly moved towards stacking and then after seeing large stacking areas moved towards OPAC. A few 2% (1) participants inquired about library working hours at the circulation counter and then moved towards OPAC. A few participants inquired about the location of lending section 2% (1), Circulation section 2% (1), and reading hall 2% (1) at the entrance counter. To minimize such inquiries building map or directional signs for different departments or information kiosk should be made available at or near the entrance of the library.

6% (3) participants moved along in basements, mezzanine floors to search electric switches before searching information sources. In case of collection such as back volumes of journals or G- series or books housed at basements or mezzanine floors, users need natural light or electricity. Signs or directional arrows for electric switches are necessary for such isolated or inaccessible places.

The task that required the longest time to complete was from first time user of the library who inquired first about the procedure and the location of the reading room. She filled the prescribed forms and the details on circulation card, then browsed manual card catalogues with author entries and failed to browsed manual card catalogues on her own. Further as per staff instructions again browsed manual card catalogues, searched in the available collection for the lending purpose and issued book from the same.

6.4.7 Behavior of participants

Observing users wayfinding behavior is a key factor in assessing the effectiveness of available visual guidance system or signage. The multiple behavior of participants observed during the study were as follows:

Table 6.7: Behavior Expressed by Participants

Behavior	Responses		Percent of Cases
	N	Percent	
Confused	25	27.5%	50.0%
Confident	14	15.4%	28.0%
Anxious	12	13.2%	24.0%
Frustrated	11	12.1%	22.0%
Disoriented	10	11.0%	20.0%
Indecisive	9	9.9%	18.0%
Comfortable	7	7.7%	14.0%
Baffled	1	1.1%	2.0%
Surprised	1	1.1%	2.0%
Amazed	1	1.1%	2.0%
Total	91	100.0%	182.0%

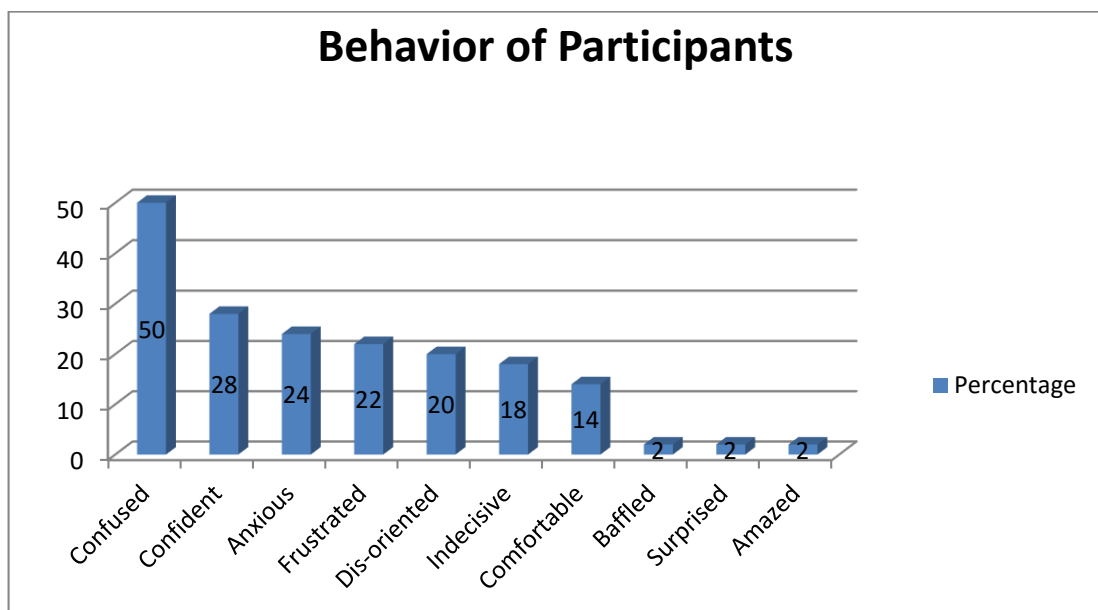


Figure 6.5: Behavior of Participants

Table 6.7/Figure 6.5 represents that maximum i.e. 50% participants were confused, 28% participants were confident, 24% participants were anxious, 22% participants were frustrated, 20% participants feel disoriented, 18% participants feel Indecisive, only 14% participants feel comfortable, 2% of participants find it baffled, 2% of participants were surprised and 2% of participants were amazed either while using OPAC, while wayfinding in libraries or while physically searching information sources in the stacking area. Behavior of participants changed as per the situations, some participants were confident while entering and using OPAC but got confused or frustrated or disoriented while physically searching information sources in the stacking area. Though the participants were 50, 91 varied types of behavior were observed.

6.4.8 Status of library orientation and success rate

Library orientation helps new users to get acquainted and familiarized with the library collection and services. Library tour as a part of orientation helps to know the basic amenities and facilities available in the library. University libraries enrolled new users every year. Therefore, it is necessary to provide library orientation every year after the enrolments. Out of ten universities observed one does not conduct library orientation

Table 6.8: Attendance for Library Orientation V/S Success Rate

Particulars		Library orientation attended		Percentage	Total
		Yes	No		
Successful in completing the task	Yes	18	8	69	26
Not successful	No	14	10	58	24
Total		32	18	127	50

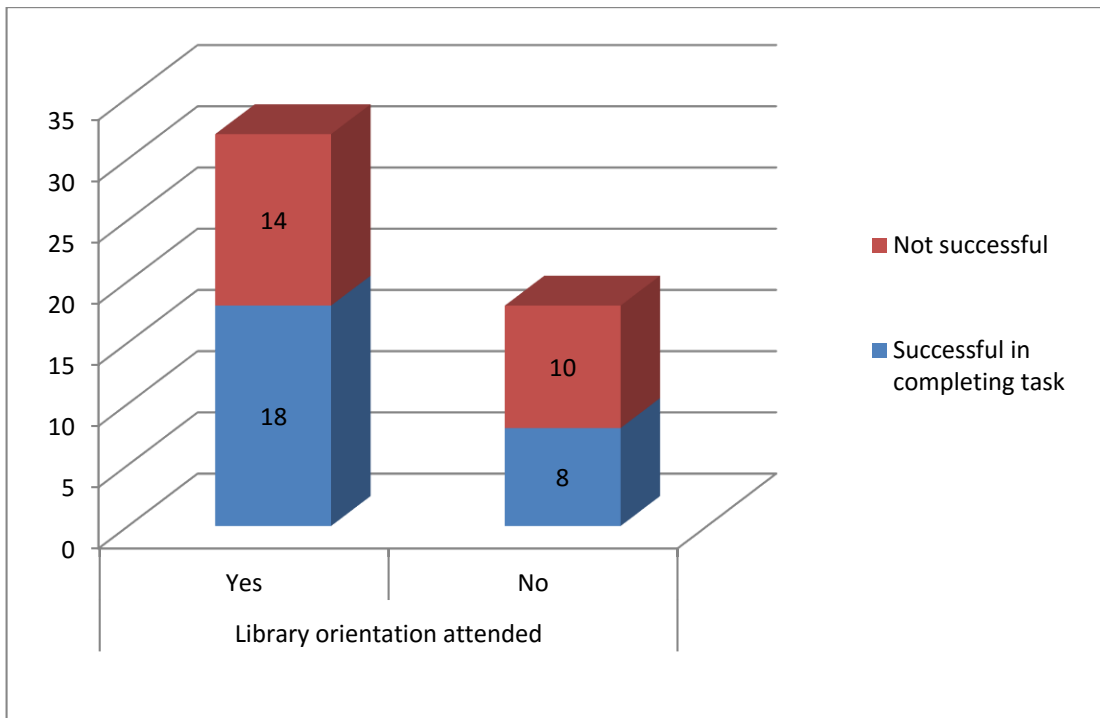


Figure 6.6: Attendance for Library Orientation V/S Success Rate

Table 6.8/Figure 6.6 shows that total 32 (64%) participants attended library orientation, however, 18 (36%) participants were either not attended library orientation or in case of few library users, library orientation was not provided by university libraries. Cross tabulation further highlights that out of 26 successful participants, 18 (69%) participants attended library orientation however 14 (58%) participants failed in completion of tasks even though they had attended library orientation.

6.4.9 Reasons for failure in timely tasks completion

The cause analysis conducted brought forth various reasons related to wayfinding and signage inadequacies. Following are the reasons for the prolonged time required for tasks completion.

Table 6.9: Reasons of Confusion or Failure in Task

Sr. No.	Reasons	Responses		Percent of Cases
		N	Percent	
1	Unable to understand class No. & shelf arrangement	11	20.0%	22.0%
2	Unaware about the use of OPAC and shelving arrangement	9	16.4%	18.0%
3	Aware of OPAC use and the shelving arrangement & library.	6	10.9%	12.0%
4	Unavailability of shelf location in OPAC. Unavailability of Stack end signage	5	9.1%	10.0%
5	Improper shelving	4	7.3%	8.0%
6	Unaware about use of manual catalogue cabinets	4	7.3%	8.0%
7	Absence of signage for reading hall & other spaces.	3	5.5%	6.0%
8	Lengthy Book issuing process for within premises	3	5.5%	6.0%
9	Unaware about how to search for articles from back volumes in OPAC.	2	3.6%	4.0%
10	Unaware about floor-wise splits in shelving order of the library collection	2	3.6%	4.0%
11	Unaware about reference and text & its availability status in OPAC	1	1.8%	2.0%
12	Unaware about non-accessibility of the third floor from front elevator.	1	1.8%	2.0%
13	Unaware about availability entry to the mezzanine is from backside staircase.	1	1.8%	2.0%
14	Unaware of availability of an elevator due to unnoticed the signage of the elevator.	1	1.8%	2.0%
15	Unnoticed the signage of floor-wise distribution and order of books	1	1.8%	2.0%
16	Wrong stack end signage	1	1.8%	2.0%
	Total	55	100.0%	110.0%

Table 6.9 indicates that merely 10.9% of participants were well-aware about OPAC use and the shelving arrangement and library. However, inability to understand class number & shelf arrangement was the major reason behind confusion or failure in tasks completion among participants 20%, followed by other reasons such as unawareness about use of OPAC and shelving arrangement 16.4%, unavailability of shelf location in OPAC & unavailability of Stack end signage 9.1 %, improper shelving 7.3%, unaware about use of manual catalogue cabinets 7.3%, absence of signage for reading hall & other spaces 5.5% and other reasons as mentioned in Table 6.9.

6.4.10 User/Library specific aspects/shortcoming

The shortcomings were distributed as user-specific unawareness aspects and library-specific shortcoming factors which created confusion and failure in wayfinding tasks were as follows:

Table 6.10: User/Library Specific Aspects/Shortcoming

Serial No.	User/Library specific aspects	Responses		Percent of Cases
		N	Percent	
1	User-specific unawareness aspects	33	59.90%	66.00%
2	Library specific shortcomings	16	29.20%	32.00%
3	User-specific awareness aspects	6	10.90%	12.00%
	Total	55	100.00%	110.00%

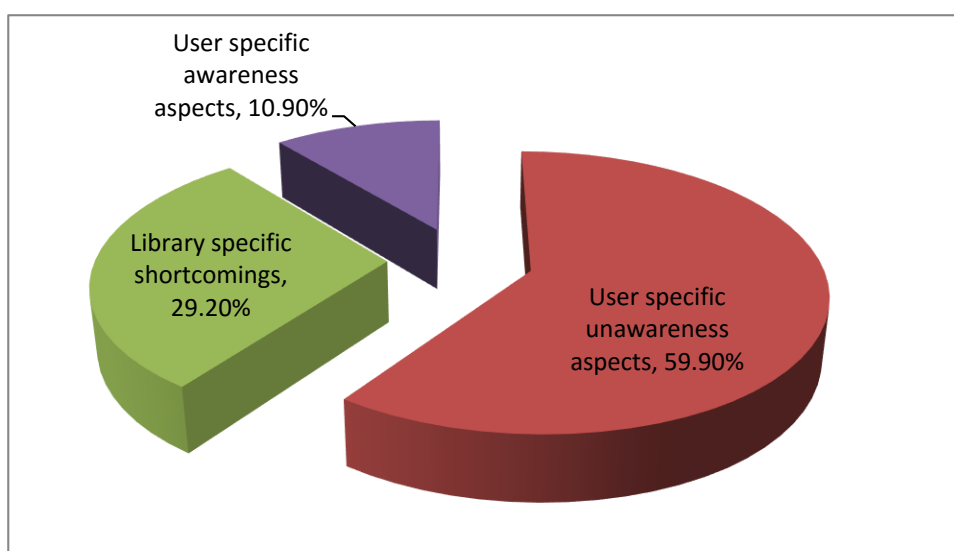


Figure 6.7: User/Library Specific Aspects/Shortcoming

Based on the findings from Table 6.9, the above Table 6.10/Figure 6.7 demonstrate that major reasons behind confusion and failure in tasks were user-specific unawareness aspects to be specific 59.90% for example, unawareness about library physical settings, classification schemes, floor-wise stacking arrangement, availability of facilities, etc. However, there were 29.20% library-specific shortcoming factors responsible for confusion and failure in wayfinding tasks such as unavailability of shelf location in OPAC, unavailability of stack end signage, improper shelving, absence of signage for reading hall & other spaces, lengthy book issuing process for within premises and wrong stack end signage. Only 10.90% of participants were well-aware about OPAC use and the shelving arrangement and libraries physical settings.

6.5 Summary

It has been said that 80 percent of what one learns come from vision. Visual communication is dependent on the eye and the brain. Providing adequate visual guidance in libraries is a difficult and complex task. 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. This study was later sent for publication after rendering the same as compact research reporting article (Rakshikar & Powdwal, 2020). The next section of the present chapter deals with findings discovered through library specific aspects of physical library building and its signage.

Section II - Library building and its signage: Matter Facet Analysis

The solutions to the human orientation needs are not just cases of designing better signage or providing the signage at all decision points. Only providing signage is not sufficient to solve all wayfinding problems. It is the comprehension of the sign's utility that is important. Therefore, the present section focused on Matter facet by analysing and evaluating university library signage. The ability to relate the information provided by all available wayfinding tools to make decisions about what to do next is important. Hence an evaluation of signage through the field observation was also necessary to assess the availability, suitability and appropriateness of existing signage. To explore the same, all the available signs were captured and saved in photographic images.

The physical design and layout of a library do pose problems of wayfinding, as in the case with any complex built structure. Moreover, some of the artistic effects that architects and designers strive for results in the high intensity of the magnitude of the wayfinding problems. Therefore, it was necessary to assess the user-friendliness and self-orientation provided by university library building as a built structure.

It was revealed from the review of literature that architects had achieved considerable success in constructing attractive buildings through engineering-technological perspective which results in visual surprises for the pathfinders while navigating in libraries however architects fall back in facilitating the behavioural realm for novice pathfinders.

Hence it was essential to assess and evaluate the available library building signage to evaluate for its utility and the level self-orientation provided through the available signage in university libraries in Mumbai.

6.6 Execution of Library signage observation

Signs of each university library building were captured and stored in the form of photographs. Total 160 photographs of signs were analyzed and evaluated on the basis of factors such as number of signs available, nature of signage type (directional, instructional and regulatory), classification of signs (permanent and temporary), placement and location of signs in each library, language of signs, utility of signs,

consistency, readability, visibility of signage and the signs which need to update or remove. While considering and counting signs stack end signs was considered as one sign for entire stack end signage for each university library (Annexure VIII).

Photographs of all directional signs, building maps, floor maps, notice boards, instructional displays as well as digital displays were collected. These photographs were also analyzed using ATLAS.ti (Qualitative Data Analysis and Research Software), through labelling and allocating codes to each photograph, to cross-check its validity and accuracy.

6.6.1 Analysis and evaluation of signage

Evaluating or testing sign effectiveness can go a long way by dividing signs as per their utility features till toward avoiding signs that mislead or became obsolete. In the present study signs of each university library building were analyzed and evaluated based on factors such as 1) the number of signs available, 2) nature of signage type (directional, instructional and regulatory), 3) classification of signs (permanent and temporary), 4) placement and location of signs in each library, 5) the language of signs, 6) consistency, 7) readability, 8) visibility of signage and 9) the signs which need to update or remove. While considering and counting signs stack end signs is considered as one sign for entire stack end signage for each university library.

6.6.2 Signs availability in quantity

The appropriateness and quantity of sign requirement in library building depend on the need of each particular library as per the size of the library, building layout and patron needs. Signs availability in quantity doesn't practically add any sense to its requirements and utility aspects. Still, this factor considered for the study as university libraries are huge and multi-storeyed and their collection is distributed in different departments and sections. Hence university libraries need basic sign system for providing directions and instructions to their users.

The observational findings revealed that total of 160 signs were found including all ten university library buildings in Mumbai. Following table presents university –wise division of the number of signs.

Table 6.11: University-Wise Distribution of Signs in Quantity

Libraries	Number of Signs	Percent
Library 1	32	20.0
Library 2	18	11.3
Library 3	13	8.1
Library 4	28	17.5
Library 5	4	2.5
Library 6	22	13.8
Library 7	14	8.8
Library 8	23	14.4
Library 9	3	1.9
Library 10	3	1.9
Total	160	100.0

The Table 6.11 presents that Library 1 poses the highest numbers of signs i.e 20% (32). However, in the case of Library 1 out of 32 signs 24 signs were provided through a single digital board at the entrance of the library. Hence, in spite of having highest number signs Library 1 missed the mark of guiding users consistently. In Library 4, 17.5% (28), Library 8 14.4% (23), Library 6, 13.8% (22), Library 2, 11.3% (18), Library 7, 8.8% (14), Library 3, 8.1% (13) signs were available respectively. However, in Library 5 only 2.5% (4), and in Library 9 and 10, only 1.9% (3) signs were available respectively even though those libraries are large in size with intriguing structure of buildings. Library 5 has a status of heritage building hence, the architectural structure cannot be changed, yet signs can be added (Annexure VIII).

6.6.3 University-wise availability of sign descriptors

University-wise availability of sign descriptors is elaborate through Table 6.12. Signs were observed and noted in the present table according to wayfinding progression from campus map till the stacking area.

Table 6.12: University-Wise Availability of Sign Descriptors

Sign Descriptor/University Libraries	1	2	3	4	5	6	7	8	9	10	Total	Percentage
Campus Map	1	0	0	0	0	2	0	1	0	0	4	2.5
Campus Information Multi-directional stand 1	1	0	1	1	0	1	0	0	0	0	4	2.5
Campus Information Multi-directional stand 2	1	0	0	1	0	1	0	0	0	0	3	1.9
Campus Information Multi-directional stand 3	0	0	0	0	0	1	0	0	0	0	1	0.6
Library building name sign	2	1	0	0	1	1	1	0	0	0	6	3.8
Library entrance sign	0	0	1	1	0	0	2	1	0	1	6	3.8
Lib building establishment sign	1	0	0	0	1	0	0	0	0	0	2	1.2
Digital Board	2 4	0	0	0	0	0	0	0	0	0	24	15.0
Floor descriptor	0	5	0	0	0	0	0	0	0	0	5	3.1
Floor Map	0	5	0	0	0	0	2	2	0	0	9	5.7
Lib Building directory	0	1	1	1	0	1	0	1	0	0	5	3.1
Building layout	0	0	0	0	0	1	0	0	0	0	1	.6
Library basic information	1	1	1	1	0	2	0	2	1	0	9	5.7
Facility indicator signs with symbols	0	2	0	1	1	0	0	0	0	0	4	2.5
Facility indicator without symbol	0	1	3	7	0	1	0	3	0	1	16	10
Rules and regulations	0	1	0	0	0	2	1	1	0	0	5	3.1
OPAC Terminal indicator	0	0	1	0	0	1	1	0	0	0	3	1.9
OPAC Manual	0	0	0	0	0	0	1	0	0	0	1	.6
Section/Department name sign	0	0	4	5	0	7	5	6	0	0	27	16.9
New arrivals	0	0	0	2	0	0	0	1	0	0	3	1.9
Floor-wise Broken Order Sign	0	0	0	2	0	0	0	0	0	0	2	1.2
How to locate a book guide	0	1	0	0	0	0	0	0	0	0	1	0.6
Stack end call numbers sign	1	1	1	4	1	1	1	1	1	1	13	8.1
Stack end journal listings	0	0	0	1	0	0	1	1	0	0	3	1.9
Back volumes section shelving arrangement from to	0	0	0	1	0	0	0	1	0	0	2	1.2
Reference collection sign	0	0	0	0	0	0	0	1	0	0	1	.6
Total	32	18	13	28	4	22	14	23	3	3	160	100.0

Campus maps and information kiosks: Campus maps and information kiosks aid wayfinders to reach till the required building or department accurately within widespread university campuses. Table 6.12 highlights that only 2.5% (4) campus maps signs were available in the total signs seen and observed in the study. That means campus maps were not available in every university campus in Mumbai. Further, it shows that only single campus information multi-directional stand was available in four university campuses in Mumbai. Only one university campus in Mumbai had more than three campus information multi-directional stands, within the campus at various decision points to be specific in library number 6. Information kiosk was not available in any library under the study, excluding one library; however it was not in working condition during the time of field visits, and hence it was not counted.

Building identification sign: In wide spread university campuses with multiple buildings, it is essential to place a building identification sign. Out of total ten university libraries in Mumbai three were housed in the same institutional buildings, remaining seven libraries were housed in separate library buildings. For out of those seven libraries in 3.8% (6) university library buildings, building name sign was available, to be specific in library building number 1, 2, 5, 6 and 7. In library 1, two-building name signs were available.

Library entrance sign: Out of total ten university library buildings in 3.8% (6) libraries, library entrance sign with the name of the library was available pin pointedly in library number 3, 4, 7, 8 and 10 respectively. Out of total six library entrance signs Library 7 had placed two library entrance signs. Only in two university libraries, to be specific Library 1 and 5, informative sign about library building establishment was available.

Digital display: Digital displays provide the facility to create changeable as well as multiple informative displays. Only in a single university library out of ten, a digital display was used specifically in library 1. However, 15% (24) different types of informative displays were merged in a single digital board in case of this library. Adding 24 displays together defeats the purpose of signage as it was not possible for users to read all the information in one shot as they arrive one after other respectively.

Besides, it's running display finished after 26 minutes. It was difficult for the researcher also to wait and read the same at a stretch.

Floor descriptor sign: Floor descriptor signs are useful to highlight the facilities or sections or services available on a particular floor. In the case of university libraries in Mumbai out of ten library buildings, total 3.1% (5) floor descriptors were available. Further, all the descriptors were available only in one university library i.e. library 2.

Floor maps and Building directory: Direction-finding in any built structure starts from the entrance of the building. Therefore, building directory as well as floor maps of all floors should be available at ground floor preferably near the entrance of the library, as well as near the entranceway of every floor so that it will be easy for the user to decide their subsequent movements without asking the staff. University libraries in Mumbai possessed total 3.1% (5) building directory signs and 5.7% (9) floor maps signs were seen out of the ten libraries.

Building Layout: Provision of building layout sign assists in deciding routes while navigating in libraries. However, it was observed that merely one library (.6%) facilitated sign for building layout at the entrance of the library. Building layout was available only in one library that is Library 5.

Basic information signs: Once users have been directed to the centre of the library or till the browsing area near the entrance, the second set of signs must orient them to the major functional area. Signs should place from general to specific from the entrance till the exact location. Therefore, informative signs describing basic information of the library is necessary near the entrance or in the browsing area of the ground floor. Such signs include information like library working hours, library layout, services, etc. In university libraries in Mumbai total 5.7% (9) basic information signs were observed.

Facility Indicator with symbols: It is preferable to facilitate signs added with symbols for facility indicator signs such as signs for restrooms, staircases, elevators, drinking water, etc. to eliminate language barrier. However, merely 2.5 (4) facility indicator signs were available with symbols including all ten university library buildings in Mumbai. Those symbols were provided for male/female restrooms at TISS, IGIDR and UOM Fort. Another symbolic facility indicator sign was provided by TISS for indicating electric switches.

Facility Indicator without symbols: Symbolic signage increases the visibility of signs, as well as they convey the messages effectively. Total 10% (16) facility indicator signs without symbols such as signs for the online catalogue, male-female restrooms, electric switches, elevators, institutional publications display, Drinking water, etc. were available during the study.

Library rules and regulations: Library rules and regulations display provide some basic information about the library processes and operations, as well as the working hours with the time schedules of selective library services which are available within a stipulated time, such as photocopy service. Display of Library rules and regulations was available at TISS, J N Library, SNTD Churchgate and SNTD Juhu.

OPAC terminal indicator sign: Usually, OPAC terminals are placed at visible places like near the entrance, near circulation counters or in browsing areas. However, many libraries also provide OPAC terminals in the shelving area or near the shelving area. Hence signs to reach to OPAC terminals are essential. Sign for OPAC terminal indicator was available at TISS, CIFE and J N Library for OPAC web address with OPAC sign was available at SNTD Churchgate and SNTD Juhu.

OPAC Manual: Provision of printed OPAC manuals near the OPAC terminals, assist users to operate OPAC confidently on their own. However, it was observed that only one (.6%) library facilitate printed OPAC manual near the OPAC terminal. OPAC manual was available at Library 7.

Section or Department Name Signs: University libraries are multi-storied hence divided into sections and departments as per the type of library collection and range of services provided by them. Therefore, it is vital to place sections and department name signs as per the bifurcations of places, sections and services to facilitate ease of identification. In the case of university libraries in Mumbai total 16.9% (27) section or department name signs were available including all ten university library buildings in Mumbai.

Display of new arrivals: Display of new arrivals, attracts as well as inform library users about newly added library collection. However, it was observed that from the total of ten university libraries in Mumbai only 1.9% (3) display of new arrivals were available at the time of the study.

Floor-wise Broken order sign: University libraries are large spread and possess huge collection, hence there are often splits in the shelving of library collection. In such cases, it is advisable to place the signs indicating the floor-wise splits in the arrangement of library collection. Out of ten university libraries in Mumbai, only in 1.3% (2) signs were available indicating floor-wise shelving allocation of library collection specifically in Library 4.

How to locate a book guide sign: TISS Library provided 'How to locate a book guide' sign with information about the broad division of Dewey Decimal Classification scheme for illustrating numerical stacking arrangement.

Stack end signage and Subject Headings: All libraries covered under study provided stack end signage for books and back volumes of journals. However, those signs should be supplemented with subject headings. SNTD Churchgate, SNTD Juhu and IGIDR library provided stack end signage supplemented with subject headings.

Stack End Journal Listing Sign: List of journals placed on the extreme stack end corner of journal display racks facilitates quick understanding about the availability of journals and ease in identification of journals. In case university libraries in Mumbai merely 1.9% (3), libraries, provides a list of available journals at the stack end of journals racks.

Back volumes section shelving arrangement sign: Bound volumes of journals are usually bound using the similar color of binding in libraries. As a result, searching a particular bound volume on shelves become difficult for users without the sign for shelf-wise splits in the arrangement of bound volumes from one rack to the other. From ten university libraries in Mumbai, only 1.2% (2) libraries had such sign for showing back volumes section shelving arrangement (from-to) as per the bound volumes shelves.

Reference Collection Sign: The reference collection is an important part of the total library collection which is used frequently by users for quick use. It is a general practice of libraries to place reference collection separately or in front shelves for quick access. Hence the availability of sign for reference collection aid users while finding the same. It was observed that out of ten university libraries in Mumbai only one (.6%) university library provided a sign for the reference collection.

6.6.4 Classification of signs (Permanent and Temporary)

Temporary signage for the present study includes the paper printed or handwritten signs which are not lifelong durable and which limits the visibly as the paper gets torn after a certain duration. Table 6.13 describes the type of signs used in university libraries in Mumbai.

Table 6.13: Sign Classification (Permanent and Temporary)

Particulars	Permanent	Percentage	Temporary	Percentage	Total
Library 1	30	26.3%	2	4.3%	32
Library 2	15	13.2%	3	6.5%	18
Library 3	9	7.9%	4	8.7%	13
Library 4	17	14.9%	11	23.9%	28
Library 5	3	2.6%	1	2.2%	4
Library 6	13	11.4%	9	19.6%	22
Library 7	9	7.9%	5	10.9%	14
Library 8	16	14.0%	7	15.2%	23
Library 9	1	.9%	2	4.3%	3
Library 10	1	.9%	2	4.3%	3
Total	114	100.0%	46	100.0%	160

Observing signs as permanent and temporary will assist in maintaining or removing the temporary or outdated signs. This will mitigate adverse environmental and amenity effects resulting in confusion among library users. Findings revealed that out of total 160 signs observed from all ten university library buildings, 71.2% (114) signs were permanent signs. However, 28.8% (46) signs were temporary i.e. Paper printed or handwritten which need to update or remove. Library 4, Library 6 and Library 8 had used greater number of temporary signs.

Further analysis of library-wise permanent and temporary signs indicates that Library 1 had used maximum permanent signs whereas Library 9 and Library 10 used maximum temporary signs. Hence these libraries need to update or remove such temporary signs.

6.6.5 Categorical division of signs

Good signage systems convey a great deal of information. They enable people to orient themselves in unfamiliar surroundings to find their way to destinations with ease, to move confidently and to notice and understand all directions, regulations and information about special conditions.

The first aim of the planning and design process is to sort out the information so that it can be presented in different ways and at an appropriate time. Selfridge (1979) suggested that while planning signage information can be divided into three categories: direction information to guide and direct people along routes to their destinations. Identical information, which include information or instructional signs that aids in labelling destinations, so that people will able to recognize them, when they arrive. Further, regulatory information aid in informing people about rules, restrictions, special conditions and procedures of respective libraries.

Building maps, directories and directional arrows grouped under directional signage, which provides a broad geographical view for orienting users to decide the route and move ahead from the entrance of the library. Identical signage aid users by providing next-level information from broad to specific till the sections, departments and services. Regulatory signage further provides specific information to guide users about the special conditions, rules, procedures about services or some locations or departments. Thus this type of categorical signage facilitates an orderly system to move users from broad areas to specific areas. The following Table 6.14 gives the data on availability of categorical division of signs.

Table 6.14: Categorical Division of Signs

Particulars	Frequency	Percent	Cumulative Percent
Directional	103	64.4	64.4
Informational/Instructional	50	31.3	95.6
Regulatory	7	4.4	100.0
Total	160	100.0	

In case of university libraries in Mumbai, 64.4% (103) signs were directional, whereas 31.3% (50) signs were identical that is informational, and 4.4% (7) signs were regulatory from the total observed signs. Following table gives library-wise information of all types of signage.

Table 6.15: University -Wise Categorical Division of Signs

Particulars	Directional	Percentage	Identical	Percentage	Regulatory	Percentage
Library 1	7	6.9%	25	49.0%	0	0.0%
Library 2	13	12.7%	4	7.8%	1	14.3%
Library 3	8	7.8%	5	9.8%	0	0.0%
Library 4	21	20.6%	6	11.8%	1	14.3%
Library 5	3	2.9%	1	2.0%	0	0.0%
Library 6	17	16.7%	2	3.9%	3	42.9%
Library 7	12	11.8%	1	2.0%	1	14.3%
Library 8	17	16.7%	5	9.8%	1	14.3%
Library 9	2	2.0%	1	2.0%	0	0.0%
Library 10	2	2.0%	1	2.0%	0	0.0%
Total	103	100.0%	50	100.0%	7	100.0%

University-wise categorical division of signage highlights that Library 4 had maximum directional signs, i.e. 20.6% (21), followed by Library 6 and Library 8 specifically 16.7% (17) each, followed by Library 2, 12.7% (13) and Library 7 pin pointedly 11.8% (12). Other libraries had very few directional signs (Table 6.15).

In case of identification signage, only Library 1 had major signs i.e. 49% (25) out of total 50 identical signs. However, in the case of this library, all the signs and instructions were provided only through a single digital display by merging a total of 24 different types of informative displays. Adding 24 displays together was not feasible for users to read all the information as they arrive one after other respectively in addition, it was running for 26 minutes to finish all displays in one set. Other libraries had very few identification signs.

Use of regulatory signs was scarce in case of university libraries in Mumbai. Out of the total 160 signs, only 7 (4.4) signs were regulatory. In case of regulatory or policy signs, very few libraries had such signs, particularly Library 2 (1), Library 6 (3),

6.6.6 Placement of signage

The placement of signs at a suitable location plays an important role while planning and exhibiting signage system. Hence signs were assessed as per their placement and locations. Table 6.16 illustrated the library-wise distribution of sign locations.

Table 6.16: University Library-Wise Distribution of Sign Locations

Sign locations	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10	Total
Campus gate	1	0	1	1	1	1	0	0	0	0	5
Inside campus/decision points	2	0	0	1	0	4	0	1	0	0	8
Library Building entrance	4	7	2	2	0	4	5	6	1	1	32
Wall	0	0	0	2	1	0	0	0	0	0	3
Circulation Desk	0	0	1	3	0	0	0	1	0	0	5
Browsing area	0	1	1	2	0	4	1	4	0	0	13
Near stacking area	0	2	1	3	0	0	0	0	0	0	6
Stack end	1	1	1	4	1	1	4	4	2	1	20
Stairs wall	0	0	0	0	0	1	0	0	0	0	1
Near elevator and stairs	0	5	0	1	0	0	0	0	0	0	6
Near OPAC Terminal	0	1	1	2	0	1	1	1	0	0	7
Glass Door/ Door	0	1	3	1	0	0	0	0	0	0	5
Near water closets	0	1	0	1	1	0	0	0	0	0	3
Xerox section/Door	0	0	1	2	0	0	0	0	0	0	3
Wall hanging	0	0	0	1	0	0	2	2	0	0	5
Near bound volumes section	0	0	0	2	0	0	0	0	0	0	2
Near section/department	0	0	0	0	0	6	1	3	0	1	11
Reading room entrance	24	0	1	0	0	0	0	0	0	0	25
Total	32	18	13	28	4	22	14	23	3	3	160

Placement of signage at suitable places will aid in wayfinding and orientation whereas it may affect the visibility as well as the utility of signs if placed at wrong locations. Further placement of signs will differ for different types and categories of signs. Such as directional signs can be placed on pillars or front walls to provide an overview and immediate orientation to decide the route and move further. On the other hand, identification signs should be preferably hanging or on the doors of respective sections or services to quickly locate the major services and sections on each floor. Further general policy signs should be placed at or near the entrance of the library and service-specific policy signs should be placed preferably near to that particular service area. For example rules regarding photocopy services should be placed near the photocopying department.

Findings revealed that only five libraries had the sign near the campus gate for locating libraries such as campus map or multi-directional stand. Merely four university libraries out of ten had campus maps or multi-directional stands inside the campuses at decision points.

The library building entrance is an important location of the placement of basic identification as well as directional signage. Libraries should preferably place library building name sign, a sign of opening and closing, library building map or directory, floor maps, list of different sections and services with the directional arrows and general rules and regulations at or near the library entrance. Table 6.16 shows that all the libraries had placed such signs near the library entrance excluding Library 5. Further Library 9 and Library 10 had placed only library name sign near the entrance.

Walls can be optimally used for the placement of directional signage. However, very few libraries, to be specific only Library 4 and Library 5 had placed few signs on walls. While assessing locations for sign placement on walls, signs placed on walls near the entrance of the library were counted as library entrance signage.

Circulation counter is a central or an ideal location for the placement of signs, as circulation counter is generally placed near the entrance or else it is visible from the entrance. Statistics highlights that very few libraries specifically three libraries, had place sign for circulation counter itself to locate the counter. Library 4 had placed additional directional and general policy signs near the circulation counter. While in

case of a few libraries, circulation counter was located near the entrance hence in case of those libraries directional signage was provided near the entrance.

Browsing area is suitable for the placement of directional signage. Only six out of ten libraries had used browsing area for the placement of directional signs. Remaining libraries had not placed any signage in browsing areas.

Stack end signage preferably includes signs such as subject headings, stack end class numbers signs, shelf-talkers, display stands etc. Table 6.16 presents that all libraries had placed stack end signage basically for starting and ending class numbers yet a few libraries had also placed signs in stacking area to display the list of bound volumes on stacks and signs for subject headings at stack ends. Library 4, 7 and 8 specifically had placed maximum signs in stacking areas.

Placement of signs on stair walls should be avoided as per the principle of human orientation science as it may distract users while using stairs. Only Library 6 had placed one sign-on stair wall which needs to be removed. Further Library 2 and Library 4 had placed signs near the elevator in the library, as only those two libraries had elevator especially for library buildings.

Sign for locating OPAC terminal is essential, especially for novice users. In case of universities in Mumbai, four libraries out of ten, placed a sign for locating OPAC terminal near the online catalogue search area. Other libraries provided sign for web address to access OPAC.

Doors can be the best location for placing identification signs especially for locating sections, departments and services. Only three libraries out of ten had placed identification signs on doors. Further in case of photocopy section, only two libraries had placed the sign of identification on the door of the section.

Signage for water closets is essential for novice users to be aware of the basic facility. Only three libraries out of ten had placed signage for water closets near the water closet area. From the remaining seven libraries only two had water closets inside the library at every floor however, signage for the same was not either available or paper printed signage without symbols was pasted on the doors of water closets, other libraries do not have the WC's inside the libraries.

Identification signs should be preferably hanged to the walls. Merely four libraries out of ten had placed wall hanging signs for identification of different departments and services. Further Library 6, Library 7, Library 8 and Library 10 had placed the identification signs near the respective section or departments. Two libraries had placed identification signage near the reading room entrance including Library 1, where the comprehensive digital display was placed near the reading room entrance for 24 different displays together.

In the case of bound volumes collection, very few libraries had individual bound volume section. Only Library 4 had placed a sign for bound volume section. Other libraries either stacked bound volumes in the journal section or behind the book stacking areas.

6.6.7 Presence of jargon

The fourteenth principle of Human Orientation Science insisted on avoiding technical jargon. Library users are often unaware of the technical terms used in the library for identification and policy signs. For example often the term reprography section is used for photocopy section. Even a sign of circulation counter can be preferably replaced with Issue/Return counter to make it simpler for the understanding of common students.

Table 6.17: Signs with Jargon

Particulars	Frequency	Percent	Cumulative Percent
Yes	1	.6	.6
No	159	99.4	100.0
Total	160	100.0	

Use of simpler terminology or word-sets should be evolved for better understanding for students. Even word sets for the subject headings in the stacking areas should be described in self-explanatory manner. For example, Ornithology can be described as Bird Science for clear understanding of students.

Findings revealed that in case of 99.4% signs there was no presence of jargon, however, only .6%(1) sign had a presence of jargon in Library 6. Here for the

photocopy section, the door sign was written as 'Pratirup Lekha Seva' at one side of the sign, although on the other side of sign it was worded as 'Photocopy Unit' the word 'photocopy' was too small and the word 'Unit' was large. Hence the sign lack legibility as well as readability.

6.6.8 Need for updating of signs

In the case of huge libraries novice users mainly want to know the working hours, membership procedure and basic rules and regulations of the library. Hence the instructional and policy signs should be limited and pin-pointed. The overload of information results in it's being ignored and will be ineffective. Even the outdated signs should be removed immediately to facilitate essential and specific information. The observation brought forth following results regarding need for updating and revising signs.

Table 6.18: Need for Updating Of Sign

Particulars	Frequency	Percent
Yes	16	10.0
No	144	90.0
Total	160	100.0

Thus in case libraries in Mumbai 10% signs were outdated or torn which needed to update or removed without delay as in some cases such signs were either not up-dated and in a few instances, such signs were torn paper printed signs.

6.6.9 Consistency of signage

The signage system should be consistent, i.e. the shapes and sizes of signs in the system should be consistent. Symbols should be used consistently; their size relating to the character size of the alphabet should be unique and consistent for the entire library. The typeface, size and lettering style should also be consistent. Further color combination should be consistent either it may be similar for the entire sign system or it may be consistently different as per the categories of sign type, i.e. instructional, policy signs and directional. The observational results are presented in Table 6.19.

Table 6.19: Consistency of Signs

Particulars	Frequency	Percent
Yes	134	83.8
No	26	16.3
Total	160	100.0

A non-consistent sign affects the effectiveness of the total sign system. In the case of university libraries in Mumbai, 83.8% signs were consistent, whereas 16.3% signs lacked consistency, as those signs were paper printed temporary signs.

6.6.10 Readability of signage

Legibility as a precursor of readability focuses on the space between the letters and numbers. Thus different factors of readability comprise stroke width, letter height, irradiation, the width of letters, typeface, etc as mentioned in chapter 2 by Claus & Claus (1974).

Table 6.20: Readability of Signage

Readability	Frequency	Percent	Cumulative Percent
Yes	140	87.5	87.5
No	20	12.5	100.0
Total	160	100.0	

As per the observational findings of university libraries 87.5% signs were readable, whereas 12.5% signs were not readable due to small font size, overwritten text, handwritten signs, and torn signs.

6.6.11 Visibility of signage

Visibility of signs depends upon the factors such as visual acuity (measured by the minimum letter size that is legible to the observer), color contrast, provision of natural light or lightening in the signs, positioning of signs for shielding the illuminating sources and placement of signs at clear spaces and at decision points.

Table 6.21: Visibility of Signage

Visibility	Frequency	Percent	Cumulative Percent
Yes	139	86.9	86.9
Less visible	20	12.5	99.4
Very low visibility	1	.6	100.0
Total	160	100.0	

Findings revealed that 86.9% signs were visible; however, 12.5% signs had less visibility due to reasons such as overload of information and placement of signs above eye level (hanged to the ceiling). Further, 6% of signs had very less visibility due to the very small font size (Table 6.21).

6.6.12 Observatory Remark on Existing Signs

It was discovered through the observational findings that 58.1% signs were up to the mark (Table 6.22). However, 41.9% signs were inappropriate. The shortfalls in case of inappropriate signs are described in Table 6.23.

Table 6.22: Observatory Remark on Existing Signs

Particulars	Frequency	Percent
Appropriate signs	93	58.1
Inappropriate signs	67	41.9

6.6.13 Observatory Findings

Through an in-depth observation of total signs of all ten university libraries observed during the study 41.9% (67) signs were found inappropriate. The shortfalls regarding those signs are described in Table 6.22 (A).

Table 6.22 (A): Observatory Shortfalls Regarding Inappropriate Signs

Particulars	Frequency	Percent
Overload of information	33	49.3
Too high lacks visibility	10	14.9
Not visible from decision point	6	9.0
Small font size	4	6.0
Changeable acrylic stack end signage remained unchanged	3	4.5
Absence of major subject headings and torn stack end signage	2	3.0
Overwritten and handwritten	2	3.0
Creative and informative sign to avoid confusion	1	1.5
Not in front of the library entrance	1	1.5
Handwritten and very small font size	1	1.5
Too small size of sign with too small font size	1	1.5
Very small font size, placement on above eye level, Common display for multiple departments	1	1.5
Difficult to understand (Jargon)	1	1.5
Flash notice out of order when surveyed	1	1.5
Total	67	100

Signs were inadequate due to different reasons such as lacked readability due to overload of information (49.3%), lacked visibility due to placement of signs on a very high level from eyesight (14.9%), signs not visible from decision point (9.0%), small font size (6.0%), Changeable acrylic stack end signage remained unchanged (4.5%), absence of major subject headings and torn stack end signage (3.0%), overwritten and handwritten sign (3.0%), wrong placement of library name sign (1.5%). Further other lacunas noticed such as handwritten and very small font size (1.5%), too small size of sign (1.5%), common display for multiple departments placed too high with small font size (1.5%), sign with jargon (1.5%), out of order flash notice (1.5%).

In case of Library 4 one creative and innovative sign was observed which was used at the baggage counter by the staff specially to inform users in the absence of the counter staff that the staff will be back in five minutes, to avoid confusion of library users when the staff is not available for a few minutes (Figure 6.8).



Figure 6.8: Interactive Sign in Absence of Staff

A unique and perplexing situation may occur in libraries with poor signs; the unnecessary repetition of signs in one location does not make the message more emphatic and effective, but, in fact, often creates an overload of signage and usually a mixture of typefaces and other graphic elements together, lessen the impact of the sign. This happened in major instruction sign in one library. Rules were placed on a single notice board cluttering multiple bits of information near the entrances or in browsing area. The following pictures illustrate the situation explained above:

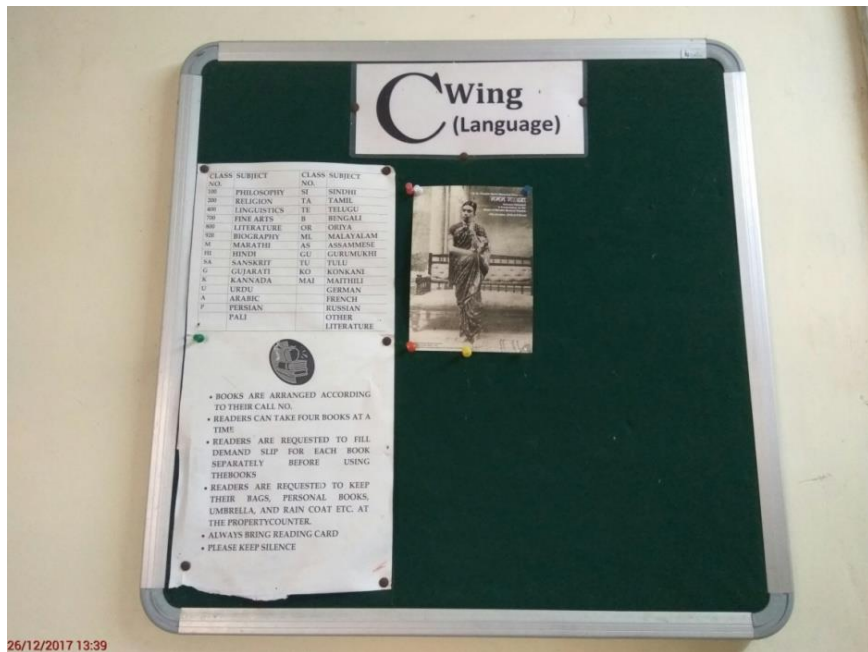


Figure 6.9: Sign Cluttering (Illustration 1)

Sign clutter is a situation when multiple signs are placed, then necessary to convey enough information, on a single board. Figure 6.9 and Figure 6.10 illustrates the situation. It is also provided in photo gallery.

