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# **Usability Evaluation of Digital Library**

## **Blekinge Tekniska Högskolan a case study**

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# ABSTRACT

Libraries have for hundreds of years been an important entity for every kind of institute, especially in the educational sector. So now it is an age of computers and internet. People are now using electronic resources to fulfill their needs and requirements of their life. Therefore libraries have also converted to computerized systems. People can access and use library resources just sitting at their computers by using the internet. This modern way of running a library has been called or given the name of digital libraries.

Digital libraries are getting famous for flexibility of use and because more users can be facilitated at a time. As numbers of users are increasing, some issues relevant to interaction also arise while using digital libraries interface and utilizing its e-resources. In this thesis we evaluate usability factors and issues in digital libraries and the authors have taken as a case study the real time existing system of the digital library in BTH.

This thesis report describes digital libraries and how users are being facilitated by them. Usability issues are also discussed relevant to digital libraries. Users have been the main source to evaluate and judge usability issues while interacting and using this digital library.

The results obtained showed dissatisfaction of users regarding the usability evaluation of BTH:s digital library. The authors used usability evaluation techniques to evaluate functionality and services provided by the BTH digital library system interface. Moreover, based on the results of our case study, suggestions of improvement in BTH:s digital library are presented. Hopefully, these suggestions will help to make BTH digital library system more usable in an efficient and effective manner for users.

**Keywords:** Digital libraries (DL), Usability, Electronic Resources, Interface

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# INTRODUCTION

This thesis consists of a report regarding usability evaluation of digital libraries. The authors have selected BTH digital library as a case study to evaluate digital libraries. The authors explain digital libraries, how they work and the importance of digital libraries today. We discuss how digital libraries can be designed and developed so that users can get maximum benefit out of them. Moreover, usability issues regarding digital libraries are discussed and some very important factors relevant to usability in digital libraries are elaborated upon. BTH digital is used in this thesis report as a case study. This is a real time existing digital library at Blekinge Tekniska Högskolan (Blekinge Institute of Technology), Sweden. The authors have performed usability tests and interviews with students of BTH regarding BTH digital library usability issues. Libraries are a very important asset of any institute. A well-run library shows the strength of any valuable university and college. It is the only entity which is accessible for and being used by every student who is studying there, whether on campus or through distance learning. Therefore, this thesis report is about how users are already interacting with this library and getting benefits from its use. The aim has also been to find some further requirements and suggestions from the users who are using it. The authors have used questionnaires and interviews with different kinds of users, such as those students who use it most and some new users who are not very familiar with its use, as well as teachers. Selected users have been given a number of tasks to perform in the laboratory and their results and suggestions have been the key factor for our usability evaluation of BTH digital library.

This thesis report has been structured in the form of chapters which contain titles and subtitles aiming to make it easy and meaningful for common users. Chapter-wise description is given below:

- **Chapter** one contains background of our research topic. It describes some history of digital libraries and how much work has already been done to evaluate them.
- **Chapter** two explains the problem area, definitions and goals of our thesis report. It also describes the scope of this research study.
- **Chapter** three is about the methodology which we have used for evaluation of digital libraries. It explains what kinds of research approaches the authors have used in this thesis and the structure of the thesis report.
- **Chapter** four consists of theoretical work and literature review. The authors discuss in depth some usability issues relevant to digital libraries.
- **Chapter** five gives a detailed overview of usability tests and interviews the authors have conducted with different users to evaluate BTH digital library.

- **Chapter** six contains results of our usability tests and interviews after performing an analysis and some mathematical operations to make them more meaningful for readers.
- **Chapter** seven contains a discussion part in which the authors discuss the results obtained from questionnaires and interviews.
- **Chapter** eight contains our conclusions regarding the usability evaluation and the authors give some further suggestions to improve the digital library system based on the responses from the users whom the authors tested and interviewed.

# CHAPTER 1: BACKGROUND

## 1.1 DEFINITIONS OF DIGITAL LIBRARY

A digital library is a collection of information and digital contents that are kept in digital format and these are accessible to different users through computers by having access to the internet. At the beginning, the concept was extracted from the concept of a library that contains a hardcopy of each component like books, journals and articles and etc. Over time people became more and more used to and comfortable with accessing digital preservation of these contents.[1]

The “*digital library*” term was first accepted by NASA and NSF and work on digital libraries was initiated in 1994. There are different types of digital libraries that have been used for the past decades in different forms like academic repositories and digital archives. Academic repositories are related to educational institution records for having books, research works and journals and articles.[2]

Around this time people started thinking about digital library as something that preserves contents and can be accessed commercially or in organizations because traditional libraries have limitations of physical space and digital libraries also have an effect on economics. So the concept of utilization of resources in efficient manner resulted in the establishment of digital libraries in operational condition through which user can easily access digital contents remotely and these concepts solved some of the problems with traditional libraries.[3]

Digital libraries are known by several names. From a librarian’s perspective, digital libraries can be called databases and some people call them electronic archives [3]. European communities and United Kingdom referred to these digital libraries as digital surrogates [10]. Digital libraries contain the digital preservation of books, video, audio, text and images that can be organized in such a way as to provide useful information to the users. It also utilizes different technologies to operate digital contents. Humans play an important role to make use of digital content for different purposes.[11],[12]

The digital library is responsible for preserving and acquiring different types of resources that make use of digital technologies. Another definition of digital library says that it is a group of services that are presented in a digital format on the web. It organizes information in a systematic way that can be accessed by users in an efficient and effective manner[9]. Moreover, digital libraries utilize digital technologies by which users can easily access information according to their interest in multiple formats. Due to the interaction of users with digital library systems, an important factor is user satisfaction scenarios. Developers and designers are trying to perform requirements analysis on the digital library system to make it more usable and user friendly in ways that enhance interest and interaction of users with the system. Therefore, user considerations become important in designing digital library systems, which brings the usability perspective to the fore[13].



## **1.2 THE ROLE OF USABILITY IN DIGITAL LIBRARIES**

Usability is a key feature in evaluation of every product. Usability is about how easy to use a product or application is so that users can be satisfied by its use [40]. In software applications, usability is very much about the quality of the interface and how all the available functionalities can be presented in front of the user in an efficient and effective manner [19]. The “usability” word also refers to ambitions to increase the easiness and effectiveness of the application while the application is in the software cycle [40]. Usability plays a vital role in evaluating digital libraries where major interaction of users with the system is measured. A lot of work has been done on usability evaluation of digital libraries by using distinctive techniques with different attributes. The system should always be user oriented rather than technology oriented and thus the user has become an important part of the development team system in recent years [4]. Usability testing shows how the system is used by the user and how he/she gets benefits while using it.

Interface design of digital libraries is an important part in digital libraries that can provide information related to the whole system that should be time saving and support the users so that they can easily get their required results. Usability can be measured by analyzing experience of different users when they interact with the system [25].

## **1.3 BRIEF DESCRIPTION OF BTH DIGITAL LIBRARY SYSTEM AND USABILITY**

This thesis report explores issues concerning usability evaluation of the BTH digital library system, with a focus on measuring user satisfaction level when users interact with the system by using different evaluation techniques. The digital library system of BTH offers access to a large variety of resources and databases like IEEE, ACM, Inspec, ebrary, LIBRIS, Google scholar etc. These contain e-books, e-journals and articles that specifically offer convenient information to users.

This system has an interface that provides users with tools to perform their searching for digital contents and behind that interface multiple databases are made accessible with the collaboration of SFX@Blekinge. This is a revolutionary link service in the BTH library system that enhances the capability of having information of broader domain. There are however different issues regarding searching contents by users which are becoming an important issue at BTH. It is necessary to accustom users with searching queries on different databases and resources for obtaining the information they are seeking. The current system of BTH digital library works in an expedient way but there is a need for discussing issues regarding user satisfaction, learnability, efficiency, effectiveness and error prevention as the system is extremely complex and growing even more so over time. Different types of users like teachers, students, researchers and librarians interact with the system to gain information. Users from different backgrounds and different subject areas experience different problems when they interact with the system.

## **CHAPTER 2: PROBLEM DEFINITION/GOALS**

Digital libraries support electronic learning by providing information to the users related to their educational and research purposes [3]. As far as BTH digital library system is concerned there are different types of users that are interacting with digital library of Blekinge Institute of Technology to get information from resources from remote locations. Students, teachers, researchers and librarians are users of BTH digital library that utilizes resources offered by different organizations. It accesses the databases of hundreds of e-resources.

This is an era of internet. Most users have access to internet at home as well as at work, so users preferably use internet to perform their research work and/or for educational purposes. Students mostly do not borrow hard copy of books from the library; they preferably access digital content to pursue their work. The digital library is a cost effective and time saving and efficient way of accessing digital material for more than one student at one time [1]. These users need a comprehensive understanding of the resources and perhaps the most important part is to learn how to search for and retrieve information through the interface of BTH digital library due to its web based classification. The designing of interfaces is becoming an important issue in every application to provide different attributes of usability like user satisfaction, learnability, efficiency, effectiveness and error prevention [4], and this is especially relevant concerning digital libraries which are used routinely by so many.