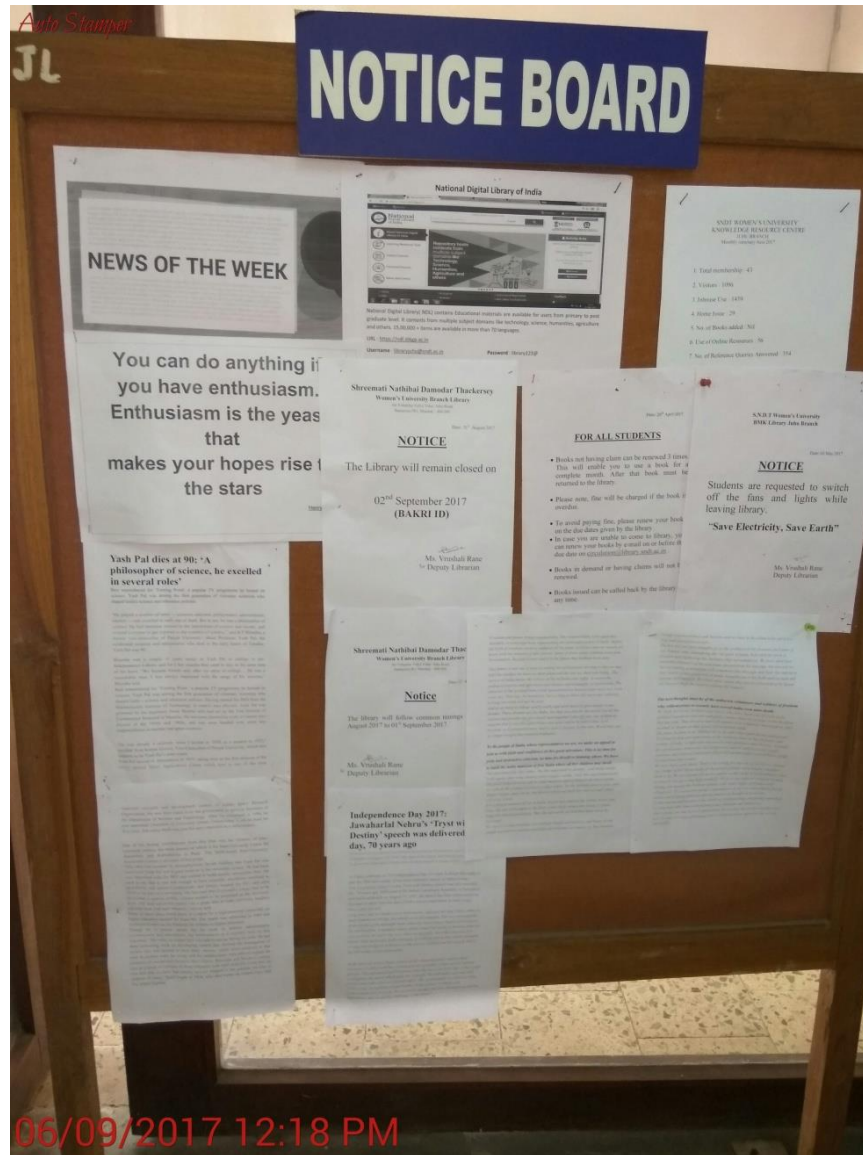


Figure 6.10: Sign Cluttering (Illustration 2)

The present section focussed on observational findings explored through available library signage, the next section highlights on observations and findings discovered through physical library buildings and its spaces.

Section III - Field observation of library buildings: Space Facet Analysis

Wayfinding as a cognitive approach seeks an essential quality of legibility in libraries. Kevin Lynch, (1960), in his study of the visual quality of the American city, defined legibility as "the ease with which its parts can be recognized and can be organized into a coherent pattern, a legible city would be one whose districts are easily identifiable and are easily grouped into an overall pattern".

A legible environment is one that can be read and comprehended, one that is humane in the sense that people can come to terms with it. In achieving the goal of a legible library, two interrelated aspects of the wayfinding system must be considered:

1. the system for identifying the parts of a library (part identification) and
2. the system for relating the parts (part relationship) (Down, 1979, p.27).

From the users' viewpoint, the library is a mixture of three classes of objects or units: specialized services and departments, (microfilm reader room, computer labs for e-resources, OPAC, circulation section, shelving arrangement) basic facilities and amenities (Photocopying, restrooms, drinking water, and elevators) and environmental ambience provided by libraries. Hence the observational findings were divided, noted and analyzed categorizing in these classes of objects. Further accessibility provisions for special users were also observed and analyzed.

The present section mainly focused on Space facet of Ranganathan's Framework of Knowledge. The physical layout of the library determines the arrangement of these objects or units, and the wayfinding system must make this arrangement legible and hence comprehensible. The first step is a system of division and labelling. The part-identification system is essential for the process of orientation, as it acts as a language for tying the cognitive representation to the surrounding physical environment. Every university library has different building layout, physical setting as well as volume and type of collection. Therefore, field observation of library building to observe the physical setting and the available guidance system of every studied library was observed and noted with the help of structured observation schedule for library buildings.

6.7 Library Building Observation Schedule

Building observation schedule consisted of a checklist for the available signage in different departments to observe the physical environment and settings, and the presence of essential signage in all service areas of the libraries.

Observational findings of library buildings brought forth the following information.

6.7.1 Orienting tools till library building

As per the field observation, all the university library buildings were visible even though a few libraries were located in parent institutional buildings. However, 50% of libraries were not identifiable due to absence of library name signs. The following Table 6.23 describes the scenario:

Table 6.23: Orienting Tools Till Library Building

Particulars	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10
Building visibility	√	√	√	√	√	√	√	√	√	√
Building Identifiability	√	√	√	X	X	√	X	√	X	X
Parking space	X	√	√	√	X	X	X	X	X	X
Parking sign	X	√	X	X	X	X	X	X	X	X
Silent Zone sign	X	X	X	X	X	X	√	X	X	X
Campus Map	√	X	X	X	X	√	X	√	X	X
Intl symbol of Library	X	X	X	X	X	X	X	X	X	X

Parking space was available only in 30% (3) libraries; however, sign for parking area was available only in a single university campus.

University campuses and their library reading area should be preferably be exposed as a silent zone for the general public to create the atmosphere of the study area. However the sign of 'Silent Zone' was observed only in one university campus near the entrance.

Campus maps help novice users to get acquainted with the unknown campus area and assist them to decide the route for the desirable departments and buildings. Findings revealed that only 30% (3) libraries had provided campus maps at the entrances or within the campuses.

Use of international symbols for signs facilitates immediate interpretation of the meanings of signs, in addition, it minimizes language barriers, as such signs include symbols or pictures. Use of international sign for the library will aid users to quickly locate and identify the library building. Hence the availability of the symbol of the library was assessed. However, it was not available in any of the libraries under study.

6.7.2 Orienting tools near the library entrance:

Library entrance should be welcoming and appealing. Provision of appropriate signage at the entrance of the libraries attracts potential users towards libraries. Hence the entrances of university libraries were observed. The observational facts described the following attributes:

Table 6.24: Orienting Tools Near Library Entrance

Particulars	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10
Space near the entrance	√	√	√	√	√	√	√	√	√	√
Library building Map	√	√	X	√	X	√	*√	√	X	X
Display of working hours	√	√	X	√	X	√	X	*√	X	X
Visibility of Inquiry/baggage counter	√	√	√	√	√	√	√	√	√	√
Space for display cases	√	√	√	√	√	√	√	√	√	√
Space for pamphlet racks/ Events displays	√	√	√	√	√	√	√	√	√	√
Space for public bulletin board	√	√	√	√	√	√	√	√	√	√

Table 6.24 indicates that provision of space near the library entrance was available in all the libraries under study. This space can be utilized for providing universal access to users including disabled users. Library building map was available at the entrance in 60% (6) libraries. However, in the case of Library 7, it was not visible due to the overload of information on a single display board at the entrance.

Display of working hours at the entrance minimizes the FAQ's at the inquiry counter. However, only 50% (5) libraries had provided a display of working hours near the library entrances. A further display of working hours placed by Library 8 was not visible as it was paper printed sign placed with other instructions on a single notice board.

The inquiry counter or circulation counter in case of libraries should be preferably visible from the entrance. It was observed that baggage counter or circulation counter were visible from the entrance in all the libraries under study. Further ample space was available in all the libraries for display cases, pamphlet racks as well as for putting bulletin boards.

6.7.3 Physical Settings and Accessibility

University libraries are massive in structures and wide-spread; besides every library has its own building layout and physical settings. Hence the physical setting of each library under the study was observed for accessibility aspects. The findings regarding physical setting and accessibility are displayed in Table 6.25

Table 6.25: Physical Settings and Accessibility Aspects

Particulars	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10
Printed Library Guides	X	√	X	X	X	X	X	X	X	X
Circulation counter at/near entrance	√	√	√	√	X	√	√	√	√	√
Visibility/ Identifiability of Circulation counter	X	X	√	√	X	√	√	√	√	√
Double-sided monitor for circulation counter	X	√	X	X	X	X	X	X	X	X
Self-checkout service	X	X	X	X	X	X	X	X	X	X
Availability & Identifiability of computerized sources	√	√	√	√	X	√	√	√	√	√
Reading area tables with power switches	X	√	X	√	X	X	X	X	√	X
Open access to collection	√	√	√	√	X	√	X	X	√	√
OPAC near shelving area	√	√	√	√	X	√	√	X	√	X
Stools/ Ladders b/w shelves	X	√	√	√	NA	√	√	√	√	X

6.7.3.1 Library guides or library manuals: Library guides or Library manuals spread awareness among novice users about the sources, services and facilities provided by the libraries. As shown in Table 6.25 printed library guide was provided by only one library.

6.7.3.2 Circulation counter: It is preferable and convenient for both library staff and users to locate circulation counter near the entrance of the library. It was observed that in 90% (9) libraries circulation counter was available near the entrance. Only one library had its circulation counter on the first floor which was far from the entrance

i.e. Library 5. However in the case of 30% (3) libraries even though located near the entrance circulation counter was not identifiable due to the absence of signage. Further, it is ideal to facilitate monitors view to the user at the circulation counter to update them with the lending transactions. However, only one library had double-sided monitor at the circulation counter. Self-checkout service saves the time of users as well as staff. It also provides the freedom to users to drop the books in self-checkout machines even though the circulation counter is closed. However self-checkout service was not available at any library under study.

6.7.3.3 Computer laboratories and Signs: University libraries acquire information sources in different forms including e-books, e-journals and databases. Therefore computer laboratories should be available with the identification sign of the availability of access to e-resources through such computer laboratories. 90% (9) libraries under the study had computer laboratories in libraries with the signage for the same. However, Library 5 did not have a computer laboratory for users at the time of field visit.

6.7.3.4 Reading Rooms: University libraries focus on higher education and receive different types of users mainly students enrolled for postgraduate diplomas or degrees, M, Phil. and Ph. D degree; as a result, users' reading choices are varied. Libraries provide multiple reading choices for such a diverse population. However with the new trend followed by university libraries of BYOD (Bring Your Own Devices) libraries should provide tables with power switches in the reading areas so that users can charge their laptops, e-book readers or palmtops on such tables itself. However, only 30% (3) libraries had provided tables with power switches on the desk of tables in reading halls.

6.7.3.5 Access: Open access to an entire printed collection of the library provides freedom for users to browse through shelves and to choose the required information sources. In addition, they get acquainted with other information sources available in the library related to their subject of interest. Providing open access to the library collection is an old practice in developed countries. However, there were few university libraries in Mumbai specifically 30% (3), where closed access or partial open access was provided.

6.7.3.6 Stools or ladders: Stools or ladders in libraries, the printed collection is often housed in stacks till the height of the ceiling. It is difficult to reach or pick the required books from the upper shelves for the people who are with a normal height of 5” to 6” feet. Hence stools or ladders are essential between the spaces of shelving racks according to Time Saver Standards. However, it was observed that in three libraries out of ten such stools or ladders were not available. One library i.e. library 5 had closed access. Other seven libraries had provided stools or ladders between the shelves for the users' convenience to reach till the upper shelves of libraries.

6.7.3.7 OPAC: OPAC acts like metadata of library resources. All libraries stress on providing OPAC service to their users to make them familiar to the library collection. In the case of libraries under the study, only in one library OPAC was not available. However, libraries prefer to provide OPAC terminals at or near the entrance. In widespread libraries when users access OPAC near the entrance often they forget the bibliographic details of the sources till reaching to the shelving areas or while physically searching books in shelves. Therefore, it is preferable to facilitate OPAC terminals both at the entrance as well as near the shelving areas for the user's convenience. However, it was observed that in 2 libraries OPAC terminals were not available near the shelving areas. Library 5 had closed access and was not automated at the time of field visit hence OPAC was not provided.

6.7.4 Availability of different types of signage

In the case of university libraries users know that the required information will be available, but how to reach the required information is a challenge especially for novice users. Good guiding system for directing, identifying and instructing users is essential to facilitate a new approach for the exploitation of library resources. One single sign cannot do this alone, but an orderly system can create a reinforcing progression of information that gives major orientation and guidance before it presents the next level of information. Hence the availability of different types of signage among the libraries under study was observed right from the entrances of the libraries. Following table elaborates the same.

Table 6.26: Availability of Different Types of Signage

Sign Types	Particulars	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10
Directional Signs	Directory/ List of departments	X	√	√	√	X	X	X	√	X	X
	Directional signs for locating departments	X	√	X	√	X	√	√	X	X	X
Identification signs	Signs for Service departments	X	√	√	√	X	X	√	√	X	X
	Signs for Equipment	X	X	X	√	X	X	√	X	X	X
	Signs for Convenience facilities	X	√	X	√	X	X	√	X	X	X
	Sign for Elevator	NA	X	NA	√	NA	NA	X	NA	X	X
	Pictorial signs	X	X	X	X	X	X	X	X	X	X
Instructions and Regulatory Signs	Display of Rules and Regulations	√	√	X	X	X	√	√	√	X	X
	Instructional sign for OPAC use	X	X	X	√	X	X	√	√	X	X
	Flash Notice/ Digital Display	√	X	X	X	X	X	*√	X	X	X
Shelving Displays	Shelving Maps	X	X	X	X	X	X	√	X	X	X
	Shelving order splits display	X	X	X	√	X	X	X	X	X	X
	Signs for electric switches near shelving areas	X	√	X	X	X	X	X	X	X	X

6.7.4.1 Directional signs

Orientation maps or directories should be preferably placed and made especially noticeable at entrances or where it is helpful to give overall views. However, such directories or floor wise list of departments were available only in four libraries out of ten.

The next level of information after the directories near the entrance for further navigating confidently is directional signs for respective departments. However, such directional signs were available merely in four libraries under the study.

6.7.4.2 Identification signs

Once the direction for the required department or service area is decided or made known through the directories, users move further from the corridors, open spaces or from browsing area till the required department. Such major identification signs name large or important areas such as baggage counter, circulation counter, special collections, etc. Hence signs to locate the service departments are essential near or on the door of the respective service areas for easy identification. However, identification signs for the service departments were available only in five libraries out of ten.

All the signs together including major and minor signs can facilitate an orderly system and will be able to create a reinforcing progression of information that will give major orientation and guide users to provide next level of information while navigating in libraries. Minor identification signs name smaller areas, facilities and amenities. Signs for equipment, such as signs for printers, OPACs, Microfiche readers, etc, as well as minor identification signs for convenience facilities like for water coolers, restrooms, elevators, etc. Although such signs are important, it was observed that signs for types of equipment were provided only in two libraries out of ten further signs for convenience facilities were facilitated merely in three libraries under the study. In addition, though the elevator was available in five university libraries under the study, only one library provided a sign for an elevator.

Symbolic signs eliminate the language barrier as well as aid in quick message conveying. In case of libraries use of symbols for library services there is a need to investigate the studies concerning international standards. Due to their complexity, library services are probably best described in words rather than symbols, but there are clear and simple symbols for general public facilities, such as restrooms, drinking fountains, stairways, elevators, exits as well as a symbol of access for disabled in wheelchairs. In spite of this in university libraries in Mumbai, there was an absence of the use of symbols for signs. Only a few libraries provided symbols for restrooms, excluding that there was an absence of symbols or pictorial signs.

6.7.4.3 Instruction or regulatory signs

Major instruction signs describe special conditions or regulations to be followed or considered within a particular situation or environment. Library rules and regulations as well as the display of library working hours, opening and closing hours of different service departments, display of instructions of photocopy department, display of how to look up information, display of broad classification scheme, instructions for OPAC use are the examples of major instruction or regulatory signs in case of libraries. It was observed that the display of rules and regulations was available in five libraries out of ten.

Table 6.27: Availability of Rules and Regulations

Particulars	University Libraries										Total	Percent
	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10		
Available	1	1	0	0	0	1	0	0	0	0	3	30
Not available	0	0	1	1	1	0	0	0	1	1	5	50
Available without working hours	0	0	0	0	0	0	1	1	0	0	2	20
Total	1	1	1	1	1	1	1	1	1	1	10	100

The Table 6.27 highlights that only in 50% libraries display of rules and regulations was available. However in case of 20% libraries details about working hours were not available on the display of rules and regulations. Hence absence of such informative displays lack adequacy of information like display of rules and regulations without working hours leads towards inconvenience.

Besides instructions for OPAC use were provided only by three libraries out of ten.

Signs such as 'Keep Silence', 'Turn off Your Mobiles', 'Entry for staff only', etc are the examples of minor instruction or regulatory signs. Minor instruction or regulatory signs were available in all the libraries, however; only two libraries provided such signs in permanent form. Remaining libraries used paper printed signs for the display of minor instructions.

Digital displays facilitate changeable as well as multiple informative displays. Only in a single university library out of ten, a digital display was used specifically in library 1; however, 24 different types of instructive as well as regulatory displays were merged together in a single digital board in case of this library. Flashing 24 displays together was not suitable for users to read all the information as they arrive one after other respectively. In addition, it was running for 26 minutes to finish all displays in one set. Provision of Flash notice was available in Library 7, near the entrance. However, it was not in a working condition at the time of field visits.

6.7.4.4 Shelving displays

Though information sources are available in various formats still printed books are the foremost preferable form of information source especially in academic libraries. Moving through aisles and browsing bookshelves can be a pleasing moment for library users who are well-aware about the library's physical settings and shelving arrangement. However, for novice users, the maze of floors and huge library collection in various forms can be intimidating. Experience proved that shelving area had always been challenging and confusing spaces for users (Stempler 2013, Fabbrizzi, 2014, Baker et al., 2015). In order to familiarise users with the classified arrangement on open shelves to their full potential, and optimal use, a good signage system is essential, especially in shelving areas. Hence the availability of signs such

as shelving maps, displays for broken order, signs for electric switches in the stacking area were examined.

6.7.4.4.1 Shelving maps or stack floor plans

Over the years, librarians have noticed that without a specific signage system, open shelves are used by library users almost exclusively to find a specific item. The main objective of organizing and arranging books on stacks as per the classification schemes is to make users aware about the multiple information sources available on a particular subject as well as on related subjects for specific research interest. Therefore shelving maps or stack floor plans are essential to fulfil the objective of searching or getting a particular book. However, only Library 3 (TISS Library) had provided stack floor plans out of ten libraries under the study.

6.7.4.4.2 Display of sign for broken order

University libraries are multi-storied and the library collection is often spread or organized floor wise by splitting the collection as per the classification schemes. Therefore it is essential to put displays specifying the floor wise splits in the collection. In addition, libraries are growing organism hence such displays need to update as per the additions in the library collection and its floor wise arrangement. However, display of floor wise splits in the collection was provided only by a single library that is IGIDR Library out of ten university libraries under the study.

6.7.4.4.3 Signs for electric switches near shelving areas

In large libraries stacking areas are widespread. Besides in metropolitan cities due to space crunch, basement areas, as well as mezzanine floors are often used as book stacking areas. For such remote spaces in libraries the available natural light may or may not be sufficient for reading or searching books in stacks. Hence sufficient light should be provided with a due sign for the electric switches near the stacking areas. While observing stacking areas in university libraries in Mumbai it was observed that signs for electric switches were available only in a single library that is TISS Library.

6.8 Signage for various forms of library collection

University libraries acquire and maintain library resources in different forms and formats to meet the changing needs of the university community. Forms of the collection have been changed as per the emergence and advancements in ICT. The library resources in different forms are housed separately or in different departments as per the forms of collection. Hence it is essential to make the users aware about its availability in different forms by facilitating minor identification signs as per the forms of collection.

Table 6.28: Signs for Different Forms of Library Collection/ Minor Identification Signs

Particulars	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10
Rare Books	X	X	√	√	X	X	X	X	X	X
Archives	X	√	NA	√	X	X	√	NA	X	NA
Special Collection	X	X	√	√	X	X	√	NA	X	NA
Manuscripts	X	NA	NA	NA	X	NA	X	NA	NA	NA
Microfilms	X	NA	NA	NA	X	NA	X	NA	NA	NA
Audio Visual Resources/CD'	X	X	X	X	X	X	√	√	X	X

Table 6.28 highlights that rare books were available in all the university libraries, however, sign for indicating the rare collection was provided only by two libraries out of ten. The archival collection was available in seven libraries; however, sign for the archival collection was available merely in three libraries. A special collection was available in eight libraries; however, it was made identifiable through sign only in three libraries. Manuscripts and microfilms were available only in three libraries, but the sign for the manuscripts and microfilms was not available in any of the libraries. Audiovisual resources and CDs were available in all the libraries; however, the sign for such resources was provided by only two libraries.

6.9 Characteristics of signs

The underlying principle of good signage is to orient people to the plan and the functions of the library, to give them a way of creating an internal map and to relate the broad geographical areas, then to orient towards specific smaller areas or service departments. Each sign cannot do this alone, but an orderly system can create a reinforcing progression of information that gives major orientation and guidance before it presents the next level of information. To provide a systematic pattern of major and minor identification, direction and instructional information signage should be designed taking into consideration the following characteristics.

Table 6.29: Characteristics of Signage

Particulars	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10
Consistency	√	√	√	√	X	X	√	√	X	X
Design- Horizontal order	√	√	√	√	√	√	√	√	√	√
Distractions at staircases	X	X	X	X	NA	√	X	X	NA	NA
Ergonomic design of signs	√	√	√	√	X	X	√	√	X	X
Eye level Placement	√	√	√	X	NA	√	X	X	NA	NA
Instructional signs in square shapes	√	√	√	√	NA	√	√	√	NA	NA
No overload of information	X	√	√	√	NA	X	X	X	NA	NA
Readability	X	X	√	√	X	√	X	X	X	NA
Regulatory signs in circular shapes	X	X	X	X	X	X	X	X	X	X
Separate display for each function	X	√	√	√	NA	X	X	X	NA	NA
Simplicity of Language	√	√	√	√	NA	√	√	√	NA	NA
Use of suitable colour contrast	√	√	√	√	NA	√	√	√	NA	NA
Use of universal symbols	X	X	X	X	X	X	X	X	X	X
Visibility	√	√	√	√	NA	√	√	√	√	NA
Warning signs in triangular shapes	X	X	X	X	X	X	X	X	X	X

6.9.1 Consistency and Utility more than artistry

Major and minor signs in an exterior and interior sign system separate information by sign size, shape and placement, and yet also create an identity through similarities of size and shape, layout type size and placement. Aesthetically, the shape and sizes of signs are related to each other to present information consistently. Consistency in signage establishes a systematic pattern while orienting users. In the case of university libraries in Mumbai, six libraries provided consistency in signage.

6.9.2 Design- Horizontal order

Boards which are vertically placed taller results in difficulty in viewing as the upward angle is difficult owing to the shrinkage effect on the view of normal letters. This affects the user's readability. Letters appear sufficiently large when viewed from close range, but look shortened when they are viewed from the upper angle. In such situations, it is advisable, in the interest of human orientation, to display the information in horizontal spread to facilitate its readability by natural sideways movement of eyes. Modak (2013) suggested especially for the names of buildings on the outer walls, should not be displayed with letters in vertical order, since it is contrary to the normal way of reading (Modak, 2013, p.62). As per the present principle university library buildings were observed for the presence of signs with letters in vertical order, it was seen that all the signs, in all the libraries were in horizontal order.

6.9.3 Distractions at staircases

As per the seventeenth principle of HO science, from the safety angle, preferably no distracting or eye-catching display boards, signs or pictures should be hung in staircases, as when a person is moving up and down staircases, he has to be more careful in taking steps. However in the case of Library 6 few signs were placed in staircases, which need to be removed to avoid distractions while using staircases.

6.9.4 Ergonomical design of signs

Signs were evaluated by applying the three principles defined by Ben-Bassat (2013) elaborated in chapter four (4.2.7.4). It was found that six libraries out of ten provided ergonomically designed signs.

6.9.5 Eye level Sign Placement

According to fifth principle of Human Orientation Science, the information display boards should not be fixed so high that either they escape the attention of the visitor or can be read, only by upward stretching of neck, rather preferably sign placement should be at eye level so that it can be noticed or read easily. While examining signage in libraries under the study it was seen that only if four libraries out of ten the signs were placed at eye level. In case of other three libraries signs were placed high; hence users were able to read signs only by upward stretching of the neck. In the remaining three libraries there was an absence of signage.

6.9.6 No overload of information

According to the tenth principle of HO science voluminous information about rules and regulations, terms and conditions and Do's and Don'ts may result in ignorance of information. Hence instructions or rules should be written in limited words and sentences with the desired and pin-pointed information. However it was observed that only three libraries provided limited and pin-pointed information, in the remaining four libraries displayed voluminous information in case of rules and regulations and on instructional displays. In three libraries there was an absence of signage.

6.9.7 Readability and visibility

According to the fourth principle of HO science height of letters should be in the proportionate distance for good visibility. Use of smaller font size will result in a lack of readability even though the signs are visible. The Table 6.29 shows that in eight libraries out of ten, signs were visible however readability was lacking in case of some of the signs due to use of small font size and due to use of the single board for multiple displays and instructions. Hence only in three libraries, all the signs were available in a readable form.

6.9.8 Separate display for each function

Use of common boards for different facilities defeat the very purpose of providing display boards as per the sixth principle of HO science. Therefore using a separate board for each facility is the best way to confirm human orientation. However, it was observed that only three libraries out of ten had provided separate display boards for each function.

6.9.9 Simplicity of Language

The third, twelfth and fourteenth principle of human orientation science says that the choice of the set of words on signs should be in conformity with the meaning people associate with it. Words used should be simple to understand that is without any technical jargon and limited in numbers. In case of the use of words for signs, all the seven libraries had used simple words sets for signs. In the remaining three libraries there was an absence of signage.

6.9.10 Universal norms for shapes of signs

As per universal norms, the regulatory or policy kind of signs are shown in circular shapes, the warning or danger-signalling signs in equilateral triangles and informative or guiding signs should be in square shapes, as described in the seventh principle of HO. However, the observational findings revealed that all kind of signs in libraries under the study were designed in square and rectangle shapes.

6.9.11 Use of universal symbols

Symbols convey the message by eliminating language barriers. Countries like India which have a plethora of languages in different regions should preferably use symbols as it is the most acceptable way of conveying messages as per the seventh principle of human orientation science. During field observation, it was observed that symbols were not used in any of the libraries under the study excluding for restrooms. The symbol for restrooms was used in three libraries out of ten.

6.9.12 Use of suitable colour contrast

As per the fourth principle of HO science the color of letters and the background color of the board should be in contrast with each other. Johannes Itten's 'Color Wheel' has

also been explained for contrasting color combinations by the experts in this principle (Modak 2013, p. 58). It was observed that seven libraries had designed their signage with using suitable color contrast as per the Johannes Itten's 'Color Wheel', in the remaining three libraries signage was not available.

6.10 Accessibility provisions for disabled

According to the Census 2011 disabled population in India is 2.68 Cr persons which is 2.21% of the total population of the 121 Cr Indians ("Disabled Population in India as per Census 2011 (2016 Updated)"). Libraries should be able to serve all types of users. Hence libraries should provide universal access to achieve the standards of equality and dignity with the rest. Barriers to accessibility are obstacles that make it difficult for Person with Disabilities to move around in public places and access buildings (Ministry of Urban Development, 2016). Hence in the case of libraries, it is desirable to provide barrier-free access to all library users.

6.10.1 Accessible Service desks

Service desks like circulation desk and reference desk should be designed with the appropriate height accessible for all users including disables. However accessible circulation desk was facilitated only in two libraries further universally accessible reference desk was not available in any of the libraries under the study.

6.10.2 Audio Instructions

Sign or display information should be supplemented with oral announcements wherever necessary and possible according to sixteenth principle of Human Orientation Science. Braille floor indicators in elevators were available only in two libraries. Further audio signs were not available in any of the libraries excluding audio instructions which were available only in elevators of two libraries.

6.10.3 Braille signs

Besides, desirable signage for special users are essential to invite special users towards the libraries, and to offer them ease and comfort. However, Braille signs for convenience facilities were not available in any of the libraries. Braille floor indicators in elevators were available only in two libraries.

6.10.4 Disabled Parking Sign

The field observation revealed that there was an absence of sign of parking for disabled in case of all the libraries under study. Further wheelchair ramp with the handrails was available only in three libraries. In addition, an elevator was available only in four library buildings out of ten.

Table 6.30: Accessibility Provisions for Disables

Particulars	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10
Accessible circulation desk	X	√	X	√	X	X	X	X	X	X
Accessible reference desk	X	X	X	X	X	X	X	X	X	X
Audio Instructions	X	√	X	X	X	X	X	X	√	X
Braille floor indicators in elevator	X	X	X	√	X	X	X	X	√	X
Braille signs for convenience facility	X	X	X	X	X	X	X	X	X	X
Disabled parking signage	X	X	X	X	X	X	X	X	X	X
Elevator	X	√	X	√	X	X	√	X	√	√
Restroom for disabled	X	√	X	X	X	X	X	X	X	X
Space between shelves (Aisle)	√	√	√	√	NA	√	√	√	√	√
Tactile at the entrance	X	X	X	X	X	X	X	X	X	X
Wheelchair ramp with handrails	X	√	X	√	X	X	X	X	√	X

6.10.5 Elevators

In the case of elevators, total five library buildings provided elevators, out of which only two libraries provided Braille floor indicators. Further audio signs were not available in any of the libraries excluding audio instructions which were available only in elevators of two libraries.

6.10.6 Restrooms for disabled

Special users need certain settings in the library and also to translate these preferences into an attitude of acceptance. To facilitate universal access, it is necessary to provide the essential amenities and environment suitable to all type users such as restrooms for disabled. Only TISS library provided restroom for disabled among university libraries in Mumbai.

6.10.7 Stacking areas

Stacking areas should be spacious with suitable space between the stacks for all disabled users to move freely along with the wheelchairs so that they can search information sources on their own without any barrier. Observational findings revealed that stacking area along with the space between shelves was accessible in all the libraries excluding Library 5, as this library had closed access system.

6.10.8 Wheelchair Ramps with Handrails

Wheelchair Ramps with Handrails were available only in three libraries out of ten university libraries.

6.10.9 Tactile

Tactile are flat-topped bars that are easily detectable underfoot by people with visual impairments. They are used externally to guide people with visual impairments along the circulation path (Harmonised Guidelines and Space Standards for Barrier-Free Built Environment for Persons with Disability and Elderly Persons, 2016). Thus, tactile aid visual impairments in sensitizing about walls, corners or similar insecure areas while moving around in the library. However tactile was not available in any university library under the study.

Thus the existing accessibility provisions facilitated by all the libraries for disabled were insufficient and inadequate to provide universal access.

Section IV -User’s Interviews Analysis: Personality, Time and Space Dimension

User’s interviews were conducted of selective participants of the study. For this interview of selective users, 1% of the total user population that is 51.35, hence five users per university library were selected. Thus total of 50 users participated in these interviews. This section considers and highlights personality, time and space dimension from PMEST with other access related aspects.

6.11 Time spent in the library

The ability to find one's way in a setting with an available guidance system and to accomplish desired information search and retrieval not only satisfies an immediate need, but it also deepens one's appreciation for the setting and strengthens one's relationship with the library. Considering these fact participants were asked about how long they were in the library.

Table 6.31: Time Spent in The Library

Duration	Libraries										Total	Percent
	Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10		
Less than an hour	4	2	4	2	3	4	2	4	2	3	30	60
One to three hour	1	2	1	3	2	0	3	1	3	2	18	36
More than three hours	0	1	0	0	0	1	0	0	0	0	2	4
Total	5	5	5	5	5	5	5	5	5	5	50	100

Table 6.31 indicates that maximum to be specific 60% (30) of participants spent less than an hour in the library during their initial visits. Very few that are 36% (18) spent one to three hours and only 4.0% (2) spent more than three hours in the library during their initial visits. Library-wise data indicates that maximum participants spent one to three hour in all the libraries. The more time users spent in the library building the more they become familiar with the library building and its sources and services.

However new users or newly enrolled students in case of university libraries mainly use to visit libraries for lending the required books and other information material from the library initially during an early stage of their academic year. In addition, confused first time user may spend more time in search of departments or material, as it was represented by Table 5.48 that maximum that is 45.4% of participants were confused while navigating and searching information in libraries. Therefore the availability of appropriate signage creates a welcoming atmosphere for such novice users as well as save their time needed for inquiries and information search processes. Hence opinions of the participants were collected on the availability of the guidance system at the entrance, study areas, service areas, and stacking areas as well as the availability of instructional signs for using different types of equipment and technologies.

The analysis was divided for the descriptive writing in different headings such as views about guidance system at the entranceway of the library, service areas, experiences while using different floors, library stacking areas, study areas, welcoming as well as off-putting aspects of libraries related to wayfinding and spatial navigation. Their opinions about the use of various equipments and facilities, display of library rules and regulations as well as views on building features and technological sources and equipments which affected their information search process were asked.

6.12 Public access settings (Guidance system) at the entranceway of library

A library is an academic institution, as an academic hub, it should be welcoming for its potential users. The entranceway of the library plays an important role in inviting potential users towards libraries, hence user opinions were sought about the availability of the guidance system at the entranceway of libraries.

To explore users' views about guidance system at the entrance of library views of participants were invited. The Table 6.32 describes the findings regarding participants' views on guidance system at the entranceway of the library.

Table 6.32: Library Entrance Way-Signage

		University Libraries										Total
		Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10	
Notice Guidance System	Count	0	3	3	3	0	4	3	4	0	0	20
	Percent	0.0%	6.0%	6.0%	6.0%	0.0%	8.0%	6.0%	8.0%	0.0%	0.0%	40.0%
Identifiable and Welcoming Entrance	Count	5	5	5	2	1	5	3	5	3	2	36
	Percent	10.0%	10.0%	10.0%	4.0%	2.0%	10.0%	6.0%	10.0%	6.0%	4.0%	72.0%
Appropriate signage-Entranceway	Count	1	3	4	3	2	5	4	4	0	1	27
	Percent	2.0%	6.0%	8.0%	6.0%	4.0%	10.0%	8.0%	8.0%	0.0%	2.0%	54.0%
No signage	Count	2	0	1	0	0	0	0	0	0	4	7
	Percent	4.0%	0.0%	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.0%	14.0%
Total	Count	5	5	5	5	5	5	5	5	5	5	50
	Percent	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	100.0%

User opinions about provision of guidance system at the entrance of library revealed that only 40% of participants opined that they noticed that guidance system was available at or near the library entrance. Maximum participants to be specific 72% were of opinion that the entranceway was identifiable and welcoming, and 54% of respondents found appropriate signage at the library entranceway.

Library-wise data highlights that in case of Library 1, Library 5, Library 9, and Library 10, participants did not noticed availability of any guidance system near the entranceways. , Library 5 and Library 10 lacked in making their entranceways identifiable and welcoming. Library 1 and Library 10 lacked in providing appropriate signage at the entranceways.

6.13 Obstacles while using entranceway

To find out if any obstacle was faced by users while using entranceways the participants were asked to elaborate the kind of problem or obstacle they had faced while using entranceways.

Table 6.33: Opinions on Obstacle While Using Entranceway

Particulars	Frequency	Percent	Cumulative Percent
No	30	60.0	60.0
Yes	7	14.0	74.0
Multiple information on single digital board lacks visibility	1	2.0	76.0
Difficulty in locating departments and sections	4	8.0	84.0
Difficult to locate library from campuses gate	2	4.0	88.0
Lack of space on baggage counter for bags	1	2.0	90.0
Absence of signage	5	10.0	100.0
Total	50	100.0	

Table 6.33 indicates that 60% participants did not face any obstacle while using libraries entranceways. However remaining 40% participants illustrated various obstacles experienced by them such as multiple information displays were provided through single digital board which lacks visibility, difficulty in locating departments and sections, difficulty in locating library from campuses gate, lack of space on baggage counter for bags, and an absence of signage near the entrances of libraries.

6.14 Public access settings (Guidance system) in service areas

Library as a public place provides different services. These services are provided by libraries by separating library's physical space in various service areas and sections, such as photocopy services, OPAC area, computer labs, including circulation counters. Presence of oriental cues for directing users about various services areas aid users in optimum utilization of the available a range of services provided by libraries, hence users opinions were sought about the public access settings and the availability of guidance system in service areas of libraries.

Table 6.34: Public Access Physical Settings - Service Areas

		University Libraries										Total
		Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10	
Identifiable Service Areas	Count	4	5	2	3	1	2	4	5	1	0	27
	Percent	8.0%	10.0%	4.0%	6.0%	2.0%	4.0%	8.0%	10.0%	2.0%	0.0%	54.0%
Welcoming Service Areas	Count	5	5	2	4	2	5	4	5	5	4	41
	Percent	10.0%	10.0%	4.0%	8.0%	4.0%	10.0%	8.0%	10.0%	10.0%	8.0%	82.0%
Appropriate signage in service area	Count	3	5	0	2	0	4	5	4	1	0	24
	Percent	6.0%	10.0%	0.0%	4.0%	0.0%	8.0%	10.0%	8.0%	2.0%	0.0%	48.0%

Users opinions about the provision of public access settings and the availability of guidance system in service areas of libraries revealed that only 54.0% of participants opined that different service areas were identifiable, further maximum participants to be specific 82.0% were of opinion that the service areas were welcoming, however, merely 48.0% of respondents agreed that appropriate signage was available at different service areas.

Library-wise findings represent that Library 5, Library 9 and Library 10 lack in providing identifiable service areas. All libraries facilitated welcoming service areas. However, There was absence of appropriate signage in service areas in case of Library3, Library 5, Library 9 and Library 10.

Lending process of the library is in varied form according to the type user. Like lending books on campus that is within the library premises, off campus that is home lending, lending for photocopying within library, etc. Even the duration for lending books may differ for different type of students like, it may be different for PG students and Ph.D. students. Table 6.35 elaborated views of participants about lending process.

Table 6.35: Lending Process

		University Libraries										Total
		Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10	
Understand Process of Borrowing	Count	4	5	5	5	2	5	5	5	5	5	46
	Percent	8.0%	10.0%	10.0%	10.0%	4.0%	10.0%	10.0%	10.0%	10.0%	10.0%	92.0%
Lending process - simple and speedy	Count	4	5	5	5	1	4	5	5	5	5	44
	Percent	8.0%	10.0%	10.0%	10.0%	2.0%	8.0%	10.0%	10.0%	10.0%	10.0%	88.0%

In case book borrowing process from circulation counter, maximum i.e. 92.0% of participants opined that they were able to understand the process of borrowing books, and 88.0% of respondents speak out that book borrowing process was simple and speedy. All the participants understood and reported positively about lending process excluding participants of Library 5, as this library was providing closed access with manual book issuing process till the time of field visits.

6.15 Obstacle while using service areas

To find out if any obstacle was faced by users while using study areas the participants were asked to illustrate the type of problems or obstacles they had faced while using study areas.

Table 6.36: Obstacles Encountered while using Service Areas

Particulars	Frequency	Percent	Cumulative Percent
None	23	46.0	46.0
Difficulty to locate service areas	13	26.0	92.0
Need more signage in stacking area	6	12.0	64.0
Difficulty while using OPAC	3	6.0	52.0
Manual catalogue system	3	6.0	98.0
Confusion about call and accession numbers	1	2.0	66.0
PC's are not available for other uses	1	2.0	100.0
Total	50	100.0	

As per participant's opinions, 46% of respondents did not face any obstacle while using and moving through study areas of the libraries. However, the remaining 54% of participants expressed different types of problems. Maximum i.e.26.0% of respondents faced difficulty in locating service areas, 12.0% of respondents felt that there was a need of more signage in stacking areas, 6.0% of participants faced difficulty while using OPACs, 6.0% of respondents were unhappy with the manual catalog, 2.0% of participants were confused due to inability in differentiating call and accession numbers, 2.0% of respondents needed PC for the use of USB however they unable to find terminals with USB drives as the OPAC terminals were not available with USB drives from the respective library.

6.16 Public access settings (Guidance system) while using other floors

University libraries are wide-spread and multi-storied; simply spatial navigation may also be a challenging task in such huge library buildings especially for novice users. To explore the fact about users experiences while navigating and using other library floors they were inquired about whether they had used other library floors and whether the available guidance system aids them in navigation and wayfinding while using other floors.

Table 6.37: Spatial Navigation Experiences while using Library Floors

		University Libraries										Total
		Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10	
Used other floors of library	Count	1	5	2	5	3	3	4	2	5	0	30
	Percent	2.0%	10.0%	4.0%	10.0%	6.0%	6.0%	8.0%	4.0%	10.0%	0.0%	60.0%
Guidance system aid in navigating	Count	0	2	0	4	1	3	2	2	2	0	16
	Percent	0.0%	4.0%	0.0%	8.0%	2.0%	6.0%	4.0%	4.0%	4.0%	0.0%	32.0%

As per participant's opinions, 60% of respondents used other floors of libraries, however, only 32% of participants agreed that the available guidance system aids them in navigating while using other floors of the library. Users from all the libraries

excluding Library 10 used other floors of libraries as this library was not a multi-floored library. However, participants from Library 1 and Library 3 noted that guidance system did not aid them while navigating and using other floors. Even in case of Library 5 the feedback was not strong enough that the guidance system aid users while navigating and using other floors of the library.

6.17 Public access settings (Guidance system) in stacking areas

Good guiding, in the form of clear easily read information, effective labels, and precise printed instructions have long been recognized as an essential part of library management, however, in case of stacking areas, continuous up-dation of labels and stack end signs is essential as the collection grows. In fact, stacking areas are places which need maximum signs to differentiate between subject headings as well as numerical arrangement for quick visibility. Hence participants were asked about their opinions about wayfinding in stacking areas.

Table 6.38: Public Access Settings in Stacking Areas

		University Libraries										Total
		Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10	
Welcoming and navigable stacks	Count	4	2	2	1	0	3	2	5	2	0	21
	Percent	8.0%	4.0%	4.0%	2.0%	0.0%	6.0%	4.0%	10.0%	4.0%	0.0%	42.0%
Appropriate signage in stacks	Count	4	4	1	2	0	1	2	4	2	1	21
	Percent	8.0%	8.0%	2.0%	4.0%	0.0%	2.0%	4.0%	8.0%	4.0%	2.0%	42.0%

Findings from the total responses revealed that only 42% of respondents were agreed on the statements that the stacking areas were welcoming and navigable as well as appropriate signage was available in the stacking areas.

However, library-wise data highlights participants from Library 5 and Library 10 replied that stacking areas were not welcoming and navigable as well as appropriate signage was not available in the stacking areas.

6.18 Descriptions about obstacles while using stacking areas

After entering in stacks at a specific subject division users tend to move around according to the stack end signs and labelling provided within the stacks. Finding one's way through library stacks is not easy. And labelling them coherently and intelligently was proved extremely difficult. Hence participants were asked to describe if any challenges faced by them while using stacking areas.

Table 6.39: Obstacles Encountered while using Stacking Areas

Particulars	Frequency	Percent
No	21	42.0
Difficulty in understanding shelving order	10	20.0
Need signs of subjects headings in stacks	9	18.0
Height of shelves	3	6.0
Closed access	3	6.0
Non-availability of issued status in OPAC	1	2.0
Improper shelving	2	4.0
Less visibility between shelves	1	2.0
Total	50	100.0

The findings from the responses revealed that maximum to be specific 58% of participants experienced that wayfinding and searching information in stacks was challenging due to various reasons such as difficulty in understanding shelving order (20%), inadequate signs of subjects headings in stacks (18%), the height of shelves (6%), difficulty due to closed access (6%), non-availability of book status in OPAC (2%), and less visibility between shelves (2%). A few participants had agreed that they face trouble while using stacking areas (4%), due to improper shelving.