### **2.1 APPLICATION TO BE TARGETED**

The application which the authors are targeting in this research work is BTH digital library system. Interface and different services of BTH digital library system are considered in the evaluation process to get user satisfaction in effective and efficient way. Users experience different types of challenging constraints while interacting with the system to operate system precisely. In this research study the authors have the aim to explore to what extent BTH digital library system fulfils the requirements of the users relevant to their research work and educational purposes. Moreover the users' satisfaction level related to usability is measured. There is a need to extract user requirements that focus on usability issues that clarify user satisfaction in order to measure and, where necessary, increase effectiveness and efficiency of the system. The authors perform usability testing with users and, based on the results, provide suggestions for improvement in the current system.

### **2.2 RESEARCH QUESTIONS**

1. What is the importance of usability in digital libraries and what are usability issues in existing BTH digital library system according to the user perspective?
2. Are students satisfied with BTH digital library system regarding usability?
3. What are suggestions or user perceived problems of BTH digital library system?

## **2.3 GOAL/RESULTS**

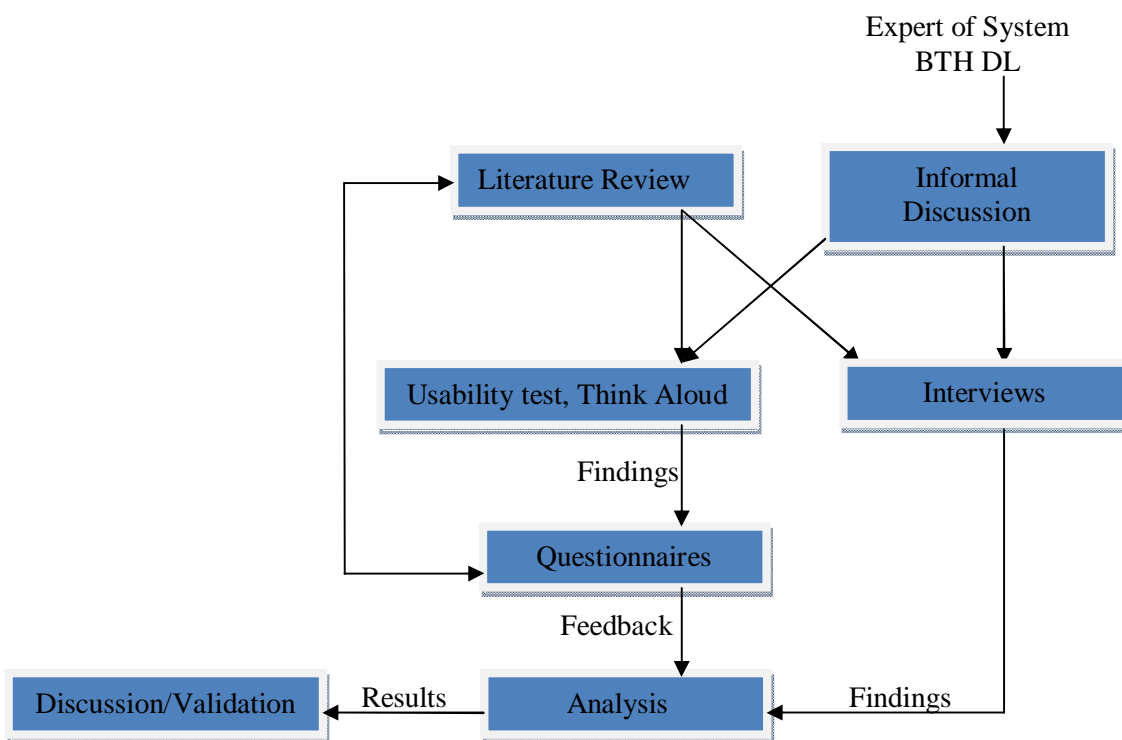
In this report the authors aim to explore experiences and requirements of users of BTH digital library system and highlight some challenges faced by digital library systems regarding in this case the interface of BTH digital library system and accessing resources behind the interface of the system in efficient and effective way. The authors plan to perform usability testing with users focusing on when users are accessing documents and information remotely.

The following will be the expected results of our report:

1. Mapping of the importance of usability in digital libraries.
2. Literature survey of the usability evaluation of digital libraries and different techniques of usability evaluation will be discussed.
3. Validation of results and analysis.
4. Discussion of the results and some suggestions for improvement of BTH digital library system especially concerning the interface.

## CHAPTER 3: METHODOLOGY

In this research work, the authors have considered the role of usability in digital libraries and more specifically the usability evaluation of BTH digital library system is focused. Usability evaluation consists of different steps and multiple evaluation methods [4]. It requires both a qualitative and a quantitative approach and when combined these approaches become a mixed methodology [4]. According to this research design the qualitative approach aims to cover the student requirements and problematic issues that contain detailed descriptions of each issue and identify the factors that are involved in usability evaluation process. The quantitative approach aims to produce results that specify the validation of results and techniques used in finding those results after analysis [4].



**Fig 1: Methodology for Usability Evaluation of BTH digital library system**

### 3.1 RESEARCH APPROACH DESCRIPTION

The authors use two types of research questions in their research. The first research question is related to the qualitative approach in which the authors carry out a literature review concerning the functioning of digital library systems and explore the usability issues of the interface of the BTH digital library system. The authors discuss the importance of digital libraries, contents of digital libraries, the resources of BTH digital library system, an interface description of BTH digital library

system, the importance of usability issues with respect to BTH digital library system, and depiction of usability factors like learnability, memorability, efficiency and effectiveness and error prevention. The second and third research questions have been addressed with a quantitative approach that aims to give us statistical data on which analysis will be performed to get results relevant to the research problem [27].

The literature review gives a base for the usability testing that is carried out through Think Aloud protocol aiming to observe the structure of mental understanding and behavior of the user of the system. The usability inquiry contains the questionnaires and interviews for the further investigation relevant to usability evaluation of BTH digital library. The discussion is based on the results of questionnaires and interviews conducted with different users and the authors aim to conclude by presenting suggestions to improve usability issues in the system.[4]

### **3.2 THINKING ALOUD PROTOCOL IN USABILITY TESTING**

The authors have used a usability testing procedure to test the user's experience of BTH digital library system by giving them some important tasks. In usability testing, Think Aloud protocol is one of the best techniques to analyze the mental structure and thoughts of the users while interacting with the system [4]. With this method the authors have tried to capture the mental understanding of the users which has been further verbalized by us to check the accomplishment of each task by the user [4]. The authors analyzed how users proceeded with each task to get his/her desired results. Think Aloud protocol evaluates the effectiveness and satisfaction of users when they interact with the system to put search queries and to get their expected responses. This method was followed by the literature review that helped the authors to understand the proper functioning of digital libraries and to extract a clear concept of BTH digital library system. The authors found that more usability issues can be identified by the usability test conduction [14]. Moreover, on the basis of this usability test conducted with users, the authors got findings that were analyzed after getting questionnaire and interview results together. Users have different study background and do not always know about how to enter queries to gain access to the BTH digital library system, and such problems have been identified, explored and described by the authors in this research.[14][5][8]

### **3.3 QUESTIONNAIRES**

The usability inquiry is an important part of the research study in which we designed questionnaires and interviews to address the research questions and desired goal [4]. In this case, close ended a questionnaire was used. Questionnaires are used in quantitative approach for evaluation of the system and for further discussion that can be considered in the system for different evaluation criteria of usability evaluation [15]. Evaluation process, cost effectiveness, analysis of usability test results and reliability are core characteristics of the questionnaires and this is an important, valuable and cheap technique to gather data from the users [15]. Questionnaires were answered by users including both teachers and students. This method helped us to find out the requirements of the users as well as

their satisfaction with BTH digital library system. Questionnaires were prepared on the basis of the tasks that were performed by the users. Each user specified his/her answers to questions concerning satisfaction, memorability, learnability efficiency, effectiveness and error prevention and other functions of usability. Users were required to answer questionnaires regarding their own experience of interacting with the system on the basis of their satisfaction. The authors received feedback from these questionnaires and this feedback gave us results after performing empirical analysis that clarify the user requirements regarding usability. Results gathered from questionnaires were further validated by interviews [14].

### **3.4 INTERVIEWS**

The interviews were an important part in our usability inquiry to find out user's vision regarding the usability of the BTH digital library system [4]. The authors classified the users into two groups, advanced and novice users, for performing tasks in the usability testing according to think aloud technique. After performing usability test and questionnaires the authors conducted interviews with both groups to get results for the final discussion for the usability evaluation of the BTH digital library system. The results collected from questionnaires were validated by the interviews. Interviews were designed and conducted with the advanced users and new users in order to help us to investigate the core issues in the usability evaluation. The authors also performed validation of results by using Guba and Lincoln method of qualitative research validation criteria which performs the auditing of the results collected from the usability test and questionnaires [41].