The stacking areas should be ideally clear and unblocked with the provision of sufficient natural light. However, it's not possible for every library situated in a metropolitan city like Mumbai to place the collection in very large rectangular spaces. The collection may be arranged in call number order from top to the bottom or from the bottom floor to the top floor, or the library may be arranged by the subject division. It is important to first have a system, and then to communicate the system to

the users through book location charts, building diagrams, floor maps, and other means like book location guides display. Libraries organize the collection in a comprehensible pattern. However, it should be well-communicative to reach until the end-users.

It was observed during the field visits that stack areas in university libraries were often designed as storage areas, with little consideration given to the users need for a comfortable and welcoming environment in which to perform the frequently difficult task of searching books.

6.19 Public access settings (Guidance system) in study areas

In larger libraries, each main areas or departments will call for a similar broad analysis of its content and organisation. This information has the most value for readers at the entrances, however, it is advisable to provide directional information repeatedly in wide-open spaces like reading rooms and different study areas to facilitate eye-catching visual guidance from a longer distance. However, It is also decided on the basis of availability of spaces and forms of collections. Study areas have more open spaces, hence the directional signs regarding the departments should be preferably repeated here; as such signs will be more visible in open study areas. Participant’s views regarding existing signage in study areas presented below:

Table 6.40: Public Access Settings in Study Areas

		University Libraries										Total
		Library 1	Library 2	Library 3	Library 4	Library 5	Library 6	Library 7	Library 8	Library 9	Library 10	
Welcoming and navigable study areas	Count	5	5	1	5	5	5	3	5	5	5	44
	Percent	10%	10%	2%	10%	10%	10%	6%	10%	10%	10%	88%
Appropriate signage in study area	Count	5	5	3	5	0	4	3	5	1	0	31
	Percent	10%	10%	6%	10%	0%	8%	6%	10%	2%	0%	62%

Findings revealed that only 88% of respondents were agreed on the statements that the study areas were welcoming and navigable and 62% participants opined that appropriate signage was available in the study areas.

Library-wise responses revealed that all libraries facilitated welcoming and navigable study areas excluding Library 3. In this library air-conditions were not working, and there was no provision to open windows, hence there was lack of air ventilation. All libraries provided appropriate signage in study areas excluding Library 5 and Library 10. In case of Library 10, it was informed by the In-charge Librarian that it will be shifted to another building after the completion of the construction of the library building, hence appropriate signage was not placed (Table 5.15 (A)). Library 5 has a status of heritage building hence, the architectural structure cannot be changed, yet signs can be added.

6.20 Obstacle while using library study areas

University libraries facilitate different kinds of study areas for different purposes or as per the forms of collection adjacent to the respective study areas. For instance study area of periodical section, study area of theses section, reference section, likewise, libraries provide different study areas for PG students and Ph. D students. It was difficult to forecast what problems users face in study areas due to the availability of multiple study areas with the different physical setting in each university. Hence participants were asked about the obstacles faced by them related to spatial movements and ease while using study areas.

Table 6.41:Obstacle while using Library Study Areas

Particulars	Frequency	Percent	Cumulative Percent
No	41	82%	82%
Absence of signs	5	10%	92%
Lack of air ventilation	4	8%	100%
Total	50	100%	

Responses revealed that 82% of respondents didn't face any obstacle while 10% opined that there was an absence of signs in study areas, further 8.0% of participants replied the problem of lack of air ventilation in study areas.

6.21 Most welcoming v/s most off-putting aspects of the guidance system

A system of guidance, as a means of leading readers towards more understanding use of libraries, represents a new approach to the exploitation of library resources. However, the effectiveness of the guiding system depends on many factors such as readability, visibility, use of appropriate color contrast, the suitable placement of signs at decision points. In addition, signs should be available in adequate quantity with avoiding cluttering of signs. Hence to assess the effectiveness of existing signs, participants were asked about their opinion on most welcoming as well as most off-putting aspects of existing guidance system.

Table 6.42: Welcoming Aspects V/S Off-Putting Aspects of SIGS

Particulars	Welcoming Aspects		Off-putting Aspects	
	N	Percent	N	Percent
Uniformity of signage	7	24.1%	1	2.3%
Colour contrast	6	20.7%	2	4.5%
Location of sign	4	13.8%	3	6.8%
Size of signs/font	4	13.8%	1	2.3%
Visibility	4	13.8%	4	9.1%
Readability	3	10.3%	0	0.0%
Signage design	1	3.4%	0	0.0%
Lack of adequate signage	0	0.0%	25	56.8%
Only paper signage provided	0	0.0%	6	13.6%
OPACs with incomplete bibliographic details	0	0.0%	2	4.5%
Total	29	100.0%	44	100.0%

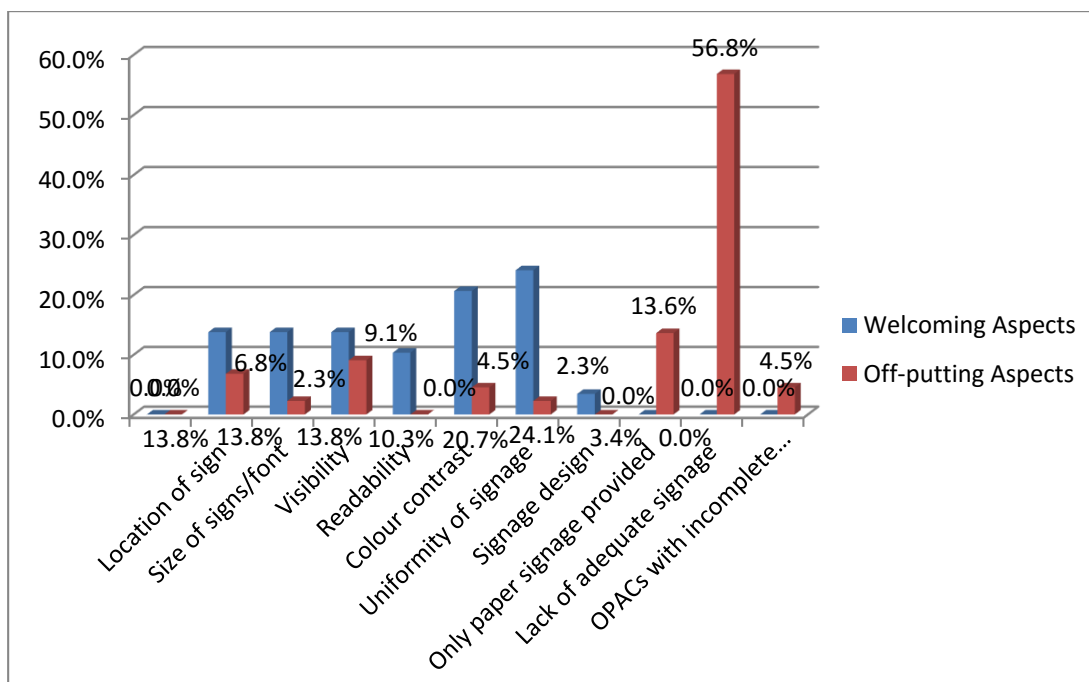


Figure 6.11: Welcoming Aspects V/S Off-Putting Aspects of Sigs

Responses on most welcoming aspects of existing guidance system indicate that uniformity of signs (24.1%), color contrast used on signs (20.7%), location of signs (13.8%), size of fonts (13.8%), visibility (13.8%), and readability (10.3%), were most welcoming features associated with existing signage, however, lack of adequate signs (56.8%) was the most off-putting aspect noted by the participants. A few participants also mentioned about availability of paper signs only (13.6%) and OPACs with incomplete bibliographic details (4.5%) as most off-putting aspects associated with the existing guidance system.

6.22 Opinions on Equipments and Facilities used

The purpose of visiting the library may differ for the visitors though major users' visits libraries for seeking required books or other printed materials. However, users often use various types of equipment and facilities provided by the libraries while completing their information search process, such as the use of the photocopier, computers, internet, library databases, reference books, textbooks any other reading material. To explore which equipments, facilities and forms of sources were preferably more used by users, participants were asked about the sources and facilities used by them.

Table 6.43: Equipment, Facilities and Sources used within Premises

Particulars	Frequency	Percent	Cumulative Percent
Reference sources	19	38%	64%
Textbooks	9	18%	26%
Own laptop, textbooks and reference books	8	16%	80%
Database, Internet and textbooks	4	8%	88%
Laptop, Internet and reference material	4	8%	100%
Library databases	2	4%	4%
Library internet	2	4%	8%
Library desktop, Photocopy machine and reference books	2	4%	92%
Total	50	100%	

Responses revealed that specifically, reference sources (38.0%) were the most used form of library collection by novice users, further, 18.0% of participants used textbooks, 16.0% of respondents used multiple sources together like their own laptops, textbooks as well as reference books, 8.0% of respondents used database, library internet and textbooks, other 8.0% used laptop, library internet and reference material, further remaining used databases (4.0%), library internet (4.0%) and library desktop, photocopy machine and reference books (4.0%) together.

6.23 Experience while using Equipments, Facilities and Sources

Human orientation science not only studies signage, wayfinding and environmental space-related factors but it also takes into consideration the level of ease and comfort provided to the users through the physical settings of libraries through its equipments, facilities and sources. Hence participants were asked about their experiences while using various equipments, facilities and sources of libraries. The question was multiple with choices; hence percent of cases were taken into consideration.

Table 6.44: Experience while using Equipments & Resources

		University Libraries										Total
		L 1	L 2	L 3	L 4	L 5	L 6	L 7	L 8	L 9	L 10	
Confused	Count	1	4	3	3	2	1	2	0	4	3	23
	Percent	2%	8%	6%	6%	4%	2%	4%	0%	8%	6%	46%
Disoriented	Count	0	2	1	0	1	1	2	1	4	3	15
	Percent	0%	4%	2%	0%	2%	2%	4%	2%	8%	6%	30%
Feel need of assistance	Count	5	0	1	3	2	1	1	0	0	0	13
	Percent	10%	0%	2%	6%	4%	2%	2%	0%	0%	0%	26%
Comfortable	Count	3	0	0	0	1	2	3	2	0	0	11
	Percent	6%	0%	0%	0%	2%	4%	6%	4%	0%	0%	22%
Unsatisfied	Count	0	0	1	1	4	0	0	1	3	1	11
	Percent	0%	0%	2%	2%	8%	0%	0%	2%	6%	2%	22%
Ease	Count	0	0	1	0	0	1	1	2	0	0	5
	Percent	0%	0%	2%	0%	0%	2%	2%	4%	0%	0%	10%
Satisfied	Count	2	0	0	0	0	0	0	0	0	0	2
	Percent	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%

Note: L = Library

The responses revealed that maximum, to be specific 46% of participants that is participants from nine libraries out of ten were confused, 30% of respondents feel disoriented that is participants from eight libraries out of ten while using various equipments, facilities and sources of libraries. Further 26% of participants that is participants from six libraries out of ten feel the need of assistance was needed while using equipments and resources. 22% of respondents that is participants from six libraries out of ten were not satisfied after using equipments, facilities and sources of libraries. Very few participants i.e. 22% of respondents that is participants from five libraries out of ten feel comfortable, 10% of participants that is participants from four libraries out of ten found ease, and only 4% of participants that is participants from one libraries out of ten were satisfied after using equipments, facilities and sources of libraries.

Library-wise responses revealed that all participants were confused excluding users from Library 8. Whereas all participants felt disoriented excluding participants of Library 1 and Library 4 while using equipments and resources. All participants felt need of assistance excluding Library 2, Library 8, Library 9, and Library10 while using equipments and resources. Very few participants were comfortable that are from Library1, Library 6, Library 7 and Library 8. Whereas participants from Library 5 and Library 9 were highly unsatisfied while using equipments and resources. Experience of ease was noted by participants of four libraries only out of ten. Experience of satisfaction was informed by only 2(4%) participants from one library out of ten.

6.24 Visibility, Readability and Simplicity of Rules and Regulations Display

The visibility and readability of the display of rules and regulation were also assessed through personal observation during field visits by the researcher. Yet to explore the users' outlook about the visibility, readability and simplicity to understand the message conveyed by the display of rules and regulation the question was raised to 50 participants who were participated for the personal interview.

Table 6.45: Visibility, Readability and Simplicity of Rules and Regulations Display

		University Libraries										Total
		L 1	L 2	L 3	L 4	L 5	L 6	L 7	L 8	L 9	L 10	
Visible	Count	2	5	0	5	1	4	3	5	0	0	25
	Percent	4 %	10 %	0 %	10 %	2 %	8 %	6 %	10 %	0 %	0 %	50 %
Readable	Count	2	5	0	5	0	3	2	2	0	0	19
	Percent	4 %	10 %	0 %	10 %	0 %	6 %	4 %	4 %	0 %	0 %	38 %
Easy to understand	Count	0	5	0	5	0	3	2	3	0	0	18
	Percent	0 %	10 %	0 %	10 %	0 %	6 %	4 %	6 %	0 %	0 %	36 %

Note: L = Library

In case of characteristics of display of rules and regulations 50% participants opined that the display was visible, 38% participants agreed that it was readable and 36% participants replied that the message convey by the display of rules and regulation was easy to understand.

Library-wise responses revealed that display of rules and regulations of three libraries was not visible that is Library 3, Library 9 and Library 10. Further, display of rules and regulations of four libraries was not readable that is Library 3, Library 5, Library 9 and Library 10. The displayed rules and regulations of five libraries out ten were easy to understand.

6.24.1 Visibility of Rules and Regulations

In case of characteristics of display of rules and regulations 50% participants opined that the display was visible (Table 6.45). The nominal variable to test the hypothesis was whether the display of rules and regulations was visible with the category yes or no. The sample of 50 first-year users was interviewed. The null hypothesis was rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of readers. That is rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user. However, the responses were in two categories, hence the expected frequencies were divided by two. That will be 50% for each category. Hence, the observational frequencies and the expected frequencies for each category will be as following:

Table 6.46: Rules and Regulations Visible – Observational and Expected Frequencies

Visible	Observational Frequency	Percent	Expected Frequency	Percent	Residual
Yes	25	50	25	50	0
No	25	50	25	50	0
Total	50	100.0	50	100.0	

As per the observed frequency 25 (50%) that is $f = 25$ participants replied that rules and regulations displayed in libraries were visible, and 25 (50%) $f = 25$ replied that rules and regulations displayed in libraries were not visible. The expected frequency is also 25 for yes category and 25 for no category; hence the residual was 0; however as per the null hypothesis rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user.

Table 6.46 (A): Visibility of Rules and Regulations-Chi-Square Test

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	34.000	9	.000
Likelihood Ratio	45.846	9	.000
Linear-by-Linear Association	2.283	1	.131
N of Valid Cases	50		

Though there was not any difference between the observational and expected frequencies, the results obtained through Chi-Square test with the 95% of confidence level indicate that the value of Pearson Chi-Square was $X^2 = 34.000$, $p = .000$, which was statistically significant at 0.05 level. The findings indicate that visibility of the display of rules and regulation lead to inconvenience of readers.

6.24.2 Readability of Rules and Regulations

In case of characteristics of display of rules and regulations 38% participants agreed that the display of rules and regulations was readable (Table 6.45). The nominal variable to test the hypothesis was whether the display of rules and regulations was readable with the category yes or no. The sample of 50 first-year users was interviewed. The null hypothesis was rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of readers. That is rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user. However, the responses were in two categories, hence the expected frequencies were divided by two. That will be 50% for each category. Hence, the observational frequencies and the expected frequencies for each category will be as following:

Table 6.47: Rules and Regulations Readable – Observational and Expected Frequencies

Visible	Observational Frequency	Percent	Expected Frequency	Percent	Residual
Yes	19	38	25	50	-6
No	31	62	25	50	6
Total	50	100.0	50	100.0	

As per the observed frequency 19 (38%) that is $f = 19$ participants replied that rules and regulations displayed in libraries were readable, and 31 (62%) $f = 31$ replied that rules and regulations displayed in libraries were not readable. The residual was -6, as 6 more were expected to say yes but they replied no, however as per the null hypothesis rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user.

Table 6.47 (A): Readability of Rules and Regulations-Chi-Square Test

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.626	9	.001
Likelihood Ratio	39.486	9	.000
Linear-by-Linear Association	6.053	1	.014
N of Valid Cases	50		

The results obtained through Chi-Square test with the 95% of confidence level indicate that the value of Pearson Chi-Square was $X^2 = 29.626$, $p = .001$, which was statistically significantly different at 0.05 level. The findings indicate that readability of the display of rules and regulation leads towards inconvenience of readers.

6.24.3 Rules and Regulations: Easy to Understand

In case of characteristics of display of rules and regulations 36% participants opined that the message conveyed by the display of rules and regulation was easy to understand (Table 6.45). The nominal variable to test the hypothesis was whether the display of rules and regulations was readable with the category yes or no. The sample of 50 first-year users was interviewed. The null hypothesis was rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of

readers. That is rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user. However, the responses were in two categories, hence the expected frequencies were divided by two. That will be 50% for each category. Hence, the observational frequencies and the expected frequencies for each category will be as following:

Table 6.48: Rules and Regulations Easy to Understand – Observational and Expected Frequencies

Visible	Observational Frequency	Percent	Expected Frequency	Percent	Residual
Yes	18	36	25	50	-7
No	32	64	25	50	7
Total	50	100.0	50	100.0	

As per the observed frequency 18 (36%) that is $f = 18$ participants replied that rules and regulations displayed in libraries were easy to understand, and 32 (64%) $f = 32$ replied that rules and regulations displayed in libraries were not easy to understand. The residual was -7, as 7 more participants were expected to say yes but they replied no; however as per the null hypothesis rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user.

Table 6.48 (A): Rules and Regulations: Easy to Understand -Chi-Square Test

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	79.412	18	.000
Likelihood Ratio	89.388	18	.000
Linear-by-Linear Association	28.819	1	.000
N of Valid Cases	50		

The results obtained through Chi-Square test with the 95% of confidence level indicate that the value of Pearson Chi-Square was $X^2 = 79.412$, $p = .000$, which was statistically significantly different at 0.05 level. The findings indicate that the ease in understanding the content of the display of rules and regulation results in inconvenience of readers.

6.25 Other Obstacles or Problems Experienced by Users

The science of human orientation is being propounded to remove all the product and service deficiencies and make the life of common people more liveable, smooth and hassle-free. Building designers and planners are not often aware of the future use of respective spaces created by them from the angle of library staff and their users, which results in difficulties while using building features for the end-users. Further, one more challenge that the human race is facing in modern times is of adjusting itself with the techno-sphere which is continually changing due to confrontation with new technology and the time lag in responding to it. Due to these aspects library, users may face the problem of dehumanization or of strengthening their relationship with libraries as a community place. Hence identify the hassles faced by users and facilitate more convenience through physical settings, environment and technology and equipments participants were asked about whether they faced any other problem or obstacle due to building features, equipments, technology, stacking areas and staff support.

Table 6.49: Building Features Which Result in Hassles in Library Use

Particulars	Frequency	Percent	Cumulative Percent
Not ticked	33	66.0	66.0
Poor signage system	12	24.0	92.0
Difficulty in finding departments	3	6.0	98.0
Confusing building layout	1	2.0	68.0
Absence of directional signage	1	2.0	100.0
Total	50	100.0	

Responses revealed that the hassles faced by participants due to building features were mainly associated with the signage systems of libraries. Though 66.0% did not face any problem associated with building features, from the remaining participants 24.0% faced obstacles due to poor signage system, 6.0% experienced difficulty in finding departments, 2.0% opined that the confusion was due to building layout, and other 2.0% replied that confusion was due to absence of directional signage. Thus findings associated with existing building features revealed that all the participants who faced obstacles while using building features suggest the need for improvement in the existing signage system.

6.26 Technology aspects which result in hassles in-library use

A variety of anxieties are being generated due to confrontation with new technology until it is accepted by its users. Human life has inevitably become more complex with the everyday change in techno-sphere. Hence participants were asked to elaborate if they had faced any obstacle related to technical aspects.

Table 6.50: Technology Aspects Resulted in Hassles in Library Use

Particulars	Frequency	Percent
Not faced any problem	15	30
OPAC related problems	31	62
Internet-related problems	2	4
Unavailability of Laptop charging facility	2	4
Total	50	100

The responses revealed that maximum i. e. 70% participants faced obstacles while using library resources due to technology-related aspects, out of those major participants face problems related to OPAC use, from the remaining 4% faced problem of internet connectivity, and 4% opined about the unavailability of Laptop charging facility. Various OPAC related aspects were explained in the Table 6.51.

Table 6.51: OPAC Related Aspects Resulted in Hassles in Library Use

Particulars	Frequency	Percent	Cumulative Percent
Not faced Problems in OPAC use	19	38.0	38.0
Problems related to OPAC	11	22.0	62.0
Need online catalogue service	7	14.0	90.0
Provision to enlarge OPAC results window	3	6.0	68.0
Unavailability of floor location in OPAC	3	6.0	76.0
Unavailability of automated services	2	4.0	94.0
Unavailability of OPAC manual	2	4.0	98.0
Unaware about e-resources	1	2.0	40.0
Department-wise OPAC searching not available	1	2.0	70.0
Unavailability of text and ref books status in OPAC	1	2.0	100.0
Total	50	100.0	

The responses revealed that maximum i. e. 62% participants faced obstacles while using library resources due to technology-related aspects, out of that 22.0 % faced problems related to OPAC, 14.0% opined the need of online catalogue services as in case of two libraries under the study, OPAC was not available due to incomplete library automation process. 6.0% of respondents suggest that there should be provision to enlarge window of OPAC results, other 6.0% of participants faced problem due to unavailability of floor location in OPAC results. It was observed during the field visit that automation process of one of the library was in process, as a result, OPAC was not available, 4.0% of respondents replied that there was the unavailability of automated services. 4.0% opined that they face obstacle while using OPACs due to unavailability of OPAC manuals. 2.0% of participants replied that they face problem in OPAC use due to availability of department-wise OPAC searching. Remaining 2.0% of respondents replied about the unavailability of text and reference books status in OPAC as an obstacle in OPAC use.

6.27 Obstacles related to staff assistance

Emergence and acceptance of technologies is an effect of transformation of traditional libraries into automated, hybrid and digital libraries. However due to more reliance on machines and technology library users often feel that this results in dehumanization and lack of personal touch with the library and its staff. To explore what users had experience in this regard participants were asked whether they had faced any difficulties associated with library staff and their assistance.

Table 6.52: Obstacles Related to Staff Assistance

Particulars	Frequency	Percent	Cumulative Percent
Not faced any obstacle related to staff assistance	43	86	86.0
Non-availability of counter staff	6	12	100.0
Behavior of library staff	1	2	88.0
Total	50	100	

Responses revealed that maximum to be specifically 86% of participants were agreed that they had not face any problem associated with staff assistance. Very few i.e. 12% of respondents replied that they face obstacle during wayfinding and while physical information search process due to non-availability of counter staff, further only 2% of

respondents faced problems due to behavior of library staff. However, the findings thus indicate that maximum i.e. 86% of participants were satisfied with the approach of library staff.

6.28 Participants' Suggestions

The technical and psychological considerations for effective sign system may differ for each library depending upon its physical layout, size of the building, and available provision of open spaces. For the library staff, the library building is a familiar place as it is a workplace for them, and they are using the same place for a number of years, therefore they might not realize the need of adding signs. However for users the university library as academic place has unfamiliar surroundings, hence user opinions and suggestions will lead to improving the existing sign system. Taking this fact into consideration participants were requested to share their suggestions to improve the existing sign system. They are shown in Table 6.53.

Table 6.53: Participants' Suggestions

Division	Particulars	Responses		Percent of Cases
		N	Percent	
Sign related suggestions	Addition of Directional signs	19	21.3%	38%
	Addition of floor maps	6	6.7%	12%
	Addition of building map	4	4.5%	8%
OPAC related suggestions	Location of material in OPAC	9	10.1%	18%
	OPAC Manual or instructions about OPAC use should be available	7	7.9%	14%
	Need status of book in OPAC	7	7.9%	14%
	Floor-wise stacking arrangement chart near OPAC	6	6.7%	12%
	Provision to enlarge OPAC results window	3	3.4%	6%
Access and physical environment related suggestions	Need open access	6	6.7%	12%
	Need provision of natural light or opening windows	6	6.7%	12%
	Provision for Air ventilation	5	5.6%	10%
	Need In-depth lib orientation	4	4.5%	8%
	Need additional working hours for library	3	3.4%	6%
	Need of additional baggage counter	3	3.4%	6%
	Embossing on the spine of bound collection	1	1.1%	2%
Total		89	100.0%	

Responses revealed that in case of suggestions regarding signs 21.3% of participants opined that more directional signs should be added, 6.7% of participants suggested to add floor maps, and 4.5% suggested adding building maps. In case of suggestions related to OPAC, 10.1% respondents suggested to add the location of each material in OPAC, 7.9% suggested that OPAC manual should be available near OPAC terminal, 7.9% advised that status of a book should be added in OPAC, 6.7% suggested to place a floor-wise stacking arrangement chart near OPAC terminals, and 3.4% opined that provision should be there to enlarge OPAC results window. Further, regarding accessibility and library environment, 6.7% demanded open access to the entire collection, besides, 6.7% proposed that provision of natural light or opening windows should be provided, 5.6% guided to facilitate provision for air ventilation in stacking areas, 4.5% expressed the need of an in-depth library orientation, 3.4% suggested a need of additional baggage counter at the entrance, 3.4% argued about the need of additional working hours for library, and 1.1% advised to facilitate embossing on the spine of bound collection for ease in identification.

6.29 Force Field Analysis of the findings

Force Field Analysis was created by Kurt Lewin in the 1940s. Lewin originally used it in his work as a social psychologist. It provides a framework for looking at the factors (forces) that influence a situation, originally social situations. At present it is also used in business and management. The tool is useful for making decisions by analyzing the forces for and against a change, and for communicating the reasoning behind decision making.

Force Field Analysis was used to describe driving causes towards the aim and blocking causes towards the aim for making libraries humanely oriented. On the basis of observations and findings following Force Field analysis is presented:

Table 6.54: Force Field Analysis of the Findings

Sr. No.	Users Expectations/ Ideal Situation	Existing Scenario	Constraints/ Hindrances
1	<p>There is a need to add different wayfinding tools within the campus, such as campus maps, information kiosks, directional signs, floor maps, building maps, directories, ‘you are here’ maps, pictorial signs, etc. in all the university campuses.</p> <p>*Medium</p>	<p>Table 5.2 revealed that 57.9% of participants opined that campus map was available either at the university entrance or at decision points. However, 42.10% of participants replied that the campus map was not available in the university libraries in Mumbai.</p> <p>45.1% of participants were able to reach the library from the campus gate within less than five minutes. However, 22% of participants required more than five minutes up to ten minutes to reach the library. However, 32.9% of participants required more than ten minutes to reach the library from the university campus gates (Table 5.4).</p> <p>On the other hand, as per the field observation of the researcher, all the university libraries under research are at the average walkable distance of five minutes from the entrance of the campuses.</p>	<p>Librarians are not considered while planning signage system for the university campus.</p> <p>*Medium</p>
2	<p>Adequate signage with good readability, legibility and visibility throughout the library building</p> <p>*High</p>	<p>Though more than 70% of signs were of permanent form, yet 30% of signs were temporary from the total signs observed from all the universities. The mean chart of library-wise responses for opinions on the readability of font size illustrated that in 40% (4) libraries, signs were readable as per user’s opinions; however in 60% (6) libraries signs, lacked readability.</p> <p>Only three university library buildings provide campus maps at</p>	<p>In case of the presence of a librarian when the building was planned, 90% of university librarians were appointed later on or joined newly after the retirement of earlier university librarians.</p> <p>None of the studied librarians specified that the library was planned and constructed as per</p>

Sr. No.	Users Expectations/ Ideal Situation	Existing Scenario	Constraints/ Hindrances
		<p>the entrances. Remaining seven libraries do not provide campus maps.</p> <p>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.</p> <p>From the ten university library buildings, five libraries provided informational signage for locating departments, functions, and services.</p> <p>Within ten university library buildings only four libraries provided the display of library's working hours.</p> <p>Out of ten libraries in three libraries utility of signage system was not up to the mark to provide right direction while wayfinding.</p>	<p>specific building construction norms.</p> <p>In the case of university libraries in Mumbai, geospatial analysis (GIS) was not done in any university library while planning and constructing or even in redesigning university library buildings.</p> <p>* High</p>
3	<p>Availability of adequate signage which will lead to self-orientation, Floor location in OPAC, Chart of call numbers & subject heading near OPAC, Additional subject heading on stacks</p> <p>*Medium</p>	<p>While wayfinding and physically reaching the information source, maximum users took other users help or inquired at the counter, very few users used instructional and directional signs due to inadequacy of signage. The total mean scores for factor ease in finding objects, sections and services were highest (3.78) among all other factors, which indicates that finding and locating objects, sections and services was not much complex with the help of</p>	<p>Findings show that 20% of university libraries in Mumbai had provision of allocating budget for acquiring and maintaining signage; however, 80% of libraries don't have any provision for allocating budget authoritatively for acquiring signage.</p> <p>In the case of</p>

Sr. No.	Users Expectations/ Ideal Situation	Existing Scenario	Constraints/ Hindrances
		<p>available signage. The display of floor-wise splits in the collection was provided only by a single library out of ten university libraries under the study.</p> <p>However, participant's feedback revealed that finding books on shelves was more challenging for maximum participants (3.32) from all the libraries.</p>	<p>university libraries in Mumbai, only 30% of libraries conducted signage audit, rest 70% of the university libraries never conducted signage audit.</p> <p>*High</p>
4	<p>Need In-depth library orientation with physical library tour, PPT with instructions as well as user education workshops, provision of video tours through the library website.</p> <p>*Medium</p>	<p>In the case of library orientation, a maximum of i.e.72.9% (239) participants had attended library orientation programmes; however, 24.7% (81) replied that they had not attended orientation programmes. Further, 2.4% (8) participants informed that the orientation program was not provided to them due to the non-appointment of a librarian at one university.</p> <p>The comparative analysis shows that though 72.9% of participants attended library orientation, however only 47.6% of participants were able to find the required information sources on their own. User's responses about the post-orientation awareness about various information sources revealed that maximum participants were aware of books, databases and e-journals, however maximum participants, even though they mentioned the importance of other sources, yet were unaware of audio-visual material, OPAC, circulation counter and printed thesis.</p>	<p>In the case of university libraries in Mumbai, 90% of university libraries provide library orientation every year. However, 10% of university libraries do not provide library orientation due to the non-availability of the librarian as the post was vacant while surveying.</p> <p>Library 10 due to the non-appointment of a librarian as well as the library was planned to shift at the time of the survey.</p> <p>*High</p>

Sr. No.	Users Expectations/ Ideal Situation	Existing Scenario	Constraints/ Hindrances
5	<p>Need of OPAC with complete bibliographic details, availability of location of source with the floor location in OPAC, OPAC manual near the terminals, provision to enlarge OPAC results window, Need the status of the book in OPAC, Floor-wise stacking arrangement chart near OPAC, Instructional video on OPAC terminals</p> <p>*High</p>	<p>Unavailability of OPAC manual, unavailability of floor location in OPAC, unavailability of text and reference books status in OPAC, unavailability of automated services in one university library,</p>	<p>OPAC was not available at Library 5 due incomplete automation process.</p> <p>*Medium</p>
6	<p>Precision regarding locations of sources, advancements in searchability, availability of OPAC manuals and availability of OPAC terminals near entrances as well as in stacking areas</p> <p>Need additional signage in stacking area, appropriate shelving,</p> <p>*High</p>	<p>The total of mean scores for the time taken to find a source in stacking (3.46) by maximum users shows users required 9 to 12 minutes to find information sources in case of all the libraries in Mumbai due to non-availability of a book on place, many users unable to understand stacking arrangement, improper shelving, inadequate signage in stacking areas. Maximum participants (52.4%) were unable to locate and find information sources on their own, that is, without taking assistance of library staff in case of university libraries in Mumbai.</p>	<p>Insufficient staff to assist users whenever needed.</p> <p>*Medium</p>

Sr. No.	Users Expectations/ Ideal Situation	Existing Scenario	Constraints/ Hindrances
7	<p>Good air ventilation, design to control temperature, roof height, provision of natural light and welcoming atmosphere.</p> <p>*Medium</p>	<p>The opinions from all the libraries on library environmental factors such as design to control temperature, roof height, provision of natural light and welcoming atmosphere collectively revealed that maximum participants or users were satisfied with the environmental ambience within the respective libraries under the study, yet few users were dissatisfied with the available air ventilation system.</p>	<p>Financial crisis is an important hurdle while organizing library space and signage.</p> <p>*High</p>
8	<p>Universal access with Convenience and access facilities as well as information sources in alternative formats and assistive devices.</p> <p>*High</p>	<p>Librarians responses revealed that only 30% (3) libraries provide wheelchair facility, only 10% (1) library from ten university libraries, facilitates alarm system that combines visual and audio, broacher in Braille form, handrails on both sides of stairways, handrails in long corridors, large font signs, ramps at the accessible entrances, restrooms for disables, in addition in one university library facilitates maximum resources on the ground floor for special users.</p> <p>Findings revealed that since Library 2 have a separate section for special and blind users, all the assistive devices like Book reading software 14.3% (1), Braille embosser 14.3% (1), OCR scanner 14.3% (1), Refreshable Braille display 14.3% (1), Screen reading software 14.3% (1) were available in the said library. Other libraries had not provided any assistive devices. The provision of tactile and touch maps was not available in any university library in Mumbai.</p>	<p>In metropolitan cities like Mumbai, it is difficult for libraries to grow horizontally due to space crisis. The problem of space crunch is a major challenge for libraries behind facilitating splendid spaces, universal access, along with humanely oriented ambience.</p> <p>*High</p>

The suggestions based on Force Field Analysis are explored in chapter seven.

6.30 Summary

The qualitative data collection and its analysis facilitated more effective results in judging the psychology of users and noting their behavioral expressions. The findings obtained through observation of users revealed that participants from nine libraries out of ten were confused, participants of eight libraries out of ten feel disoriented while using various equipments, facilities and sources of libraries. Further participants from six libraries out of ten feel the need of assistance was needed while using equipments and resources, participants from six libraries out of ten were not satisfied, very few that is participants of five libraries out of ten feel comfortable, participants from four libraries out of ten found ease, and participants of only one libraries out of ten were satisfied after using equipments, facilities and sources of libraries (Table 6.44). Maximum that is 50% participants experience confusion while navigating and searching for information sources in libraries (Table 6.7). Despite the availability of existing signage, many participants in university libraries realized that wayfinding was challenging or not self-oriented due to the complexity of library buildings and insufficient signage. As a result, major participants that is, 70% and 24% had taken assistance or hint from library staff or other library users during experiment (Table 6.2). The observational finding of library users highlights that, university libraries in Mumbai lack in self-orientation of library users.

To assess the comprehension of the sign utility all the signs available in university libraries under the study were studied and analysed. University-wise categorical division of signage highlights that Library 4 had maximum directional signs, as compared to other libraries Directional signs were available in small numbers in other libraries under the study. Very limited identical signs were available in many libraries and 50% libraries there was an absence of regulatory signs (Table 6.15). In case of sign placement, many libraries had preferred to place directional signs at or near the entrances. Browsing area is also suitable for the placement of directional signage. Only six libraries out of ten had used browsing area for the placement of directional signs rest libraries had not placed any signage in browsing areas. Besides, six libraries out of ten placed a sign for locating OPAC terminal near the online catalogue search area. Doors of individual departments and sections can be the best location for placing

identification signs especially for locating sections, departments and services. Only three libraries out of ten had place identification signs on doors (Table 6.16).

Through library building observation it was revealed that 50% of libraries were not identifiable due to the absence of library name signs (Table 6.23). The international sign for the library was not available at any of the libraries under study which is an important exterior sign (Table 6.23). The provision of space near the entrance was available in all the libraries under study. However, it was found that there was a need to add more directional signage near the library entrances, such as library building map or building directory, floor maps, display of working hours, and directional arrows with descriptions of adjoining departments in case of a few libraries (Table 6.24). In 90% (9) libraries circulation counter was available near the entrance. However in the case of 30% (3) libraries even though located near the entrance circulation counter was not identifiable due to the absence of signage. 90% (9) libraries under the study had a computer lab in libraries with the signage for the same (Table 6.25).

Use of symbols with descriptive signs makes the signage clearer and easy to understand for library users while navigating spatially. In university libraries in Mumbai, there was an absence of the use of symbols for signs excluding the use of symbols for restrooms signs (Table 6.29).

Library signage must be well planned if they are to function effectively and efficiently. The present chapter described the observational findings with the behavioral analysis of users, further; it provided examples and illustrations of existing signage system with its building features and characteristics. In addition, users opinions collected through selective interviews of participants gave a vision regarding the problems faced by users related to wayfinding. In addition, spatial navigation and information search process as well as the suggestions provided by the participants will lead to achieve an improved visual guidance system in university libraries in Mumbai. On the basis of insights gained through quantitative and qualitative analysis of users' responses, the next chapter suggests incentives for creative and thoughtful library signage.

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Chapter 7

**SUMMARY AND
RECOMMENDATIONS**

CHAPTER VII

SUMMARY AND RECOMMENDATIONS

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CHAPTER 7

SUMMARY AND RECOMMENDATIONS

7.1 Introduction

The present chapter comprises of the rationale, objectives and summarizes significant findings of the existing research. Based on these findings, it also suggests measures to make university libraries more humanely oriented. These measures and recommendations will guide and assist librarians to make their libraries user-friendly. The chapter also offers directions for further research in the area of Human Orientation, wayfinding and signage for academic libraries.

7.2 Rationale

Human behavior is very much influenced by physical environment. Large public places and huge structures often create confusion and uncertainty in the minds of people, especially first-time visitors. In public spaces, people can find their way or get lost and disoriented. Human orientation tries to explore what may be going on in the minds of concerned persons and then anticipate the possible causes or elements of confusion.

Whenever people enter an unfamiliar environment, they experience disorientation and stress. Libraries are no exception. They intimidate potential users through their size, complexity, design, and layout of the library building, unfamiliar tools, and equipment. Wayfinding is the method that orient humans, navigates in space, particularly in built environments, constructed surroundings either in cities, towns, buildings, including libraries.

Human Orientation helps to complete the process that begins with the acquiring, organizing and storing of information sources for quick and easy retrieval. Human Orientation Science supplements the services of library staff in helping users gain access to the library collections. In addition, a humanely oriented library sets a tone for the library, subtly conveying that a library has a friendly, welcoming atmosphere and a well organized efficient place.

7.3 University Libraries and Human orientation

University libraries can be very different from one another in their architecture and floor plans. Though most libraries are organized, based on one the classification systems, very often, this is at a secondary level, the primary classification being with the designated departments. There are very few actual rooms housing the collections. Most items are stored in departments that often encompass large open spaces, sometimes floors. Because of 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. Neither the items in the collection nor the shelving has many distinguishing characteristics to aid in the finding process. Just getting information about where the items are stored in the building is often a challenge.

As a medium for information, the university library serves a wide spectrum of information seekers and has a crucial role to play as a facilitator of information and knowledge provider. University library users are of varied ages, backgrounds, and educational levels. Many of them do not have experience of using such libraries; some may have never been to a large library before. In addition, every year, such libraries receive new users. Hence, unhindered access to knowledge is essential in the scholarly communication process. Human orientation science will definitely play an important role here to anticipate and draw out causes of difficulties and irritations experienced by both users of the library as well as library staff in their day to day work.

7.3.1 Need of Human Orientation in University Libraries

Besides the factor like convenience and ease, there is an ardent need for the libraries to be humanely oriented when ICTs are impacting the libraries. Following are other clues indicating the need of HO in university libraries.

7.3.1.1 Serves a wide spectrum of information seekers: University libraries cater to different types of users like PG students, research scholars, faculty, non- teaching staff, guest readers, institutional members etc. In addition, every year such libraries

receive new users. Needs of each category of readers are different and levels of comfort and familiarity with the spaces, resources and services in these libraries also differ. Therefore it is challenging to cater all users with personalized assistance and guidance.

7.3.1.2 Different structures of different university libraries: University libraries can be very different from one another in their architecture and floor plans. Some are historic structures that have been retrofitted to house their current collections. A user cannot necessarily enter one large library and expect it to have the same layout as another.

7.3.1.3 Introduction of new technologies: Due to advancement in technologies, information is available in different forms. Remote access is also possible to search required information; therefore, the availability of the information is also in different forms in the library at different places. For example, in the university library there will be CD's collection stored separately; selected databases will be available in the computer lab of the libraries. Because of these technological changes, there are designated departments in university libraries according to the changing forms of collection. The creation of such varied departments and sections needs guidance and orientation.

7.3.1.4 Dehumanization: In the past, library services were mainly provided by personal assistance and guidance. Today it has been demonstrated that personalized contact may be "dehumanizing" in effect, particularly in university libraries, as these libraries are fully automated.

7.3.1.5 Confusing floor plans and poor signage: Confusing floor plans, poor signage and use of library jargon, poor directional information, incomplete instructions or guidelines confound library patrons, especially first- time visitors.

7.3.1.6 Excessive commercialization: Due to excessive commercialization, manufacturers and publishers often do attractive packaging of their products, but removing this attractive packaging, the real product may create confusion while using or searching the same product in case of libraries. For example, in the case of hardcover books having book jackets, the publishers often make the book jackets

more attractive and colorful. But when the jackets are removed, the plain hardcover of both sides makes it difficult for readers to search for the same book.

Hence, it is planned to conduct the study of human orientation with reference to university libraries.

7.4 Contributory Features of the research

Human Orientation Science is a new concept as the term 'Human orientation science' was coined in 1990's by Modak and Patkar (1993). They applied Human orientation to transportation terminals as public places. They further suggested that human orientation can be applied to other public places like health and banking sectors, including academic institutions including their libraries to make libraries user-friendly. Taking up their perspective of Human Orientation Science, this research is developed with mixed method. Following are some contributory features of this research.

7.4.1 Subject Experts' Interviews

In-depth interviews of these two pioneering experts were mainly conducted to explore principles of Human Orientation Science and their applicability to libraries, methodology of HO science, and its applicability in Libraries.

Chapter 4 portrays the contribution of two pioneering scholars who promoted the concept of Human Orientation Science and applied the same to various areas like transport, health and banking sectors. Further, the chapter presents the application side/features of the concept with the help of interviews of the experts conducted as a part of the research.

7.4.2 Framework of Ranganathan's theory of knowledge

Dr. S. R. Ranganathan formulated and enumerated five fundamental categories to be used in library classification, which are applied while considering user-friendly and humanely oriented libraries. Features/components of Information seeking behavior are the approaches opted by users while seeking out the required information. The study of experiences in the field of Human Orientation thus is the foundation for investigating information seeking behavior. Ranganathan categorised human

knowledge using concepts of “Personality”, “Matter”, “Energy”, “Space”, and “Time” (PMEST). Based on the analogy of the framework of Ranganathan’s categorisation of human knowledge (PMEST), information behavior of novice library users in relation to human orientation measures adopted by libraries, their user’s wayfinding behavior and navigational experiences were studied through the application of PMEST framework of human knowledge in this research.

The following table explains the categories applied in the context of present research:

Table 7.1: Categorization Of PMEST Facets

Categories	Analogy	Application
Personality (P)	Who	Novice library users and librarians
Matter (M)	What	Available signage and wayfinding tools
Energy (E)	How	Accomplished information seeking Tasks
Space (S)	Where	Library buildings and sections, services and spaces
Time (T)	When	Task Completion Time

The above categorisation is used to understand human wayfinding behavior while information seeking by drawing the following analogies:

7.4.2.1 Personality: Personality indicates the kind of people or users or personality trait chosen for a particular study. With this need and concern, the present study was conducted, which focuses on wayfinding experiences and behavior of novice university library users in Mumbai. As well as librarians’ perspectives about making libraries humanely oriented and the constraints faced by them were also covered in personality factor.

7.4.2.2 Matter: Matter includes the available signage and wayfinding tools, including technological resources accessed by library users during the physical observation of participants as well as responses received from participants through questionnaire associated with the existence and availability of essential signs.

7.4.2.3 Energy: Energy entails the tasks and processes performed by participants during the information source search, including their wayfinding behavior as well as problems faced by participants in the course of information seeking.

7.4.2.4 Space: Space entails the university library buildings in Mumbai for the present study and the kind of spaces available for library users in the libraries.

7.4.2.5 Time: Time entails the total time needed for wayfinding and information to be accessed for the selective participants during the field observation.

The framework of Ranganathan's theory of knowledge and its application through Ranganathan's categorization of human knowledge (PMEST) was applied and analyzed and explained in the present chapter further in Section 7.11 by integrating and summarizing key findings from qualitative and quantitative analysis results.

7.4.3 Diverse methods of data collection and analysis

Data was collected through various data collection tools like, questionnaire for users as well as university librarians and structured observation schedule for users, and interview of selective users as well as structured observation schedule for library building observation along with photographs and videos wherever permitted with the due consent of users. Mixed method and diverse tools gave the researcher an opportunity to conduct the research in an in-depth manner.

The qualitative data collected through observation of participants as well as through photographs and videos was coded and analyzed using ATLAS.ti (Qualitative Data Analysis and Research Software) and SPSS (Version 20), to cross-check its validity and accuracy.

7.4.4 Signage Model for Libraries

The study also developed a signage planning model for university libraries with the checklist of various external as well as internal signs. This would serve the purpose of providing signage guidelines for university libraries while renovating or considering signage for NAAC.

7.4.5 Force Field Analysis

Force Field Analysis was used as tool for root cause analysis. By the use of Force Field Analysis, driving causes towards the aim and blocking causes towards the aim for making libraries humanely oriented were described.

7.5 Objectives

The broad objective of the study was to assess the navigational aspects from the user's point of view and evaluate the available guidance tools to facilitate ease of wayfinding and overall usability.

The study was conducted with the following specific objectives:

1. To find out users outlook regarding ease in physical search of service departments while using university libraries in Mumbai.
2. To investigate the extent of convenience and results thereof experienced by the readers while using university libraries in Mumbai.
3. To evaluate the document delivery processes affecting the users while using university libraries in Mumbai.
4. To find out ways and means to make university libraries in Mumbai more user-friendly and easily accessible.
5. To explore the appropriateness in the display of rules and regulations provided by university libraries in Mumbai.
6. To discover the suitability of signage system used in university libraries in Mumbai.
7. To find out the provisions made in university libraries in Mumbai, including physically challenged users, related to wayfinding indicators.
8. To find out the provisions made in university libraries in Mumbai, including physically challenged users, for convenience in searching library material.

7.6 Hypotheses

The following specific null hypotheses were formulated for the study based on the objectives.

Ho1 University library users are not facing any problem or confusion while searching different service departments of university libraries.

Ho2 There is no significant relationship between human orientation and the extent of convenience experienced by the readers while using university libraries in Mumbai.

Ho3 There is no significant relationship between circulation processes and operations and the ease of use in the case of university libraries in Mumbai.

Ho4 There is no significant relationship between human orientation and user-friendliness of university libraries in Mumbai.

Ho5 Rules and regulations displayed in university libraries in Mumbai are not leading towards convenience of readers.

Ho6 There is no significant relationship between the signage system and certainty among readers while using university libraries in Mumbai.

7.7 Research Methodology

The present study followed a mixed method of research, including qualitative as well as quantitative aspects. This basically is an explorative survey method. In order to have a comprehensive enquiry into human orientation aspects applied to university libraries in Mumbai, the mixed method of research with qualitative and quantitative approaches were used for data collection and analysis. Mixed method research design (QUAL + QUANT) was used adopting the concurrent design in which both strategies are perused in parallel. This form of research fulfils both qualitative and quantitative approaches, in combination, and lends depth to the inquiry.

7.8 Population and Sample

The study involved finding out the attitudes/approaches while wayfinding on the basis of the experiences of the new users of university libraries in Mumbai. The study further considered librarian's perspective towards the human orientation aspects.

7.8.1 Library users

As per the list of UGC, total of eleven universities fall under the Mumbai region. From these eleven universities, two universities also have branch libraries. Hence there are 13 university library buildings falling under the Mumbai region, including branch libraries. Three university libraries were excluded from the study due to consent issues. Therefore, total of ten university libraries newly enrolled users of Mumbai were considered as a population for the present study.

As per the enrolment data available from respective universities total of 5135 students were enrolled for the academic year 2017-18 for the first-year of PG courses and first-year M.Phil./ Ph. D. courses. Therefore 5135 was the total population for the study.

Total 400 questionnaires were distributed to new library users and 328 filled questionnaire received from novice library users, which includes the first-year of PG courses and first-year M.Phil./ Ph. D. courses as well as newly appointed teachers.

7.8.2 University Librarians

Questionnaires were administered to all ten university librarians.

7.9 Methods of Data Analysis

Quantitative data was coded and tabulated for the systematic study. Descriptive interpretation of data including frequencies, percentages, and means was displayed in tables to enhance the meaning of collected data. SPSS 20.0 was used for data analysis.

The qualitative data was collected through observation of participants as well as through photographs and videos which were coded and analyzed using ATLAS.ti (Qualitative Data Analysis and Research Software) and SPSS (Version 20), to cross-check its validity and accuracy.

Signs of each university library building were analyzed and evaluated on the basis of factors such as the number of signs available, nature of signage type (directional, instructional and regulatory), classification of signs (permanent and temporary), placement and location of signs in each library, the language and utility of signs, consistency, readability, visibility of signage and the signs which need to update or remove. While considering and counting signs, stack end signs were considered as one sign for entire stack end signage for each university library.

Testing of hypotheses was executed using Chi-square and Pearson Correlation for testing relationships between categorical variables wherever suitable. Further percentage, mean tables and library-wise tables were used to portray the general scenario of university libraries in Mumbai associated with making libraries humanely oriented.

Data available in response to the open-ended questions were analyzed using content analysis.

7.10 Key Findings from objective Analysis

The present study aimed to investigate the measures undertaken by university libraries in Mumbai to make libraries humanely oriented. The key findings according to the objectives were investigated and described as following:

7.10.1 Objective 1: To find out user's outlook regarding ease in physical search of service departments while using university libraries in Mumbai.

This objective was attained by analyzing opinions of users on wayfinding problems.

User opinion on Wayfinding Problems

The effective wayfinding system aids users while navigating and using library resources efficiently.

- To explore this objective, participants were asked whether participants face any wayfinding problems while physically searching of service departments of university library. Table 5.8 describes that more than 45% participants faced problem or confusion while searching different service departments.

Hypothesis 1 Testing

A hypothesis testing was conducted through applying Chi-square.

For searching different service departments of university libraries, users navigate in the library. Therefore the present hypothesis was tested through the user responses on whether they face any wayfinding problems while using university library.

The nominal variable to test the hypothesis was whether participants face any wayfinding problems while using university library, with the category yes or no. The sample of 328 first-year users was surveyed. The null hypothesis is university library users are not facing any problem or confusion while searching different service departments of university libraries. That is not a single user from university libraries is facing any problem or confusion while searching different service departments. However, the responses are in two categories. Therefore the expected frequencies should be divided by two for each category that will be 50% for each category.

The observational frequencies were 46.6 % of users replied that they face problems while finding their way, whereas, 53.4% of participants do not face the problem of wayfinding (Table 5.8). Hence, as per the observed frequency 153 (46.6%) that is $f = 153$ participants faced problem or confusion while searching different service departments, and 175(53.4%) $f = 175$ do not faced problem or confusion while searching different service departments. Whereas according expected frequency from the total 328 participants 164 participants expected to say no and 164 expected to reply yes. Thus the residual or the difference was 11 (Table 5.8(A))

The data was analyzed using Chi-Square for the ten libraries. The Degree of freedom is 9. The results obtained through Chi-Square test with the 95% of confidence level indicate that the value of Pearson Chi-Square was $X^2 = 22.106$, $p = 0.009$, which was statistically significant at 0.05 level (Table 5.8(B)). The results represent that nearly half of the sample that is 47% university library users are facing problem or confusion while searching different service departments of university libraries and while using library.

The null hypothesis 'University library users are not facing any problem or confusion while searching different service departments of university libraries' was therefore rejected and an alternative hypothesis was formed as

H1: University library users are facing problem or confusion while searching different service departments of university libraries.

The objective was further explored with the help of hypothesis, which was discussed in detail in chapter 5 section 5.2.9.

Findings revealed that participants faced problem or confusion while searching different service departments especially novice users.

7.10.2 Objective 2: To investigate the extent of convenience and results thereof experienced by the readers while using university libraries in Mumbai.

This objective dealt with user responses on their experiences while navigating various departments, sections and services till the information source. User opinions on ease in finding basic amenities, ease in finding objects/sections/services, and ease in finding books on shelves were studied.

Space is an important factor in Human Orientation Science. Hence users were asked about their opinion on the level of ease in identifying different parts of the library and relating these parts/ sections.

- In the case of ease in finding objects, sections and services, nearly 60% participants replied that 75%-100% ease was experienced. Remaining 40% respondents replied that from 74% to below 20% ease was facilitated in finding objects, sections and services.
- Large libraries provide basic amenities like elevators, restrooms, drinking water, refreshment area, music room, etc. Users opinion on ease in finding basic amenities and facilities revealed that less than 55% participants agreed that 75 to 100% ease was experienced, however more than 45% respondents replied that from 74% to below 20% ease was facilitated in finding basic amenities and facilities.

- User opinions regarding ease in locating and finding printed information sources in stacking areas. Responses revealed that less than 50% of participants agreed that 75%-100% ease was experienced; remaining 51% respondents replied that around 74% to below 20% ease was facilitated in finding and locating required books on shelves.
- The total mean scores for factor ease in finding objects, sections and services were highest (3.78) among all other factors, which indicated that 75% level of satisfaction was experienced by users while finding and locating objects, sections and services. Thus it was not much complex with the help of available signage. However, participants' feedback from the mean score (3.32) revealed that finding books on shelves was more challenging for maximum participants from all the libraries and provided 50% level of satisfaction.

Thus, the descriptive findings and total mean scores represent the inadequacy of existing directional as well as identification signs in shelving areas among all the libraries, resulted in inconvenience while using university libraries , which also proved through the observational findings of locating books and journals on shelves (Table 6.26 and Table 6.28).

Hypothesis 2 Testing

A Hypotheses testing was conducted through applying Pearson Correlation with 95% confidence interval for analyzing responses of users.

Library users mainly visit libraries to get the required information sources. During this process, users move around through different sections and departments, and use different facilities and amenities provided by library. During the information search process, users should be guided by the physical setting of library from general to specific that is from entranceways to OPAC, from OPAC to various departments, sections and services till the information source. Hence the present null hypothesis 'There is no significant relationship between human orientation and the extent of convenience experienced by the readers while using university libraries in Mumbai' was tested through correlation of variables such as ease in finding basic amenities with the opinions on difficulty in searching information, ease in finding objects/sections/services with the opinions on difficulty in searching information, and

ease in finding books on shelves with the opinions on difficulty in searching information during the information search process. The hypothesis testing highlighted following results which are explained in-detail in (Table 5.50 (B), (Table 5.50 (C), and (Table5.50 (D).

Table 7.2: Hypothesis Number 2 – Testing Results

Correlated Variables	r value	p-value	Level of Significance
Ease in finding basic amenities and difficulty in searching information	.241	.000	Significant weak positive relationship
Ease in finding objects/sections/services and difficulty in searching information	.370	.000	Significant weak positive relationship
Ease in finding books on shelves and difficulty in searching information	.442	.000	Significant weak positive relationship

From the findings it can be concluded that there is a relationship between the ease experienced by users in finding objects/sections/services, finding basic amenities, and in finding books on shelves with the extent of convenience and the human orientation experienced by the readers while using university libraries in Mumbai. Hence the null hypothesis was rejected and an alternative hypothesis was developed.

H2: There is a significant relationship between human orientation and the extent of convenience experienced by the readers while using university libraries in Mumbai.

The objective was further explored with the help of hypothesis, which was discussed in detail in chapter 5, section 5.7.1 and 5.7.2.

7.10.3 Objective 3: To evaluate the document delivery processes affecting the users while using university libraries in Mumbai.

The objective was explored through analyzing users responses about whether participants had used OPAC, their opinion on the degree of self-guidance provided through OPAC by various utilities like ease in operations, user-friendliness, and visibility of search results, as OPAC use is one of the procedure to accomplish circulation process. Further the time duration required to participants for finding a required source after leaving the OPAC terminal, success in finding information sources and whether they were able to find the desired information source on their own were discovered.

- **Use of OPAC**

Regarding the use of OPAC, the responses revealed that 81.1% of participants had used OPAC, only 11.9% of participants were not familiar and not used OPAC, further 7.0% of participants from one of the library users under study replied that OPAC was not available in the library due to incomplete library automation process of the said library (Table 5.31).

- **7.10.3.2.1 User-friendliness of OPAC**

Users perceptions about the user-friendliness of OPAC which highlights that more than 55% participants were of the opinion that 75%-100% level of user-friendliness was provided by OPAC. (Table 5.32). Rest 45% participants given mixed responses for 50% -74%, 21% - 49% and below 20% level of user-friendliness facilitated by OPAC.

- **7.10.3.2.2 Ease in operations**

Regarding level of ease facilitated by OPAC in operations nearly 50% participants were of the opinion that 75%-100% level of ease was experienced while operating. Remaining 50% participants given mixed responses for 50% -74%, 21% - 49% and below 20% level of ease was provided in use and operations of OPAC.

- **Visibility of search results**

In case of visibility of search results more than half percentage of participants were not satisfied and replied that less than 50% visibility of search result was experienced by them (Table 5.32).

- The total mean score for the feature user-friendliness of OPAC (3.20) was highest among other features, which represents that overall 50% user-friendliness was facilitated by OPAC, followed by feature ease of operation (3.13) again represents that 50% ease of operation was facilitated during the use of OPAC; however, the mean score of visibility of search result was lowest (2.96) represents below 50% visibility of search results. (Table 5.32(A)).

In detail information about OPAC use and its feature is described in Chapter 5, section 5.4.1 and 5.4.2.

- **Time required for searching information source in stacks**

The objective further investigated time required for searching information source in stacks for users. The total mean scores for the time taken to find a source in stacking (3.46) by average users shows users required 9 to 12 minutes to find information sources in case of all the libraries in Mumbai (Table 5.37(A)).

- **Success in finding books on stacks**

Locating and finding books on stacks leads to completion of circulation process. In case of success in finding books on stacks nearly 65% participants able to locate required books on stack before 12 minutes, from the rest maximum users required more than 12 minutes (18.9%) where as remaining that is 13.7% users were unable to find required source even after spending more than 12 minutes (Table 5.38(A)).

- **Finding information sources solely without assistance**

While finding resources without assistance maximum that is 52.4%, participants were unable to locate and find information sources on their own (Table 5.39(A)).

- **Lending process simplicity and timely service**

In case book borrowing process from circulation counter, maximum i.e. 92.0% of participants opined that they were able to understand the process of borrowing books, and 88.0% of respondents speak out that book borrowing process was simple and speedy. (Table 6.35)

Thus findings revealed that document delivery process or circulation process affects users while using university libraries in Mumbai. In detail information about this objective is described in Chapter 5, section 5.5.1 and 5.5.2., 5.5.3.

Hypothesis 3 Testing

The null hypothesis ‘There is no significant relationship between circulation processes and operations and the ease of use in the case of university libraries in Mumbai’ was tested through analyzing the degree of self guidance provided through OPAC by various utilities like ease in operation, user-friendliness, and visibility of search results, as OPAC use is one of the procedure to accomplish circulation process.

Further it was tested the time duration required to participants for finding a required source after leaving the OPAC terminal, success in finding information sources and whether they were able to find the desired information source on their own.

The provision of OPAC for searching information sources in libraries with alternative interfaces saves the time of users required to complete circulation processes and operations. Therefore for the best use of OPACs, it should be easy to operate, user-friendly, with visible search results. Hence participants were asked about their experience of using OPAC and the level of self-guidance provided by the library OPACs in case of ease in operation, user-friendliness, and visibility of search results. Ease in operations of OPAC improves user-friendliness. It is expected that the OPAC interface should be available within minimum clicks as well as with spontaneous operations to facilitate ease in operations. The hypothesis testing highlighted following results which are explained in-detail in (Table 5.32(B), (Table 5.32(C),and (Table 5.32(D).

Table 7.3: Hypothesis Number 3: Testing Results

Correlated Variables	r value	p-value	Level of Significance
Use of OPAC and Ease in Operations	-.203	.000	significant weak negative relationship
Use of OPAC and User-friendly OPAC	-.207	.000	significant weak negative relationship
Use of OPAC and Visibility of Search Results	-.194	.000	significant weak negative relationship

The research study is conducted especially on first-time users who are not much familiar with the library and its OPAC, hence the obtained r value is negative. Further, findings indicated that maximum participants feel confusion (45.4%), challenging (33.2%), frustrating (21.6%), during information search process, which may result in library anxiety while using OPAC at initial stage (Table 5.48).

The user responses and the r value highlight that, university libraries in Mumbai lack in facilitating user-friendliness, ease in operations and visibility of OPAC search results which indicate the downfall and a negative correlation between the two

variables, which ultimately affect the ease of use of OPAC, while carrying out circulation processes and operations in the case of university libraries.

The relationship between two variables can also change over time and may have periods of positive correlation as well, when those new users will use OPAC frequently, they may experience ease in operations while using OPAC and over the period of time there may be a positive correlation. Thus the frequent use of OPAC over the time may lead to user-friendliness and ease in operations while using OPACs.

- **Time requirement, success in locating sources and ability to find resource solely**

The provision of bibliographic details with the locations of books in OPAC with the accurate shelving will lead to quickly finding information sources on stacks. Further, appropriate signage will lead to self-orientation in finding information sources successfully. Hence the correlation was tested among the variables like, time taken to getting resource from OPAC till stacking and success in finding source, ability to find resources solely with time taken to find source from OPAC till stacking and success in finding source with finding resources solely which complete the circulation processes and operations.

After the use of OPAC and noting down the bibliographic details of the desired information source, it's expected by the users that they should be able to locate and find the required information source within a minimum time. If the library has appropriate visual guidance and a humanely oriented system, users will be able to find the desired information sources within a minimum time. To assess the ease of use provided by university libraries in the processes and operations related to physically searching printed sources in stacks, the time taken by participants in locating and finding information sources after leaving the OPAC terminal till physically finding the required information source was considered. Further participants' ability to find resources solely were analyzed as well as success in finding source tested. The hypothesis testing highlighted following results which are explained in-detail in (Table 5.39(B)).

Table 7.4: Hypothesis Number 3: Testing Results

Correlated Variables	r value	p-value	Level of Significance
Time taken to find source from OPAC till stacking and success in finding source	.703	.000	Significant with strong positive relationship
Ability to find resources solely and time taken to find source from OPAC till stacking	.376	.000	Significant with weak positive relationship
Success in finding source and finding resources solely	.332	.000	Significant with weak positive relationship

On the basis of findings and tests results of responses on aspects concerned with the ease of use provided by university libraries in OPAC utilities like degree of self-guidance provided by OPAC through the ease and user-friendly operations and messages, visibility of search results, and factors like time requirement for searching sources, success in locating sources and ability to find resource solely, indicates a significant relationship between circulation processes and operations and the ease of use in the case of university libraries in Mumbai. Hence a null hypothesis was rejected. Therefore following alternative hypotheses was generated.

H3 There is a significant relationship between circulation processes and operations and the ease of use in the case of university libraries in Mumbai.

7.10.4 Objective 4: To find out ways and means to make university libraries in Mumbai more user-friendly and easily accessible.

Library orientation is one of the important facets of human orientation science in the context of libraries, as it results in user-friendliness among users for the use of library and its collection. Hence libraries attempt of cover features of human orientation through library orientation programs. This objective dealt with factors like attendance of library orientation and post-library orientation experience and familiarity about campus for locating library, library staff, sources and facilities within library, computer resources and identifiability of academic skills.

- **Attendance at library orientation**

Finding showed a positive result that maximum libraries (72.9%) provided library orientation programmes for the novice users of respective libraries. Remaining 27% participants were either did not attended library orientation, or it was not provided by the respective libraries (Table 5.42)

- **Post-library orientation familiarity in finding way around campus**

The responses of participants revealed that, only 38.7% of participants agreed that they were able to find a way around the campus.

- **Post-library orientation experience of comfort while using library**

Even after library orientation program less than half (47.5%) participants experience comfort while using libraries.

- **Post-library orientation experience of feeling connected with library staff**

While responding on whether users feel connected with staff, less than half (42.7%) participants replied positively.

- **Post-library orientation for awareness in locating Information sources and facilities**

Regarding familiarity with locating different sources and facilities available in the library, more than half that is 56.4% of participants replied positively.

- **Post-library orientation for awareness in locating computerized sources**

In case of familiarity while locating and using computerized resources in the library less than half that is 49.3% of participants opined that they were able to locate computerized resources (Table 5.45).

- **Post-library orientation for identifying academic skills**

While responding on the identification of academic skills, merely 39% of respondents agreed that they were acquainted with the academic skills.

Thus findings from the responses revealed that though more than 70% participants attended library orientation program the post-orientation familiarity was average 50% in case of navigating and locating resources. In detail information about this objective is described in Chapter 5, section 5.6.1.1 and 5.6.1.4.

Hypothesis 4 Testing

A Hypotheses testing was conducted through applying Pearson Correlation with 95% confidence interval for analyzing responses of users.

Library orientation is one of the important facets of human orientation science in the context of libraries, as it results in user-friendliness among users for the use of library and its collection. Hence libraries attempt to cover features of human orientation through library orientation programs. How well people are made aware of the academic skills and the library's collection and services, and its impact on their ability to use library facilities to accomplish information needs successfully also depends on the quality of orientation given, as well as the presence of users for orientation programs. The in-depth library orientation program will result in more familiarity in case of navigation as well as in knowing and locating various facilities, amenities, sources and services. Only attending orientation program is not sufficient for novice users to be familiar with the library hence participants were also asked about how far comfortable they feel in the library, as well as their interactivity with the library staff was also explored.

The present null hypothesis 'There is no significant relationship between human orientation and user-friendliness of university libraries in Mumbai' was tested through Pearson Correlation between the variable, attendance of library orientation and post-library orientation experience and familiarity about campus for locating library, feeling of comfortness in the library, feeling of connected with library staff, familiarity about sources and facilities within the library, awareness about computer resources and identifiability of academic skills. The hypothesis testing highlighted following results which are explained in-detail in (Table 5.45(B), (Table 5.45(C), (Table 5.45(D), (Table 5.45(E), (Table 5.45(F) and (Table 5.45(G).

Table 7.5: Hypothesis Number 4- Testing Results

Correlated Variables	r value	p-value	Level of Significance
Finding way around campus	-.496	.000	Significant weak negative relationship
Experience of comfort while using library	-.517	.000	Significant moderate negative relationship
Experience of feeling connected with library staff	-.524	.000	Significant moderate negative relationship
Locating Information sources and facilities	-.540	.000	Significant moderate negative relationship
Locating computerized sources	-.518	.000	Significant moderate negative relationship
Identifying academic skills	-.497	.000	Significant weak negative relationship

The user responses and the negative *r* value highlight that, university libraries in Mumbai lack in facilitating self-orientation, experience of comfort, experience of feeling connected with library staff, ease in locating sources and facilities as well as computerized sources and in disseminating academic skills to users, after the library orientation program, which indicate the downfall and a negative correlation between the two variables.

In addition negative correlation also indicates that library orientation is not a single variable responsible for feeling connected with the library staff, findings indicated that maximum participants feel confusing (45.4%), challenging (33.2%), frustrating (21.6%), during information search process at initial stage, which may results in library anxiety while using library (Table 5.48) in case of first-time visitors. Such anxious users hesitate to approach library staff at initial stage however; frequent visits to libraries over the period of time, those users may feel connected with the library staff.

University-wise responses indicate that major participants of Library 5 and Library 10 replied that any type of library orientation was not provided to them by the library (Table 5.44(A)). Further due to incomplete automation process, computerized sources were not available in case of Library 5 till the time of field visit. The lowest mean score of Library 5, regarding awareness of computerized sources (.17) represents the scenario (Table 5.45(A)).The user responses and the negative *r* value highlight that,

university libraries in Mumbai lack in creating awareness for locating computerized sources after the library orientation program, which indicate the downfall and a negative correlation between the two variables.

The user responses and the negative r value highlight that, university libraries in Mumbai lack in creating awareness for identifying academic skills after the library orientation program, which indicate the downfall and a negative correlation between the two variables. User education workshops or in-depth information literacy programmes aid in improving academic skills hence, libraries should provide in-depth library orientation.

The research is conducted especially on first-time users who are not much familiar with the university campus and such novice users may require more time to be familiar with the library as compared to frequent users, hence the obtained r value is negative. The relationship between two variables can also change over time and may have period of positive correlation as well, when those new users will visit the university frequently, they may experience ease and acquaintance while finding way around the campus, comfort while using library, connected with staff. Further they may get familiar with sources and facilities, computer resources as well as academic skills.

In addition negative correlation also indicates that library orientation is not a single variable responsible while finding a way in the campus, availability of appropriate and sufficient signage is also essential for navigating confidently within the campus especially in case of first-time visitors.

On the basis of findings and tests results of responses on aspects concerned with the attendance of library orientation and post-library orientation familiarity to find way around the campus, to feel comfortable in library, to feel connected with staff, ability to locate sources and facilities, ability to locate computerized sources, and in identifying academic skills, the p value for all the variables is statistically significant at .05 level and indicate a negative relationship.

Hence the null hypothesis was rejected and an alternative hypothesis was formed.

H4 There is a significant relationship between human orientation and user-friendliness of university libraries in Mumbai.

7.10.5 Objective 5: To explore the appropriateness in the display of rules and regulations provided by university libraries in Mumbai.

To study this objective availability of the display of rules and regulations, and variables such as visibility, readability, and ease in understanding of display of rules and regulations was inquired through selective users' interviews.

- **Availability of display of rules and regulations**

The Table 6.26 highlights that only 50% (5) libraries display for rules and regulations was available.

- **Visibility of display of rules and regulations**

In case of characteristics of display of rules and regulations 50% participants opined that the display was visible (Table 6.45).

- **Readability of display of rules and regulations**

Regarding readability merely 38% participants agreed that it was readable (Table 6.45).

- **Display of rules and regulations - Easy to understand**

Table 6.45 highlighted that 36% participants replied that the message conveyed by the display of rules and regulations was easy to understand.

The findings from the responses revealed that more than half participants replied that the display for rules and regulations was inappropriate to facilitate visibility, readability and ease in understanding message conveyed by the display. In detail information about this objective is described in Chapter 6, section 6.24.

Hypothesis 5 Testing

Library rules and regulations as well as the display of library working hours, opening and closing hours of different service departments as well as display of instructions of photocopy department were considered for the study. However, availability of the display of library rules and regulations is an important factor to assess its utility. Hence the availability of the display of library rules and regulations was observed during the field visit. The Table 6.26 highlights that only 50% (5) libraries display for

rules and regulations was available. The present null hypothesis ‘Rules and regulations displayed in university libraries in Mumbai are not leading towards convenience of readers’ was tested through the variables such as visibility, readability ease in understanding of display of rules and regulations inquired through selective users’ interviews.

- **Visibility of Rules and Regulations**

In case of characteristics of display of rules and regulations 50% participants opined that the display was visible (Table 6.45). The nominal variable to test the hypothesis was whether the display of rules and regulations was visible with the category yes or no. The sample of 50 first-year users was interviewed. The null hypothesis was rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of readers. That is rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user. However, the responses were in two categories, hence the expected frequencies were divided by two. That will be 50% for each category.

As per the observed frequency 25 (50%) that is $f = 25$ participants replied that rules and regulations displayed in libraries were visible, and 25 (50%) $f = 25$ replied that rules and regulations displayed in libraries were not visible. The expected frequency is also 25 for yes category and 25 for no category; hence the residual was 0; however as per the null hypothesis rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user (Table 6.46).

Though there was not any difference between the observational and expected frequencies, the results obtained through Chi-Square test with the 95% of confidence level indicate that the value of Pearson Chi-Square was $X^2 = 34.000$, $p = .000$, which was statistically significant at 0.05 level. The findings indicate that visibility of the display of rules and regulation lead to inconvenience of readers (Table 6.46(A)).

- **Readability of Rules and Regulations**

In case of characteristics of display of rules and regulations 38% participants agreed that the display of rules and regulations was readable (Table 6.45). The nominal variable to test the hypothesis was whether the display of rules and regulations was

readable with the category yes or no. The sample of 50 first-year users was interviewed. The null hypothesis was rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of readers. That is rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user. However, the responses were in two categories, hence the expected frequencies were divided by two. That will be 50% for each category.

As per the observed frequency 19 (38%) that is $f = 19$ participants replied that rules and regulations displayed in libraries were readable, and 31 (62%) $f = 31$ replied that rules and regulations displayed in libraries were not readable. The expected frequency is also 25 for yes category and 25 for no category (Table 6.47). The residual was -6, as 6 more were expected to say yes but they replied no, however as per the null hypothesis rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user.

The results obtained through Chi-Square test with the 95% of confidence level indicate that the value of Pearson Chi-Square was $X^2 = 29.626$, $p = .001$, which was statistically significantly different at 0.05 level. The findings indicate that readability of the display of rules and regulation leads towards inconvenience of readers (Table 6.47(A)).

- **Rules and Regulations: Easy to Understand**

In case of characteristics of display of rules and regulations 36% participants opined that the message conveyed by the display of rules and regulation was easy to understand (Table 6.45). The nominal variable to test the hypothesis was whether the display of rules and regulations was readable with the category yes or no. The sample of 50 first-year users was interviewed. The null hypothesis was rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of readers. That is rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user. However, the responses were in two categories, hence the expected frequencies were divided by two. That will be 50% for each category.

As per the observed frequency 18 (36%) that is $f = 18$ participants replied that rules and regulations displayed in libraries were easy to understand, and 32 (64%) $f = 32$

replied that rules and regulations displayed in libraries were not easy to understand. The expected frequency is also 25 for yes category and 25 for no category (Table 6.48). The residual was -7, as 7 more participants were expected to say yes but they replied no; however as per the null hypothesis rules and regulations displayed in university libraries in Mumbai are not leading towards inconvenience of any user.

The results obtained through Chi-Square test with the 95% of confidence level indicate that the value of Pearson Chi-Square was $X^2 = 79.412$, $p = .000$, which was statistically significantly different at 0.05 level. The findings indicate that the ease in understanding the content of the display of rules and regulation results in inconvenience of readers (Table 6.48(A)).

On the basis of factors such as visibility, readability ease in understanding of display of rules and regulations inquired through selective users' interviews, the results obtained through Chi-Square tests were statistically significantly different at 0.05 level, which highlight that different utility characteristics of the display of rules and regulations, lead towards inconvenience of readers. Hence the null hypothesis was rejected and an alternative hypothesis was formed.

H5 Rules and regulations displayed in university libraries in Mumbai are leading towards inconvenience of readers.

7.10.6 Objective 6: To discover the suitability of signage system used in university libraries in Mumbai.

To study this objective, responses of participants were taken into consideration regarding which sources of inquiry they consulted for help from library gate till destination or information source and whether the available wayfinding system reminded them in proceeding in right direction.

- **Sources of inquiry they consulted for help**

While moving around in the library, and while searching for information sources, more than half (56.7%) of library users consulted library staff, further 36.2% of library users taken other library users help for direction guidance while reaching till the required information source (Table 5.6).

- **Utility of available wayfinding system**

Regarding the utility of available wayfinding system, 63.4% of library users were of the opinion that the available guidance system provides the right direction in university libraries in Mumbai.

However the total mean score of library staff (.57) and other library users (.36) as a source of instructional help was very high, which indicates that the existing signs and other wayfinding tools were not sufficient in all the libraries for participants to confidently accomplishing tasks of wayfinding and information search process (Table 5.6(A). In detail information about this objective is described in Chapter 5, section 5.2.6 and 5.2.7.

Hypothesis 6 Testing

A Hypotheses testing was conducted through applying Pearson Correlation with 95% confidence interval for analyzing responses of users.

The null hypothesis ‘There is no significant relationship in the signage system and uncertainty among readers while using university libraries in Mumbai’ was tested through the correlation of variables between participants consulted for help from library gate till destination or information source and whether the available wayfinding system reminds user in proceeding in right direction.

- **Need of instructional help and utility of available wayfinding system**

Wayfinding tools should be available at the right location and at the decisive points to provide right direction. The obtained r value was .177, which is less than .3, signifies a weak positive relationship between need of instructional help opted by participants from other users and utility of available wayfinding system to reminds user in proceeding in right direction (Table 5.7(B).

The p value is .001 which means it is significant at .05 level. Therefore it can be concluded that there is a relationship between need of participants to take assistance from other users while reaching from library gate till the destination or an information source with the available wayfinding system which lack to provide right direction and hence participants opted other users assistance during the wayfinding process, which

indicate that signage system provided by university libraries were insufficient and hence, affected the user-friendliness provided by library in case of wayfinding and use of library.

Hence the null hypothesis was rejected and an alternative hypothesis was developed.

H6 There is a significant relationship in the signage system and certainty among readers while using university libraries in Mumbai.

7.10.7 Objective 7: To find out the provisions made in university libraries in Mumbai, including physically challenged users, related to wayfinding indicators.

The present objective dealt with the variables such as a number of special users enrolled every year in different university libraries and the list of facilities made available by the libraries for special users for providing universal access.

- **7.10.7.1 Enrolment of special users every year**

To find out enrolments of special users, librarians were asked about enrolment of special users every year. Three university libraries had never received special users (30%), whereas four university librarians replied that one to five special users were enrolled every year (40%), further three university libraries stated that five to ten special users were enrolled every year (30%) (Table 5.78).

- **7.10.7.2 Convenience and access facilities for special users**

Regarding convenience facilities, librarian's responses revealed that only 27.3% (3) libraries provide wheelchair facility, only 9.1% (1) library from ten university libraries, facilitates alarm system that combines visual and audio, broacher in Braille form, handrails on both sides of stairways, handrails in long corridors, large font signs, ramps at the accessible entrances, restrooms for disables, in addition in one university library facilitates maximum resources on the ground floor for special users (Table 5.79). In the case of other facilities, one university library provides maximum facilities on the ground floor. However, provision of tactile and touch maps was not available in any university library in Mumbai (Table 6.30).

The responses obtained from librarians revealed that university libraries in Mumbai were not equipped with the different access utilities required for libraries to facilitate access to special users, which adversely affect the number of enrolments made by special users in the case of universities and their libraries. It shows that the provisions made in university libraries in Mumbai for all users, including physically challenged users, related to wayfinding indicators were inadequate.

7.10.8. Objective 8: To find out the provisions made in university libraries in Mumbai, including physically challenged users, for convenience in searching library material.

The present objective was explored through the variables such as types of alternative formats of information sources available in libraries for special users for providing universal access.

- **7.10.8.1 Provision of information sources in alternative formats and assistive devices**

Regarding the provision of assistive devices, responses revealed that since Library 2 have a separate section for special and blind users all the assistive devices like Book reading software 14.3% (1), Braille embosser 14.3% (1), OCR scanner 14.3% (1), Refreshable Braille display 14.3% (1), Screen reading software 14.3% (1) were available in the said library. Library 7 had a CD player and tape recorder. The available assistive devices were in working condition at the time of the survey. Other assistive devices like Braille keyboard, Braille translator, digital talking books, large monitors, magnifying glass, large print keyboard, pocket accessible Daisy player, screen magnifying software and speech synthesizer were not available in any university library in Mumbai (Table 5.80).

The responses obtained from librarians revealed that university libraries in Mumbai were not equipped with the alternative formats of information sources and assistive devices of learning required in libraries to promote the learning needs of special users, which adversely affect the number of enrolments made by special users in the case of universities and their libraries. It shows that the provisions made in university libraries in Mumbai for all users, including physically challenged users, for their convenience in searching and using required library material were insufficient.

7.10.8.2 User survey for hindrances face by special users

Special users need special services and attention, and difficulties encountered by such users should be explored through communicating with them.

When the university librarians were asked about any survey conducted in the past to find out the hindrances faced by special users, it was revealed that university libraries in Mumbai had never conducted a user survey to find out hindrances faced by special users.

7.10.8.3 User survey for Conveniences for special users

Consideration of the special needs of disabled patrons will quite probably result in good design, even for the general population. When the university librarians were asked about any survey conducted in the past to find out the convenience facilities expected by special users, it was revealed that university libraries in Mumbai had never conducted any user survey regarding the needs of special users about required convenience facilities by special users.

7.11 Key findings as per PMEST

7.11.1 Personality:

Personality indicates the kind of people or users or personality trait chosen for a particular study. With this need and concern, the present study was conducted, which focuses on wayfinding experiences and behavior of novice university library users in Mumbai. As well as librarians perspectives, as a personality trait about making libraries humanely oriented and the constraints faced by them was studied as a personality feature.

The present study specially focussed on novice users as participants since such users are not familiar with the huge university libraries. The adequacy of a systematically planned visual guidance system or measures taken by libraries to make libraries humanely oriented can be assessed through the familiarity of such new users with the facilities, spaces and services as well as their comfort while successfully finding their ways and paths in searching required information sources confidently of the university libraries. Hence novice library users, which include the first-year of PG

courses and first-year M.Phil./ Ph. D. courses as well as newly appointed teachers taken into consideration for the present study as a population.

Opinions all university librarians were studied to explore them as an attribute of personality, to analyze the measures applied by librarians for transforming libraries into humanely oriented libraries as well as to discover the facts about efforts put by them to convert the library into a community hub.

According to librarian's responses, three university libraries had never received special users, whereas four university librarians replied that one to five special users were enrolled every year; further, three university libraries stated that five to ten special users were enrolled every year.

7.11.1.1 Library instructions and library orientation of users

Table 5.42, highlights that a maximum of i.e.72.9% (239) participants had attended library orientation programmes; however, 24.7% (81) replied that they had not attended orientation programmes. Further, 2.4% (8) participants informed that the orientation program was not provided to them due to the non-appointment of a librarian at one university.

The comparative analysis shows that though 72.9% of participants attended library orientation, however only 47.6% of participants were able to find the required information sources on their own. The table illustrates that there is a need to provide in-depth library orientation to users (Table 5.43).

In the case of university libraries in Mumbai, 90% of university libraries provide library orientation every year. However, 10% of university libraries do not provide library orientation due to the non-availability of the librarian as the post was vacant at the time of the survey (Table 5.69).

The qualitative finding of participants' observation (Table 6.8) shows that a total of 32 (64%) participants attended library orientation. However, 18 (36%) participants were either not attended library orientation or in case of few library users, library orientation was not provided by university libraries. Cross tabulation further highlights that out of 26 successful participants, 18 (69%) participants attended library

orientation however, 14 (58%) participants failed in completion of tasks even though they had attended library orientation.

7.11.1.2 Types of library orientation

The total mean of different types of library orientations indicates that maximum libraries provided oral instructions (.41), followed by PPT presentations with instructions (.33), physical library tour (.27), library tour along with staff introduction (.24) and by combining multiple types of orientation programs. However, the total mean of user education workshop (.09) and video library tour (.07) highlights that very few libraries were provided such types of orientation programs (Table 5.44(A)).

Taking into consideration the librarian's responses, major university libraries in Mumbai provide multiple forms of library orientation, excluding university library 10, as the university librarians post was vacant in the said library when surveyed.

7.11.1.3 Effect of library orientation (Post-orientation awareness of physical settings and facilities)

The total mean scores for aspects such as became aware of the sources (2.83) was highest and able to find a way in campus (2.40) was lowest mean as compared to other aspects associated with post-library orientation familiarity with respective libraries, it indicates that library orientation programmes help in increasing familiarity among users about library sources, services and facilities (Table 5.45(A)).

7.11.1.4 Post-orientation importance and awareness of library sources and services

User's responses about the post-orientation awareness about various information sources revealed that maximum participants were aware of books, catalog and circulation counter, however maximum participants, even though mentioned the importance of other sources, yet were unaware of audio-visual material, databases, e-journals and printed thesis (Table 5.47).

7.11.1.5 Behavioral search experiences

Table 5.48 represents that maximum, i.e. 45.4% of participants were confused, though 36.6% of respondents replied that they feel ease in wayfinding and while searching information sources, 33.2% of participants opined that information source search was challenging for them. Further, 27.4% of participants felt frustrating, 21.6% of participants felt disoriented, 19.2% of participants noted that they baffled while moving around and searching required sources in the library. 18.9% of participants feel as if they had lost in the library, only 8.5% of participants feel surprising either while using OPAC, while wayfinding in libraries or while physically searching information sources in the stacking area.

The total mean scores associated with behavioral search experiences of participants from all the libraries represents that maximum participants (.45) were confused while moving around and searching information sources in university libraries in Mumbai (Table 5.48 (A)).

Observational findings revealed that maximum participants were confused (Table 6.7). Only a few participants were confident; or else though the participants were 50, 91 varied types of behavior were observed due to multiple behavior experienced by users. With maximum feedback of confusion, many participants noted varied expressions such as anxious, frustrated, felt disoriented, felt indecisive, a few felt comfortable, a few participants baffled while searching ways. In addition, few were surprised and amazed.

7.11.1.6 Satisfaction with finding and obtaining library materials

The total mean scores associated with behavioral search experiences of participants from all the libraries represents that maximum participants (45.4%) were confused while moving around and searching information sources in university libraries in Mumbai (Table 5.48).

The total mean scores for the satisfaction of finding information sources in all the libraries highlights that the totals mean of audiovisual material was lowest (Table 5.49(A)). It indicates that major participants (2.55) from all the universities were unsatisfied in locating, finding and using A/V sources due to absence of signage for

locating A/V collection in eight libraries out of ten libraries. The total mean score were less than four in case of finding and obtaining different library material and sources. It represents that very few participants from all libraries were strongly satisfied while finding and obtaining different library material and services, hence major remaining participants from all libraries given mixed and somewhat unsatisfactory feedback regarding finding and obtaining different library material and services (Table 5.49 (A)).

7.11.1.7 Participant's Suggestions

Responses from the survey revealed that in the case of suggestions regarding signs, 68.9% of participants opined that more directional signs should be added, 55.4% of participants suggested adding floor maps, and 40.2% suggested adding building maps (Table 5.15). In case of suggestions related to OPAC collected through the questionnaire, 47.8% of participants suggested OPAC manuals should be available near terminals, 42.9% suggested availability of Instructional video on OPAC terminals, 40.2 opined need of guidance chart for OPAC (Table 5.35). The participants of interviews given suggestions such as, 10.1% of respondents suggested adding the location of each material in OPAC, 7.9% suggested that OPAC manual should be available near OPAC terminal, 7.9% advised that status of a book should be added in OPAC, 6.7% suggested to place a floor-wise stacking arrangement chart near OPAC terminals, and 3.4% opined that provision should be there to enlarge OPAC results window. Further, regarding accessibility and library environment, 6.7% demanded open access to the entire collection; besides, 6.7% proposed that provision of natural light or opening windows should be provided, 5.6% guided to facilitate provision for air ventilation, 4.5% expressed the need of an in-depth library orientation, 3.4% suggested a need of additional baggage counter at the entrance, 3.4% argued about the need of additional working hours for library, and 1.1% advised to facilitate embossing on the spine of bound collection for ease in identification (Table 6.53).

7.11.1.8 Personality traits of University librarians

In the case of personality traits of university librarians, it was found that 90% of respondents were male librarians, whereas very less, i.e. only 10% of respondents

were female librarians (Figure 5.43). Regarding librarian's qualification, the findings revealed that 50% of university librarians were M. L. I. Sc. with Ph. D. degree, 40% of university librarians were only qualified with M. L. I. Sc. and 10% of university librarians were not library science professionals they have a degree of Ph. D. in Sociology (Table 5.54) and working as a professor of sociology as well as an In-charge Librarian. Thus findings revealed that only 50% of librarians were fully qualified.

In the case of total work experience, findings revealed that 50% of university librarians have 11 to 20 years of total work experience as library professionals. 30% of university librarians have 21 to 30 years of total work experience, and 10% of librarians have 31 to 40 years of work experience as library professionals. Another 10% of librarians have experience of less than a year as library professionals (Table 5.55). The statistical information about a span of librarians experience in the present university revealed that excluding one librarian, all university librarians were well experienced to understand the changing needs of university library users with the changes in space planning and physical settings of a library (Table 5.56).

In the case of the existence of librarian when the building was planned, 90% of university librarians were appointed later on or joined newly after the retirement of earlier university librarians (Table 5.62). Hence librarians' decision was not taken into consideration while constructing or designing library building as well as while planning wayfinding cues as per the requirement of the physical arrangement of departments and services.

In the case library staff possessing good communication skills or acquiring the same through training sessions is necessary especially for counter staffs who directly serve users. Table 5.73 represents that 70% of university librarians offer training or send the staff to continuing education programs associated with communication skills. However, in the case of 30% of university libraries, such training was not made available or provided.

7.11.2 Matter

Matter includes the available signage and wayfinding tools, including technological resources accessed by library users during the physical observation of participants as well as responses received from participants through questionnaire associated with the

existence and availability of essential signs. The placement of signs at a suitable location in adequate quantity and appropriate visibility and readability plays a vital role while planning and exhibiting signage system.

Evaluation of signage was accomplished through the field observation to assess the availability, suitability and appropriateness of existing signage. To evaluate the signage, all the available signs were captured and saved in photographic images. The observational findings revealed that total of 160 signs were found, including all ten university library buildings in Mumbai (Table 6.11).

In the case of university libraries in Mumbai, 70% of libraries implemented systematically planned signage systems; however, 30% of university libraries in Mumbai had not implemented any systematically planned signage systems (Table 5.64).

Findings show that 20% of university libraries in Mumbai had provision of allocating budget for acquiring and maintaining signage. However 80% of libraries don't have any provision for allocating budget authoritatively for acquiring signage (Table 5.65). In case of availability of alternative budget heads, librarian's responses revealed that 20% of libraries had an authoritative budget allocation for signage, whereas 20% of university libraries acquire signage through the miscellaneous budget head, other libraries acquire signage from other budget heads such as General Fund (20%), administrative expenditures (10%), Maintenance Grants (10%) (Table 5.66).

In the case of university libraries in Mumbai, only 30% of libraries conducted signage audit, rest 70% of university libraries never conducted signage audit (Table 5.67). However, university libraries should plan and conduct a signage audit at a frequent interval to update and remove outdated signs. Further, university libraries in Mumbai 10% university libraries rarely conducted signage audit, and they conducted the same as a part of space audit, another 10% university libraries conducted the same after every two years, and another 10% libraries conducted signage audit after every three years. Rest 70% of university libraries had never conducted signage audit (Table 5.68).