### **3.5 RESULTS AND DISCUSSION**

Findings were collected from the usability test, questionnaires and interviews and on the basis of these findings, analysis was done to map the satisfaction level of the users with the system. Finally, the authors conclude with a discussion of the results. Answers to the research questions are explained in detail in the conclusion part of the thesis and this has guided us in presenting suggestions concerning the possible future improvements of usability of the BTH digital library system.

## **CHAPTER 4: THEORETICAL WORK**

### **4.1 DEFINITION OF USABILITY**

Usability has been defined by many authors. Most of the ones we have found offer similar definitions and most of the definitions include at least a core of the same attributes. A simple but to-the-point definition provided by The International Standards Organization is as follows *"the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use"* [16]. Usability is an important factor for digital libraries. Many people daily interact with digital libraries and they are from different ethnic backgrounds, environments and communities. So when a digital library is designed and developed we need to keep in mind all those factors. Usability is a generic term and we are unable to have a very uniform or standard definition in context of digital libraries [17],[18]. The authors would like to give some description of the usability attributes which have been defined by Nielsen [4], which we feel are useful and relevant in this context.

#### **4.1.1 LEARNABILITY**

Learnability is very relevant to the user interaction with his/her perceptions about the system for the first time and how he/she learns to interact with the design of the system or web.[20] Learnability is about the learning and understanding of an interface, how a person gets used to using it and gets maximum benefits out of it. Learnability relates to simplicity of the interface. If an interface is simple, its learnability usually also is better.

#### **4.1.2 EFFICIENCY**

Efficiency is about the working environment of an interface. An interface is efficient if the users are able to perform their tasks quickly and efficiently through it [20]. If task performing is tough and complex it will lead towards failure of that product.

#### **4.1.3 MEMORABILITY**

Some users use an interface sporadically and do not use it again for some time so when they come to use it again there may be a problem concerning how well they can keep in their memory how to use it again.[20],[27]. Users develop habits by performing things again and again. An interface is usually memorable if it is consistent with its icons, menus and its way of using different facilities provided by the interface.

#### **4.1.4 LOW ERROR RATE**

If a user working to perform some tasks fails to perform anything or he/she gets an error and he/she is unable to correct it then probably he/she will give up trying to perform his/her tasks [20]. So a good interface or usable product should not have a high rate of error generation while users are working on it.

#### **4.1.5 SIMPLICITY**

The interface should be simple for every kind of expected user. Simplicity leads to ease of use and understanding and these both play a major role in success of the interface. If the interface of website is simple then it will be more convenient for users to use it and perform their tasks [20].

#### **4.1.6 USER FRIENDLY**

The interface should be user friendly. It should minimize the efforts of the users and maximize the results they get from it in relation to expected results. [20]

#### **4.1.7 COMFORTABLE**

The users should feel comfortable while working through the interface. There should not be irritating points and complexities or errors while a user are working through the interface [20].

#### **4.1.8 RELEVANCY**

When a user tries to find some data in digital libraries the system should return relevant data for which user has given the query. This helps the users to increase their satisfaction level [20].

#### **4.1.9 USER ANALYSIS**

Different kinds of people interact with BTH digital library system. A library is usually a public property and many different people use it. They do not come from a single community and culture. So when a digital library interface is designed the future users of the system should be kept in mind including the need to satisfy different kinds of users [20].

#### **4.1.10 EASINESS**

Users of digital libraries are not all expert users of computers and the internet. So the interface must be easy to understand for every expected kind of users, whether they are new users or expert users [20].

#### **4.1.11 SATISFACTION**

User satisfaction is based on all of the previously discussed issues regarding usability of any product. A user is satisfied with a product if he/she gets the benefits he/she is expecting. Users perform different functions via the BTH digital library interface so it should be used with ease. Satisfaction of users is the main success factor for any interface [20].

### **4.2 IMPORTANCE OF USABILITY**

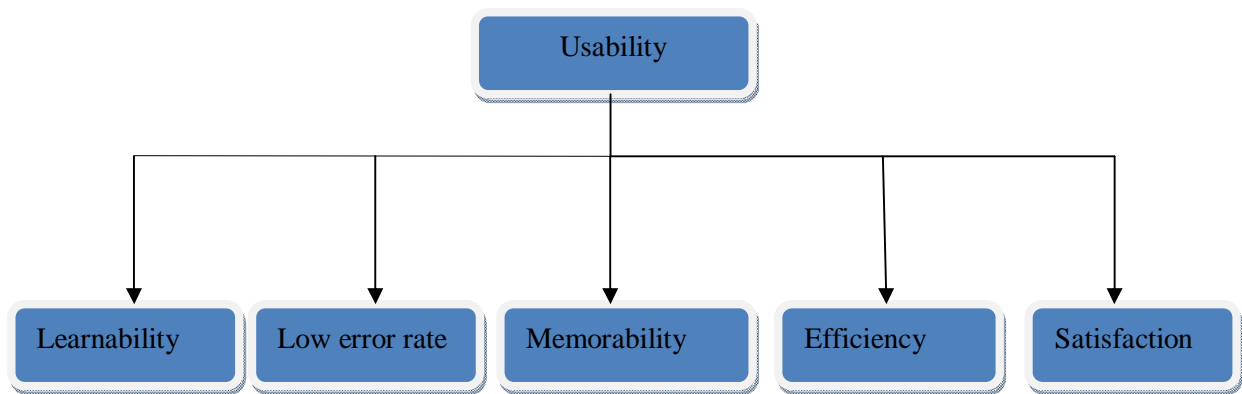
Usability as we have defined it here based on Nielson [4], is mainly concerned with use of a web site or interface and how people use it to perform their tasks. If a web page or interface is not capable of satisfying its users, then it will not be able to be successful in the long run. The authors would like to summarize the importance of usability with a statement by the famous usability and human computer interaction expert Jacob Nielsen "*Usability rules the Web. Simply stated, if the customer can't find a*



*product, then he or she will not buy it*”[4]. So a product must be usable for all kinds of expected users. Those users can include expert users as well as new users.

Usability is important because acceptance of any product or system is finally dependent on users who are going to use and evaluate it. An interactive product is successful if it provides the right sufficient facilities to the users to perform their tasks in an efficient and easy way. It is not only a requirement for a product or web to be attractive and beautiful in its color scheme, but to be capable of satisfying its users in relation to what they want to accomplish through its use . Even if a system performs its functionalities, if users do not understand about its usage and they are facing problems like errors while using it and they cannot understand how to employ their abilities to perform some important tasks, then this interface is not usually good and usable. Because it is not fulfilling its users’ requirements.[7]

So developers and designers focus on usability issues and see usability as an important factor. For service providers it is important to have key persons who are usability experts. According to usability professionals association [20], usability and quality of a product or interface are directly proportional to each other. And if we keep in mind the users of the system then we increase its efficiency, effectiveness and satisfaction of its users [20],[26]. If important criteria for usability evaluation are taken seriously in design and development of the services and interface then success of a product is more probable.



**Fig 2: Important Criteria for Usability Evaluation**

### **4.3 DEFINITION OF DIGITAL LIBRARY (DL)**

The Digital library Federation (DLF) defines digital libraries (DLs) as “*Organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities*” [16].

## **4.4 ROLE OF DIGITAL LIBRARIES IN EDUCATION**

The concept of libraries is not new. These have been used from ancient times and they serve as repositories of information and knowledge which can be used to further improve previously acquired information and knowledge. Libraries had a special importance for any institution even in old times when libraries relied on papers and physical printed books. A library was considered a major asset for educational institutions. Today we are in the modern age and we are using machines in spite of manual work to complete our daily tasks. Today a modern academic library which represents today's age is no longer simply a collection of physical existing books but rather it is to a large extent in digital form. Digital libraries now have become an important and integral part of every institute. Digital libraries facilitate for their users to access data easily, share data, collaborate with each other and for right use of information which digital libraries provide them with.[18],[25],[27],[28]

Libraries are the main source of information and knowledge for students, teachers and people who are doing some kind of research work on specific topics. The history of libraries is very old and they have been used by every nation to get information and knowledge. The history of digital libraries is not very old but they have gained popularity in a very short time and now they are being implemented everywhere along with physical libraries [17].

Use of computers and internet is increasing very rapidly. People are now more dependent on computers and electronic products than ever before. They prefer to use computers and internet to perform their tasks. This is an age of machines. Machines have replaced a lot of man power and made our work very easy and convenient for us. Thus the importance of digital libraries is increasing as its users are increasing very rapidly. Now any one can find and read almost any book or text from home or from their work place and they do not need to sit in a library. They can be at remote locations and can borrow a book and read it. So it is not necessary to waste your time to travel to a library and find a book and then be able to read it. Digital libraries have made it really easy for almost anyone to access almost any kind of information quickly and get maximum benefits even when he/she is at home or some remote location.