7.11.2.1 Type of signs

Finding revealed that out of total of 160 signs observed from all ten university library buildings, as a type of signs, 71.2% (114) signs were permanent signs. However, 28.8% (46) of signs were temporary, i.e. paper printed or handwritten, which need to update or remove (Table 6.13).

7.11.2.2 Categorical division of signs

Findings revealed that in the case of university libraries in Mumbai, 64.4% (103) signs were directional, whereas 31.3% (50) signs were identical and 4.4% (7) signs were regulatory from the total observed signs (Table 6.14).

7.11.2.3 Directional signs

Orientation maps or directories or floor wise list of departments were available only in four libraries out of ten.

The next level of information after the directories near the entrance for navigating confidently is directional signs for respective departments. However, such directional signage was available merely in four libraries under the study (Table 6.26).

7.11.2.4 Identification signs

Major identification signs include signs; such as signs to locate the service departments are essential near or on the door of the respective service areas for easy identification. However, identification signs for the service departments were available only in five libraries out of ten.

Minor identification signs name smaller areas, facilities and amenities such as signs for types of equipment, like signs for printers, OPACs, Microfiche readers, etc., as well as minor identification signs for convenience facilities like water coolers, restrooms, elevators, etc. Although such signs are important, it was observed that signs for types of equipment were provided only in two libraries out of ten further signs for convenience facilities were facilitated merely in three libraries under the study. In addition, though the elevator was available in five university libraries under the study, only one library provided a sign for an elevator (Table 6.26).

7.11.2.5 Regulatory signs

Display of working hours at the entrance minimizes the FAQ at the inquiry counter. However, only 50% (5) libraries had provided a display of working hours near the library entrances. A further display of working hours placed by Library 8 was not visible as it was paper printed sign placed with other instructions on a single notice board (Table 6.26).

Display for rules and a regulation was available in only 50% of libraries. However, in the case of 20% of libraries details about working hours were not available on the display of rules and regulations. Hence absence of such informative displays or displays lacks adequacy of information like the display of rules and regulations without working hour's leads to inconvenience among readers (Table 6.27).

According to selected users opinions obtained through interviews in case of characteristics of display of rules and regulations, 50% participants opined that the display was visible, 38% participants agreed that it was readable, and 36% participants replied that the message conveyed by the display of rules and regulation was easy to understand (Table 6.45).

7.11.2.6 Terminology

In the case of the use of simple terminology or word sets, findings revealed that in 99.4% signs, there was no presence of jargon. However only .6% (1) sign had a presence of jargon. In the case of the use of words for signs, all the seven libraries had used simple words sets for signs. In the remaining three libraries, there was an absence of signage (Table 6.17).

7.11.2.7 Outdated signs

In case of existence of outdated or torn signs, 10% signs were outdated or torn which needed to be an update or removed without delay as in some cases such signs were either not up-dated and in few instances, such signs were torn paper printed signs (Table 6.18).

7.11.2.8 Consistency

A use of consistent signs improves the effectiveness of the total sign system. In the case of consistency, 83.8% of signs were consistent, whereas 16.3% of signs lack consistency, as those signs were paper printed temporary signs (Table 6.19). Aesthetically, the shape and sizes of signs are related to each other to present information consistently. In the case of university libraries in Mumbai, six libraries provided consistency in signage (Table 6.29).

In the case of universal norms for shapes of signs, the observational findings revealed that all kind of signs in libraries under the study were designed in square and rectangle shapes (Table 6.29).

7.11.2.9 Legibility

Legibility is a precursor of readability; the observational findings of university libraries revealed that 87.5% of signs were readable, whereas 12.5% of signs were not readable due to small font size, overwritten text, handwritten signs, and torn signs (Table 6.20).

7.11.2.10 Visibility

Although signs are readable, signs should be visible; findings revealed that 86.9% of signs were visible; however, 12.5% of signs had less visibility due to reasons such as overload of information and placement of signs above eye level (hanged to the ceiling). Further, 06% signs had very little visibility due to very small font size (Table 6.21). While examining signage as per its height and placement in libraries under the study, it was seen that only if four libraries out of ten the signs were placed at eye level. In the case of the other three libraries, signs were placed high; hence users were able to read signs only by upward stretching of the neck. In the remaining three libraries, there was an absence of signage (Table 6.29).

7.11.2.11 Separate display for each function

The use of common boards for different facilities defeat the very purpose of providing display boards as per the sixth principle of HO science. Therefore using a separate board for each facility is the best way to confirm human orientation. However, it was

observed that only three libraries out of ten had provided separate display boards for each function (Table 6.29).

7.11.2.12 Sources used for wayfinding within campus

Though other sources and signs were available for wayfinding in all the libraries, the total mean scores of the responses for existence and use of wayfinding tools within campus till the library building shows that inquiry of routes with passerby (.57) and personal inquiry as a source of inquiry was heavily used by users (.35). Thus the findings from the total mean scores represent that available signage was inadequate for satisfying wayfinding inquiries of users. (Table 5.1 (A) Further campus maps were available only in three university campuses out of ten universities. Information kiosks were not used by participants of any library as kiosks were not available in any of the library under the study according to the observational findings (Table 6.12). In the case of five libraries, either a library building name sign or sign indicating library entrance was available to locate the library building (Table 6.12). Further use of international sign for the library was not available at any of the libraries under the study (Table 6.23).

7.11.2.13 Library-wise availability, readability, visibility and utilities of campus maps

The total mean score for the factor, the existence of campus maps, represents that in the case of a few universities, there was an absence of availability of campus maps (.58) at the entrances of the campuses. In the case of visibility (1.77) and readability (1.75), the total mean scores of respondents highlights that excluding a few libraries, participants replied satisfactorily about visibility and readability of campus maps (Table 5.3(A)).

In the case of the utility of campus maps total mean score of directional based support maps (1.56) was higher as compared to location-based supportive maps (1.49). It represented that, the utility of campus map to answer 'How I will get at a particular location', i.e. maximum maps with directional based support services were available at the entrances or within the campuses of university libraries (Table 5.3(A)).

7.11.2.14 Orienting tools near the library entrance

The provision of appropriate signage at the entrance of the libraries attracts potential users towards libraries. A library building map was available at the entrance in 60% (6) libraries. However, in the case of Library 7, it was not visible due to the overload of information on a single display board at the entrance (Table 6.24).

7.11.2.15 Library-wise Sources Used for Instructional Help

The total mean score of library staff (.57) and other library users (.36) as a source of instructional help was very high, which indicates that the existing signs and other wayfinding tools were not sufficient in all the libraries for participants to confidently accomplishing tasks of wayfinding and information search process. Further, the total mean of instructional manuals (.07) and library guides (.13) represents that participants in all the libraries rarely used both (Table 5.6 (A)).

Only in a single university library out of ten, a digital display was used specifically in library 1; however, 24 different types of informative displays were merged in a single digital board in the case of this library. Adding 24 displays together was not feasible for users to read all the information as they arrive one after another respectively; besides, it was running for 26 minutes to finish all displays in one set. Further, provision of Flash notice was available in Library 7, near the entrance. However, it was not in a working condition at the time of field visits (Table 6.26).

Floor descriptors were available only in one university library out of ten, i.e. library 2. Floor maps were provided merely in three library buildings; further library building directory sign was available in five library buildings (Table 6.12).

7.11.2.16 Utility of Available Wayfinding System to Provide Direction

While exploring views regarding the utility of available wayfinding system, Figure 5.6 presents that 63.4% of library users were of the opinion that the available guidance system provides the right direction in university libraries in Mumbai. However, 36.6% replied that the available guidance system does not provide the right direction in university libraries in Mumbai (Table 5.7).

7.11.2.17 Opinion on wayfinding problems

When asked about experience and opinion about wayfinding problems, 53.4% of participants faced the problem of wayfinding. However, though major participants agreed that they didn't face any wayfinding problems yet, from the total participants, 46.6% of participants faced wayfinding problems (Table 5.8).

7.11.2.18 Sign Characteristics - Ability to aid till destination, Readability, Self-explanatory and visibility

The total mean scores of the features of sign characteristics such as, ability to aid till destination were (2.80), and for the characteristic self-explanatory signage, it was (2.82), as well as for readability (3.19) and visibility (3.15) which represents that majority of participants were neutral about the sign characteristics to facilitate direction, readability, self-explanatory and visibility. Thus, total mean scores for the sign characteristics represents that the available signage in all the university libraries in Mumbai lacks in aiding users to reach till desired destinations, facilitating self-explanatory signage, readability as well as visibility (Table 5.19 (A)).

7.11.2.19 Need of additional signs

The total mean for the addition of directional signs such as campus maps, floor maps, and directories (.74) followed by directional arrows (.59) was the highest mean which indicates that maximum participants from all the libraries insisted more on the need of putting directional signs such as campus maps, floor maps, directories as well as directional arrows Table 5.20(A).

7.11.2.20 Library-wise existence of building map at the entrance

Library-wise existence of building map at the entrance shows that in case of all the libraries, major participants, i.e. total 72.3%, disagreed on the availability of library building map at the entrance (Table 5.22(A)). It represents that a building map was not available near the entrances in case of maximum university libraries in Mumbai.

7.11.2.21 Height of available signs for visibility and readability

User's opinions were sought regarding the height of existing signage. 68% of participants opined that signs were placed at an appropriate height for the visibility and readability of signs (Table 5.23).

Descriptive findings associated with height of existing signage highlights that in major libraries (60%), placement of signage was at fairly accurate i.e. at or near eye level. However, in the remaining (40%) libraries, there was an absence of signage in one library and signs were placed either at a low level or at a high level in libraries, which resulted in low visibility and readability of signage (Table 5.23 (A)).

7.11.2.22 Library-wise readability as per font size, Character type and color

The mean chart of library-wise responses for opinions on the readability of font size illustrated that only Library 2 provided appropriate font size. Remaining library users expected bigger font size in signs. Thus descriptive findings indicate that very few libraries provided appropriate font size for readability of signage in the case of university libraries in Mumbai (Table 5.25(A)). The use of a smaller font size will result in a lack of readability even though the signs are visible. Table 6.29 shows that in eight libraries out of ten, signs were visible however, readability was lacking in the case of some of the signs due to use of small font size and due to the use of the single board for multiple displays and instructions. Hence only in three libraries, all the signs were available in a readable form.

Overload of information will lead to may result in ignorance of information; however, it was observed that only three libraries provided limited and pin-pointed information, in the remaining four libraries displayed voluminous information in case of rules and regulations and on instructional displays. In three libraries, there was an absence of signage (Table 6.29).

7.11.2.23 Character type preference

Table 5.26 shows that maximum, i.e. 72% of participants noted their preference for all capital letters on signs.

Users' responses about existing color scheme and contrast on signs reveal that 67.1% of participants were of the opinion that it was appropriate and convenient for readability, whereas 30.5% of opined that it was not suitable for readability (Table 5.27).

Observational findings revealed that seven libraries had designed their signage using suitable color contrast as per Johannes Itten's 'Color Wheel; in the remaining three libraries, signage was not available (Table 6.29).

7.11.2.24 Utility and significance of existing arrows

Table 5.29 presented that 44.5% of participants agreed upon that the existing arrows signify proper directions, yet 52.1% of participants were of the opinion that existing arrows do not signify proper directions.

7.11.2.25 Sources of inquiry used for physically reaching till destination inside a library

Table 5.30(A) also indicates that the total mean of other users as a source of guidance tool was used highly by the users of all the libraries. The total mean score for inquiry from other users (.88) was highest as compared to the use of other available inquiry sources while physically reaching till destination, which indicates that although the signs were available in all the libraries, the signage system was insufficient for self-orientation of users. Hence they had taken help of other users while wayfinding and while physically reaching till destination.

7.11.2.26 Distractions at staircases

As per the seventeenth principle of HO science, from the safety angle, preferably distracting or eye-catching display boards, signs or pictures should not be hung in staircases, as when a person is moving up and down staircases, he has to be more careful in taking steps. However, in the case of Library 6, few signs were placed in staircases, which need to be removed to avoid distractions while using staircases (Table 6.29).

7.11.2.27 Ergonomical design of signs

Signs were evaluated by applying three principles of design: sign-content compatibility, familiarity, and standardization. It was observed that six libraries out of ten provided ergonomically designed signs (Table 6.29).

7.11.2.28 OPAC Use

The responses revealed that 81.1% of participants had used OPAC, only 11.9% of participants were not familiar and not used OPAC, further 7.0% of participants from one of the library users under study replied that OPAC was not available in the library due to incomplete library automation process of the said library (Table 5.31).

7.11.2.29 Opinions to facilitate self-oriented OPAC

According to the percentage of cases, the findings highlight that participants from all the libraries believed that it was essential to facilitate manuals, preferably near OPAC terminals (47.8%). Further, the facility of instructional videos on OPAC terminals (42.9%) and printed guidance charts (40.2%) will aid in self-oriented OPAC use. Other opinions are listed in the table 5.35.

7.11.2.30 Opinion about availability of OPAC manuals

Responses of participants' highlights that major that is 80.5% (264) participants replied that OPAC manuals were not available in the library. Very few, i.e.11.3% (37) respondents, agreed that it was available near OPAC terminals (Table 5.36).

7.11.2.31 Signage for various forms of library collection

To make aware, the users about its availability of collection, minor identification signs as per the forms of collection should be available. Table 6.28 highlights that rare books were available in all the university libraries. However, a sign for indicating the rare collection was provided only by two libraries out of ten. The archival collection was available in seven libraries; however, the sign for the archival collection was available merely in three libraries. A special collection was available in eight libraries; however, it was made identifiable through sign only in three libraries. Manuscripts and microfilms were available only in three libraries, but the sign for the

manuscripts and microfilms was not available in any of the libraries. Audiovisual resources and CD's were available in all the libraries; however, the sign for such resources was provided by only two libraries.

7.11.2.32 Most welcoming v/s most off-putting aspects of the guidance system

Users opinions about the effectiveness of existing signs, gathered through selected users interviews, highlighted most welcoming features associated with existing signage were uniformity of signs (24.1%), color contrast used on signs (20.7%), location of signs (13.8%), size of fonts (13.8%), visibility (13.8%), and readability (10.3%); however, lack of adequate signs (56.8%) was the most off-putting aspect noted by the participants, followed by availability of paper signs only (13.6%) and OPACs with incomplete bibliographic details (4.5%) as most off-putting aspects associated with the existing guidance system (Table.6.42).

7.11.2.33 Assistive devices for disabled users

Findings revealed that since Library 2 have a separate section for special and blind users, all the assistive devices like Book reading software 14.3% (1), Braille embosser 14.3% (1), OCR scanner 14.3% (1), Refreshable Braille display 14.3% (1), Screen reading software 14.3% (1) were available in the said library. Library 7 had a CD player and tape recorder. The available assistive devices were in working condition at the time of the survey. Other assistive devices like Braille keyboard, Braille translator, digital talking books, large monitors, magnifying glass, large print keyboard, pocket accessible Daisy player, screen magnifying software and speech synthesizer were not available in any university library in Mumbai (Table 5.80).

7.11.3 Energy

Energy entails the tasks and processes performed by participants during the information source search, including their wayfinding behavior as well as problems faced by participants in the course of information seeking.

7.11.3.1 Completion of task

Out of the total 50 observed participants, 26 (52%) participants completed their tasks successfully. However, 24 (48%) participants were not able to complete the required

tasks and therefore failed to search and find the required library material (Table 6.1). However, merely 10% (5) participants out of 26 were able to successfully find the required information sources without assistance or any hint (Table 6.2).

Out of 50 participants, 70% (35) had taken the assistance of library staff, or from other users of the library, from which 28% (14) participants taken assistance for OPAC as well as information source search, 24% (12) participants opted assistance for information source search, and 18% (9) participants opt taken assistance while accessing OPAC search (Table 6.3).

Out of a total of 24% (12) participants who received hints, 6% (3) participants taken hint specifically for OPAC search, 12% (6) participants taken hint for information source search, 4% (2) participants opt hint for OPAC search as well as information source search and 2% (1) taken hint for inquiring working hours of the library for Sundays either from library staff or from other users of libraries. (Table 6.3)

7.11.3.2 Reasons for failure in timely tasks completion

Table 6.10 demonstrate that major reasons behind confusion and failure in tasks were user-specific unawareness aspects of being specific 59.90%, for example, unawareness about physical library settings, classification schemes, floor-wise stacking arrangement, availability of facilities, etc. However, there were 29.20% library-specific shortcoming factors responsible for confusion and failure in wayfinding tasks such as unavailability of shelf location in OPAC, unavailability of stack end signage, improper shelving, absence of signage for reading hall & other spaces, lengthy book issuing process for within premises and wrong stack end signage. Only 10.90% of participants were well aware of OPAC use and the shelving arrangement, and libraries physical settings. However, the inability to understand class number & shelf arrangement was the major reason behind confusion or failure in tasks completion among participants.

7.11.3.3 Number times stopped for directional inquiry

The total mean score (2.12) represents that maximum participants from all the libraries stopped at least once or twice directional inquiry from the library gate till the actual destination and the information source (Table 5.5(A)).

7.11.3.4 Degree of self-guidance in wayfinding and information search

Looking at the overall total mean scores for the degree of self-guidance in wayfinding and information search, the factor, locating and identifying the library buildings achieved the highest degree of self-guidance (3.89) in the case of all libraries. Whereas the factor experiencing ease in use of OPAC (3.18), provided the lowest degree of self-guidance, followed by factor ease and convenience in searching and finding sources in stacks (3.29) in the case of all libraries. It demonstrates that there is a need to make improvements in the available signage system for OPAC use as well as in the stacking areas (Table 5.14(A)).

7.11.3.5 Reasons behind Problems of Wayfinding

The total mean scores for the factors, absence of directional signs was highest, i.e. (.69), followed by the factor, absence of floor maps, i.e. (.55), which reflects that those factors were the strongest factors behind the problem of wayfinding (Table 5.15(A)).

In the case of university libraries in Mumbai, only 10% of libraries had conducted a user survey to find out wayfinding problems faced by users and implemented the changes as per the findings of the wayfinding survey. (Table 5.63) When the university librarians were asked about any survey conducted in the past to find out the hindrances faced by special users, it was revealed that university libraries in Mumbai had never conducted a user survey to find out hindrances faced by special users. In the case of convenience facilities expected by special users, university libraries in Mumbai had never conducted any user survey regarding the needs of special users about required convenience facilities by special users (5.4.2 & 5.4.3, Section II). In the case of university libraries in Mumbai, merely 30% of libraries had surveyed to explore access difficulties faced by users. However, 70% of libraries had never planned for surveying for exploring access difficulties (Table 5.72).

7.11.3.6 Accessibility and self-orientation aspects

Table 5.71 shows that 70% of university libraries in Mumbai facilitate open access to the entire library collection. 20% of university libraries provide partial open access to the library collection. Yet, one university library (10%) had closed access for the

entire library collection, excluding textbooks. According to physical observation, few university libraries in Mumbai specifically 30% (3), where closed access or partial open access was provided (Table 6.25).

7.11.3.7 OPAC use

The total mean score for the feature user-friendliness of OPAC (3.20) was highest among other features. It represents that all the libraries in Mumbai, excluding one library, user-friendly OPAC interfaces were provided (Table 5.32 (A)).

The descriptive findings show that users of maximum libraries didn't face any trouble while accessing and using OPACs; however, in the case of a few libraries, users (30.5%) faced trouble while using OPAC (Table 5.33(A)).

All libraries stressed on providing OPAC service to their users to make them familiar with the library collection. In the case of libraries under the study, a single library did not provide OPAC. All remaining nine libraries provided OPAC terminals at or near the entrance. Out of these nine libraries, seven libraries provided OPAC terminals near shelving areas also. (Table 6.25).

To explore kind of troubles users faced, participants were asked to elaborate on the problems faced by them while using OPAC. Table 5.34 describes various troublesome situations faced by participants. Though 74.1% of participants didn't face any problem in OPAC use, the remaining 25.9% of participants face trouble while accessing and operating OPACs. Thus major problems faced by participants were difficulty in log-in, availability of books was unclear, disconnected internet resulted in non-connectivity to OPAC, difficulty in using the software, lack of proper guidance, poor in providing search strategies, inaccessibility due to password protected terminals and so on (Table 5.34).

7.11.3.8 Success in finding books on stacks

In case of searching and finding books on stacks, 18.9% (62) participants were able to find the required more than 12 minutes to search and find desired sources. However, 13.7% (45) participants were unable to locate and find the books in stacks even after spending more than 12 minutes for a physical search of books (Table 5.38).

Considering the feedback of participants who were not able to locate and find required sources even after spending more than 12 minutes (13.7%), as well as in case of all the libraries the total of mean scores for time taken to find source in stacking by maximum users shows users required 9 to 12 minutes to find information sources in case of all the libraries in Mumbai (Table 5.38(A)). Thus all university libraries need to improve their signage system in the stacking areas and even need to provide personal assistance in case of such users who unable to find books on stacks even after spending a long time for information searching.

7.11.3.9 Finding information sources solely

Table 5.39 indicated that 47.6% of participants were able to search and find required information sources on their own; however, major, i.e. 52.4% participants replied that they could not locate and find information sources on their own.

The findings indicated that maximum participants (52.4%) were unable to locate and find information sources on their own. The total mean score (1.52) also represented that maximum participants were not able to search sources without taking assistance of library staff in case of university libraries in Mumbai. Thus it shows that existing signage was insufficient to aid users in finding information sources on their own, in stacking areas (Table 5.39(A)).

7.11.3.10 Appropriate shelving order

In case of shelving, 66.2% of participants opined that shelving was appropriate, while 33.5% of participants replied that shelving was inappropriate. One special user only used the Braille collection from the Braille department and never used printed books (Table 5.40).

The findings revealed that according to Table 5.39, major i.e. 52.4% of participants replied that they were unable to locate and find information sources on their own. Hence even though major participants, i.e. 66.2% from Table 5.40, opined that shelving order and arrangement was appropriate, yet major, i.e. 52.4% of participants replied that they could not locate and find information sources on their own. Thus the findings revealed that all libraries were lacking in providing effective stacking signage in stacking areas.

7.11.3.11 Physical information source searching opinions

The total results for the responses regarding opinions about experience of difficulty in searching information reveals that maximum participants (50.3%) from selective libraries faced difficulty in searching information due to the absence of signage or due to newly established libraries which were completely organised and well-established at the time of the study (Table 5.51).

Responses obtained through selected users interviews revealed that 42% of participants did not face any obstacle while using stacking areas, however remaining 58% of participants described the problems related to stacking areas, such as the need for additional signage in stacking areas, non-availability of books on place, unable to understand the stacking arrangement, closed access, less visibility between shelves and improper shelving. (Table 6.39).

7.11.3.12 Equipment, facilities and sources used within premises

Responses revealed from selected users' interviews discovered that reference sources (38.0%) were the most used form of library collection by novice users. Further, 18.0% of participants used textbooks, 16.0% of respondents used multiple sources together like their own laptops, textbooks as well as reference books, 8.0% of respondents used database, library internet and textbooks, other 8.0% used laptop, library internet and reference material, further remaining used databases (4.0%), library internet (4.0%) and library desktop, photocopy machine and reference books (4.0%) together (Table 6.43).

The responses revealed that maximum, i. e. 70% of participants faced obstacles while using library resources due to technology-related aspects; out of those major participants face problems related to OPAC use, the remaining 4% faced the problem of internet connectivity, and 4% opined about the unavailability of Laptop charging facility (Table 6.50).

In case of reasons behind technology aspects related to OPAC which results in hassles in-library use, maximum participants face problems associated with OPAC use such as lack of online catalogue services, need of provision to enlarge window of OPAC results, unavailability of floor location in OPAC results, unavailability of automated

services, to unavailability of OPAC manuals and unavailability of text and reference books status in OPAC as an obstacle in OPAC use (Table 6.51).

Behavioral responses from the interviewees while using types of equipments and facilities 46% of participants were confused, 30% of respondents feel dis-oriented while using various equipment, facilities and sources of libraries. Further, 26% of participants, feel need for assistance, while using equipment and resources. 22% of respondents were not satisfied after using equipment, facilities and sources of libraries. Very few participants, i.e. 22% of respondents feel comfortable, 10% of participants found ease, and only 4% of participants were satisfied after using equipment, facilities and sources of libraries (Table 6.44).

7.11.3.13 User opinions on expected improvements for finding sources in stacks

To facilitate easily accessible shelving areas, the maximum that is 56.7% expected that floor location should be available in OPAC search results for the printed sources, 53.9% noted that display chart of call numbers and subject headings should be made available near OPAC terminals, respondents 48.4% participants replied that there should be the provision of additional subject headings signs on stacks, 20.4% respondents expect that stack end signs should be provided at eye level so that it will be more visible and readable. In the case of other 1.5% participants suggested views such as OPAC should be available with an effective search engine, a good ventilation system should be provided in stacking areas, open access to all books with OPAC was suggested by few participants in the library where there was closed access, appropriate shelving was expected by few users, and Braille charts and instructions should be provided as suggested by one of the special users (Table 5.52).

Opinions on required improvements for stacking areas from all the libraries highlights that existing signage in the stacking areas among all the libraries was not satisfactory; hence, there is a need to improve the existing signage in case of stacking areas in case of all the libraries.

Stools or ladders are essential between the spaces of shelving racks to reach till upper shelves. However, it was observed that in three libraries out of ten, such stools or ladders were not available (Table 6.25).

Shelving maps or stack floor plans are essential to fulfil the objective for which the shelves are arranged systematically and made easily accessible. However, only Library 3 (TISS) had provided stack floor plans out of ten libraries under the study (Chapter 6, 6.7.4.4.1). In addition, libraries are growing organism; hence such displays need to update as per the additions in the library collection and its floor wise arrangement. However, the display of floor-wise splits in the collection was provided only by a single library out of ten university libraries under the study.

7.11.4 Space

Space entails the university libraries in Mumbai for the present study and the kind of spaces available for library users in the libraries.

7.11.4.1 Independent Library building

Out of total ten university libraries in Mumbai, three were housed in the same institutional buildings, remaining seven libraries were housed in separate library buildings.

In the case of the establishment of library buildings, the findings from Table 5.57 indicated that four libraries out of ten were established more than 20 years later from the establishment of the respective universities.

Responses from university librarians revealed that in case of 70% libraries in Mumbai, sufficient space and independence was available, due to availability of independent building for libraries, for space planning and designing a structural layout as well as arranging the physical settings of the libraries. However it also depends upon appointment or presence of librarian at the time constructing or redesigning library buildings and its spaces (Table 5.59).

7.11.4.2 Building Construction Norms

Chapter 8 Responses from librarians revealed that only 30% of library buildings were constructed by following building construction norms, but the librarians had not specified the type of building construction norms followed while planning and building construction. The remaining 70% of library buildings were not constructed as per building construction norms. None of the studied librarians specified that the

library was planned and constructed as per specific building construction norms (Table 5.60).

In the case of university libraries in Mumbai, geospatial analysis was not done in any university library while planning and constructing university library buildings.

7.11.4.3 Type of universities

According to the type of universities, 50% were Deemed universities, 40% were state universities including two branch libraries, and 10% were Central universities. Hence due to the existence of varied types university libraries in Mumbai, the funding system, availability of grants and space provisions differ according to the type of library and the administrative system of each respective library (Table 5.58).

7.11.4.4 Library entrance and space provisions

Table 5.21 presents that 72% of participants agreed that the library entrance was visible and identifiable. However, 27.7% of participants opined that it was not visible and identifiable. One participant was visually disabled.

As per the field observation, all the university library buildings were visible even though few libraries were located in parent institutional buildings; however, 50% of libraries were not identifiable due to the absence of library name signs. Further parking space was available only in 30% (3) libraries; however, sign for parking area was available only in a single university campus (Table 6.23).

Table 6.24 indicates that the provision of space near the library entrance was available in all the libraries under study. This space can be utilized for providing universal access to users, including disabled users. The inquiry counter or circulation counter in the case of libraries should be preferably visible from the entrance. It was observed that the baggage counter or circulation counter were visible from the entrance in all the libraries under study, excluding one library. Further ample space was available in all the libraries for display cases, pamphlet racks as well as for putting bulletin boards.

Users opinions about the provision of guidance system at the entrance of library obtained through selected users interviews revealed that only 40% of participants opined that they noticed that guidance system was available at or near the library

entrance, further maximum participants to be specific 72% were of the opinion that the entranceway was identifiable and welcoming and 54% of respondents agree that appropriate signage was available at the library entranceway (Table 6.32). In addition, while explaining views about obstacle while using the entranceway, 60% of participants did not face any obstacle while using libraries entranceways. However, remaining 40% of participants illustrated various obstacles experienced by them, such as multiple information displays were provided through a single digital board which lacks visibility, difficulty in locating departments and sections, difficulty in locating library from campuses gate, lack of space on baggage counter for bags, and an absence of signage near the entrances of libraries (Table 6.33).

7.11.4.5 Public access settings in service areas

Service areas are facilitated by libraries by separating the library's physical space in various service areas and sections, such as photocopy services, OPAC area, computer labs, including circulation counters. Users opinions about the provision of public access settings and the availability of guidance system in service areas of libraries revealed that 54% of participants opined that different service areas were identifiable, further maximum participants to be specific 82% were of the opinion that the service areas were welcoming, however, merely 48% of respondents agreed that appropriate signage was available at different service areas (Table 6.34).

As per participant's opinions, 46% of respondents did not face any obstacle while using and moving through service areas of the libraries. However, the remaining 54% of participants expressed different types of problems. Maximum i.e.26.0% of respondents face difficulty in locating service areas, 12.0% of respondents felt that there was a need for more signage in stacking areas, 6.0% of participants faced difficulty while using OPACs, 6.0% of respondents were unhappy with the manual catalog, 2.0% of participants were confused due to inability in differentiating call and accession numbers, 2.0% of respondents needed PC for the use of USB however, they unable to find terminals with USB drives as the OPAC terminals were not available with USB drives from the respective library (Table 6.36).

Regarding spatial navigation experiences while using library floors, 60% of respondents used other floors of libraries. However, only 32% of participants agreed

that the available guidance system aids them in navigating while using other floors of the library (Table 6.37).

7.11.4.6 Public access settings in stacking areas

Stacking areas are places that need maximum signs to differentiate between subject headings as well as numerical arrangement for quick visibility. Looking at the total mean scores for the degree of self-guidance in wayfinding and information search, the factor locating and identifying the library buildings achieved the highest degree of self-guidance (3.89) in the case of all libraries. Whereas the factor experiencing ease in use of OPAC (3.18) provided the lowest degree of self-guidance, followed by factor ease and convenience in searching and finding sources in stacks (3.29), in the case of all the libraries. It demonstrates a need to make improvements in the available signage system for OPAC use and the stacking areas (Table 5.14 (A)).

Though major participants, i.e. 66.2% from Table 5.40(A), opined that shelving order and arrangement was appropriate, yet major, i.e. 52.4% of participants replied that they were unable to locate and find information sources independently without taking assistance of library staff in case of university libraries in Mumbai (Table 5.39). Thus the findings revealed that all libraries were lacking in providing effective stacking signage in stacking areas.

The total mean score were less than four in case of finding and obtaining different library material and sources. It represents that very few participants from all libraries were strongly satisfied while finding and obtaining different library material and services, hence major remaining participants from all libraries given mixed and somewhat unsatisfactory feedback regarding finding and obtaining different library material and services (Table 5.49 (A)).

Users opinions obtained through selected users interviews regarding stacking areas revealed that only 42% of respondents were agreed on the statements that the stacking areas were welcoming and navigable, as well as 42% of respondents opined that appropriate signage was available in the stacking areas (Table 6.38). The remaining 58% of respondents experienced that wayfinding and searching information in stacks was challenging due to various reasons such as difficulty in understanding shelving order (20%), inadequate signs of subjects headings in stacks (18%), the height of

shelves (6%), difficulty due to closed access (6%), non-availability of book status in OPAC (2%), and less visibility between shelves (2%). A few participants had agreed that they face trouble while using stacking areas (4%); however, they had not described the type of obstacle faced by them (Table 6.39).

7.11.4.7 Public access settings in study areas

In the case of library study areas, responses revealed that only 88% of respondents were agreed on the statements that the study areas were welcoming and navigable, and 42% of participants opined that appropriate signage was available in the study areas. In case of opinions regarding obstacles while using library study areas, 82% of respondents didn't face any obstacle while 10% opined that there was an absence of signs in study areas, further 8.0% of participants replied the problem of lack of air ventilation in study areas (Table 6.40).

7.11.4.8 Physical settings & accessibility aspects

Printed library guide spread awareness among novice users about the libraries' sources, services and facilities. As shown in Table 6.25 printed library guide was provided only by one library. It was observed that in 90% (9) libraries, a circulation counter was available near the entrance. Only one library had its circulation counter on the first floor, which was far from the entrance, i.e. Library 5. However, in the case of 30% (3) libraries, even though located near the entrance circulation counter, was not identifiable due to the absence of signage for the circulation counter (Table 6.25).

90% (9) libraries under the study had a computer lab in libraries with the signage for the same. However, Library 5 did not have a computer lab for users at the time of the field visit (Table 6.25).

7.11.4.9 Library environment and space planning

The total mean scores for factor ease in finding objects, sections and services were the highest (3.78) among all other factors, which indicates that finding and locating objects, sections and services was not much complex with the help of available signage. However, participant's feedback revealed that finding books on shelves was more challenging for maximum participants (3.32) from all the libraries (Table 5.50 (A)).

Thus the descriptive findings and total mean scores represent the inadequacy of existing directional as well as identification signs in shelving areas among all the libraries, which also proved through the observational findings of observations about locating books and journals on shelves (Table 6.26 and Table 6.28).

7.11.4.10 Satisfaction of environmental aspect of the library building

The opinions from all the libraries on library environmental factors such as air ventilation, design to control temperature, roof height, provision of natural light and welcoming atmosphere collectively revealed that maximum participants or users were satisfied with the environmental ambience within the respective libraries under the study (Table 5.53).

Responses obtained through selected users interviews revealed that the hassles faced by participants due to building features were mainly associated with the signage systems of libraries. Though 66.0% did not face any problem associated with building features, from the remaining participants, 24.0% faced obstacles due to poor signage system, 6.0% experienced difficulty in finding departments, 2.0% opined that the confusion was due to building layout, and other 2.0% replied that confusion was due to absence of directional signage (Table 6.49).

7.11.4.11 Diverse learning spaces

Responses from librarians revealed that in 60% of university libraries in Mumbai cubicle for researchers, computer lab inside the library and group study spaces were available. Only 40% of university libraries in Mumbai had a conference hall or informal meeting space. Merely 30% of university libraries had space for conducting instructional activities by staff for library users. 10% of university libraries also facilitate other learning spaces such as E-library for Kindle, and 10% of university libraries offers separate space for music listening and film-screening (Table 5.74). In the case of other learning spaces, responses revealed that 80% (8) university libraries facilitate browsing area, 30% (3) libraries provide discussion area, 10% (1) libraries provide activity area, and 10% (1) libraries provide discussion room on demand from users (Table 5.76).

In case of convenience facilities, such as restrooms, staff food services, and a vending machine for tea or coffee is essential for library users who wish to spend long hours in libraries. 90% (9) university libraries have restrooms for male and female. However, only 30% (3) libraries provide space for staff food services and no university library in Mumbai provide the facility of a vending machine for refreshment (Table 5.75).

7.11.4.12 Convenience and access facilities for special users

Librarian's responses revealed that only 27.3% (3) libraries provide wheelchair facility, only 9.1% (1) library from ten university libraries, facilitates alarm system that combines visual and audio, broacher in Braille form, handrails on both sides of stairways, handrails in long corridors, large font signs, ramps at the accessible entrances, restrooms for disables, in addition in one university library facilitates maximum resources on the ground floor for special users. However, provision of tactile and touch maps was not available in any university library in Mumbai (Table 5.79).

The field observation revealed that a single library had parking space for disables; however, there was an absence of sign of parking for disables in case of all the libraries under study. Further, wheelchair ramp with handrails was available only in three libraries. In addition, an elevator was available only in four library buildings out of ten (Table 6.30).

Tactile aids visual impairments in sensitizing about walls, corners or similar insecure areas while moving around in the library. However, tactile was not available in any university library under the study (Table 6.30).

Service desks like circulation desk and reference desk should be designed with the appropriate height accessible for all users, including disabled. However, accessible circulation desk was facilitated only in two libraries; further universally accessible reference desk was not available in any of the libraries under the study (Table 6.30).

In the case of the stacking area, observational findings revealed that the space between shelves along with wheelchair was accessible in all the libraries excluding Library 5, as this library had a closed access system. Further, in the case of elevators, only two libraries provided Braille floor indicators. Only one library had provided a

restroom for disabled among university libraries in Mumbai. Braille signs for convenience facilities were not available in any of the libraries. Braille floor indicators in elevators were available only in two libraries. Further audio signs were not available in any of the libraries, excluding audio instructions available only in elevators of two libraries (Table 6.30).

7.11.4.13 Resting room/ Napping Room

Providing resting rooms to users in large libraries is a new trend in developed countries to make the user comfortable while spending long hours in libraries. However, due to the space crisis, facility of the resting room was not available in any university library in Mumbai.

7.11.4.14 Provision of space allocation to accommodate future changes

Findings revealed that 80% of university libraries have space to accommodate future changes as per the changing requirement of learning spaces. However, 20% (2) university librarians replied that they don't have space to accommodate future changes (Table 5.77).

As per Table 5.81, 28.6% (2) librarians planned to facilitate, disable friendly washrooms for the library users, 14.3% (1) library planned to build an elevator for a library building, 14.3% (1) planned the expansion of second and third floor for making library spacious as well as comfortable, 14.3%(1) library planned to implement a system for visually impaired, 14.3% (1) library planned for a separate reading room and IT space, and 14.3%(1) library planned for implement digital signage in their respective university libraries in Mumbai.

7.11.4.15 Use of space and energy consumed

User-friendly space arrangement with adequate indicators and cues facilitate comfort and ease, as well as save the time of library users while using library infrastructure, sources and services. The observational findings of selective participants while navigating and finding their required information sources revealed the following conclusion regarding the use of space and energy consumed.

Table 6.6 shows that maximum, i.e. 32% (16) participants followed the right steps or series of actions to find out source details and to search information source. However,

a very few participants, i.e. 12.5% (2), were able to complete their task within 1 to 5 minutes, whereas 18.8% (3) spent 26 to 30 minutes for completing a task, even though they had followed the right series of actions.

7.11.5 Time

Time entails the total time needed for information to be accessed for the selected participants during the field observation.

7.11.5.1 Time required reaching Library from Campus Gate:

In the case of responses for the time required to reach till library from campus gate, 45.1% of participants could reach the library from campus gate within less than five minutes. However, 22% of participants required more than five minutes to reach the library. However, 32.9% of participants required more than ten minutes to reach the library from the university campus gates (Table 5.4).

On the other hand, as per the field observation, all the university libraries under research are at the average walkable distance of five minutes from the entrance of the campuses.

7.11.5.2 Time required for OPAC search

The observational findings of participants revealed that the average time spent by the participants to complete the required tasks was 18.50 minutes, ranging from an average minimum of 2 minutes to a maximum of 33 minutes (Table 6.4).

Maximum participants were able to use and search OPAC within 1 to 10 minutes. However, maximum participants spent 11 to 20 minutes for a physical search of required information source. (Table 6.5)

7.11.5.3 Time required for searching information source in stacks

Table 5.37 presents that maximum, i.e.31.7% of participants spent more than 12 minutes, 22.6% of respondents spent 5-8 minutes, 17.7% of participants required 9-12 minutes to locate and find the books or information sources in the stacking area after leaving OPAC terminals. Very few participants, i.e. 21.0% and 7.0% of participants were able to find the books in the stacks within 1-4 minutes and less than one minute

respectively. It highlights that maximum participants spent more time in stacking area for information source search.

The total mean scores for the time taken to find a source in stacking (3.46) by maximum users shows users required 9 to 12 minutes to find information sources in case of all the libraries in Mumbai (Table 5.37(A)).

7.11.5.4 Time spent in the library during initial visits

Table 6.31 indicates that maximum to be specific 60% (30) of participants spent less than an hour in the library during their initial visits. Very few that are 36% (18) spent one to three hours and only 4.0% (2) spent more than three hours in the library during their initial visits. Library-wise data indicates that maximum participants spent one to three hour in all the libraries. Newly enrolled students in case of university libraries mainly use to visit libraries for lending the required books and other information material from the library initially during an early stage of their academic year. In addition, confused first time user may spend more time in search of departments or material, as it was represented by Table 5.48 that maximum that is 45.4% of participants were confused while navigating and searching information in libraries.

7.11.6 Observations of personality

Regardless of available signage, major participants in university libraries felt that wayfinding was complex or not self-oriented due to the complexity of library buildings and lack of appropriate signage. Many participants experienced confusion, disorientation, indecisiveness, and anxiousness, while navigating and searching for information sources in libraries.

Post-library orientation user opinions about awareness and importance of various information sources revealed that average participants from all libraries were not familiar with library resources (66.7%) even though they feel those sources were important (97.1%). User's responses about the post-orientation awareness about various information sources revealed that maximum participants were aware of books, databases and e-journals, however maximum participants, even though mentioned the importance of other sources, yet were unaware of audio-visual material, OPAC, circulation counter and printed thesis (Table 5.47).

Findings also revealed that major reasons behind confusion and failure in tasks were user-specific such as user non-familiarity about physical library settings, classification schemes, floor-wise splits in stacking arrangement, availability of facilities, etc. (Table 6.10). Even out of 24 participants who failed to complete tasks, 14 (58%) participants failed in completion of tasks even though they had attended library orientation. Thus, university libraries need to provide in-depth library orientation along with physical library tour to familiarize novice users with the university libraries (Table 6.8).

In the case of university librarians all the librarians were well qualified and experience excluding one library which was newly established library (Table 5.54 and Table 5.55).

7.11.7 Observations of Matter feature

Information kiosks were not used by participants of any library as kiosks were not available in any of the library under the study according to the observational findings (Table 6.12). The use of international sign for the library will aid users to quickly locate and identify the library building. Hence the availability of the symbol of the library was assessed. However, it was not available at any of the libraries under study. It is advisable to add a sign of a silent zone near the university campus or the library building. However, the sign of 'Silent Zone' was observed only at one university campus near the entrance.

The available signage within the campus was inadequate for satisfying wayfinding inquiries of users; rather the available campus maps were also inadequate and inappropriate to facilitate directional guidance within campus till the library building (Table 5.3(A)). There is a need to add different wayfinding tools within the campus, such as campus maps, information kiosks, directional arrows, 'you are here' maps etc. in all the university campuses.

A few participants from three university libraries approached library staff for inquiring about working hours of the library and location of the photocopy section, location of back volumes of journals due to the absence of such informative and directive signage (Table 6.6). In all those three university libraries, very few permanent signs were available. Other informal and directional signage was available in paper printed form.

Response of participants' highlights that major that is 80.5% of participants replied that OPAC manuals were not available in the library. During physical observation of buildings, it was observed that only one (.6%) library facilitated printed OPAC manual near the OPAC terminal (Table 6.12). Besides, instructions for OPAC use were provided only by three libraries out of ten.

Findings highlight that only 2.5% (4) campus maps signs were available in the total signs seen and observed in the study (Table 6.12). That means campus maps were not available at every university campus in Mumbai. Information kiosks were not used by participants of any library as kiosks were not available in any of the library under the study according to the observational findings. In the case of five libraries, either a library building name sign or sign indicating library entrance was available to locate the library building (Table 6.12).

Though more than 70% of signs were of permanent form, yet nearly 30% of signs were temporary from the total signs observed from all the universities (Table 6.13).

Though major signs were directional from the total observed signs from all the universities, (64.4%) yet orientation maps or directories or floor wise list of departments were available only in four libraries out of ten (Table 6.15).

Six libraries out of ten had consistency in the available signage. Out of the remaining four libraries, one library provided paper signage. Two libraries do not provide signage, and one library provided signage but lacked consistency (Table 6.29).

Maximum participants specified that absence of directional signs (68.9%), absence of floor maps (55.4%), unavailability of building maps at the entrances (40.2%), resulting in confusion, uncertainty, and lack of self-orientation among participants (Table 5.15).

Maximum participants were of the opinion that existing arrows do not signify proper directions (52.1%). It indicates an ineffectiveness of existing directional arrows with the unavailability of directional cues ultimately resulting in uncertainty among library users (Table 5.29).

A display for rules and regulations was available only in 50% of libraries. However, in the case of 20% of libraries, details about working hours were not available on the display of rules and regulations (Table 6.27).

Only in a single university library out of ten, a digital display was used. However, 24 different types of informative displays were merged in a single digital board in the case of this library, which was not feasible for users to read all the information as they arrive one after other respectively. In addition, it was running for 26 minutes to finish all displays in one set (Table 6.12)

Symbolic signs eliminate the language barrier as well as aid in quick message conveying. In spite of this, in university libraries in Mumbai, there was an absence of the use of symbols for signs. Only a few libraries provided symbols for restrooms, excluding that there was absence of symbols or pictorial signs (Table 6.12).

In the case of university libraries in Mumbai, only 30% of libraries conducted signage audit, rest 70% of university libraries never conducted signage audit (Table 5.67).

7.11.8 Observations from Energy feature

Major participants during the observation had taken assistance or hint from library staff or other library users. It shows that university libraries in Mumbai lack in self-orientation of library users.

During the physical observation of participants while navigating and in the information search process, the aspect that caused the most confusion was the inability to understand the class number & shelf arrangement. The other hurdles in wayfinding mentioned by participants were difficulty finding entry to the mezzanine floor, basement stacking areas, and difficulty finding electric switches in such isolated spaces.