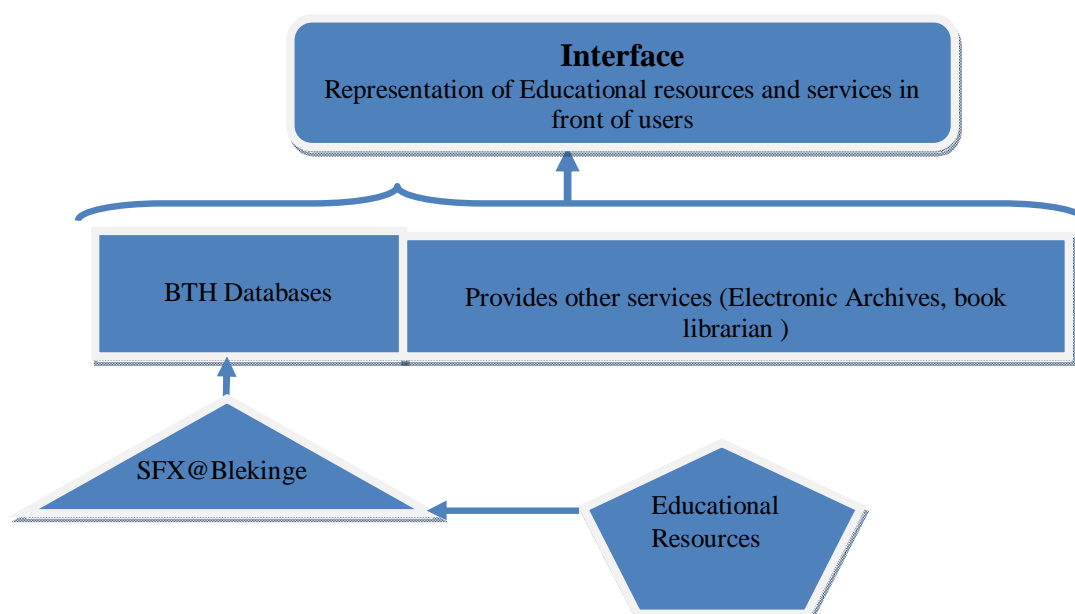
## **4.5 BTH DIGITAL LIBRARY SYSTEM**

Blekinge Institute of Technology is a research institute with worldwide education standard and its primary efforts are to educate professionals in especially the areas of Applied Information Technology and Sustainability [31]. BTH offers an extensive library that provides digital contents for students, teachers and many other resource people for research and academic purposes. Mostly people whether they are working or they are studying, prefer to use electronic devices and operate via the internet to perform their daily tasks. Everything works fairly fluently in this environment of computing and the internet, so we need to have a library that clearly focuses on digital contents. In this regard BTH digital library provides information contents like books, journals, and research articles in electronic format to facilitate students, teachers and researchers.

### 4.5.1 BTH DIGITAL LIBRARY SYSTEM DESCRIPTION

The BTH digital library provides different functionalities and services to the users so that users can easily find information according to their educational and research needs and purposes. This system offers access to a lot of educational sources by separating each source with articles, journals and books depending upon the scenario on which users are searching material. This system provides access to hundreds of sources called databases which are accessible to users from their home location. Being a university library it provides other services such as support for users and librarian to interact with each other to solve problems when users experience problems while searching information. For instance user can chat with librarian online, email, phone, order books, and texts electronically etc.

The interface of BTH digital library presents services and sources for searching information which directly shows their options for interaction with the system. Hundreds of educational sources are categorized by different fields to differentiate their information and material like books, articles and journals in different subject areas. The BTH library contains physical library as part of it and provides users with the possibility to search, borrow and return books from physical library. At the back end this system is handled by the librarian who supports and provides solutions to the problems faced by the users. As librarians are not available twenty four hours a day, it also offers a chat facility with a librarian to make contact to acquire solution for problem after office hours. This system looks simple, but it requires a lot of information to make use of it. Sources are presented at the BTH website by a link service called SFX@Blekinge. The university pays for this service, which offers access to most international libraries.



**Fig 3: Blekinge Tekniska Hogskolan Digital library System**

### **4.5.2 ACCESSING BTH DIGITAL LIBRARY CONTENTS**

When a person accesses BTH library home page he or she can find a very visible shortcut New Student. This shortcut provides guidance to new students concerning how they can use the digital library in a better way and get benefit from this. It gives access to comprehensive information about how they can get a new library user account and get a library card in order to borrow books from the library. It also tells them how they can navigate through the BTH digital library and access different kinds of digital information which is required of them to do their assignments and gain knowledge regarding any subject or topic.

Students, teachers and researchers can access the digital library at remote locations as well to get access to the facilities it offers. They can access it using BTH web site home page and their learning management system called It's Learning. When users open the home page of BTH we can see many icons to access different kinds of functionalities of this web page. The home page of BTH web site provides a link to access library provided by BTH. Users can access digital contents of information using other shortcuts like LIBRIS, Search Guide, Find Database, and Find Journals, which are all visible on the home page of BTH library. These shortcuts provide a way to enter BTH digital library.

### **4.5.3 CONTENTS OF BTH DIGITAL LIBRARY SYSTEM**

The BTH digital library system contains links to reliable and credible sources and different services for the users and all sources and services are accessible to users with visible links available at the library home page.

#### **4.5.3.1 DATABASES**

This part of BTH digital library concerns e-resources for both educational and research purposes. It provides information in efficient and effective manner so that user can easily access e-books, research papers and e-journals for their own interest. Some of the resources in the BTH digital library system are LIBRIS, Inspec Village, Google scholar, ebrary, Encyclopedias, etc. Users should have good knowledge about searching for information and in order to use the facilities efficiently should be familiar with identifying research problems and searching for information. Guidance for searching is available through the university library link and it is also possible to get information regarding searching material from the experts of the BTH digital library that deal with digital library system of BTH. There are also some differences in types of material, whether users are interested in e-books, e-journals, or research papers because it classifies searches according to the material. Some of the important resources and their characteristics are explained in the following sections.

#### **4.5.3.2 LIBRIS**

LIBRIS is a Swedish national library which contains information in digital form. Swedish universities and research libraries provide information of different titles approximately from 20 public libraries along with Swedish university libraries. Using Libris we can find different kinds of informative material in the form of books, articles and journals. Users can access all these materials

electronically using computers and the internet. It facilitates access to information at remote locations all around Sweden. We can give a query to find data and detailed information is returned about author, publisher and date of publication. This is a very big database of electronic informative material which contains six million titles which is very large in size but we can think that how good and beneficial is this in providing us knowledge of different perspectives. [32]

We can access all the features of Libris. It is updated on a daily basis because a lot of information is added to keep us fully aware of changing technologies. We can access full text facility if we login with our student acronym and password. We cannot buy books from here but we can buy from a web shop after finding bibliographic information about them from here. So Libris is a huge database of information facilitating for us in an excellent way, once we have learned how to make use of it.

#### **4.5.3.3 INSPEC (EI VILLAGE 2)**

The Inspec source holds over 8 million documentations of bibliographic sources and those records are published by Institute of Electrical and Engineering Task Force. It offers scientific information according to engineering and information technology perspective that enhances expertise in research of the students, teachers and researchers of BTH. [33]

#### **4.5.3.4 GOOGLE SCHOLAR**

Google scholar is a good way to get information. When the user accesses the Google scholar page through the library website the user efficiently retrieves research papers, thesis, and e-books and it is available in full text in collaboration with SFX@Blekinge. It is also a scientific information retrieval source that helps users to approach the information according to their intention. [34]

#### **4.5.3.5 EBRARY**

Ebrary is an electronic source specifically designed for electronic book and users can have access of about 35000 thousands e-books with full text accessibility[35]. These books are not downloadable but user can read these books online and read online access is restricted for three to four students at one time but if a specific book demands in more reading then BTH can buy more copies of that book and it is available for students, teachers and researchers in the university library system and users mostly prefer this services to read books online expect to come to library to borrow books. It also provides books for engineering, Information technology and computer, software Engineering and general purpose.[35]

#### **4.5.3.6 ELIN@BLEKINGE**

Elin@Blekinge is a very important resource available at BTH digital library that contains documents and research papers from different sources with a single aesthetic interface. One of the most interesting features of this resource is that it integrates different publishers, databases and e-material with data that is very helpful for users especially in research work. It also handles preparation of referencing and citations in research reports that saves a lot of time for users. [36]

#### **4.5.3.7 ENDNOTEWEB**

As citations is an important aspect in report writing and for research purposes EndNoteWeb provides an efficient way of creating citations for managing sources. It is a bibliographic solution in a collaborative environment for students. [37]

#### **4.5.3.8 ENCYCLOPEDIAS**

This source is responsible for creating and managing comprehensive and unique work that describes the whole regulation of electrical and electronics engineering research. It is always an important aspect in developing and learning advanced applications in neural networks and robotics. It offers important topics for gaining great interest in different field of research. It always makes interest in getting knowledge of different fields in relation with academia and research purposes to create better understanding of concepts and details [38].

#### **4.5.3.9 ARKIVEX:**

ArkivEX contains all the thesis work of BTH students thus offering an overview of previous research work at BTH. It is an efficient way of understanding different concepts of study areas to browse through student reports from recent years. It handles the degree thesis offering access to these resources to gain knowledge about what topics have been addressed earlier. Users of this system can easily get access to these sources from the library page by entering from the university home page. It also promotes thesis works for the upcoming research in specific areas and future works that should be helpful for the users to boost up their knowledge by showing their interest in all areas. [39]

### **4.5.4 SERVICES OFFERED BY BTH DIGITAL LIBRARY**

There are a lot of services offered by the BTH digital library system, some of which are explained below:

#### **4.5.4.1 LIBRARY CATALOGUE**

This service is provided by the university for students and teachers, offering access to the physical library. This service presents bibliographical information about all the books that are present in the physical library. Students of BTH can easily borrow books without having access to the librarian. This is an easy way to access material that students cannot access via the digital library or not from databases. Some of the books in the library catalogue are accessible in digital format for reading.

#### **4.5.4.2 BOOK A LIBRARIAN**

This is a guidance service to get information by accessing BTH library page or if a user wants any information then user can easily book a librarian for help or can chat with the librarian online or can have contact by phone. If users have some questions regarding accessing digital contents of library then users can easily interact with a librarian that is online.

#### **4.5.4.3 BOOK A GROUP ROOM**

This service is provided to the users to reserve group rooms online for their study purpose. These group rooms are located in three cities, Karlskrona, Karlshamn and Ronneby campus. Users can specify their study or meeting time by reserving time slots for any group rooms available. Users can also view, change, or cancel their reservation of the group rooms.

#### **4.6 USABILITY ISSUES AND BTH DL INTERFACE DESCRIPTION**

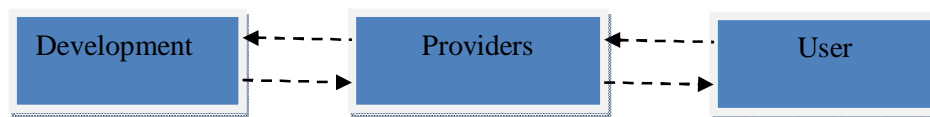
Usability is an important aspect for evaluating applications. Usability standards should be followed by the websites that support user's confidence level and interest when interacting with the website [6]. The library which we are studying in our report is an academic digital library so it is using those conventions that should be used in other library websites to it make easier for the user to get information regarding their interest.

Interactivity is a basic principle underlying the satisfactory behavior of the system by the user [34]. System constraints are basic conditions to operate functionalities that integrate different services and sources in one interface that displays to develop interest of users [34]. BTH digital library functions overall via interactive interfaces that fulfill complete functionalities of the system to satisfy and support confidence level of users. Most of the students of BTH have lack of information to come across information that is highly interesting for the users. Searching of information is an important perspective where usability is of high relevance for user satisfaction.[4],[21]

The interface is an important part in every system because this is the part where the user directly interacts with the system and utilizes services offered by the system [23]. The interface of BTH digital library is very interactive and it reflects usability factors that have importance in accessing resources and services presented and offered by the system that plays an important role in enhancing usability factors like memorability, satisfaction, efficiency and effectiveness. The system performs different functions it presented both graphical and text information that can be easily understood by the users of the system. Important services are accessible very easily by entering into the library from the main link of Library from the university for international students. It provides good support for interaction of international students since there is an English version of this library.

Moreover, the system works and it supports features that are helpful for users to know about the system and to search information procedures in an efficient and effective manner. It also offers LIBRIS link on the library page for having access to the national library to get access for the books in all the libraries of the Sweden. Other services are also presented that are available to users. There is a proper link to guide to the digital library for helping users that is quite visible and esthetic by showing the characteristics of usability engineering. Interface contains all the application features that are supported by the system and it shows consistency and visibility in front of users that enhances user's interest to explore more about the digital library.

One of the most interesting features of BTH digital library that enhances the usability characteristics is that it doesn't show splash pages. It has a direct link to return back to home page that is an interesting feature introduced by Nielsen [16]. It doesn't have animation feature, as this is considered more distracting than helpful for users. . It also shows both text and graphical representation of links that encourages user to explore contents easily to get their interested work. One of the important perspectives of the library system is that users can easily get information of their interest from the system that will help in guidance to fulfill their own task to find study material of their own interest[21].



**Fig 4: E-based cycle with respect to usability**

In every system, usability is a reverse procedure and it can be done at any phase of software development life cycle [29]. Specifically, students, teachers and researchers are end users of the application and their interaction with the system shows the satisfactory behavior. It helps developers or service providers to understand how the application is used by the end users and if the system is fulfilling user requirements or not. The best way to achieve this understanding is to repeat a usability test after a period of time because it requires a lot of changes to be made in the system, and for some users those are not satisfied with the functionalities or interactivity with the system sources.

Therefore, usability testing is becoming an important ingredient in different types of application. When users interact with BTH digital library system, the system shows some important links that will give guidance to the users to further get access with the system. Graphical and textual representations are both important for the users to enhance the understanding of the material and make it more accessible, which in turn is important for their educational and research work.



## **CHAPTER 5: EMPIRICAL WORK**

In this chapter the authors discuss usability evaluation techniques. For the usability testing, the authors have used think aloud technique for evaluation of BTH digital library system. Pre test and post test functions have been performed to identify important tasks and total maximum and minimum time for all tasks. This chapter describes the different usability testing and inquiry techniques for usability evaluation. Afterwards, the results of the conducted tests are presented in graphical representation.

### **5.1 THINKING ALOUD TECHNIQUE IN USABILITY TESTING**

The authors have used think aloud technique for usability testing to observe mental structure of the users when they interact with the system [4]. Using this technique, authors have conducted usability tests with the users. In usability test conduction procedure, four different tasks were designed that were performed by students from BTH. These students were selected from different ethnic backgrounds. We divided users into two groups, advanced users and novice users. The usability test was conducted at the university laboratory. The same equipment and environment was provided to all users to perform their tasks. Before starting the usability test, some pretest questions were put to the users about BTH digital library system. At the end of the usability test, posttest questions were asked to map the user's experience with BTH library concerning functionality, interactivity and satisfaction. One of the authors carefully observed the user's behavior and expressions. The second author took notes about the user's expression when he/she interacted with the system. The test results were collected and afterwards these results were represented in graphical notation in order to support the analysis process and illustrate the testing procedure.

- Novice Users (Number of students = 3)
- Advanced Users (Number of students = 3)

#### **5.1.2 TEST USERS SELECTED FOR USABILITY TEST**

##### **5.1.2.1 NOVICE USERS**

The authors used novice users who did not have much experience of interaction with this application and these users were guided before conducting the usability test so that they felt comfortable while interacting with the system. Authors selected three novice users from different schools and study programmes at BTH: Management, Software Engineering and Computer Science.

##### **5.1.2.2 ADVANCED USERS**

The authors used advanced users who had more experience of interacting with the BTH digital library. A total of three advanced users were selected for the usability test. The students were selected from different schools and study programmes at BTH: Management, Software Engineering and Computer Science.

### **5.1.3 TEST ENVIRONMENT IN USABILITY TEST**

The test environment was familiar and friendly so that users could perform their tasks comfortably and with interest. The university computer laboratory (Astrid) was selected for the usability test. Mostly students use this laboratory for studying. Thus we felt it was a good idea for us to use the laboratory for usability test. The laboratory systems were reserved for students for task performing and internet and hardware was checked before starting the usability test. Information related to BTH digital library was given to both types of users so that they would not feel difficulty in performing their tasks.

### **5.1.4 PRIOR USABILITY TEST, THINK ALOUD INFORMATION FOR USERS**

Before starting the usability testing, users were given information about usability so they would gain interest in performing the tasks and know about why the test was being conducted with them. It was also beneficial for the users to get information about library sources, as it will be helpful for the users in future as well. They can use this information for their educational and research purposes.

### **5.1.5 TEST CONDUCTION PROCEDURE**

As the think aloud technique was used for the usability test and responses were received from both kinds of users, observations were gathered. The tasks were designed by the authors. Expression of users were noted and analyzed while getting responses on each task and giving queries to the system. The authors also noted whether users got results according to their desire or not while performing the predefined tasks. A sample test was conducted with pre-test users to help authors to calculate maximum and minimum time for each task so that task time could be checked when test users performed the tasks. The tasks were designed in such a way as to support “thinking aloud” for the users when they described their interaction with the system interface.

### **5.1.6 TASKS IN USABILITY TEST**

The authors designed four different tasks for the usability test of the BTH digital library system`:.

#### **TASK 1**

To access library resources

- Click on “library” appears on the main page of BTH website([www.bth.se/eng](http://www.bth.se/eng))
- Click on the “Find database” to access for e-resources.
- Write “Ebrary” in search bar to access Ebrary resource.
- Click on Ebrary to search e-books.
- Click on the search button that is displayed on the Ebrary page.
- Fill the “search in” and “..and in” for particular e-book.
- Click on the “search ebrary” to get result of your search.