Most participants stopped immediately after entering the library near the entrance to look for a sign to help them decide which way to go or inquire at the entrance counter/ baggage counter about the required section or departments. Participants also mentioned difficulty orienting themselves within open spaces, browsing areas as well as in locating different departments and service areas.

In the case of OPAC use, participants had a difficult time figuring out reference collection and general collection while browsing OPAC.

In all university libraries in Mumbai, due to the absence of floor location in OPAC, it was complicated for participants to decide from where to start searching physically for library material even after noting exact source details.

In few university libraries, the desktop of OPAC terminals were protected through passwords or screen locks. Due to the absence of instructions or signs for the same participants get frustrated and approached library staff.

In some libraries, OPAC instruction manuals or guidelines were available near OPAC terminals. While in a few libraries, due to the absence of such manuals or instructions, few participants avoid using OPAC or preferred to take assistance from staff while using OPAC.

In the case of one library, manual catalogues card were also provided in addition to OPAC. However, there was the absence of an instructional sign describing the status of updation, till a particular year, in the case of manual catalogue card cabinets.

The absence of a floor-wise call number range sign to highlight floor-wise splits in the collection made it challenging for participants to decide where to begin searching the required book. Findings revealed that most participants found difficulty in understanding the shelving arrangement.

The absence of floor maps or informational sign about the floor-wise division of type of collection made it demanding for participants to think about where to begin for the required bound volume of a journal in many university libraries.

Almost all participants found difficulty in understanding the call numbers while searching the printed materials. Many of the participants expressed that; there should be an availability of subject headings in shelving areas.

In the case book borrowing process from circulation counter, maximum i.e.92% of participants opined that they were able to understand the process of borrowing books, and 88% of respondents speak out that book borrowing process was simple and speedy (Table 6.35).

Self-checkout service saves the time of users as well as staff. It also provides the freedom to users to drop the books in self-checkout machines even though the circulation counter is closed. However, self-checkout service was not available at any library under the study (Table 6.25).

Nine libraries under the study had computer labs in libraries with the signage for the same, to access and use resources. However, one library did not have a computer lab for users at the time of field visit (Table 6.25).

Only three libraries had provided tables with power switches on the desk of tables in reading halls (Table 6.25).

7.11.9 Observations from space feature

Out of total ten university libraries in Mumbai, three were housed in the same institutional buildings, remaining seven libraries were housed in separate library buildings (Table 5.59).

A few libraries were established after quite a long interval as compared to the establishment of those universities (Table 5.57).

In the case of 70% of libraries in Mumbai, sufficient space and independence were available due to the availability of independent building for libraries, space planning, and designing the structural layout (Table 5.77).

70% of library buildings were not constructed as per building construction norms. None of the studied librarians specified that the library was planned and constructed as per specific building construction norms (Table 5.60).

In the case of university libraries in Mumbai, geospatial analysis was not carried out in any university library while planning and constructing university library buildings.

It was revealed that university librarians were either not appointed at the planning stage of libraries or university planning authorities did not consider them at the planning stage of individual library buildings (Table 5.62).

Findings from the questionnaire present that a maximum, i.e. 72% of participants agreed that the library entrance was visible and identifiable (Table 5.21).

As per the field observation, all the university library buildings were visible even though few libraries were located in parent institutional buildings; however, 50% of libraries were not identifiable due to the absence of library name signs. Further parking space was available only in 30% (3) libraries; however, sign for parking area was available only in a single university campus (Table 6.23).

The provision of space near the library entrance was available in all the libraries under study (Table 6.24).

Users opinions about guidance system at the entrance of the library obtained through selected users interviews revealed that only 40% of participants opined that they noticed that guidance system was available at or near the library entrance, further maximum participants to be specific 72% were of the opinion that the entranceway was identifiable and welcoming and 54% of respondents agree that appropriate signage was available at the library entranceway (Table 6.32).

About obstacle while using entranceway, 60% of participants did not face any obstacle, however remaining 40% of participants illustrated various obstacles experienced by them, such as multiple information displays were provided through the single digital board which lacks visibility, difficulty in locating departments and sections, difficulty in locating library from campuses gate, lack of space on baggage counter for bags, and an absence of signage near the entrances of libraries (Table 6.33).

It was observed that the baggage counter or circulation counter were visible from the entrance in all the libraries under study, excluding one library (Table 6.25).

Users' opinions about service areas of libraries revealed that 54% of participants opined that different service areas were identifiable, further maximum participants to be specific 82% were of the opinion that the service areas were welcoming; however, merely 48% of respondents agreed that appropriate signage was available at different service areas (Table 6.34). Yet maximum, i.e. 54% of participants expressed different types of problems while using service areas (Table 6.36).

Though 62% of respondents used other floors of libraries, yet only 32% of participants agreed that the available guidance system aids them in navigating while using other floors of the library (Table 6.37).

A few participants used OPAC and then moved towards the shelving area; however, while moving around the stacking area, they have forgotten the source details and used OPAC again for finding source details and again moved to a stack area.

Many participants unknowingly moved towards stacking and then, after seeing large stacking areas moved towards OPAC.

A few participants moved along in basements, mezzanine floors to search electric switches before searching passive information sources such as back volumes of journals and reports.

A few participants mentioned that there was a lack of air ventilation and enough provision of light in the stacking areas.

Findings associated with existing building features revealed that all the participants faced obstacles while using building features suggest the need for improvement in the existing signage system.

Some participants could not locate electric switches in the stacking areas due to the absence of signage for the same.

Stacking areas were unable to provide a satisfactory degree of self-guidance in case of ease and convenience in searching and finding sources in stacks (3.29) in all the libraries (Table 5.14 (A)).

Though major participants, i.e. 66.2%, opined that shelving order and the arrangement were appropriate, yet major, i.e. 52.4%, of participants replied that they were unable to locate and find information sources on their own (Table 5.39(A)). Thus the findings revealed that all libraries were lacking in providing effective stacking signage in stacking areas.

Very few participants from all libraries were strongly satisfied while finding and obtaining different library material and services. Hence major remaining participants

from all libraries given mixed and somewhat unsatisfactory feedback regarding finding and obtaining different library material and services (Table 5.50 (A)).

Users opinions obtained through selected users interviews regarding stacking areas revealed that 58% of respondents experienced that wayfinding and searching information in stacks was challenging due to various reasons, such as difficulty in understanding shelving order, inadequate signs of subjects headings in stacks, the height of shelves, difficulty due to closed access, non-availability of book status in OPAC, and less visibility between shelves (Table 6.39).

The total mean score for factor ease in finding objects, sections and services was highest (3.78) among all other factors, which indicates that finding and locating objects, sections and services was not much complex with the help of available signage. However, participant's feedback revealed that finding books on shelves was more challenging for maximum participants (3.32) from all the libraries (Table 5.50 (A)).

In the case of library study areas, responses revealed that only 88% of respondents were agreed on the statements that the study areas were welcoming and navigable, and 62% of participants opined that appropriate signage was available in the study areas. A few participants noted problems while using study areas like lack of air ventilation and self-guidance (Table 6.40).

Printed library guide was provided only in a single library. It was observed that in 90% (9) libraries, a circulation counter was available near the entrance. However, in the case of 30% (3) libraries, physical spaces and sections were not identifiable such as circulation counter, due to the absence of signage. Further, 90% (9) libraries under the study had a computer lab in libraries with the signage for the same (Table 6.25).

The opinions from all the libraries on library environmental factors such as air ventilation, design to control temperature, roof height, provision of natural light and welcoming atmosphere collectively revealed that maximum participants were satisfied with the environmental ambiance within the respective libraries under the study (Table 5.53). However, responses obtained through selected user's interviews revealed that the hassles faced by participants due to building features were mainly associated with the signage systems of libraries (Table 6.49).

Responses from librarians revealed that in 60% of university libraries in Mumbai, cubicle for researchers, computer lab inside the library and group study spaces were available. Only in 40% of university libraries in Mumbai had a conference hall, merely 30% of university libraries had space for conducting instructional activities by staff for library users, 10% of university libraries facilitate other learning spaces such as E-library for Kindle as well as a separate space for music listening and film-screening (Table 5.74). In the case of other learning spaces, responses revealed that 80% (8) university libraries facilitate browsing area, 30% (3) libraries provide discussion area, 10% (1) libraries provide activity area, and 10% (1) libraries provide discussion room on demand from users (Table 5.76).

In case of convenience facilities, 90% (9) university libraries have restrooms for male and female; however, only 30% (3) libraries provide space for staff food services and no university library in Mumbai provide the facility of a vending machine for refreshment (Table 5.75).

Librarian's responses revealed that accessibility provisions for disables were provided merely in a single library.

The field observation revealed that a single library had parking space for disables; however, there was an absence of sign of parking for disables. Further, wheelchair ramp with handrails was available only in three libraries. In addition, an elevator was available only in four library buildings out of ten. Tactile was not available in any university library under the study (Table 6.30).

The universally accessible circulation desk was facilitated only in two libraries; further, universally accessible reference desk was not available in any of the libraries under the study (Table 6.30).

The existing accessibility provisions and spaces facilitated by all the libraries for disabled were insufficient and inadequate to provide universal access (Table 6.30).

Due to the space crunch facility of the resting/napping room was not available in any university library in Mumbai.

7.11.10 Observations from Time feature

According to field observation, all the university libraries under research are at the average walkable distance of five minutes from the entrance of the campuses. However, less than half of participants were able to reach the library from the campus gate within less than five minutes.

The observational findings of participants revealed that the average time spent by the participants to complete the required tasks was 18.50 minutes, ranging from an average minimum of 2 minutes to a maximum of 33 minutes.

Maximum participants were able to use and search OPAC within 1 to 10 minutes; however, maximum participants spent 11 to 20 minutes for a physical search of required information source (Table 6.3).

In case of searching information source in stacks maximum of, i.e.31.7% of participants spent more than 12 minutes. Very few participants, i.e. 21.0% and 7.0% of participants, were able to find the books in the stacks within 1-4 minutes and less than one minute respectively. It highlights that maximum participants spent more time in stacking area for information source search.

The total mean scores represents that maximum participants required 9 to 12 minutes to find information sources in stacks in case of all the libraries in Mumbai.

7.12 Recommendations and Suggestions

On the basis of findings and observations following recommendations and suggestions are presented to make libraries humanely oriented. The Force Field Analysis (Table 6.54) also brought forth suggestions regarding utility to nullify / to tone down the obstacles and move towards fulfilling user expectations given below:

7.12.1 Recommendations from Personality

There is a need to provide in-depth library orientations with user education workshops. Besides, the provision of video tours will aid the users who are absent for library orientation programmes. Another reason may be that participants may not be considering user orientation programmes useful. There is a need to make participants aware of the importance of attending various library orientation programmes.

Video library tour is cost-effective for libraries as well as for users as it can be utilized multiple times once produced. However, no library from the universities within Mumbai offers a video library tour. Hence, video library tour should be facilitated with other alternatives to library orientation programs.

Responses from participants highlight that very few participants from all libraries were strongly satisfied while finding and obtaining different library material and services, hence major remaining participants from all libraries gave mixed and somewhat unsatisfactory feedback regarding finding and obtaining different library material and services, which highlights that there is need to improve the signage and accessibility in stacking areas.

Responses from the survey in case of suggestions from participants indicate that university libraries need to improve their signage system. Many users were unaware of facilities and services due to inadequate signage. Regarding OPACs, maximum participants suggested precision regarding locations of sources, advancements in searchability, availability of OPAC manuals and availability of OPAC terminals near entrances as well as in stacking areas.

In the case of personality traits of university librarians, maximum librarians were well qualified, and experienced, excluding a case of one university where librarian was not appointed at the time of the study. Librarians post should be filled for effective development and management of library functions.

Decisions of librarians should be taken into consideration while constructing or designing library building as well as while planning wayfinding cues as per the requirement of the physical arrangement of departments and services.

Major university libraries did not have budget provision for acquiring signs or wayfinding tools; hence all universities should provide an authoritative budget allocation for planning and implementation of internal library building signage system for libraries as academic and cultural hubs. NAAC Assessment is an ideal period for librarians to work upon this lacuna of signage and librarians should put forward their signage plans through the Library Committee. This will alleviate the signage problem as far as libraries are concerned.

7.12.2 Recommendations from Matter

All university libraries in Mumbai should implement systematically planned signage systems.

7.12.2.1 Visibility

Signs should be placed at eye level with appropriate font size for its visibility; further consistency should be maintained while placing all the signs on a specific height.

The use of a separate board for each facility is the best way to confirm human orientation, as well as its visibility and readability in addition signage, should be self-explanatory.

Though maximum participants noted their preference for all capital letters on signs, preferably sentence case should be used while designing signs.

There should be no obstruction between the signs and the users' vision point of view. While placing signs, it should be seen that it will not get hide due to other objects or due to congested spaces.

7.12.2.2 Placement

The campus maps should provide directional based information as well as location-based information, i.e. It should able to answer the questions such as, where am I and where am I going? and How will I get to my destination.

All the university libraries should provide library building maps near the entrances to facilitate self-orientation to users.

All universities should provide directional signs, as orientation maps or directories or floor wise list of departments with directional arrows at decision points.

Display for rules and regulations, including details about working hours, should be available in all libraries to avoid frequent inquires of users as well as to save their time near the entrance or in the entrance lobby.

Library instructional manuals and library guides should be made available at the entrance or at the inquiry counter to avoid frequent FAQ's.

There is a need to provide appropriate signage at the entrance of the libraries. Many libraries had used single information boards to add multiple notices as well as signs together. Such clutter of signage should be avoided. Libraries should mainly facilitate library building map or directory with floor maps near the entrances.

Placement of major and minor signage should be in harmony and in an appropriate manner to aid till destination.

Directional arrows with the descriptions should be added at decision points.

Signs should not be placed in staircases, as it creates distractions while using staircases.

Signage should be placed for the mezzanine floor at a visible point, as in many university libraries, stairs for the mezzanine floors are available in the stacking area, which is not easily visible.

OPAC manuals should be made available near the OPAC terminals. The provision of printed OPAC manuals near the OPAC terminals will assist users in operating OPAC confidently on their own.

Library OPACs should provide complete bibliographic details, preferably with the accurate location and floor.

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

7.12.2.3 Color Scheme

Hue is the perceptual attribute associated with elementary colour names. Hue enables us to identify basic colour categories such as blue, green, yellow, red and purple. People with normal colour vision report that hues follow a natural sequence based on their similarity to one another. With most colour deficits, the ability to discriminate between colours on the basis of hue is diminished (Harmonised Guidelines and Space Standards for Barrier Free Built Environment for Persons with Disability and Elderly Persons, 2016).

Colour Contrast - The basic guidelines for making effective colour choices are based on the hue value of the colours. The most commonly used methods of achieving colour contrast incorporate either 'harmonising' or 'contrasting' colour combinations (Harmonised Guidelines and Space Standards for Barrier Free Built Environment for Persons with Disability and Elderly Persons, 2016).

7.12.2.4 Standardization

Consistency in signage establishes a systematic pattern while orienting users; hence, all university libraries should plan and design signs with consistency in case of use of color contrast, shapes, and size of fonts for major and minor signs.

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 and facilitate more visibility. Clear and simple symbols for general public facilities, such as restrooms, drinking fountains, stairways, elevators, exits as well as a symbol of access for the disabled in wheelchairs, are certainly available.

All university libraries should plan and conduct a signage audit at a frequent interval to update and remove outdated signs and torn signs.

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

The use of paper signage should be minimized as it affects consistency in the signage system. Further, if such signs are not removed or updated relevant and desired information is often mixed up with the other instructions reducing the effectiveness of the total display system.

Signs should be designed ergonomically by applying three principles of design such as sign-content compatibility, familiarity, and standardization.

Signs such as Keep silence, Turn off Your Mobiles, Entry for staff only, etc. are examples of minor instruction or regulatory signs. Minor instruction or regulatory

signs were available in all the libraries; however, only two libraries provided such signs in permanent form. The remaining libraries used paper printed signs for the display of minor instructions. Permanent signs are recommended for such type of Minor instruction or regulatory signs.

Digital displays attract more to pathfinders as compared to acrylic or traditional signage. However, overload of information on digital displays with multiple slides should be avoided to retain its visibility and readability.

National Archives of India Access Audit Report (2009) recommends that Elevators call buttons with Braille signs on each floor, should be placed at a reach of 900mm - 1000mm, at least 400mm from any corner or have a clear floor space with 900mm x 1200mm with no obstruction place to prevent a wheelchair user from reaching the call buttons. (National Archives of India Access Audit Report)

In (Indian Standards) IS 1553 (1989): Design of Library Buildings, an amendment is essential regarding recommended frequency intervals for conducting signage audit in libraries.

The process of executing signage audit and the expected frequency or interval for conducting signage audit is not yet covered in any standards. Creation of multilingual signage should also be thought and implemented to provide linguistic diversity. Two sides of the same hanging sign boards can be used for the same.

QR (Quick Response) codes can be used wherever possible. QR codes are easy to read by scanning through mobile devices. They can store more information than traditional bar codes. QR codes embedded in item records in an OPAC can lead the users to get bibliographic information easily.

Assistive devices for disabled users like Book reading software, Braille embosser, OCR scanner, Refreshable Braille display, Screen reading software and CD player should be available in all the libraries. Other assistive devices like Braille keyboard, Braille translator, digital talking books, large monitors, magnifying glass, large print keyboard, pocket accessible Daisy player, screen magnifying software and speech synthesizer should be preferably made available in all university libraries in Mumbai.

7.12.3 Recommendations from Energy

University libraries in Mumbai lack in self-orientation of library users. There is a need to provide in-depth library orientation with physical library tool as well as video library tour to make users aware of the library's spaces, services and facilities. The difference between reference collection, rare books and other collection should be well explained during the library orientation sessions.

Minor signage for electricity switches, basement areas and a way to the mezzanine floor should be placed at decision points and in isolated areas.

Inquiry counter or circulation counter should be planned immediately near the entrances of all the libraries to provide personal assistance and human touch to all the users, including the novice users entering in the libraries.

Desktop of OPAC terminals should not be protected through passwords or screen locks. In case of such cases, instructions or signs for the same should be provided near the terminals.

Printed OPAC instruction manuals or guidelines should be available near all the OPAC terminals in all the libraries.

It is preferable to facilitate OPAC terminals both at the entrance as well as near the shelving areas for the user's convenience.

If manual card catalogues are also provided in addition to OPAC, manual card catalogues should be updated with the addition in the library collection. However, if it is not updated after a particular year, an instructional sign describing the same should be placed near manual card catalogue cabinets.

OPAC results should highlight the difference between reference collection, rare books and other collection by adding related alphabet to the class numbers.

Provision of enlargement of OPAC results should be provided with simple as well as advanced search strategies.

Floor-wise splits in the collection should be represented with a visible sign near the OPAC terminals, near shelving areas as well as near the entrances of each floor.

In many libraries, information sources are organised and housed according to the type of collection, for example, journal section, theses section, etc. Floor maps or informational signs about the floor-wise division of type of collection should be made available in all the university libraries.

Libraries should provide multiple reading choices for a diverse population. However, with the new trend followed by university libraries of BYOD (Bring Your Own Devices), libraries should provide tables with power switches in the reading areas so that users can charge their laptops, e-book readers or palmtops on such tables themselves.

Sign for subject headings should be available in or near the shelving areas in all the libraries.

Open access should be provided in all the university libraries to facilitate freedom for users to browse through shelves and to choose the required information sources.

All libraries should provide computer labs in libraries with appropriate signage for the same.

The book issuing process should be easy and speedy in all university libraries. Self-checkout service saves the time of users by providing freedom to users to drop the books in self-checkout machines even though the circulation counter is closed. Hence this service should be provided in all libraries.

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

Call number range sign should be assigned for back volumes of journals and should be placed at the entrance of the journal section and near the stacking area of bound volumes.

Stack end signage should be updated frequently with the addition of printed material on shelves.

Reshelving of books by users should be minimized to lower the percentage of misshelved books. To encourage the desired behavior from users, clearly marked

book return shelves should be provided at the end of each range. Signs encouraging users not to reshelve books will be more effective if placed at a suitable visible point near the stacking areas.

Stools or ladders should be provided between the shelves for the users' convenience to reach the upper shelves of libraries for the users' convenience.

Video library tour is cost-effective for libraries as well as for users as it can be utilized multiple times once produced. However, no library from the universities within Mumbai offers a video library tour. Hence video library tour should be facilitated with other alternatives to library orientation programs. Video library tour can be planned and created with the GoPro camera right from the entrance of the university campus including the wayfinding tools provided till the library building. Further the external signage system and the surrounding of library should be covered while recording navigational path. The library entrance and the service departments near the entrance, library building map, floor maps or building directory should be captured and explained while shooting and recording. The process of circulation counter, OPAC use should be preferably well explained with screenshots for OPAC clicks for the search process. The shelving areas should also be covered with the explanations about floor-wise and subject-wise classified arrangement of the collection. Video library tour should be linked to university website. Creation of video library tour will provide diverse benefits' like users can access the video for multiple times, which will lead in minimizing FAQs by users to the library staff, in addition it will also be beneficial for the students who were absent for the library orientation program.

7.12.4 Suggestions of Space

An independent library building should be available for university libraries to serve varied types of users with huge library collection, wide-ranging e-resources and databases as well as diverse e-learning spaces.

Different types of Building Construction Norms and Standards are available such as National Building Code of India 2016 (Bureau of Indian Standards, 1989), IS 1553 (1989): Design of Library Buildings, Harmonised Guidelines and Space Standards for Barrier-Free Built Environment for Persons with Disability and Elderly Persons, 2016 (Ministry of Urban Development, 2016), Access to libraries for persons with disabilities –CHECKLIST by IFLA (International Federation of Library Associations

and Institutions, 2005), Indian Accessibility Standard: Recommendations for Buildings and Facilities for Inclusion of Persons with Disabilities as well as guidelines provided by American Disabilities Act (ADA). University libraries need to follow such Standards and Guidelines with application of geospatial analysis before re-designing or renovating libraries in future.

There is a need to revise or reaffirm IS 1553: 1989 Indian Standards for Design of Library Buildings (Bureau of Indian Standards, 1989), the revision of the same was also recommended before 2005 by the Indian Bureau of Standards. The signage guidelines and standards for libraries are not yet included in the IS 1553: 1989 Indian Standards for Design of Library Buildings which need to be added while revising the same.

Hence, librarians should advise the planners and architects to plan library building as per IS 1553 (1989): Design of Library Buildings, IS 2672: 1966 Code of practice for library lighting, and IS 11460: 1985 Code of practice for fire safety of libraries and archives, for implementation of recommended environmental factors while constructing or renovating existing library buildings.

The provision of space near the library entrance that is browsing area was available in all the libraries under study. This space can be utilized for providing universal access to users, including disabled users. Further ample space was available in all the libraries for display cases, pamphlet racks and bulletin boards.

The inquiry counter or circulation counter in the case of libraries should be preferably visible from the entrance.

To minimize directional inquiries, building map or directional signs for different departments or information kiosk should be made available at or near the entrance of the library.

A parking area should be preferably provided by all the libraries for all users, including disabled users, with the appropriate sign for the same.

Spacious baggage counters with ample dowers should be provided near the entrances. Provision should be made for keeping wet umbrellas near baggage counters during rainy seasons.

Additional signage should be placed in service areas and browsing areas as per need in all the libraries to connect minor and major spaces in the libraries.

An appropriate guidance system should be planned in all the libraries to locate and direct users towards other floors of libraries.

A few OPAC terminals should be made available with USB drives in all the libraries.

OPAC terminals with a visible and readable sign for the same should be available near the browsing area. Further libraries should provide OPAC terminals near or inside the stacking area to save library users time.

Signs or directional arrows for electric switches are necessary for such isolated, inaccessible places and basements or mezzanine floors.

Physical spaces and sections and services should be made identifiable by placing appropriate signage.

There is a need to make improvements in the available signage system in the stacking areas. Provision of sufficient natural light and air ventilation, with open access for maximum information sources, should be made wherever possible in the stacking areas.

Open stack arrangement should be facilitated by giving the user all essential location information in the OPAC as well. The format and placement of book location signs and charts should be standardized in each stacked area throughout the building. Book location information should be readily distinguishable from other directional messages to indicate the traffic pattern and continuity of shelving order.

University libraries need diverse learning spaces as per their enrolment strength and subject specialization or a type of university. However, each university library should preferably have a conference hall, a cubicle for researchers, computer lab, and an additional space for other instructional activities inside the library.

One library had double-sided monitors at the circulation counter. It's ideal for facilitating monitors view to the user at the circulation counter to update them with the lending transactions (Time).

University libraries should preferably facilitate space for staff food services and the facility of a vending machine for refreshment.

Use of consistent, uniform names for spaces throughout all library signage and literature is advisable.

Considering the special needs of handicapped patrons will quite probably result in good design, even for the general population. For example, large-size lettering, high-colour contrast, and consistency in shape and placement of signs, spacious corridors and pathways are features to be incorporated in any guidance system.

Elevators with Braille buttons inside the elevators as well as for call buttons, a restroom for disabled, Braille signs for convenience facilities, and audio signs for elevators should be made available in all the university libraries to facilitate universal access.

Reading rooms, reading tables, and computer tables should be fairly accessible and have adequate aisle space suitable for all users, including special users.

Tactile maps, ramps, handrails, wheelchairs, and restrooms for disabled should be made available in all the libraries to facilitate universal access.

It is essential to plan or implement Geospatial analysis while re-designing or reconstructing university libraries in Mumbai.

The physical features of library settings constitute one source of orientation information, which leads to investigating the requirements for a particular space for particular users in each individual library building and its architectural structure. Every library has its own architectural structure and physical layout. Hence space planning and organization of collection, equipment and services will differ for each library. Yet norms related to information commons should be preferably followed by libraries at the time of space planning.

7.12.5 Suggestion from Time

Location guide map with the specifications about the floor-wise allocation of the printed collection as well as library sections, resources and services should be designed and placed at the entrance counter.

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

'You are here' maps should be available on every floor of libraries at a visible point or at decision points where users routinely stop or unable to decide which way to go.

A display of library working hours should be made available at or near the main entrance of the library to minimize FAQs as well as to save the time of users.

The broad classification system can be briefly explained in library orientation and made available at OPAC terminals.

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

Passwords for screen lock of a desktop of OPAC terminals should be avoided otherwise, instructions, or signs should be provided about the same near OPAC terminals.

The link of OPAC should facilitate straightforward access to the OPAC and other library resources within minimum clicks.

A separate call number range sign should be added for the reference collection near the area where it is placed.

Findings highlights that in the case of users of all the libraries, stacking area signage need to be more appropriate and stacking signs should provide general to specific information about stacking arrangements to save the time of users.

A floor-wise call number range sign should be provided on each floor of the libraries. 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.

The 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 an online catalogue for searching.

User's survey for convenience and access facilities should be conducted while renovating or modifying space arrangements and signs to save users time.

Electronic stair climbing wheelchair should be provided by the libraries for disabled in case of non-availability of an elevator.

7.13 Library Signage Model for University Libraries

Based on the observations, findings and suggestions following Library Signage Model is prepared and presented. The model will assist university librarians while planning library signage for university libraries.

ABC LIBRARY SIGNAGE MODEL

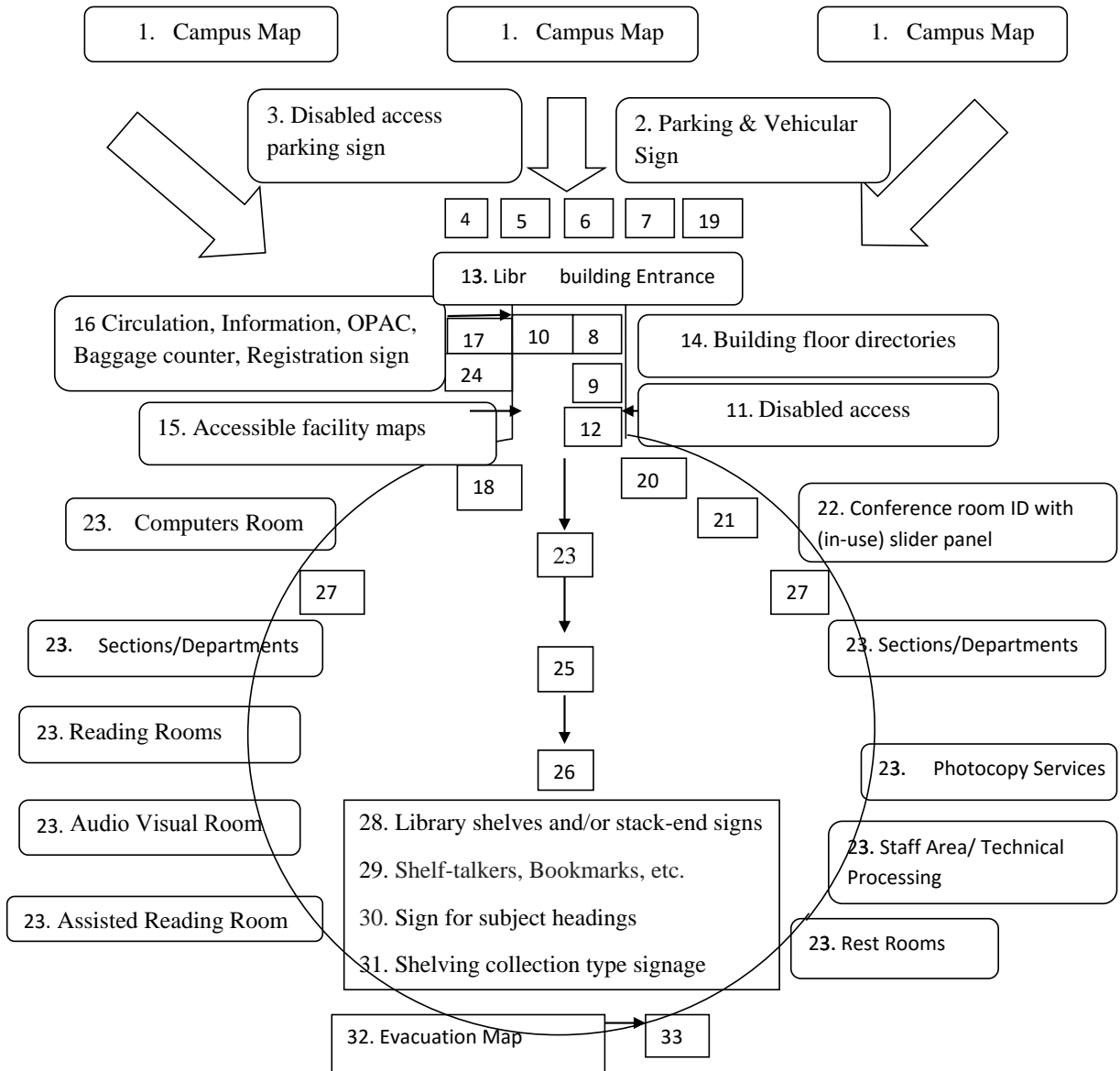


Figure 7.1: Library Signage Model

Based on the designated code numbers allotted to the above listed signs, university library signage model is presented below

Signage list with code numbers

Exterior Signs

1. **Campus Map:** The campus maps should provide directional based information as well as location based information, i.e. It should able to answer the questions such as, Where am I and where am I going?, and How will I get my destination. In addition 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. Multiple campus maps should be placed at decision points (turning points) as per the requirement.
2. **Parking & Vehicular Sign:** An area enclosed or unenclosed, covered or open, sufficient in size to park vehicles, together with a drive-way connecting the parking space with a street or alley and permitting ingress and egress of the vehicles.(National Building Code of India, 2005, P.11)
3. **Disabled access parking sign:** Spaces that are accessible and approximate to the facility should be set aside and identified for use by individuals with physical disabilities. A parking space open on one side, allowing room for individuals in wheelchairs or individuals on braces and crutches to get in and out of an automobile onto a level surface, is adequate. It should have a minimum width of 2700 mm preferably 2800 mm for ambulant disabled and minimum 3000 mm preferably 3300 mm for wheel chair users. Parking spaces for individuals with physical disabilities when placed between two conventional diagonal or head-on parking spaces should be 3.6 m to 3.8 m wide and the length of the aisle should 7.3 m, 6.1 m and 6.5 m for head-on, 90° and 60° parking respectively. Care in planning should be exercised, so that individuals in wheelchairs and individuals using braces and crutches are not compelled to wheel or walk behind parked cars. Consideration should be given to the distribution of spaces for use by the disabled in with the frequency and persistency of parking needs (National Building Code of India, 2005, P.11).

4. **Primary building identification, (name of bldg with international sign for the library):**
Prominent building identification sign, with large illuminated lettering on the exterior near the entrance should be available to all university library buildings. International sign for the library should be placed or adjoined with the building name sign.
5. **Monument sign (primary or secondary signature, freestanding in landscape):**
Details of building establishment with year of establishment should be placed near or in front of library building.
6. **Building address:** Detail building address sign often required by Fire Department for emergency purposes should be placed near or in front of library building.
7. **Building entry Sign:** Library building entry sign with large illuminated lettering on the exterior near the entrance placed at eye level near pedestrian entrance(s) with arrow if entrance is not identifiable due to adjacent walls.
8. **Restriction sign:** Restriction signs like, No smoking, No food or drink, Silent Cell Phones, etc. should be placed in the entrance lobby at a visible points.
9. **Hours of operation or Working hours sign:** Working hours sign should be placed in the entrance lobby at a visible point.
10. **Directional signage:** All universities should provide directional signs, like orientation maps or directories or floor wise list of departments with directional arrows at decision points to key entrances, bridges to other facilities and key destinations.
11. **Disabled access:** Tactile maps, ramps, handrails, wheel chairs, and rest rooms for disables should be made available in all the libraries to facilitate universal access.

At least one primary entrance to each building shall be usable by individuals in wheelchairs and shall be indicated by a sign with ramp and handrails. Ramp with slope not greater than 1 in 20 or maximum of 1:12 for short distance with extended handrails at head of ramp. This ramp should be available with alternative stepped approach where ramp gradient exceeds 1 in12, tread min. 300mm and Risers Max.

150mm. with 1800 X1800mm minimum level platform. (National Building Code of India, 2005).

To enable wheelchair users to pass through doors, the minimum clear width should be 900 mm and shall be operable by a single effort. In certain cases the clear width should be 900 mm to 1 000 mm; for example, if the wheelchair has to be turned in the doorway, where there is a door-closer or at entrance doors to public buildings and in other situations where there is considerable traffic. (National Building Code of India, 2005).

It is recommended that all doors have kick plates extending from the bottom of the door to at least 400 mm from the floor, or be made of a material and finish that would safely withstand the abuse they might receive from canes, crutches, wheelchair foot platforms, or wheelchair wheels (National Building Code of India, 2005).

Elevators call buttons with Braille signs at each floor, should be placed at a reach of 900mm - 1000mm, at least 400mm from any corner or have a clear floor space with 900mm x 1200mm with no obstruction place to prevent a wheelchair users from reaching the call buttons (National Archives of India (Annexe) Access Audit Report).

To enable wheelchair users to approach doors manoeuvring space is needed as shown in a corridor should have a width of at least 1200 mm to allow a 90° turn to be made through a door. In narrow spaces sliding doors may be preferable. (National Building Code of India, 2005). Texture change should be provided for persons with vision impairment in walkways adjacent to seating by means of warning tactile pavers.

12. Touch screen interactive displays: Since some individuals may also be wheelchair users, and the Americans with Disabilities Act Accessibility Guidelines allows for the touch screen to be approachable by a wheelchair user from the front or parallel (side). Participants with and without motor control disabilities, including wheelchair users, performed a number entry task on a number pad with different combinations of button and gap sizes, while seated at a touch screen kiosk. Touch screen interactive displays should be preferably provided near the entrance or in the entrance lobby at accessible place including wheelchair users.

Interior Signs

13. **Library building Entrance:** Library entrance can be made more welcoming through placing library building identification sign as well as library building map, building directory or digital display at or near the entrance. Directional information about major departments, personnel, resources should be placed near the entrance.
14. **Building floor directories on each level:** Building floor directories and individual floor map on each level with specifications about departments, destinations and facilities should be placed on each floor.
15. **Accessible facility maps:** Accessible facility maps with the layout showing elevators, room numbers, restrooms, water coolers, phones, etc. should be placed at visible points on each floor. Pictogram should be used in Accessible facility maps for signs leading to elevators, room numbers, restrooms, water coolers, phones, etc.
16. **Circulation Desk / Information Station:** Baggage counter and Circulation Desk or Information Station should be preferably available near the entrance lobby preferably with Interactive Touch Screen if possible to facilitate universal access with adjustable desk. Registration sign should be placed at information desk for easy identification. Signs for Circulation desk, OPAC services should be placed near the individual service areas. Printed OPAC manual should be provided near OPAC terminals. Floor location in OPAC, chart of call numbers & subject heading near OPAC should be provided. OPAC should be available with an effective search engine and alternative interfaces. Provision of Braille charts and instructions should be facilitated wherever possible.
17. **Library manual/Procedures booklet/ brochures:** Printed Library manual, Procedures booklet or brochures should be preferably made available at Baggage counter and Circulation desk or Information Station.
18. **Code, Regulatory sign for general rules and regulations:** Sign for general code of conduct and sign for general rules and regulations should be placed in the entrance lobby as well as in the browsing areas. Sign for general rules and

regulations should be in simple wording, readable and visible. 'You attitude' should be used in framing rules and regulations. Use of negative words should be preferably avoided in the regulatory signs, by adding positive statements in such signs. For example, use of 'Enjoy the quiet' rather than 'keep silence', 'Treat book kindly', 'Support reading by returning book on time', and the like. Instructions for computers use should be made available in the computer room as well as near OPAC terminals. These instructions should include screen lock passwords, links for access of OPAC and internet access if any applicable.

19. **Book drop/ Self-checkout service sign:** Book drop or front desk Self-checkout service saves the time of users as well as staff. It also provides the freedom to users to drop the books in self-checkout machines even though the circulation counter is closed. Clearly visible sign should be placed for Book drop or front desk Self-checkout service.
20. **Suggestion board or box with reply board:** Suggestion boxes with the sign should be placed to get feedback from the users. It is also advised by NAAC to place Suggestion box in library
21. **Weekly calendar of events board:** Weekly calendar of events board should be available near the entrance lobby or in browsing area as a visible place. This board should be up-dated frequently as per the calendar of events.
22. **Conference room ID with (in-use) slider panel:** Conference Room or hall should be available at every university library according to IS 1553 (1989): Design of Library Buildings Standards. Sign for Conference room ID with (in-use) slider panel should be placed on the entry door of the conference room.
23. **Informative signs:** Informative signs include signs for services and departments like Restroom, photocopy section, Departments, Services, Reading Rooms, Audio visual Room, Assisted Reading Room, technical processing area, etc. on the particular door or near the entrance area of the individual section or department.
24. **Workstation ID sign:** Workstation ID sign should be flexible and changeable as per the requirement. A certain number of tables and computer workstations should be adapted for persons in wheelchairs.(IFLA Checklist of Disables, 2005)

25. **Stair sign:** Stair sign should be placed with the essential pictogram showing staircases at stairwells and at the turning points for the staircases. Tactile flooring should be provided near staircases for the disabled. If needed, a non-slip and not too steep ramp with railings next to the stairs. (IFLA Checklist of Disables, 2005)
26. **Sign for Floor-wise splits in the collection:** Floor-wise splits in the collection should be represented with visible sign near the OPAC terminals, near shelving areas as well as near the entrances of each floor.
27. **Minor signage for electricity switches, basement areas and way to mezzanine floor:** Signs or directional arrows for electric switches, basements or mezzanine floors are necessary for such isolated and inaccessible places.
28. **Library shelves and/or stack-end signs:** Library shelves and/or stack-end signs should be placed at eye level. Changeable signage should be used especially in the shelving area with insert system.
29. **Shelf-talkers, bookmarks or display stands for highlighting signs of class number:** Use of shelf-talkers, bookmarks or display stands for highlighting signs of class numbers, subject headings should be used to increase the accessibility to the library resources.
30. **Sign for subject headings as per classification scheme:** Sign for subject headings as per classification scheme should be placed in the stacking areas.
31. **Shelving collection type signage: Signs for the shelving according to the collection type such as Rare ,books, Special collection, Reference, Government Publications, Dissertations, Reports, etc.** should be used in the shelving areas for easy identification of different type of collection in stacking areas.

Displays of subject heading within stacking areas should be facilitated. Stack end signs should be placed at eye level. A good ventilation system in stacking areas with open access to all books and appropriate shelving order should be preferably provided.
32. **Evacuation map/ plans:** Evacuation plans that clearly indicate the designated emergency evacuation routes as well as location of refuge areas should be

displayed at all public areas of the building. These should contrast strongly against the background. Where possible, these should incorporate raised letters and tactile routes, and Braille for benefit of persons with visual impairments. (Standards for Accessibility of Disables India, 2016, P.74)

33. **Emergency door/route sign:** Orientation and direction signs should be installed frequently along the evacuation route and these should preferably be internally illuminated.(Standards for Accessibility of Disables India, 2016, P.75) Whilst the emergency lighting provided by traditional overhead emergency lighting luminaries, conforming to the Indian Standard IS: 9583-1981: Emergency Lighting Units, with an alarm is acceptable for people who are visually impaired. Exit signs shall be in accordance with IS: 4878-1968. Exit signage should also be available in tactile format in the evacuation route. Along the emergency route, tactile floor guidance for persons with visual impairments should be provided. (Standards for Accessibility of Disables India, 2016)

Placement of all signs should be at suitable height, the information display boards not fixed so high that either they escape the attention of the visitor or can be read only by upward stretching of a neck. Boards should be fixed at viewer's eye-level. Display information on board horizontally to facilitate ease of readability by a natural sideways movement of eyes. For instance if the line of sight is 10 feet, the letter height should approximately be 3/8 inch, if it is 25 feet then 5/8 inch. Libraries serve a wide spectrum of information seekers of varied ages, backgrounds, and educational levels. Therefore the height of the display should be suitable to make displays clearly visible to all kind of users.

7.14 Areas for Future Research

Human Orientation Science is comparatively a new phenomenon. There is an ardent need for exploration studies for the application of Human Orientation Science in different types of huge library buildings such as public libraries, special libraries and national libraries.

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.

Wayfinding studies will aid in designing a good signage system which in turn will help to explain the facility and, in a sense, answer the questions before they are asked. The key to good signage is, first to establish a systematic pattern of major and minor identification, direction and instruction information so that people will rely on it, finding the data they need at the right place as they go to and through the library and second, to present the information with different degrees of visual emphasis so that it can be comfortably absorbed. Novice users who are less familiar with the library environment and hence tend to be more sensitive towards landmarks and directional signage.

- There is a need to plan studies on use of different types of signage in a large library, which will aid in compiling a signage manual for individual library.
- In-depth case studies need to be planned for individual large libraries to implement good signage system in Indian libraries through studying routes and traffic patterns of spatial behavior of users by conducting pre and post experimental method after implementing new or improved signage system.
- Pre and post test experimental research can be carried out before and after renovation and sign designing in university libraries.
- Covid pandemic is a lingering concern for the society including libraries as social and academic hubs. The present survey was started in the year 2017-18; hence application of human orientation in the libraries during the Covid-19 pandemic was not covered. Therefore a study of human orientation and space planning in libraries during and the post-covid pandemic has a scope for future research.

7.15 Concluding Remarks

As per the findings and observations, though the signage in the libraries under the study was not up to the mark, three out of ten libraries achieved minimum standard norms those were Library 2, Library 4 and Library 8. Four libraries achieved average minimum standard norms those were Library 1, Library 3, Library 6 and Library 7. Three libraries those were Library 5, Library 9 and Library 10 lacked in achieving minimum standard norms for facilitating ideal signage and humanely oriented libraries.

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. For a good wayfinding system, 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 to consider users' wayfinding needs and their information-seeking and other library-specific needs.

The study has brought to the fore the present scenario regarding human orientation provided by university libraries in Mumbai. The responses revealed that participants need improvements in wayfinding tools and signage. The available signage in universities in Mumbai was inadequate to facilitate self-guidance and orientation. The extent of awareness from information literacy facilitated through the orientation programs provided to them was not satisfactory. Results obtained from behavioral experiences highlight that maximum participant were confused while using and searching library material. Though the degree of satisfaction from the physical space and the library environment was high, many users suggested improving the ventilation system.

In a developing country like India, many university libraries face a problem of inadequate financial provisions. According to UNESCO (1998)," the economic situation in many developing countries is such that many university libraries do not have the resources to purchase information resources, which has had a negative and damaging effect on training and research capacities." In addition, there is a proliferation and tremendous growth in electronic information sources which have transformed the ways of organizing library collections than those conventionally made available, which present a big financial challenge in their implementation. In such situations, university librarians are forced to prioritize their immediate funding needs. Hence acquiring wayfinding tools is not considered as priority items even by university funding agencies. Further, it is unfortunate that the importance of the wayfinding problem is difficult to be articulated or measured in terms of cost. Hence

allocating a budget provision for visual guidance tools is a neglected aspect in case of university libraries in India.