#### **TASK 2**

To access E-journal

- Click on the “Find Journal” link appears on the main page of library.
- Write the “Title name” of the Journal.
- Click on the “Go” to process your request.
- Click one of the results you received.

### **TASK 3**

To book a librarian

- There are two options appearing on the main library, use graphical button “Book a Librarian” appear on the left side of the main library page or use “contacts and visit” link appears on the left side in “ENTRIES” menu to book librarian.
- Form will appear to you.
- Fill the form with required fields.
- Click on the book button to send request to the librarian.

### **TASK 4**

To access LIBRIS national library of Sweden

- Click on the “LIBRIS” link appears on the main library page.
- Type the name of the book in search bar that you want to search.
- Click on “extended search” link.
- Fill one or multiple fields to find books.
- Click on the “preferences” to select libraries for your preferences.
- Click on “save” to save changes into preferences.
- Perform same procedure to search book.

## **5.1.7 USER BEHAVIOR AND RESPONSE RECORDED DURING USABILITY TEST**

During the test conduction procedure users were required to convey their ideas and their thinking when they were performing their tasks. One of the authors observed the behavior and expression and the other author wrote all the information on the spot so that results should be gathered in time and accurately. The information concerning task performance was saved according to the time, completed task or uncompleted tasks. Additionally, users showed their satisfaction level by answering questionnaires and interviews.

## **5.2 QUESTIONNAIRES**

Questionnaires were designed and handed to users and the authors got feedback from the questionnaires from users performed usability tests as well as from other users using BTH digital library system. The first questionnaire was related to tasks and the authors received feedback related to their satisfaction level for tasks. The second questionnaire was related to the usability evaluation criteria questionnaires from which the authors calculated a usability evaluation of BTH digital library system with different attributes. The findings from both kinds of questionnaires was analyzed and presented in graphical and tabular form in order to show the user satisfaction level related to the usability test and questionnaires. These findings were thereafter further validated by the interviews.

### **5.2.1 QUESTIONNAIRE FOR TASKS**

After the usability test, the questionnaire for tasks was distributed among those users who performed tasks so that they could describe their satisfaction level for accomplishing the tasks. It also included whether users successfully performed their tasks or not. This also helped the authors to get results and perform analysis concerning the usability of BTH digital library.

### **5.2.2 USABILITY EVALUATION CRITERIA QUESTIONNAIRE**

The usability evaluation criteria questionnaire explores different factors involved in usability evaluation. These factors have already been presented and explained in the theoretical chapter. This questionnaire was distributed to those users who performed the usability tests and also to those who use this system for their educational purpose. This questionnaire contained information that gave the authors quantitative results concerning usability factors such as simplicity, visibility, memorability, consistency, learnability, error prevention, and completeness of each task.

### **5.3 INTERVIEWS**

This part of the usability inquiry procedure helped us to investigate the user's own experience while accessing e-material from the BTH digital library. This part contains formal communication between interviewee and interviewer. One of the authors performed friendly communication with the users face to face and the other author wrote notes concerning the concepts and experience on paper which allowed us to gather data related to usability evaluation procedure regarding this system. The interviews were conducted with those users who were involved in the usability test and also from those who use the system for their educational purposes. This inquiry approach was considered useful in order to gain an understanding of users' personal experience and their own ideas and thoughts about their satisfaction with the BTH digital library system.

## CHAPTER 6: RESULTS/ANALYSIS

This chapter consists of three main sections. The first section describes the analysis of the usability test and results. The second section contains the analysis and results of the questionnaires in tabular and graphical representation. The third section explains the results of interviews conducted with the users that use BTH digital library system for their educational and research purpose.

### 6.1 RESULTS OF USABILITY TEST

The authors conducted usability test with six users who were divided into two groups consisting of advanced users and novice users (three users in each group). Users were students of BTH studying in different courses at BTH University. They were given some tasks to perform via the BTH digital library. The authors set up the usability test so that it should be conducted by each individual user and in a peaceful and familiar environment [4]. So the usability test was conducted in the laboratory. The talk aloud technique was used in order to observe the mental understanding of the users while they were interacting with BTH digital library in performing the predefined tasks [4].

#### 6.1.1 OBSERVATIONS GATHERED FROM USABILITY TEST

The authors' observations of the users and the results regarding task completion with respect to time are shown below in table 1 which describes whether the task was completed within the allotted time or not.

USERS FOR USABILITY TEST	Total time (Min.)	T1 (Min.)	T2 (Min.)	T3 (Min.)	T4 (Minutes)
Novice User	28	9 / UC	7 / UC	3 / C	9 / C
Novice User	30	10 / UC	3 / C	5 / C	12 / UC
Novice User	31	8 / UC	4 / C	6 / C	13 / UC
Advanced User	24	8 / C	3 / C	7 / UC	6 / C
Advanced User	23	6 / C	4 / C	2 / C	11 / UC
Advanced User	28	8 / C	3 / UC	8 / UC	9 / C

UC: Uncompleted      C: Completed

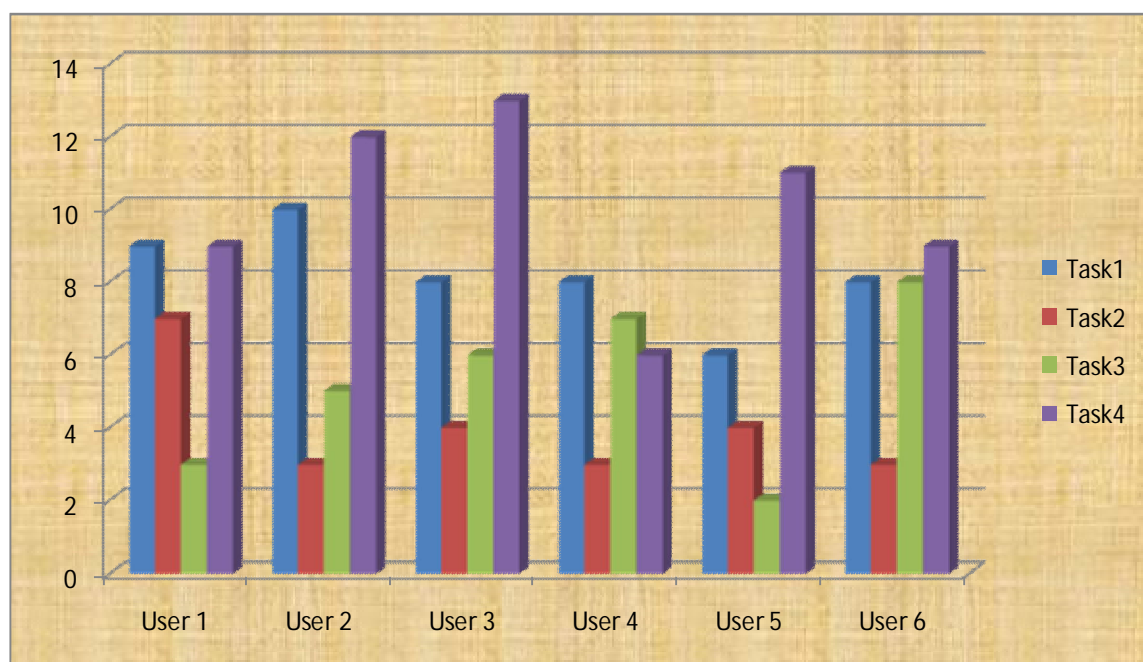
**Table 1: Time Structure of each participant in Usability test**

The statistics regarding the usability test which was conducted with different users in the lab to evaluate BTH digital library is shown in tabular form. One of the authors observed the expressions and mental level when users were performing tasks. Task completion time was noted for each task.

Before the usability test, sample testing was conducted with the users that gave the time limit of each task. So that authors could calculate the maximum and minimum time limit of each task. This helped authors to identify those users who would not be able to complete tasks in time.

The authors also analyzed facial expressions of the users which were varying with tasks. Sometimes their expressions were quite good but some of the students were confused during performing tasks. The authors also provided guidance to novice users regarding usability and BTH digital library system before performing tasks. Most of the students were not able to complete all their tasks. Some advanced users started well but even they could not complete some tasks within the allotted time.

The authors have presented the results and observations of the predefined tasks in graphical representation. This graph shows the relation of users with respect to their time for the four tasks. If we analyze derived results after performing these tasks we see that task 1 was performed completely by four out of six users within the allotted time and two users out of six were unable to perform it completely within that time. Task 2 was completed by five out of the six users and only 1 user could not complete the task. Four out of the six users completed Task 3 while two out of six students failed to perform it in time. Task 4 was completed by three users out of six and three were unable to accomplish this task within time.



**Graph 2: Time Calculated for Each task for six users**

### 6.1.2 EXAMINATION OF PERFORMED TASKS

In this section, the authors explain about observation according to expressions and behavior they noted while watching the users performing these tasks.

**TASK 1:** The authors observed that users were quite familiar with the library page. They were comfortable using the English version. They found “Find Databases” link and opened the database page quite easily. They gave a query on the database page to find “ebrary” which was quite easy for all the participants. After this, users had to find an e-book and they did it well. But some users found it hard and got confused while performing filtration of their search. Those users who could not complete the task were only due to this complex advanced search option. Mostly users were not getting complete information about the books they were searching for and could not perform filtration.

**TASK 2:** This task concerned searching for an e-journal from BTH digital library. Users opened the library page using BTH web site. Users found the link of “Find E-Journal” on BTH library page. Then they moved on to the search page and entered the name of any journal they knew about to find it from the journal database. They were quite comfortable while performing this task. Most of the users performed it with good confidence and completed it within time. Most users got quite relevant results and very few were not able to find relevant results and that’s why two users could not complete this task within predefined time. Some students were quite satisfied with Ajax feature.

**TASK 3:** This task contained a very important service provided by BTH digital library; to book a librarian. Users opened the library page and tried to find the link “book a librarian”. Most of the users got confused in finding visit and contact. Most of the users had never tried it before and they were not aware of this service being provided by BTH digital library. Contact and visit link was not quite visible to the users. They clicked on “book a librarian” link and reached a web page where they were presented with a form to be filled by them. They had to enter some mandatory information in that form. This information provided on form will be used for further contact by the librarian. It was quite easy for the users to fill this form. But some users faced problem that they were not aware of the librarians and even did not know their names. They were not sure which resource person they needed to meet to get maximum information about this digital library. Some users were not happy about button “send order” because they thought that they were not buying any product but just sending request to the respected librarian.

**TASK 4:** Here the users were given the task to access LIBRIS which is a Swedish national library. Users opened BTH digital library page and tried to find the LIBRIS link. They were able to see its link in text form as well as in iconic form. It was quite easy for them to find it and use it for further processing of the task. The iconic link increased its visibility for the users and they felt comfortable to use it. Users accessed LIBRIS page and gave a query to find a book in the database. It was quite pleasant for them to see the required book and which libraries could have that book. Then they had to make some extended search where they could filter their search. First impression of users was very confusing after seeing so many text fields and captions on the page. Users got confused about which kind of filtration they needed to perform to find the most relevant results. Some users could not

complete the task within time because the extended search took too long. Users had to set some preferences for their selected libraries. Most of the users could not find preferences button because they were expecting that it must be in the main menu on the page but it was quite high up at the side in the corner of the page and they were unable to find it easily. Then they selected some universities and it was quite interesting for them to have such opportunity to find data in libraries they prioritize.

### **6.1.3 ANALYSIS OF USERS' BEHAVIOUR IN USABILITY TEST**

The authors observed the participants and found some important findings about BTH digital library system. Table 2 shows the results of usability test and their satisfaction level while using BTH digital library. The authors observed both kinds of comments from users which are positive as well some users were not quite happy. The authors would like to present and explain some positive points of BTH digital library which were commented by the users during usability test.

- BTH digital library is very important source for students to access informative data from different databases.
- Students can access many databases of e-material and can find data they want to get in an area of their search data is very vast. There are a great many different kinds of data bases and information resources which are provided by BTH digital library.
- Students can access BTH digital library resources from remote locations. It is not necessary for them to be physically present at BTH to use and access these e-resources of BTH digital library.
- BTH digital library provides different kinds of services to users such as those users can book a librarian, book a group room, chat with a librarian and provide some news resources as well. Users are quite happy with using these services.
- When users enter into “book a librarian” link, it shows a form. Visibility and error prevention facility is good on the form through the clear marking with ‘\*’ of fields that are mandatory to filled and it is quite visible for users.
- Mostly students are happy that sometimes when they can't get a book from the physical library they can access and read it online or even ask for a book to be borrowed for him or her if it is not available at BTH digital library and librarians can arrange it for students.

During the usability tests with different users, the authors observed some factors which were confusing for the users, where they were expecting something else than what they got from the system. These requirements relevant to BTH digital library provided by users during usability test are presented and explained in the next section.

### **6.1.4 LEVEL OF SEVERITY ASSESSMENT IN USABILITY TEST**

Students were not quite happy with the library main page. Most of them asked why the blank spaces are left on both sides of this page.



- Mostly students were expecting text should be a bit larger and in order to increase its visibility of the page of BTH digital library.
- SHORTCUTS menu is not very visible even though shortcuts are very important for efficient use of the digital library. These SHORTCUTS should be more prominent compared to graphics which have been given more space although they are not very useful for users.
- A link on the main library page “Find Databases” was confusing for students because they got confused about what kind of database it means.
- Students were quite confused with so many databases which were provided by BTH digital library. Though it was a good idea to have so many resources, students did not know which kind of database they needed to use to get maximum benefits out of it.
- It was quite good to give a query in search text field and find data, but when students moved on to the filtration and sorting page they got confused. It was not simple and easy for them to fill in all this information to perform a filtration.
- When users book a librarian, which is a great service provided by BTH digital library, they could not find it easily. Mostly users expected that it must be on the home page of BTH digital library. It was not easy to find a proper link to book a librarian. If this link were on the home page more students would be able to find librarian for help to solve their problems.
- Another important issue was pointed out by users during the task to book a librarian; when we send request after filling in the form we see a button “send order”. Students think that this cannot be right, because we are not going to buy a product; rather we are booking a respectable resource person to get time for a meeting. This should be replaced with some other label such as “request”. Also, it was pointed out that there should be a facility of printout of book a librarian so that the booking can be saved by students for future reference.
- When users were searching for e-books and e-material using LIBRIS they were quite confused because they could not understand the filtration procedure of advanced search and preferences used in LIBRIS.

## **6.2 RESULTS OF QUESTIONNAIRES**

The findings which were gathered from the two types of questionnaires from users were analyzed and the results are explained further in the following subsections.

### **6.2.1 RESULTS OF QUESTIONNAIRE FOR TASKS**

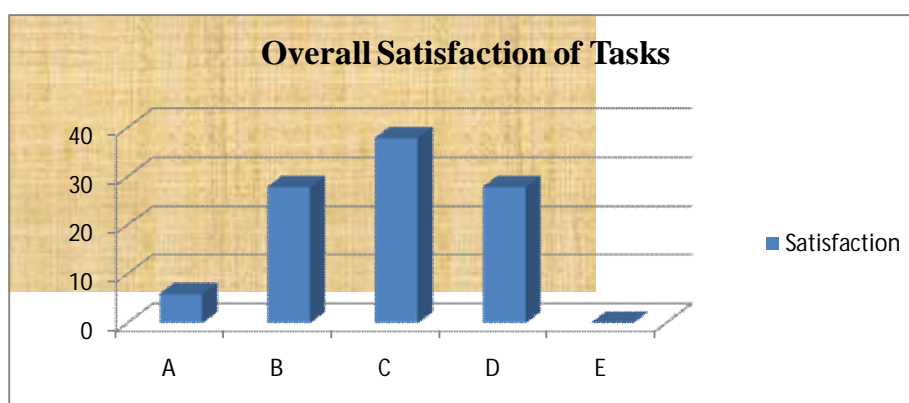
The authors conducted usability tests with six users and the feedback received is presented below in table 2. This table represents satisfaction level of the users relevant to the tasks they were given to perform in the usability test. Feedback from this questionnaire was only received from those users who conducted the usability test. The satisfaction level of users has been evaluated on the base of easiness to perform the tasks, time factor concerning how it saves time to perform tasks and whether users get relevant results upon the completion of the tasks.

Criteria	Questions	Strongly Satisfied A	Satisfied B	Less Satisfied C	Not Satisfied D	Strongly Not Satisfied E
Overall Satisfaction of Tasks	1	17%	0%	50%	30%	0%
	2	0%	17%	33%	50%	0%
	3	0%	67%	33%	0%	0%
	<b>Total</b>	5.67%	28%	38.67%	27.67	0%

**A:** strongly satisfied. **B:** satisfied **C:** less satisfied **D:** not satisfied **E:** strongly not satisfied

**Table 2: Task questionnaires results**

The graph below shows results of the questionnaire concerning tasks performed by the users in graphical representation. A bar graph has been used for this purpose which shows different levels of satisfaction of the users while performing tasks on BTH digital library system. The horizontal bar represents levels of satisfaction. The vertical line represents percentage of the users.



**A:** strongly satisfied. **B:** satisfied **C:** less satisfied **D:** not satisfied **E:** strongly not satisfied

**Graph 1: Overall Satisfaction in graphical representation**

The authors have defined different satisfaction levels. A represents strongly satisfied users who are fully satisfied with this when they use it and they range from 5% to 7%. The authors found that percentages of the users who are fully satisfied with this are very low. B represents satisfied users which range from 25% to 27%. C represents less satisfied users and their percentage is approximately 35%. D represents users who are not satisfied with its use and feel that it gives no satisfaction to them while using it and this has a range from 25% to 27%. E is used for the users who are strongly not satisfied with the use of this system and its percentage is extremely low.