Library signage systems serve a multitude of functions. They identify and locate the library for the patron. They advertise specific events and programs. They promote the services available and explain how to use them. Signs attract potential users towards libraries as well. They direct traffic and help use space efficiently. They create an image and encourage the library patron to feel welcome. 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. University libraries receive RUSA (Rastriya Ucchatar Shiksha Abhiyan) Grants for acquiring infrastructure, equipment and digitization. Under this library can plan directional signage, digital signage and flash notices at the entrances or in the long corridors or in the browsing area. In addition, application of ergonomically designed signage will help to earn points in NAAC and other similar valuation and accreditation councils. Universities can plan the development of a wayfinding app for university campuses and libraries with the Global Positioning System with the help of UGC Infrastructure Grants. Help from other departments like the Department of Ergonomics, Art and Computer Science can be taken for the preparation of appropriate signage and for the development of a wayfinding app. With the advent of IoT and Global Positioning System, mobile technologies can be paired through signals to the physical environment to build an indoor positioning system inside the library building with the use of Wi-Fi. Library users' expectations of getting real-time location guidance within a building can be served by using software or mobile apps that give real-time directions.

The findings revealed that university libraries in Mumbai need to either improve the existing signage system of their physical library buildings or to provide library services in a digital form, at user's doorsteps. Yet such libraries housed with large and varied forms of information resources 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 the digital collection. Hence university libraries in Mumbai need to improve the

existing signage system of their physical library buildings to facilitate their own distinctive environmental ambience and to transform libraries into happening places.

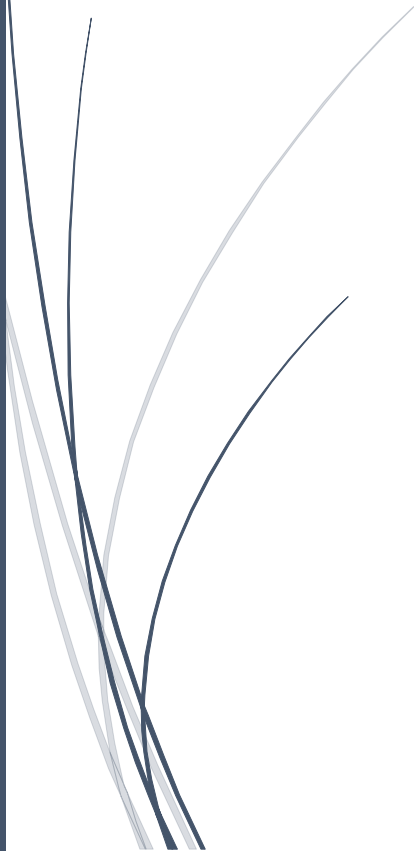
While concluding we should concur with Clement Mok's views that "Navigation is about wayfinding, you can't treat it as separate because many other things run parallel with it. If you look at studies in wayfinding, everything from exhibit design to building the cathedrals, it's about creating a complete system. It's about looking at the whole."

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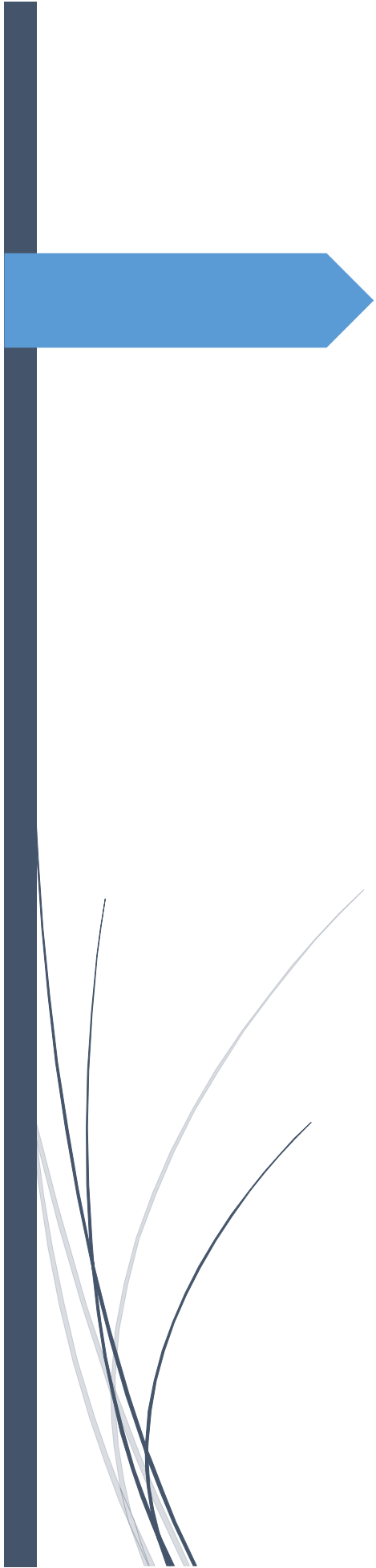
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ANNEXURES

Annexure 1: Covering Letter

Nidhi N. Rakshikar
1511, Shiv Prasad CHS,
Laxmi Nagar, Ghatkopar(E),
Mumbai – 400075.

Dear Sir/Madam,

I am a Doctoral student in SHPT School of Library Science, SNDT University, Mumbai. My Guide is Dr.Sushama Powdwal, Former University Librarian and Head of SHPT School of Library Science, SNDT Women's University, Mumbai.

My topic for research is 'Human orientation in libraries: a study of university libraries in Mumbai.'

This study is being conducted to explore human orientation measures followed by university libraries in Mumbai to make libraries humanely oriented.

This questionnaire/ interview schedule will take approximately 25 minutes to complete.

Your participation in this study is completely voluntary. Please be assured that the information provided by you would be used for academic purpose only.

If you have any questions or concerns regarding the questionnaire or the study, please feel free to contact me on my mobile (09821882154) or e-mail

(nidhi25librarian@gmail.com.) All inquiries will be kept in strictest confidence.

For the purpose of this study, the following operational definition of Human Orientation is used:

“Human orientation is a science which studies human beings in the situations to anticipate and draw out the difficulties experienced by them while wayfinding in libraries as a first time users and to suggest solutions for making human life more easy and hassle-free.”

Wayfinding refers to activities and process of people navigating and finding their ways in and environment. The wayfinding system must assist the wayfinding process by providing signs, maps, indicators, colour coding and information desk.

I earnestly request you to complete the Questionnaire/ Interview schedule. I will sincerely appreciate your co-operation in this regard.

Thanking You in Anticipation.

Yours truly,

Nidhi N. Rakshikar

Mo. - 9821882154

E-mail – nidhi25librarian@gmail.com

Note-

Glossary -

1. Library building – The term library building refers to building where the library is located.
2. “Visual guidance system” express the central idea to incorporate signage system with all other related components related in planning and organizing a signage system.
3. Universal access –Reachable or obtainable by all including differently able persons and senior citizens and universal access can be assured through universal design.

I invite you to fill the questionnaire **A Survey Human Orientation in University Libraries in Mumbai.**

Annexure II: Users Questionnaire

Date:

Human orientation in university libraries in Mumbai

I) Details

Name: _____

Institution/University: _____

Academic Significance: _____

Mobile: _____

E-mail Address: _____

Landline No.: _____

Age: _____

Gender: _____

II) Wayfinding

1. As a first time visitor, which of the following sources of inquiry you used for directional guidance till reaching to the library?

- i) Campus map
- ii) Directional signs around the campus
- iii) Inquiry of routes with the passerby
- iv) Information Kiosk in the campus
- v) Personal inquiry at the entrance of the campus about place of destination
- vi) Other source (please specify)

2. Is there a university campus map at the entrance of the campus?

- i) Yes
- ii) No

3. If yes was it visible?

- i) Yes
- ii) No

4. Was the campus map readable?

- i) Yes
- ii) No

5. Was the campus map able to answer the following questions to guide you further?

- i) Where am I and where am I going?
- ii) How will I get my destination?

6. How long it took for you (time approximately) to reach to the library after arriving at campus gate?

- i) Less than five minutes
- ii) More than five minutes
- iii) Less than ten minutes
- iv) More than ten minutes

7. As a first time visitor, from the starting of the library gate till you reach the actual destination, how many times you stopped in between to find out directions?

- i) Once
- ii) Twice
- iii) Thrice
- iv) Four times
- v) Five times
- vi) More than Five times

8. To whom have you consulted for the help from the starting of the library gate till you reach the actual destination?

- i) Instruction manual
- ii) Library guides displayed on boards
- iii) Library Staff
- iv) Other library users
- v) No help was required
- vi) Other (please specify)

9. While moving through the library's physical settings did the available wayfinding system remind you at appropriate places that you are proceeding in the right direction?

- i) Yes
- ii) No

10. As a first time visitor did you face problems of wayfinding in the library building?

- i) Yes
- ii) No

11. Would you like to provide your opinion and suggestions to make the library free of barriers?

	100% Degree of self-guidance provided	75% Degree of self-guidance provided	50% Degree of self-guidance provided	25% Degree of self-guidance provided	Below 20% Degree of self-guidance provided
i) I was able to find my way around the campus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii) I was able locate the library	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii) I became aware of different departments and their locations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iv) I found ease in use of OPAC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v) I was able identify and be comfortable in use of computer resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
vi) Searching and finding printed sources in stacks was easy and convenient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. According to you the problems of wayfinding were due to following:

- i) Absence of building map
- ii) Absence of directional signs
- iii) Absence of floor maps
- iv) Artistic effect of architecture
- v) Confusing building map
- vi) Confusion due to available signage
- vii) Layout of library
- viii) Physical design
- ix) Any other (please specify)

III) Signage and Displays (Visual Guidance System)

13. Do you think that sign boards from the starting of the gate till your destination in the library building is appropriate according to following characteristics?

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
i) Ability to aid you to reach till destination confidently	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii) Readability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii) Self-explanatory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iv) Visibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. What according to you should be added for the directional guidance from the entrance of campus till the library building?

- i) Arrows
- ii) Directional signs (Descriptive)
- iii) Display of list of departmental buildings within the campus at the adjacent road
- iv) Pictorial signs
- v) Any other (please specify)

15. Do you think that the entrance of the library building is clearly visible and identifiable?

- i) Yes
- ii) No

16. Have you seen any library map at the entrance of library gate?

- i) Yes
- ii) No

17. What is your opinion about the height of the existing sign boards within the campus as well as inside the library?

- i) Appropriate
- ii) High
- iii) Low

18. What will be your preference about the level of sign boards?

- i) Ground Level
- ii) Eye Level
- iii) Other (please specify)

19. Is font size of the characters on sign boards appropriate for readability?

- i) Yes
- ii) No

20. If no what will be your preference about the character size?

- i) Bigger size
- ii) Smaller size

21. Which character type according to you will be preferable on the sign boards?

- i) All capital letters
- ii) All small letters
- iii) Sentence case

22. Do you find existing colour scheme of sign boards convenient?

- i) Yes
- ii) No

23. If no, which background- foreground (character colour) combination would you prefer for signboards?

- i) Black on white
- ii) Black on Yellow
- iii) Blue on White
- iv) Green on White
- v) White on Black
- vi) White on blue
- vii) White on green
- viii) Other (please specify)

24. Do the existing arrows signify proper directions till the library building?

- i) Yes
- ii) No

25. After coming inside the library building how you decided your destination?

- i) By inquiring at the entrance counter
- ii) By inquiring about a particular location with other library users
- iii) By reading instructional sign boards
- iv) Any Other way (please specify)

26. How did you actually reach your destination?

- i) By inquiring at the entrance counter
- ii) By inquiring about a particular location with other library users
- iii) By reading instructional sign boards
- iv) Any other way? (please specify)

IV) Online Public Access Catalogue (OPAC)

27. Have you used OPAC for searching location of any library material?

- i) Yes
- ii) No

28. If yes what is your opinion about OPAC?

	100% Level of satisfaction	75% Level of satisfaction	50% Level of satisfaction	25% Level of satisfaction	Below 20% Level of satisfaction
i) User friendly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii) Easy to operate and search	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii) Visibility of search results	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29. Do you face trouble while using Online Public Access Catalogue (OPAC)?

- i) Yes
- ii) No

30. If yes, what was the trouble? Please explain.

31. What should be the solutions to eliminate above hurdles while using OPAC?

- i) Guidance chart at the OPAC terminal
- ii) Instructional videos should be available on the desktop of OPAC terminals
- iii) OPAC Manual should be available at the OPAC terminal
- iv) Library personnel guidance should be provided if required
- v) Provision to enlarge the window of search results of OPAC
- vi) Any Other (please specify)

32. Whether any manual or instruction guide was there at OPAC terminal?

- i) Yes
- ii) No

33. If yes have you used manual while searching material at OPAC terminal?

- i) Yes
- ii) No

34. Whether the OPAC manual or guide was easy to understand to follow the instructions accurately?

i) Yes

ii) No

V) Shelving

35. From the time you left the OPAC terminal, how long did it take you to find the particular library resource?

i) Less than 1 minute

ii) 1-4 minutes

iii) 5-8 minutes

iv) 9-12 minutes

v) 12+ minutes

36. If your choice is (v) whether the resource was found?

i) Yes

ii) No

37. Whether you able to find the resource solely using the stack end signs?

i) Yes

ii) No

38. Whether the shelving was appropriate?

i) Yes

ii) No

VI) Physical and Psychological Barriers

A) Library Instructions

39. Have you attended library orientation programme?

i) Yes

ii) No

40. If yes, which type of library instructions were provided to you?

- i) Oral classroom instructions
- ii) Physical library tour
- iii) Physical library tour and introduction with library staff
- iv) PPT presentation and Instructions
- v) User education workshop
- vi) Video library tour
- vii) Any Other (please specify)

41. Did attending library orientation programme help you to ...

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
i) Find way around the campus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii) Feel more comfortable in library	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii) Feel connected with the library staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iv) Become aware of sources and facilities within library	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v) Identify and be aware of computer resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
vi) Identify academic skills for success	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

42. Have you become aware of the following:

(For each item listed below, please tell whether or not you were aware of following library materials as well as the process of searching these materials prior to this survey, and how important each tool or method is to you for your research or coursework.)

	Not Aware	Aware	Not Important	Somewhat Important	Very Important	Essential	No opinion
i) Audio Visual material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii) Books	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iii) Catalogue (OPAC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iv) Circulation counter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
v) Databases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vi) E-Journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vii) Printed Thesis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B) Psychological Barriers and Satisfaction

43. Select the objective that describes your search experience from the group of below possible objectives?

- i) Challenging
- ii) Confusing
- iii) Difficult
- iv) Dis-orientated
- v) Easy
- vi) Feeling lost (In the Library)
- vii) Frustrating
- viii) Surprising
- ix) Any Other (please specify)

44. Please report your satisfaction with the finding and obtaining library materials:

	Strongly dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Very satisfied
i) Audio Visual material	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii) Books	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii) Catalogue (OPAC)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iv) Circulation counter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v) Databases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
vi) E-Journals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
vii) Printed Thesis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

VII) Library Environment and Space Planning

45. How far was it easy to identify different parts of the library as well as to relate these parts/ sections/ services such as:

	100% Ease in identification of different Parts/ Sections/ Services/ Facilities/ Amenities	75% Ease in Identification of different Parts/ Sections/ Services/ Facilities/ Amenities	50% Ease in Identification of different Parts/ Sections/ Services/ Facilities/ Amenities	25% Ease in Identification of different Parts/ Sections/ Services/ Facilities/ Amenities	Below 20% Ease in Identification of different Parts/ Sections/ Services/ Facilities/ Amenities
i) Arrangement of objects/sections/services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii) Basic facilities and amenities (Eg. Elevators, copying machine, vending machines, restrooms, pathways between two sections)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii) Shelving arrangement of books and journals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

46. Did you face any difficulty while searching information sources in the library?

- i) Yes
- ii) No

47. If yes, which of the following areas need improvements to facilitate better searching?

- i) Addition of subject headings needed on every stack end signage
- ii) Availability of chart of call numbers with subject heading at OPAC terminals
- iii) Availability of location of material in OPAC with its floor location
- iv) Level of stack end signage should be at eye level rather than at the top of the stacks
- v) Any Other (please specify)

48. Are you satisfied with the environmental aspects of the library building and space allocation?

	Strongly dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Strongly satisfied
i) Air ventilation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ii) Design to control temperature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iii) Height of roof	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
iv) Sufficient natural light	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v) Well-coming atmosphere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Annexure III: Librarians Questionnaire

A Survey of Human Orientation in university libraries in Mumbai



PART I –BACKGROUND INFORMATION

A .Librarian

* i. Name

ii. Mobile No:

iii. E-mail:

iv. Designation:

v. Qualifications:

vi. Total LIS work experience: (In Years)

vii. Work experience with current institution: (In Years)

B. Institute Details

i. Name of the institute:

ii. Name of the library:

iii. Address:

iv. Year of establishment (Institute):

v. Year of establishment (library):

PART II – HUMAN ORIENTATION MEASURES OF YOUR LIBRARY

I) BUILDING

1 Type of university library- *Please Tick mark the applicable option*

a) Type of library

i. Central University

ii. Deemed University

iii. Open University

iv. Private University

v. State University

b) If Campus/ Branch library please specify the city

.....
.....

2 Is library located in the independent building?

i) Yes

ii) No

3 Whether any library building construction norms/standards were followed while constructing the building which will aid human orientation?

i) Yes

ii) No

4 If yes please specify the norms and standards followed

.....
.....

5 Whether you were a librarian when the library building was planned, constructed or renovated?

i) Yes

ii) No

6 Whether any geospatial analysis is done when the library building was planned, constructed or renovated? (i.e. Geospatial analytical techniques that are provided within modern Geographic Information Systems (GIS) and related software tools such as ArcGIS, Idrisi, Grass, Surfer and many others)

i) Yes

ii) No

7 If yes, whether your suggestions were taken into consideration while planning or renovating the library building?

i) Yes

ii) No

II) Wayfinding

8 Was any user survey conducted regarding wayfinding problems/ signage in the library for users?

i) Yes

ii) No

9 Was any survey conducted in past to know the hindrances and obstacles faced by people with special needs?

i) Yes

ii) No

10 Was any survey conducted in past to know the conveniences and favorable conditions to help people with special needs?

i) Yes

ii) No

11 If yes whether changes were implemented according to the findings and suggestions provided through user study?

i) Yes

ii) No

III) Signage

12 Whether the present sign system for the library was systematically planned? (i.e. Defining the needs for signage & other visual information, analyzing and classifying the signage & investigating signage needs by content and location.)

i) Yes

ii) No

13 Is any budget allocated for acquiring new signs and displays as per the changes occurs in transitional spaces within the library building?

i) Yes

ii) No

14 If No under which budget head you are presently acquiring new signs or digital displays?

.....
.....

15 Have you conducted signage audit (to study and remove overlapping and outdated signs) of your library?

i) Yes

ii) No

16 If yes how frequently you organize signage audit?

.....
.....

17 If No, whether signage audit is a part of library space audit?

i) Yes

ii) No

IV) Physical and psychological conveniences

18 Is library orientation is provided for every first-time visitor?

i) Yes

ii) No

19 If Yes, which of the following methods used for library orientation?

i) Oral classroom instructions

ii) Physical library tour

iii) PPT presentation and Instructions

iv) User education workshop

v) Video library tour

vi) Any Other (Please Specify)

.....
.....

20 Whether open access is provided for the whole library collection?

i) Yes

ii) No

21 If no please specify the type of access provided to different type of library users.

.....
.....
.....
.....
.....

22 Was any user survey conducted to know the access difficulties faced by the users?

i) Yes

ii) No

23 If yes elaborate the desirable changes made according to the findings and suggestions provided through user study?

.....
.....
.....
.....
.....

24 Whether any training was provided to library staff related to communication skills/ customer relationship management or human psychology?

i) Yes

ii) No

V) Space Allocation and facilities

25 Does your library provide learning space for:
(Please tick mark in the box to indicate "Yes" for as many as apply.)

- i) Conference hall or other informal meeting space for faculty and students ii) Cubicle for researchers iii) General computing laboratories(Computer Lab)
- iv) Group study space for students v) Instructional activities conducted by library staff

vi) Any Other learning space (Please Specify)

26 Does the library provide other facilities for users such as:

- i) Rest rooms both for male and female ii) Staff food services iii) Vending machine and beverage services within the library building

27 Does the library provide social space for students? (other than food service and group study spaces)

- i) Activity room ii) Browsing Area iii) Discussion room/Area

iv) Please describe any other space if not covered above:

28 Does the library space allocation allow for future changes in the use of library space?

- i) Yes ii) No

VI) Facilities for special users

29 How many special users (Physically challenged) are enrolled every year?

30 Mark the facilities from the following checklist available at your library to facilitate universal access?

- i) Alarm system that combines visual and audible signals ii) Audible signals in elevators to indicate direction of movement iii) Colored signs or strips on all glass doors
- iv) Floor designations in elevators in raised numerals v) Floor designations in elevators with Braille characters vi) General brochure in audio form for introducing special users to library facilities
- vii) General brochure in Braille for introducing users to library facilities viii) General brochure in large print for introducing users to library facilities ix) Handrails on both sides of stairways
- x) Handrails in long corridors xi) Placement of signs with large size font to provide maximum visual exposure xii) Ramps are on the accessible entrances of library
- xiii) Restrooms for disabled users xiv) Tactile cues on walking surfaces to indicate approaches to stairs and ramps xv) Tactile orientation map of public service areas within building (Touch map)
- xvi) Wheel chair

xvi) Any Other (Please Specify)

31 Are the following assistive devices available in your library for disabled users?

- | | | |
|---|--|---|
| <input type="checkbox"/> i) Book reading software | <input type="checkbox"/> ii) Braille embosser | <input type="checkbox"/> iii) Braille keyboard |
| <input type="checkbox"/> iv) Braille translator | <input type="checkbox"/> v) CD-player | <input type="checkbox"/> vi) Digital talking books |
| <input type="checkbox"/> vii) Large monitor | <input type="checkbox"/> viii) Magnifying glass | <input type="checkbox"/> ix) Modified, Large print keyboard |
| <input type="checkbox"/> x) OCR scanner | <input type="checkbox"/> xi) Pocket Accessible Daisy Player/Recorder | <input type="checkbox"/> xii) Refreshable Braille display |
| <input type="checkbox"/> xiii) Screen Magnifying software | <input type="checkbox"/> xiv) Screen reading software | <input type="checkbox"/> xv) Speech synthesizer |
| <input type="checkbox"/> xvi) Tape recorder | | |

xvii) Any Other (Please Specify)

.....

.....

32 If any of the above assistive technology/facilities in question number 31 exists but not in working condition, please mention.

.....

.....

.....

.....

33 Does your library provide a resting room for library users?

- i) Yes ii) No
-

34 Elaborate your future plans to make your library humanely oriented.

.....

.....

.....

.....

Annexure IV: Subject expert Interview schedule

Questions for interview with subject experts

- 1) What prompted you to write a book 'Human Orientation: Science and Art'?
- 2) Was there any particular event or situation through which you realize that there is need of application of HO in India at public places?
- 3) If so will you like to share that event or a situation with us?
- 4) In which year you become conscious and realize the need of Human orientation and thought of writing about this subject initially?
- 5) Was it the outcome of your research or study?
- 6) Which study was undertaken for the same?
- 7) What motivated you to enunciate principles of HO?
- 8) What is the impact of the publication of a book on HO on the scholarly community?
- 9) What feedback you receive after this publication from others?
- 10) What initiated you to write a new book *Human Orientation Science* in the year 2013?
- 11) What were the practical benefits of application of HO?
- 12) Has anybody else studied this aspect in India?
- 13) Do you think the principles are applicable to all public organizations?
- 14) According to the principles of HO should the researcher give more weight age to first-time visitors?
- 15) What basic suggestions would you offer from these principles to the student while applying them to libraries?

Note:

Pioneers of Human Orientation Science

Dr Shankar. K. Modak formerly worked as Principal of Sydenham College of Commerce and Economics, the Elphinstone College, and Tolani College of Commerce, Mumbai. He has taught at various colleges for over three decades and besides authoring eight books, he has contributed over eighty chapters on transport,

telecommunications, town and regional planning and labour economics. He was the Dean of Faculty of Commerce and also a Chancellor's Nominee on the Senate of the University of Mumbai. He was a recipient of the State Teacher Award of Government of Maharashtra in 1991. He is also associated with a large number of academic and professional societies.

He prepared a report entitled West Coast Transport Network- An Optimal Inter-Modal Mix for the National Transport Policy Committee. He has been a member of working groups constituted by the Government of India and was also a member of the Maharashtra State Planning Board.

Dr Vivek Patkar was Professor of Quantitative Methods and Operations Management at the ICFAI Business School, Mumbai. He worked for 25 years as an Operations Research Specialist in the Planning Division of Mumbai Metropolitan Region Development Authority (MMRDA) and was involved in various schemes and projects related to land-use planning, infrastructure financing, and area and transport development. He also initiated the computerisation of technical, administrative and library systems within MMRDA. A comprehensive Regional Information System employing a geo-referencing tool like Remote Sensing (RS) and Geographic Information System (GIS) for urban planning and management were established in MMRDA by the unit guided by him. At present, he is an Independent Researcher and engaged in research on different aspects of research. He has conducted several workshops on research methodology for both natural and social sciences. He is a Visiting Faculty to the Department of Library & Information Science of Mumbai University since 1985. He has authored, co-authored and edited eleven books on Mathematics and Research Methodology. To his credit are over 300 research papers and chapters in reputed international journals, professional magazines and newspapers and also a variety of other publications.

Dr Patkar is a Member of the Editorial Board of the international journals entitled, Human Systems Management and Journal of Geomatics. He is a Member of the Monitoring/Steering Committee for Education and Content Development of the Rajiv Gandhi Science and Technology Commission.

He contributed 38 research papers (including one convocation address) in the field of LIS. His research papers in LIS mainly focus on computerisation and use of ICT in LIS.

Annexure V: Interview schedule for library users

Interview Schedule for Library Users

Human orientation in university libraries in Mumbai

Degree/Name of University:

Date:

Sr. No.	Questions	Yes/No	Why	Suggestions
1	How long were you in the university library for this visit? i) Less than an hour ii) One to three hours iii) More than three hours			
2	Did you notice guidance system provision at the entranceway?			
3	Is the entranceway identifiable and welcoming? (Well lit, navigable, comfortable, etc.)			
4	Is the signage in the entranceway appropriate? (Avoiding negative words, user-friendly vocabulary, etc.)			
5	Do you face any obstacles while using entranceway of a library?			
6	Are all service areas within the library, easy to search and locate?			
7	Are all service areas welcoming? (approachable desk, well lit, spacious, etc.)			
8	Is the signage in the service areas appropriate?			
9	Did you understand the process of borrowing books from university library?			
10	Do you feel the process of borrowing books is simple and speedy?			
11	What obstacles do you encounter towards using service areas in the library?			
12	Did you use other floors of the library?			
13	If yes, did the available guidance system aid you in navigation and			

	wayfinding while using other floors?			
14	Are the stacks welcoming and navigable? (subject areas identified, well lit, spacious)			
15	Is the signage in the stacks appropriate?			
16	Do you face any obstacles while using library stacks? If Yes which are those obstacles? (Height of shelving, shelving order)			
17	Are the study areas welcoming and navigable? (spacing, lighting, quiet and conversational spaces identified?)			
18	Is signage in the study areas appropriate?			
19	Do you face any obstacles while using library's study area?			
20	Which aspects of this library are the most welcoming and comfortable for use related to directional guidance? (Like Location of signage, Size of signs boards, Visibility of signs, Readability of signs, colour contrast of signs, uniformity in signage designing)			
21	Which aspects of this library are the most uncomfortable and off-putting for use related to directional guidance? (Like Location of signage, Size of signs boards, Visibility of signs, Readability of signs, colour contrast of signs, uniformity in signage designing)			
22	What equipment, facilities or resources did you use within premises? (My laptop Library desktop Library databases Library printer Library internet Mobile internet Operating system Software (i.e. Word, Excel, Powerpoint) Photocopying Machine Textbooks Reference material			
23	What was your experience while using the above- mentioned equipment, facilities or resources? (Ease of use Comfortable			

	Confused Not satisfied Feel disoriented Need assistance from library staff)			
24	Are the rules and regulations of the library: Visible Readable Easy to understand			
25	Do you face any obstacle within the library in following areas? a) Building features (Confusing building layout, Lack of personal assistance, non-welcoming library environment, Poor signage system, Difficulty in finding different departments) b) Technology (Processes & Problems related to use of database, CDs or other e-resources) c) Equipment (Processes & Problems related to Copier machine, OPAC, Printers. etc) d) Obstacles in finding actual information sources (Stacking arrangement, non-availability of book, non-availability of photocopying due to library rules, improper shelving, etc.) e) Personal assistance: (Lack of personal assistance due to behaviour of library staff, non-availability of counter staff, etc.)			
26	Would you like to provide your opinion and suggestions to make the library free of obstacles?			

* *Appropriate*: The word appropriate here indicate 'providing appropriate direction and location'.

Annexure VI: User Observation Schedule

I) Description of Participants in Detail

	Name of University:	Date:
	Name of User:	Mob:
1	Entry point behavior of the student.	
2	First approach—	
	Library Staff -	
	Computer catalogue -	
	Directly going to the shelves (in case of open access) -	
	Going to the computer table –	
	Librarian -	
3	Behavior of the students while approaching the library and getting the resources	
	Anxious -	
	Confused -	
	Confident -	
	Comfortable -	
	Frustrated -	
	Indecisive -	
	Baffled-	
	Disoriented-	
	Surprised-	
	Amazed-	
4	Process of the wayfinding behavior step by step	
5	Interactions and Conversations that occur in the library setting	

6 End of the wayfinding process

7 Informal activity (non verbal communication)

8 Any other point

Annexure VII: Building and Signs Observation Schedule

Building and Sign Observation Schedule

Points for Field Note of Researcher

Name of University:			
Sr. No.	Points to be observe	Yes	No
I)	Physical Environment of the Library		
a)	Essentials of Building		
	i) Visibility of building		
	ii) Identifiability of building		
	iii) Availability of parking space		
	iv) Signage for parking space		
	v) Signage for parking space for disabled		
	vi) Signage of Silent Zone		
	vii) Sitemap highlighting library at the entrance of university campus		
b)	Essentials of Library Entrance		
	i) Sign of standard international symbol for libraries		
	ii) Library building map		
	iii) Space at library entrance		
	iv) Separate wheelchair ramp with handrails at the entrance of the library with minimum clear width of 36 inches at main gate		
	v) Separate wheelchair ramp with handrails at the entrance of the library with minimum clear width of 36 inches at other gate		
	vi) OPEN/CLOSED sign		
	vii) Display of library's working hours		
	viii) Availability of instructional signs for OPAC/catalogue use		
	ix) Availability of signs on locating departments to identify the function or service within that room or area		
	x) Availability of directional signs leading patrons to different departments and placed at logical decision points		
	xi) Visibility of inquiry counter		
	xii) Space near the entrance for:		
	1) Display cases		
	2) Pamphlet racks		
	3) Announcements of events		
	4) Public bulletin boards		
	5) Library rules and regulations (Highlighting Library Working Hours)		
	xiii) Flash notices at entrance		

c)	Essentials of library signage		
	i) Pictorial sign with verbal descriptions placed below the picture		
	ii) Placement of signage (at eye-level)		
	iii) Consistency of signage		
	iv) Design of signage (Horizontal/ Vertical reading)		
	v) Use of universally applicable symbols on signs		
	vi) Simplicity of language on signs		
	vii) Applicability of universal norms while designing and shaping the signs, i.e.		
	<input type="checkbox"/> Regulatory signs –Circular shape		
	<input type="checkbox"/> Warning or caution sign – triangular		
	<input type="checkbox"/> Informative signs – Square		
	i) Separate display board for each function or service		
	ii) Use of colour contrasting on signage (Johannes Itten’s Colour Wheel)		
	iii) Height of letters to facilitate visibility		
	iv) Readability of signs		
	v) Availability of ergonomically designed signage		
d)	Internal physical settings		
	i) Availability of tactile at the entrance and within the premises for visually impaired people		
	ii) Well lighted entrance and browsing area		
	iii) Visibility of staff areas		
	iv) Location of circulation area (Near the library’s entrance)		
	v) Visibility of circulation counter from the library’s entrance		
	vi) Signs and indicators for locating circulation counter		
	vii) Availability of self-check out/ Computer checkout terminals		
	viii) Display of instructions near self-check out		
	ix) Queuing system at circulation counter		
	x) Provision for sorting shelves for holding returned materials		
	xi) Accessibility of circulation desk for disabled users		
	xii) Visibility of circulation desk monitor to users		
	i) Identifiable reference desk		
	ii) Signage to locate reference section		
	iii) Accessibility of reference desk for adults and disabled patrons (appropriate height)		
	iv) Provision of separate or acoustically isolated spaces at reference section for		

	1) Interlibrary loan		
	2) Database searches		
	3) General information		
	4) Customer interviews		
	5) Telephone reference service		
	xvii) Signs and indicators provided for following collections:		
	<input type="checkbox"/> Rare books		
	<input type="checkbox"/> Archives		
	<input type="checkbox"/> Special collection		
	<input type="checkbox"/> Manuscripts		
	<input type="checkbox"/> Microfilms		
	xviii) Exhibition area		
e)	Essentials for shelving area		
	i) Display of map for shelving arrangement		
	ii) Display sign for broken order (if any) within shelving area		
	iii) Space between shelves		
	iv) Availability of stools or small ladders between shelves		
	v) Provision of sufficient light between shelves		
	vi) Height and visibility of shelf indicators		
	vii) Availability of books on shelves as per the classification scheme		
	viii) Availability of OPAC terminal near shelving areas		
	ix) Open access facility to the whole collection		
f)	Seating arrangement of reading area		
	i) Wide variety of reading areas for different users having many choices to fit their mood or reading environment needs		
	ii) Availability of natural light in reading area		
	iii) Provision of tables generously sized individual tables with task lighting, power switches for laptop computers and table lecterns for holding large books or rare book collection		
g)	Arrangements of computers Laboratory/ Multimedia Facilities		
	i) Independent cooling system that can be regulated to control the temperature and humidity		
	ii) provision for opening windows to provide ventilation in case of electricity/system breakdown		
	iii) Provision of separate or acoustically isolated spaces at reference section for:		

	1) Audiovisual carrels with built-in playback equipment		
	2) Computer workstations and printers		
	3) Revolving chairs		
	4) LCD projectors		
	5) CD/DVD Drive		
h)	Convenience facilities		
	i) Directory or library guide identifying major library services and their locations		
	ii) Availability of water cooler with visible signage		
	iii) Space allocated for convenience equipment such as:		
	1) Photocopiers		
	2) Printers		
	3) Audiovisual equipment		
	iv) Signage for each individual equipment		
	v) Availability of other convenience facilities such as:		
	1) Refreshment area		
	2) Vending machines		
	3) Elevator		
	4) Restrooms on each floor (Both for male and female)		
	5) Restrooms for disabled		
	vi) Signage for each convenience facility		
	vii) Availability of Braille signs for convenience facilities		
	viii) Availability of audio instructions and visible alarm in elevator and blind and deaf		
	ix) Availability of Braille floor indicators in elevator		

Annexure VIII: Signage Images



1. Campus Map



2. Multi-directional stand



3. Multi-directional stand



4. Library Building Name Sign



5. Library Entrance Name Sign



6. Library Establishment Information

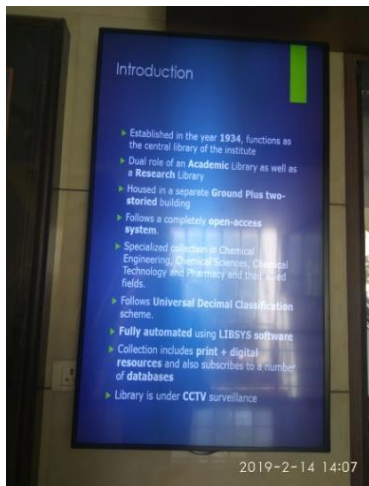
Signage Images



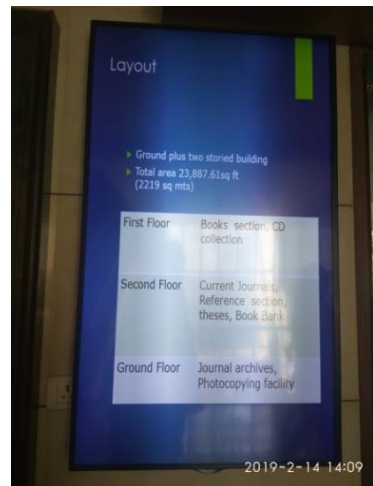
7. Library Rules & regulations and working hours



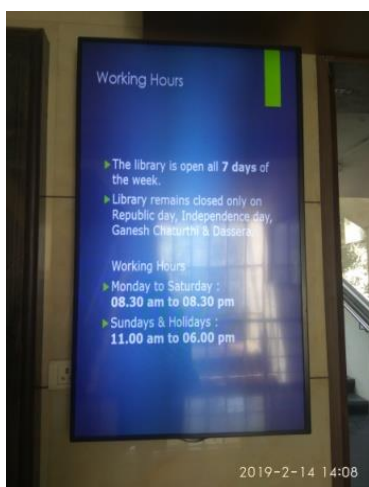
8. Digital Display Library Name Sign



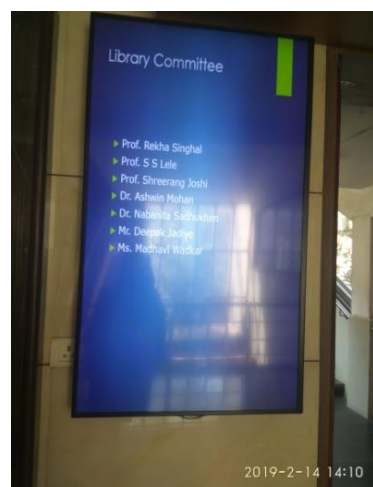
9. Library Introductory Information



10. Library Layout

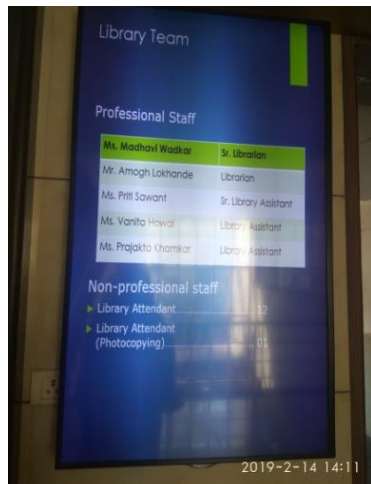


11. Library Working Hours

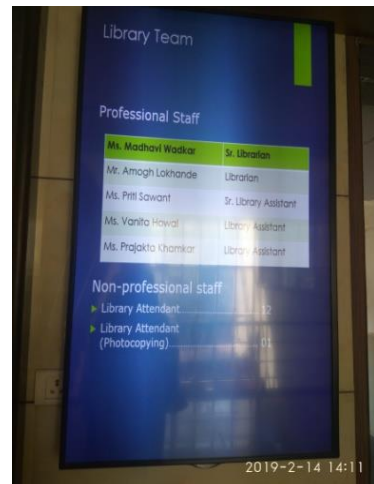


12. Library Committee

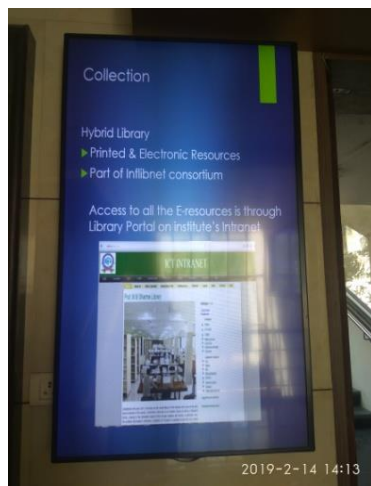
Signage Images



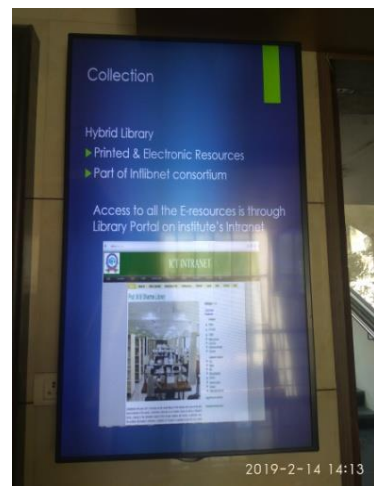
13. Library Staff Information



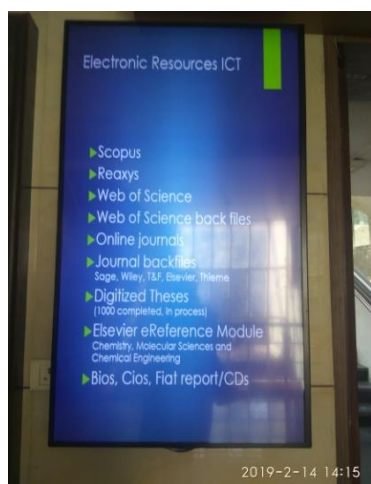
14. Library Services



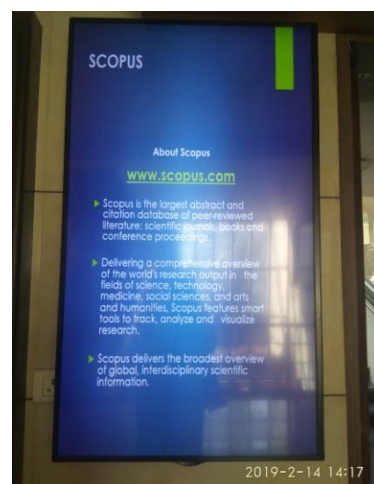
15. Forms of Library Collection



16. Library Collection in Quantity

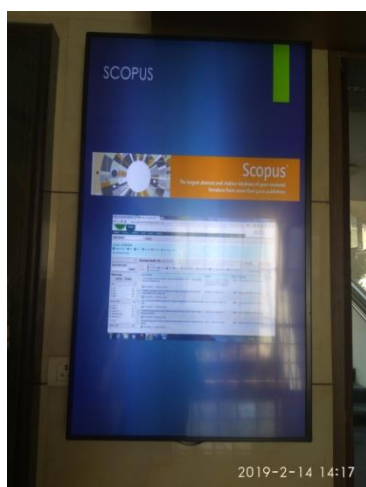


17. List of E-resources

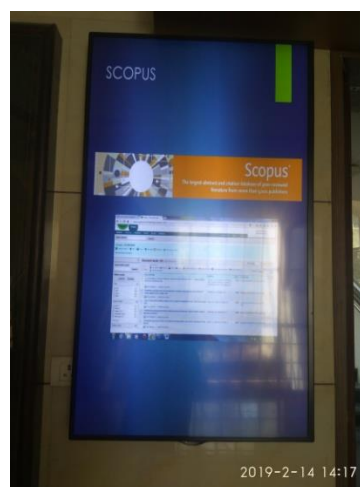


18. Information about Scopus

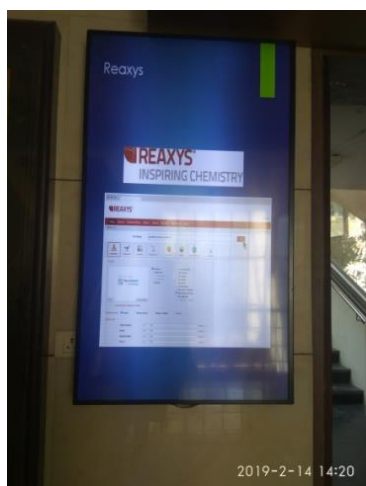
Signage Images



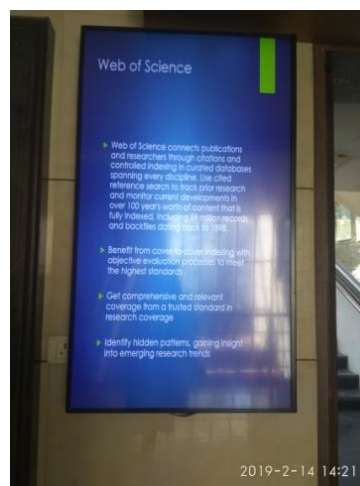
19. Home Screen of Scopus



20. Information About Reaxys Database



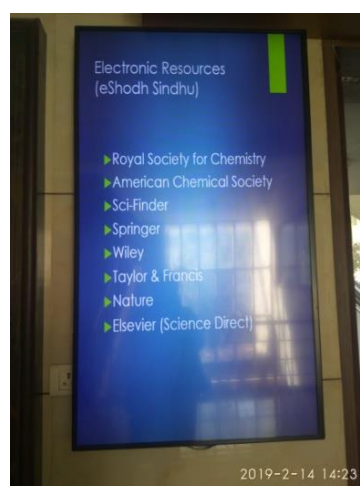
21. Home Screen of REAXYS



22. Information About Web of Science

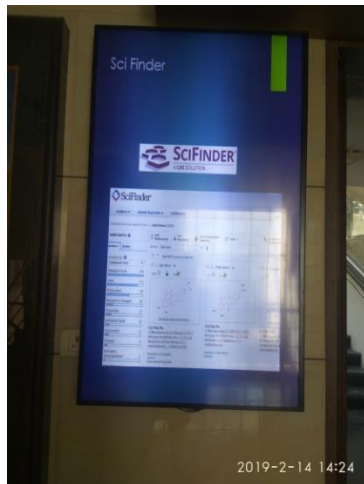


23. Home Screen of Web of Science

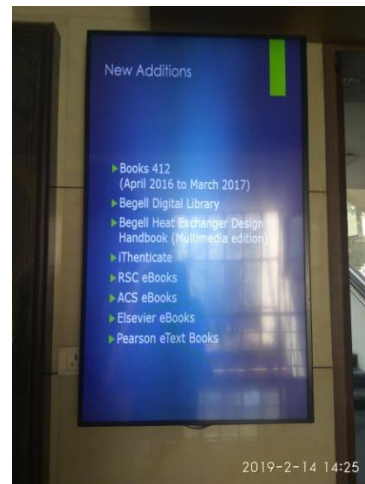


24. Information About eShodh Sindhu

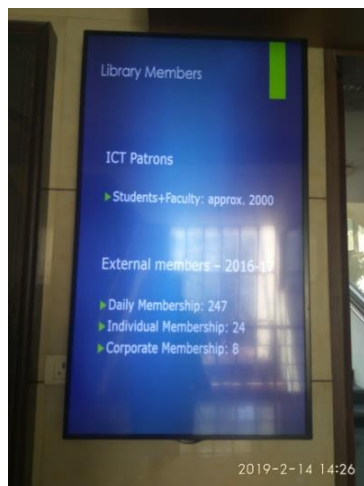
Signage Images



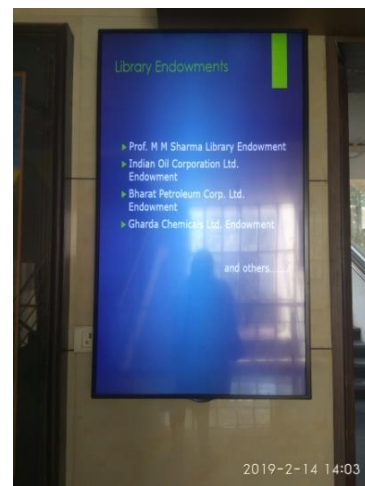
25. Information about Sci Finder



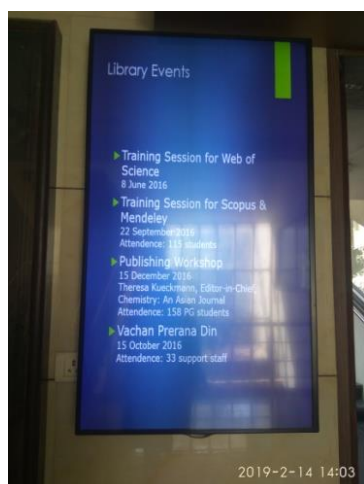
26. List of New Additions



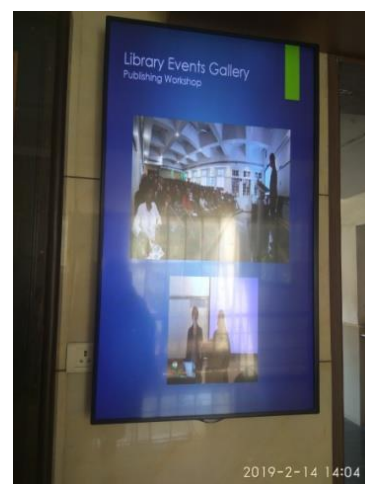
27. Library users' statistics



28. Library Endowments

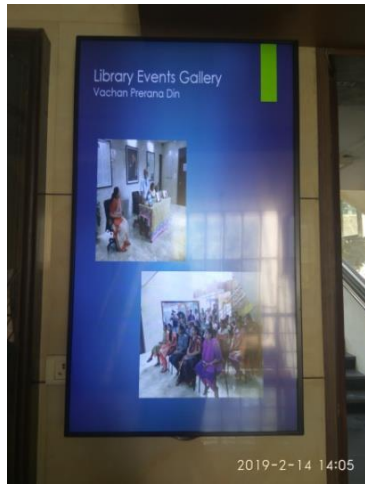


29. List of Library Events



30. Library Events Gallery 1

Signage Images



31. Library Events Gallery 2



32. Library Stack End Signage



33. Library Entrance Name Sign



34. Library Building Directory & Floor plan



35. Library Ground Floor Map



36. Library First Floor Map

Signage Images



37. Library Second Floor Map



38. Library Third Floor Map



39. Library Fourth Floor Map



40. Library Working Hours





41. Main Lift Floor Entry Information



42. List of services/facilities on ground floor

Signage Images

 <p>FIRST FLOOR</p> <ul style="list-style-type: none"> ➤ CYBER LIBRARY (Masters / STP) ➤ COPY / PRINT ➤ ONLINE DATABASES & JOURNALS ACCESS ➤ STACK ROOMS ➤ WASHROOMS ➤ DRINKING WATER ➤ ENTRANCE / LIBRARY SECURITY <p>24/07/2017 11:14 AM</p>	 <p>SECOND FLOOR</p> <ul style="list-style-type: none"> ➤ INFILIBNET CENTRE ➤ SCAN / COPY / PRINT ➤ VISITORS E-RESOURCES ACCESS ➤ DATA CENTRE ➤ STUDY AREA ➤ CCTV CONTROL ROOM ➤ STACK ROOMS ➤ WASHROOMS / DRINKING WATER ➤ ENTRANCE / LIBRARY SECURITY <p>24/07/2017 11:32 AM</p>
<p>43. List of services/facilities on First floor</p>	<p>44. List of services/facilities on Second floor</p>
 <p>THIRD FLOOR</p> <ul style="list-style-type: none"> ➤ CYBER LIBRARY (MPhil / PhD) ➤ COPY / PRINT ➤ STACK ROOMS ➤ SMCS DIGITAL ARCHIVE ➤ WASHROOMS ➤ DRINKING WATER ➤ ENTRANCE / LIBRARY SECURITY <p>24/07/2017 11:31 AM</p>	 <p>HOW TO LOCATE A BOOK ?</p> <p>The Books in TSMU Library are arranged on the shelves in numerical order according to the Dewey Decimal Classification System (DDC). Books are divided into 100 main divisions with sub-divisions.</p> <ul style="list-style-type: none"> 000 - 000 GENERAL WORKS Books that deal with subjects like Library and Information Science, Computer Science, News, Media, Journalism, General Collections, etc. 100 - 100 PHILOSOPHY AND PSYCHOLOGY Metaphysics, Epistemology, Psychology, Logic, Ethics, Philosophy, etc. 200 - 200 RELIGION General Theology, works on Religion, etc. 300 - 300 SOCIAL SCIENCES Statistics, Research Methods, Economics, Political Science, Law, Public Administration, Social Work, Education, Commerce, etc. 400 - 400 LANGUAGE Linguistics, Etymology, Grammar, etc. 500 - 500 PURE SCIENCES Mathematics, Astronomy, Chemistry, Earth Sciences, Life Sciences, etc. 600 - 600 APPLIED SCIENCES (TECHNOLOGY) Medical, Engineering, Agriculture, Management/ Manufacturing, etc. 700 - 700 ARTS Fine Arts, Architecture, Drawing, Painting, Music, Performing Arts, etc. 800 - 800 LITERATURE Essays, Poetry, etc. in all languages. 900 - 900 GEOGRAPHY AND HISTORY Geography, Travel, General History, etc. <p>If you have any difficulty in finding a book, we will be happy to help you. Please contact Library Administrator or Department of Library.</p> <p>Sir Dhanraj Tata Memorial Library TATA INSTITUTE OF SOCIAL SCIENCES, MUMBAI</p> <p>2019-1-22 12:42</p>
<p>45. List of services/facilities on Third floor</p>	<p>46. How to Locate book Guide</p>
 <p>ONLINE CATALOGUE</p> <p>2019-1-22 12:43</p>	 <p>Rules of Cyber Library for Students</p> <ol style="list-style-type: none"> 1. All members must follow the rules. 2. All members must be members of the library. 3. All members must be members of the library. 4. All members must be members of the library. 5. All members must be members of the library. 6. All members must be members of the library. 7. All members must be members of the library. 8. All members must be members of the library. 9. All members must be members of the library. 10. All members must be members of the library. <p>By IT Team.</p> <p>Do's and Don'ts of Cyber Library</p> <ul style="list-style-type: none"> Do's: Do not use the library for any other purpose. Do not use the library for any other purpose. Do not use the library for any other purpose. Do not use the library for any other purpose. Do not use the library for any other purpose.
<p>47. Online Catalog Sign</p>	<p>48. Cyber Library Rules</p>

Signage Images



49. Sign for Electric switches in shelving area



50. Sign for WC with Symbols



51. Stack end sign with subject headings



52. Campus Information Directory



53. Library Entry Sign

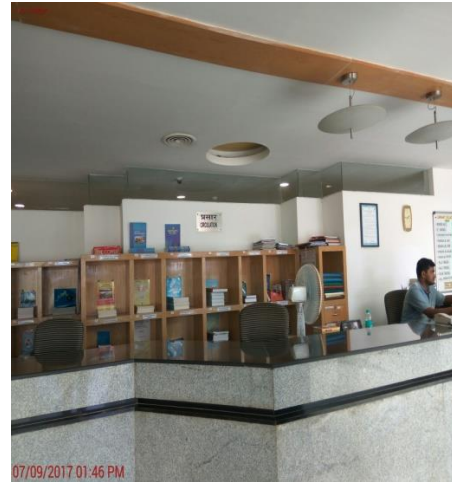


54. List of Services

Signage Images



55. Library Collection



56. Circulation Counter sign



57. OPAC Counter Sign



58. Xerox Section Sign



59. Institutional Publications Sign



60. Current Periodicals Sign

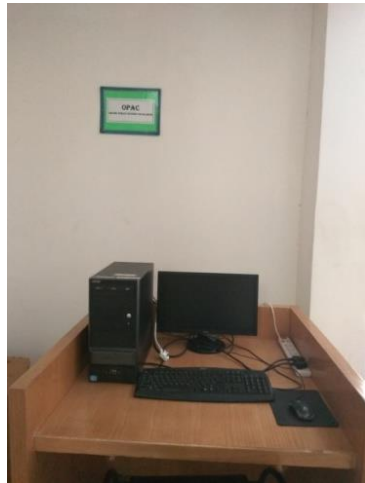
Signage Images



61. Theses and Dissertations Section Sign



62. Digital Library Departmental Sign



63. OPAC Counter Sign near Shelving Area



64. Stack End Signs



65. Campus Information Directory



66. Directional sign locating library

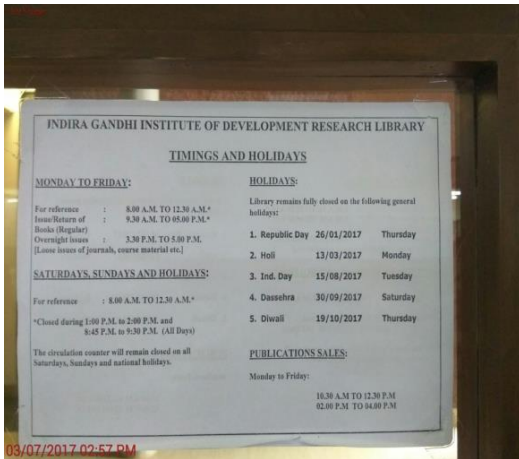
Signage Images



67. Library Entrance Sign



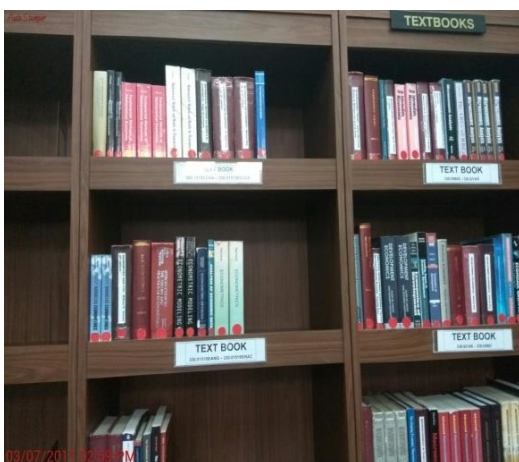
68. Library Building Directory Sign



69. Library Working Hours



70. Circulation Counter Sign



71. Changeable stack signs at circulation counter



72. New Arrivals Sign

Signage Images



73. Current Journals Sign



74. Floor-wise Broken Order Sign



75. Directional sign for Elevator and WC



76. Ground Floor Book Shelving Range

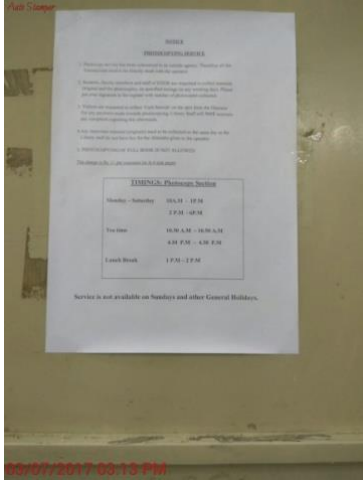



77. Sign for Elevator with Arrow



78. Sign for Gr. Floor Stacking area

Signage Images

 <p>A black sign with yellow text that reads "BASEMENT BACK VOLUMES". Below this, a white box contains the text "FROM 001 to 307.12" and "TO O - Z".</p> <p>03/07/2017 03:11 PM</p>	 <p>A doorway with a sign above it that says "PHOTOCOPY SERVICE". To the left of the doorway, a sign on the wall says "SILENCE PLEASE".</p> <p>03/07/2017 03:13 PM</p>
<p style="text-align: center;">79. Basement Back Volumes Range Sign</p>	<p style="text-align: center;">80. Photocopy Section Sign</p>
 <p>A white sign with black text. The top section is titled "RULES" and lists several guidelines. The bottom section is titled "LIBRARY Photocopy Service" and lists operating hours for Monday-Thursday (10:30 - 12:30 and 2:30 - 10:30), Friday (10:30 A.M. - 10:30 A.M. and 4:00 P.M. - 6:00 P.M.), and Lunch Break (12:30 - 1:30). A note at the bottom states "Service is not available on holidays and other General Holidays."</p> <p>03/07/2017 03:13 PM</p>	 <p>A sign that says "BACK VOLUMES" is mounted on a large, grey, cylindrical pillar in a library aisle. Bookshelves are visible in the background.</p> <p>03/07/2017 03:14 PM</p>
<p style="text-align: center;">81. Photocopy Section Rules and Working hours Sign</p>	<p style="text-align: center;">82. Back Volumes Sign</p>
 <p>A computer monitor on a desk. The screen displays a web page with a prominent "OPAC" link.</p> <p>03/07/2017 03:15 PM</p>	 <p>A sign on a wooden desk that reads "3 MORE PCs WITH INTERNET CONNECTION AVAILABLE IN MEZZANINE (FIRST FLOOR)" with an arrow pointing to the right.</p> <p>03/07/2017 03:15 PM</p>
<p style="text-align: center;">83. Web OPAC Link on Desktop</p>	<p style="text-align: center;">84. Information about Additional Internet PC</p>

Signage Images

 <p style="text-align: right; color: red; font-size: small;">03/07/2017 03:17 PM</p>	 <p style="text-align: right; color: red; font-size: small;">03/07/2017 03:19 PM</p>
<p>85. Sign for G-Series</p>	<p>86. Sign Statistical Publications</p>
 <p style="text-align: right; color: red; font-size: small;">03/07/2017 03:02 PM</p>	 <p style="text-align: right; color: red; font-size: small;">03/07/2017 03:02 PM</p>
<p>87. Interactive Sign in absence of staff</p>	<p>88. Shelving Range sign with subject headings</p>
 <p style="text-align: right; color: red; font-size: small;">03/05/2017 03:12 PM</p>	 <p style="text-align: right; color: red; font-size: small;">03/07/2017 03:05 PM</p>
<p>89. Shelf Call Number Range Sign</p>	<p>90. List of Back Volumes on stacks</p>

Signage Images



97. Campus Map 2 Showing Library



98. Campus Information Multi-directional stand 1



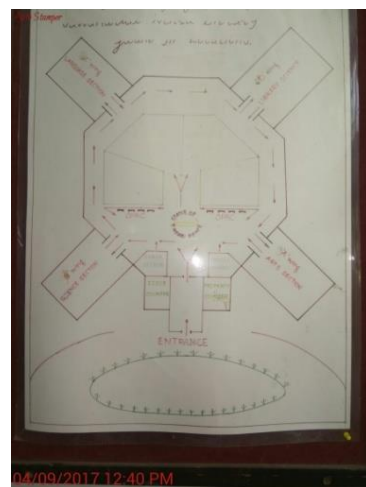
99. Campus Information Multi-directional stand 2



100. Campus Information Multi-directional stand 3



101. Library Building Name Sign

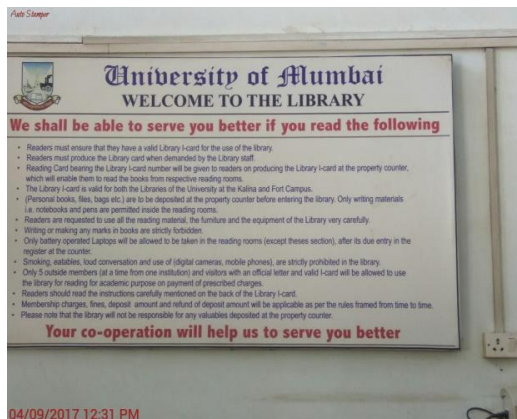


102. Library Building Layout

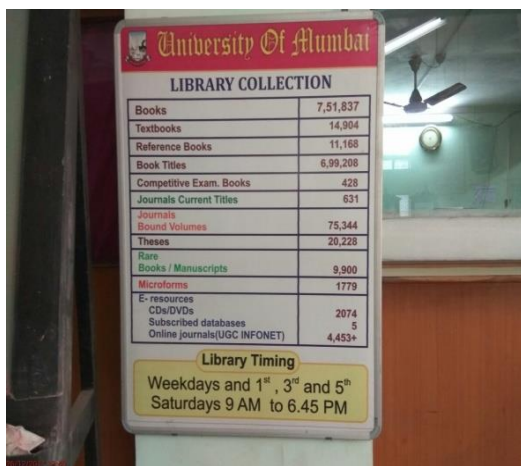
Signage Images



103. Library Building Directory



104. Library Rules and Regulations



105. Library Collection and Working Hours



106. Department/Section Sign




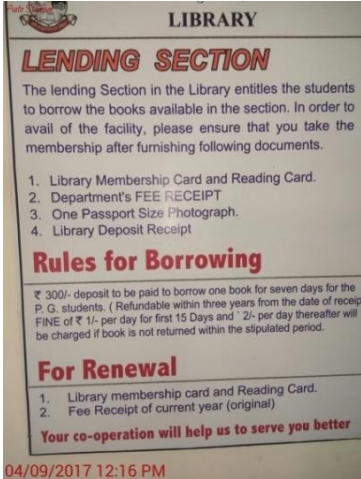
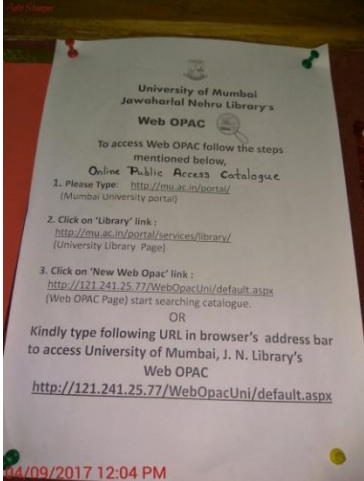



107. Department/Section Sign



108. Department/Section Sign

Signage Images

	
<p>109. Directional Arrow for Department/Section Sign</p>	<p>110. Directional Arrow for Department/Section Sign</p>
	
<p>111. Directional Arrow for Department/ Section Sign</p>	<p>112. Library Rules and Regulations for Lending</p>
	
<p>113. Web OPAC Information & URL</p>	<p>114. Code of Conduct Sign</p>

Signage Images



115. Photocopy Section Sign 1



116. Photocopy Section Sign 2



117. Stack End Sign



118. Library Name Sign

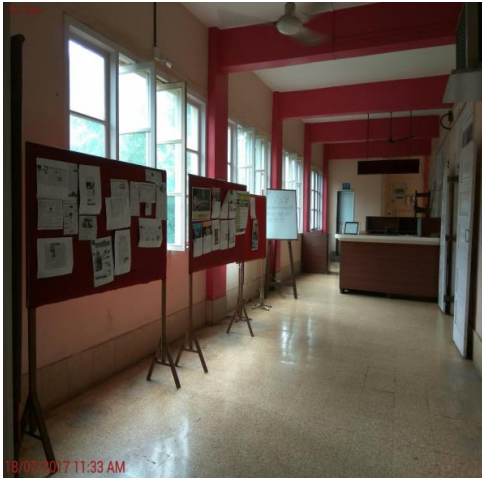




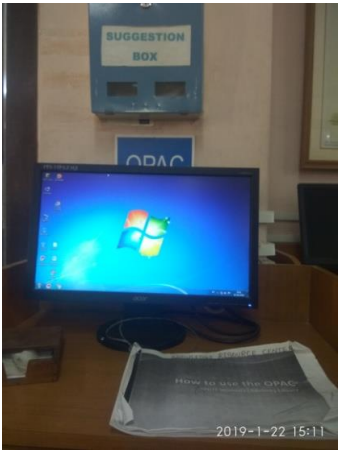


119. Library Entry Name Sign



120. Library Map with Rules & regulations

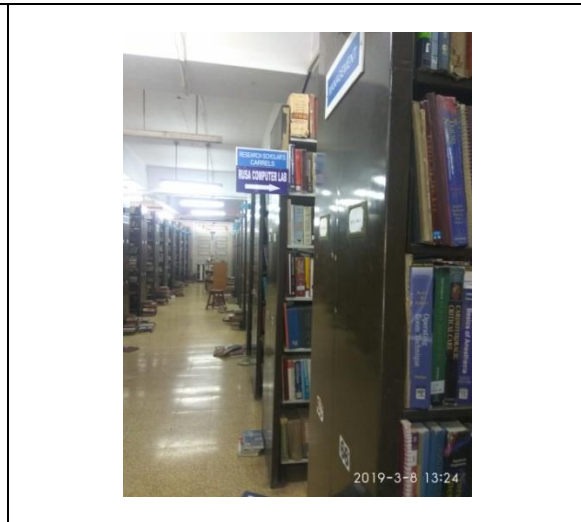
Signage Images

 <p>18/07/2017 11:33 AM</p>	 <p>18/07/2017 11:45 AM</p>
<p>121. Bulletin Boards for CAS and Notices</p>	<p>122. Sign of Second Floor Map</p>
 <p>18/07/2017 11:46 AM</p>	 <p>18/07/2017 11:46 AM</p>
<p>123. Sign of Second & Third Floor Map</p>	<p>124. Reading Hall Sign</p>
 <p>18/07/2017 11:46 AM</p>	 <p>2019-1-22 15:11</p>
<p>125. Periodical Section Sign</p>	<p>126. OPAC Sign with OPAC Manual</p>

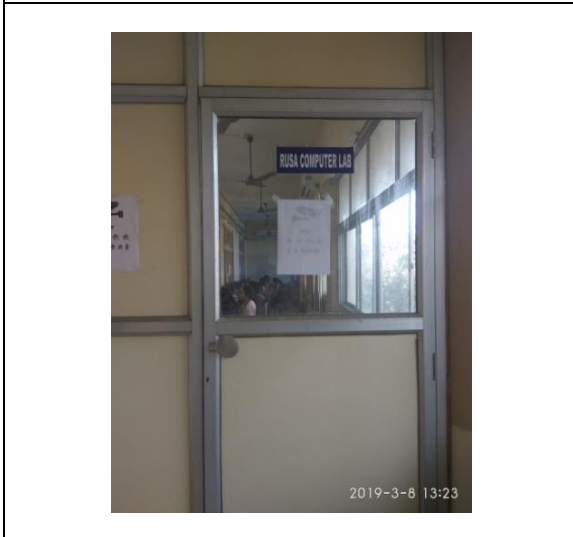
Signage Images



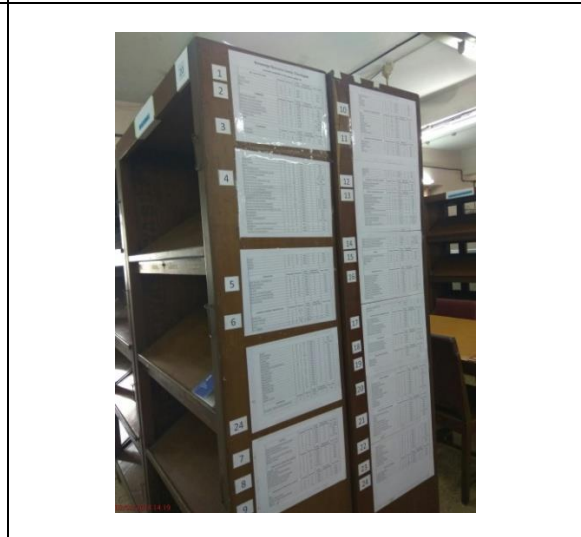
127. Research Scholars Carrels Sign



128. Directional Sign for Computer Lab



129. Sign for Computer Laboratory



130. Journal Stack end List



131. Stack end sign

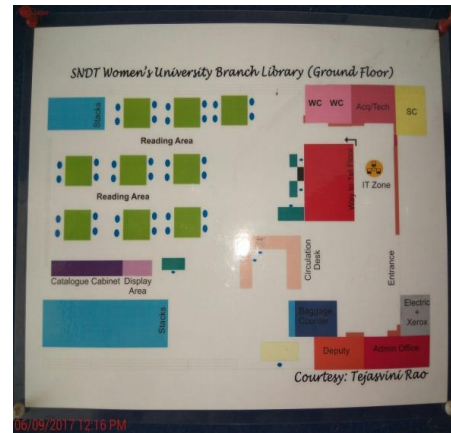


132. Campus Map showing Library Building

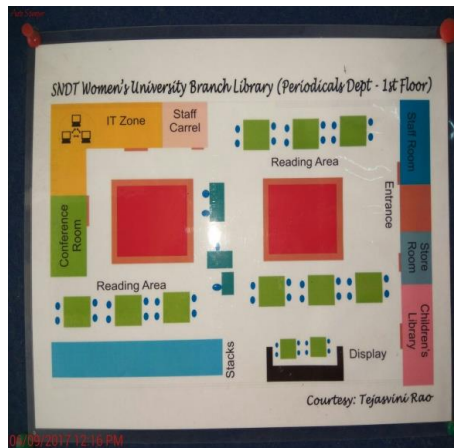
Signage Images



133. Library Building Name Sign



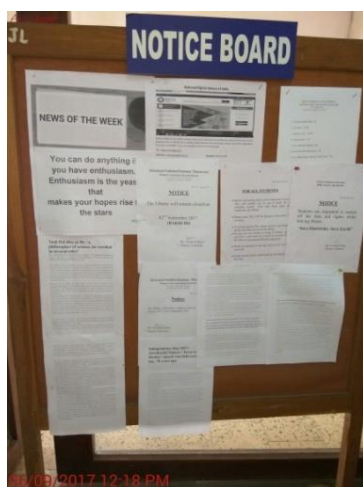
134. Ground Floor Map



135. First Floor Map



136. Library Building Directory

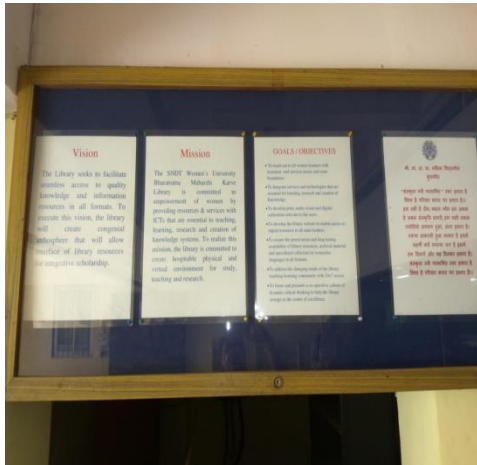


137. Notice and Rules and Regulations



138. Baggage Counter Sign near Ceiling

Signage Images



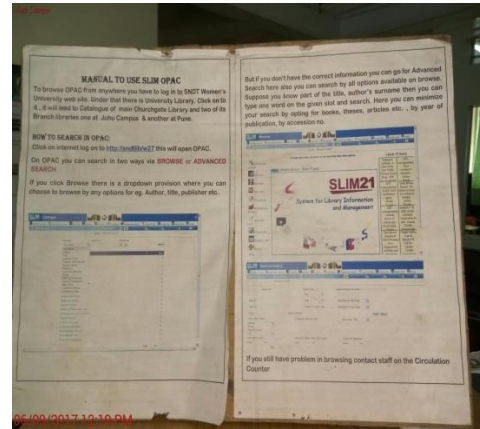
139. University Vision and Mission



140. New Arrivals Sign



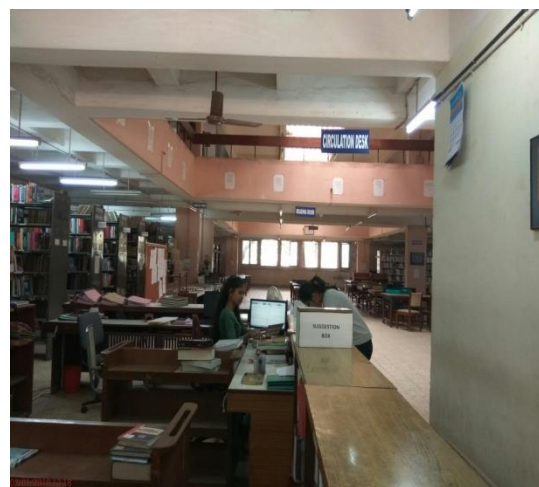
141. Technical Room Sign



142. Printed OPAC Manual near terminal



143. Photocopy Section Sign



144. Circulation Desk Sign

Signage Images



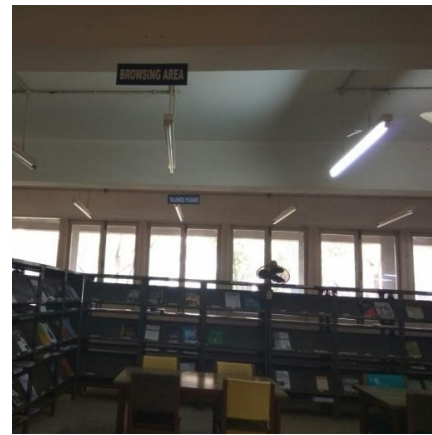
145. Circulation Desk Sign



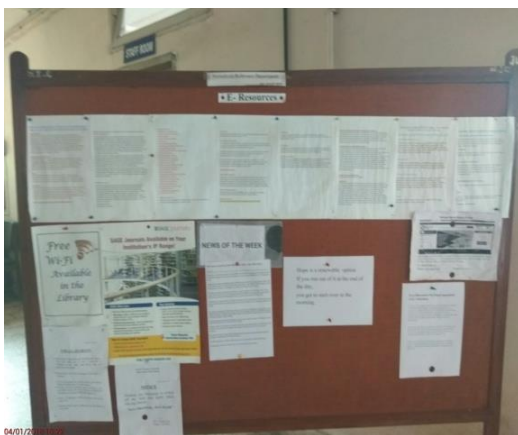
146. Periodicals Area Sign



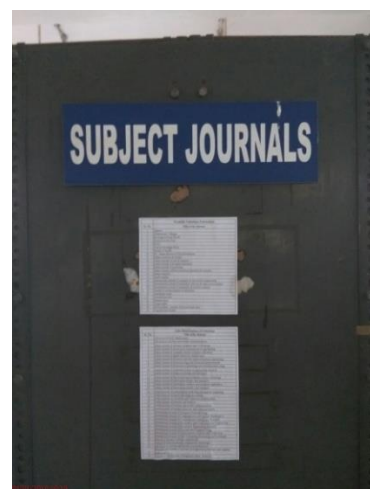
147. Activity Area Sign



148. Browsing Area Sign



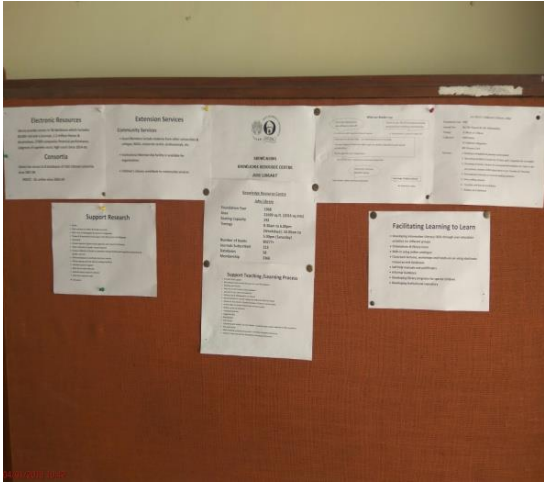


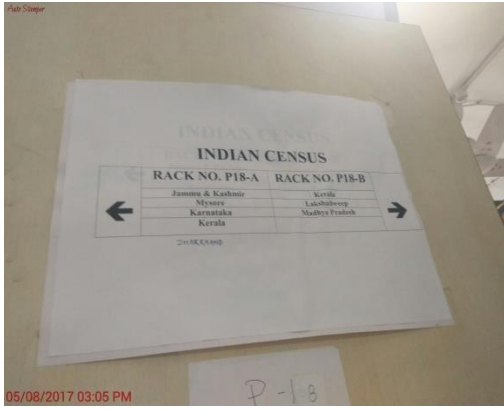


149. Display of List of E-resources







150. List of Journals on Journals stack end

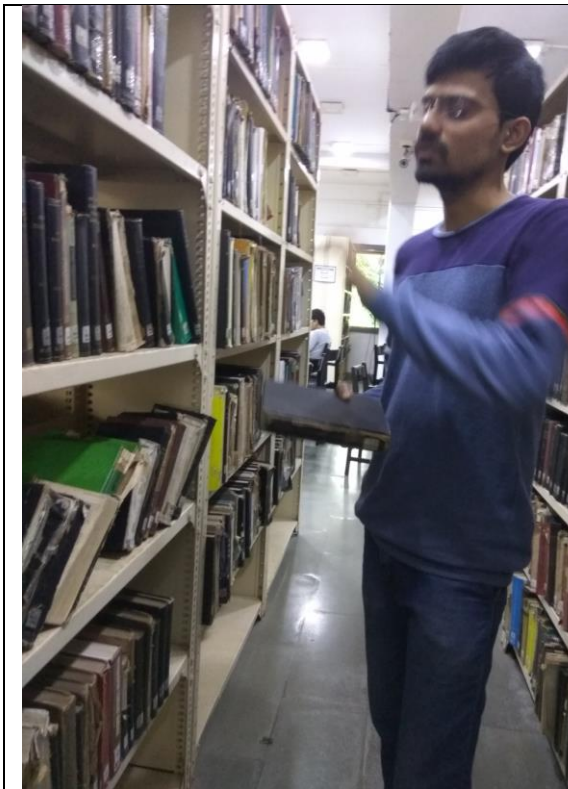
Signage Images

	
<p>151. Bound Volumes with List of Journals stack end</p>	<p>152. Reference books with shelving range</p>
	
<p>153. Type of e-sources and access schedule</p>	<p>154. Stack End Signage</p>
	
<p>155. Library Collection and Working Hours</p>	<p>156. Stack end signage for Census</p>

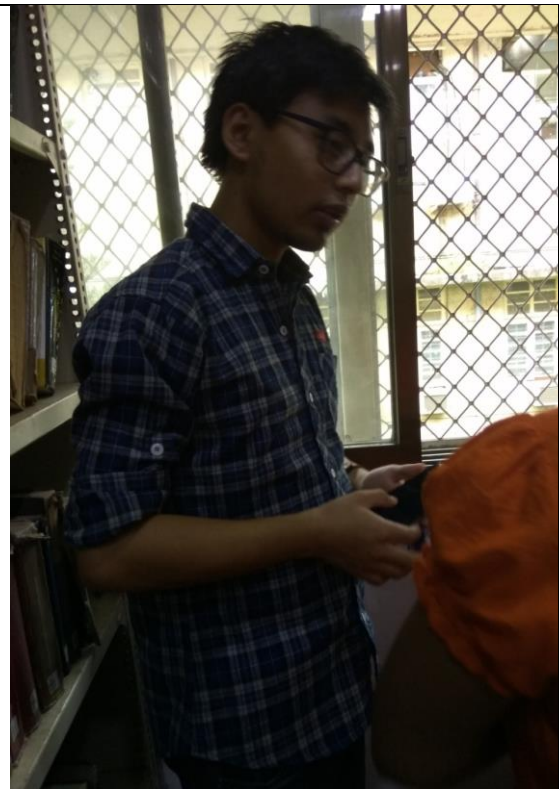
Signage Images

 <p style="text-align: center;">157. Stack end signage</p>	 <p style="text-align: center;">158. Library Entrance Sign</p>
 <p style="text-align: center;">159. Library Rules with Working Hours</p>	 <p style="text-align: center;">160. Stack end signage</p>

Annexure IX: Users Observation Images



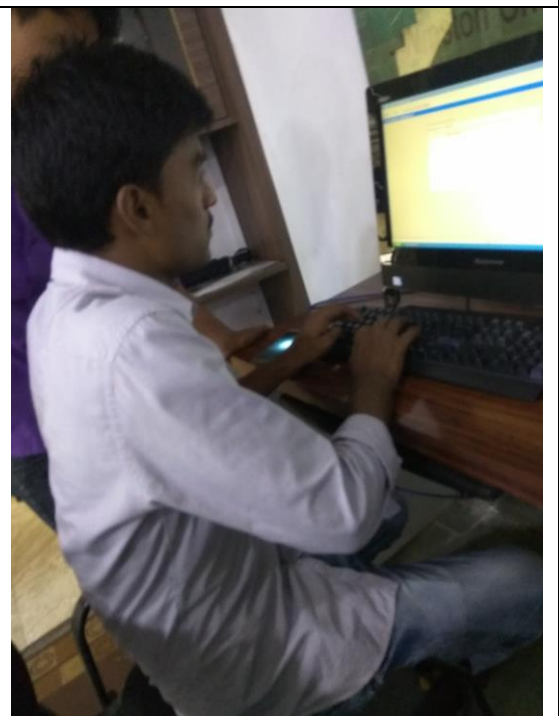
Behavior- Confused while searching book



Behavior- Indecisive while moving around stacks



Behavior-Confident



Behavior- Anxious while using OPAC



Behavior-Disoriented while searching book



Behavior- Baffled while using catalog cards



Behavior- Amazed while using manual catalog



Behavior- Anxious while searching author catalog



Behavior- Confident while locating book



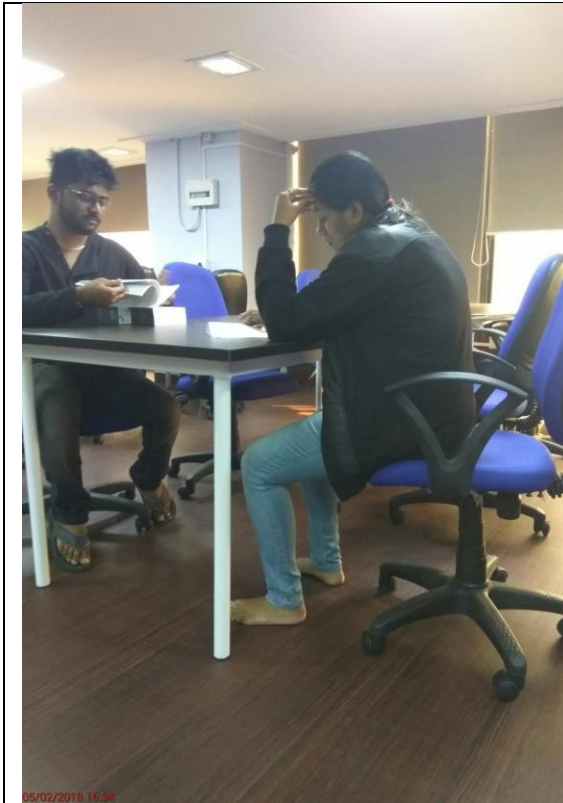
Behavior- Confused and Anxious while OPAC use



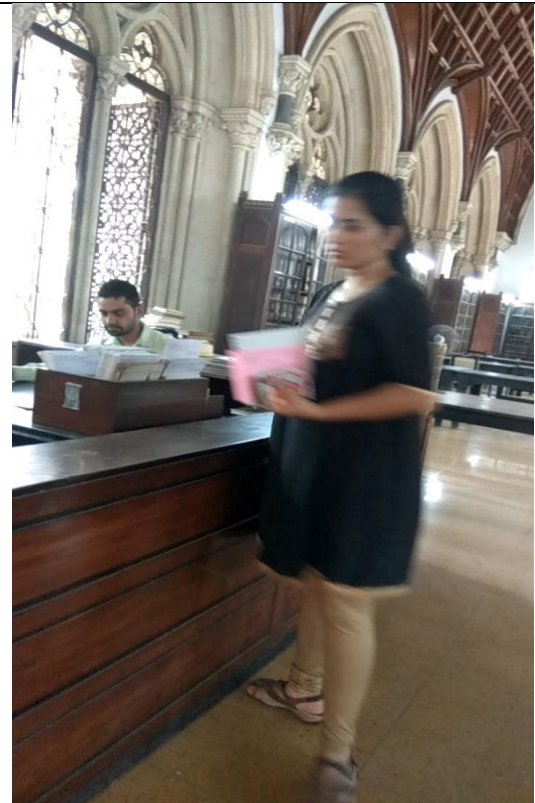
Behavior- Surprised and Amazed after finding multiple books on required topic



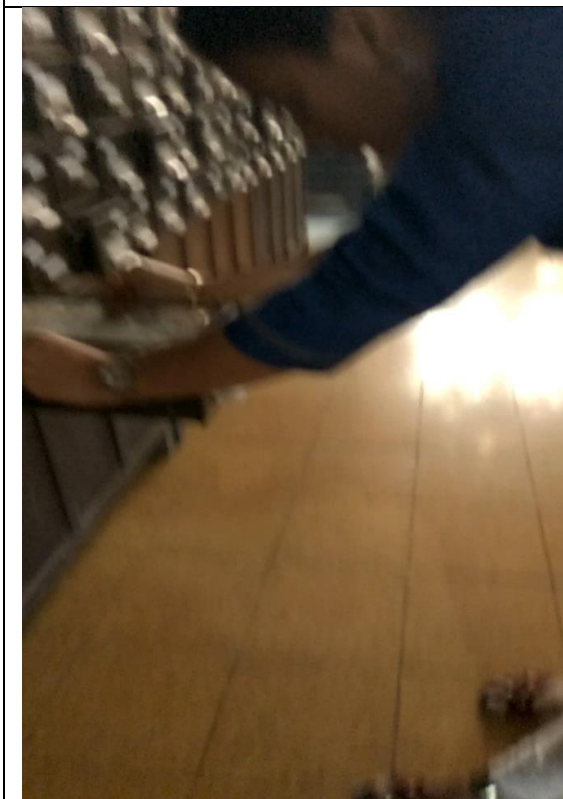
Behavior- Baffled while moving around stacking area



Behavior- Frustrated when unable to find required source



Behavior- Disoriented and approached library staff



Behavior- Anxious while using manual catalog cards



Behavior- Confused while using OPAC

Annexure X: List of Universities

Sr. No.	Name of University	Name of Library
1	Central Institute of Fisheries Education Yari Road, Panch Marg, Versova, Andheri West, Mumbai, Maharashtra 400061	Library
2	Indira Gandhi Institute of Development Research General Arun Kumar Vaidya Marg, Film City Rd, IGIDR, Goregaon, Mumbai, Maharashtra 400065	Library
3	Institute of Chemical Technology Nathalal Parekh Marg, Matunga, Mumbai, Maharashtra 400019	Prof. M. M. Sharma Library
4	International Institute for Population Science Govandi Station Road, Deonar, Mumbai, Maharashtra 400088	Library
5	Maharashtra National Law University 2nd and 6th Floor, MTNL Building, Technology St, Hiranandani Gardens, Powai, Mumbai, Maharashtra 400076	Library
6	SNDT Women's University 1, NT Road, New Marine Lines, Marine Lines, Mumbai, Maharashtra 400020	Bharatratna Maharshi Karve Library, Churchgate
7	SNDT Women's University Juhu Rd, Daulat Nagar, Santacruz West, Mumbai, Maharashtra 400049	Bharatratna Maharshi Karve Library, Juhu Branch Library
8	Tata Institute of Social Science VN Purav Marg, Deonar, Chembur, Mumbai, Maharashtra 400088	Sir Dorabji Tata Memorial Library
9	University of Mumbai Mahatma Gandhi Road, Mantralaya, Fort, Mumbai, Maharashtra 400001	The University Library, Fort
10	University of Mumbai Vidya Nagari, Kalina, Santacruz East, Mumbai, Maharashtra 400098	Jawaharlal Nehru Library

Annexure XI: Publications

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- 83-88 Indonesian Millennial Awareness to Privacy and Personal Data Protection on the Internet
Muhammad Usman Noor
DOI : 10.14429/djlit.40.2.14969
- 89-96 Comparative Analysis of Information Retrieval using Ontology Based vs Traditional Information Systems in Food Science Domain
Padmavathi T.
DOI : 10.14429/djlit.40.2.15213
- 97-103 Contribution of Library Professionals and Libraries in Open Educational Resources in Indian Scenario
Sunil Kumar Upneja
DOI : 10.14429/djlit.40.2.15339
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Somesh Rai, Kunwar Singh and Akhilesh Kumar Varma
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- 122-130 Fifty Years Research Output in Oral Submucous Fibrosis: A Bibliometric Analysis of Publications from 1967 to 2016
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DOI : 10.14429/djlit.40.2.14727
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