## 6.2.2 RESULTS OF USABILITY EVALUATION CRITERIA QUESTIONNAIRE

The authors prepared this questionnaire which consisted of some questions to evaluate usability of BTH digital library. This questionnaire was prepared by using different usability evaluation criteria which could be helpful for authors to evaluate usability issues in BTH digital library system at its maximum level. These criteria were based on human computer interaction principles and usability evaluation techniques.

Usability Evaluation Criteria	Questions Related to Usability Factors	# of Responses	Strongly Satisfied A	Satisfied B	Less Satisfied C	Not Satisfied D	Strongly Not Satisfied E
Effectiveness	1	24	4%	67%	13%	12%	4%
Learnability	2,3,13	24	21%	27%	43%	5%	4%
Easiness	4,8	24	2%	33%	41%	17%	6%
Simplicity	8	24	4%	17%	50%	17%	12%
Time Saving	5,9	24	6%	23%	29%	41%	0%
User Friendly	6,7	24	2%	37%	35%	23%	2%
Comfortable	10	24	21%	42%	0%	29%	8%
Aesthetic	19	24	4%	29%	42%	21%	4%
Memorability	14	24	0%	33%	21%	42%	4%
Satisfaction	15,18	24	42%	33%	17%	6%	2%
Consistency	12	24	8%	29%	38%	21%	4%
Reliability	17	24	4%	50%	46%	0%	0%
Error Prevention	11	24	8%	42%	25%	25%	0%
<b>Total</b>			<b>9.69 %</b>	<b>35.538%</b>	<b>30.769%</b>	<b>19.923%</b>	<b>3.846 %</b>

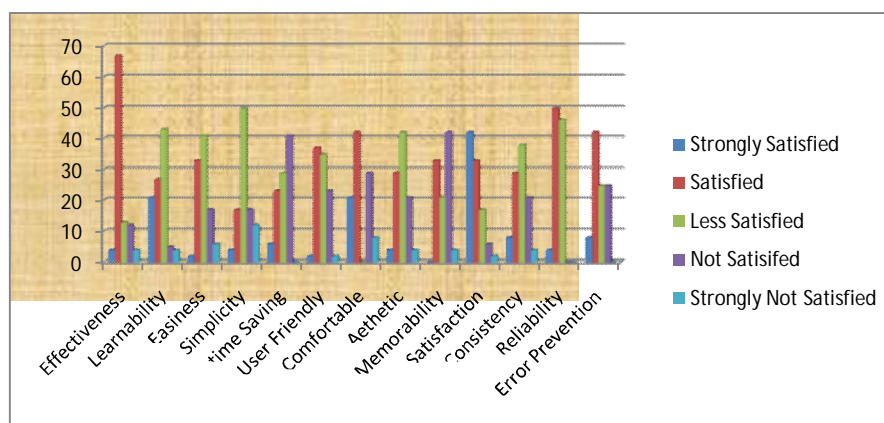
**Table 3: Usability Evaluation Criteria results of BTH digital library System**

The authors designed this questionnaire in a way that could extract maximum requirements of the users relevant to BTH digital library. Results obtained from this questionnaire are shown above in tabular form above in table 3.

This questionnaire was distributed among students of different courses from different ethnic background by electronic mail and as well manually in the form of a hard copy. The authors were only able to get this questionnaire filled in from twenty four users. After getting feedback from the users regarding questionnaire of usability evaluation with different criteria of BTH digital library, the

authors analyzed the statistics to get results in percentages so that they would be in a better position to evaluate this system in a relevant way.

There were approximately 10% of those users who are strongly satisfied with the fact that BTH digital library is facilitating them in every aspect for which it is intended to provide support. Users who are satisfied with usability are 35% so it is a greater percentage of those users who are satisfied from this digital library and they are getting benefits which it is intended to provide to users. The percentage of users who are less satisfied is 31%. 20% are those who are not satisfied with this and only 4% are strongly not satisfied that it provides them all those facilities defined in different criteria of usability evaluation.

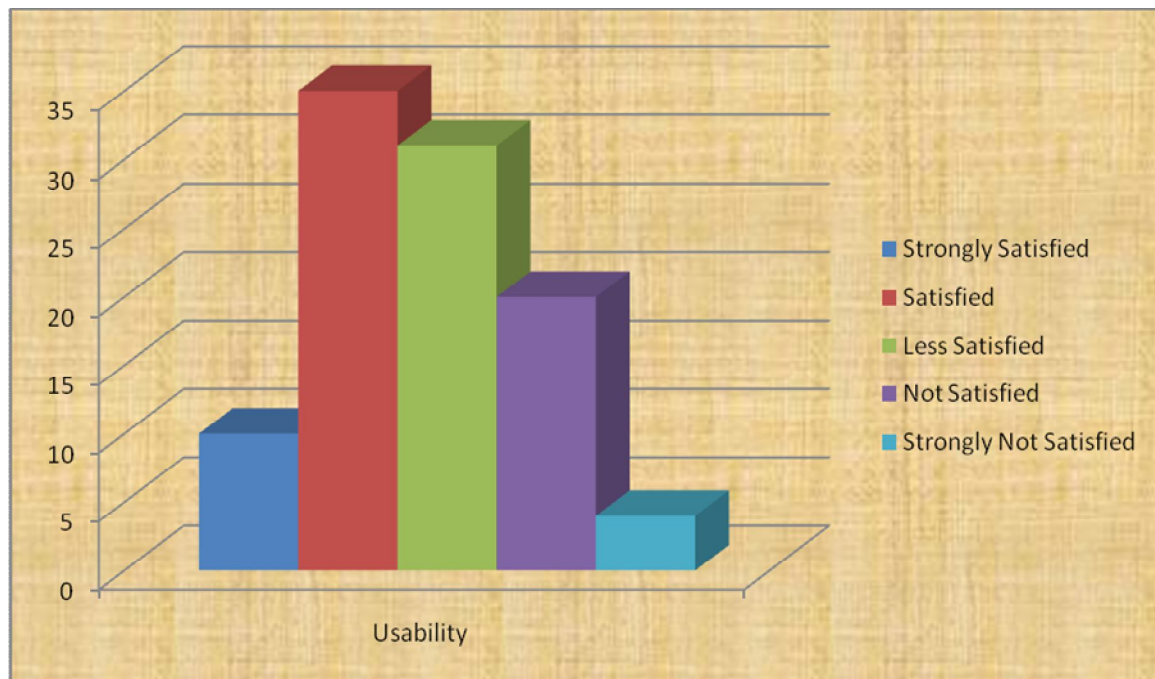


**Graph 3: Usability Evaluation Criteria Satisfaction level in Graphical Representation**

The above graph shows results of questionnaire in graphical representation. All those factors which have been used to evaluate usability issues in digital library have been shown in graph format so that readers can easily understand our results obtained from users. The usability evaluation criteria results will be further explained in detail with reasoning in later section of Discussion.

### 6.2.2.1 OVERALL USABILITY EVALUATION OF BTH DIGITAL LIBRARY SYSTEM

In graph 4, below, it is clear that the users of BTH digital library are mostly satisfied with their user experience, but there is also a bar of not satisfied and less satisfied in the bar graph which shows that a not negligible percentage of students are also not showing their satisfaction with the usability of the BTH digital library system. The factors which show their less satisfaction and not satisfaction behavior will be explained further in the discussion section which clearly explains the student's recommendations and their requirements regarding BTH digital library system.



**Graph 4: Over all Usability Evaluation of BTH digital library system**

## 6.3 RESULTS OF INTERVIEW

In this research study, the authors also conducted interviews with users of BTH digital library system. The authors also have got some findings from interviews as gathered in questionnaires and these interviews are represented in appendix 2. A total number of nine questions were prepared for the interview and 12 interviews were conducted with users. The analysis of interviews and questionnaires will be discussed in the next chapter to explain usability evaluation criteria with respect to the user satisfaction.

The results of the interviews were analyzed to map user satisfaction and also to validate results gathered from questionnaires. Required improvements and other suggestions will also be described in detail, offering recommendations for better usability in order to move from less satisfaction level to strong satisfaction level among students who are the main user group of the BTH digital library. Users have their different points of view when they interact with the application and show their requirements and suggestions concerning how to improve the BTH digital library system.

## **CHAPTER 7: DISCUSSION**

In this chapter, the authors discuss the derived results according to the usability evaluation with different criteria. In this case study, the authors used different usability evaluation methods like usability testing in which think aloud technique was used for observing the user behavior while interacting with BTH digital library. Secondly, we used a usability inquiry procedure in which questionnaires were used to get results which map user's satisfaction level with the BTH digital library system. This section describes the usability evaluation criteria according to user's perspective and presents validation of results gathered from users.

### **7.1 USABILITY EVALUATION CRITERIA DISCUSSION**

In this research study the authors have conducted usability tests from users and collected feedback from questionnaires regarding usability evaluation with different criteria that are explained below:

#### **7.1.1 LEARNABILITY**

In the performing of tasks, it should be easy for users to learn the procedure to make the system usable. When users are performing tasks, some users experience difficulties in performing their tasks because it is difficult for users to remember the procedure for basic tasks like for "book a librarian" as well as how to chat with a librarian about problems they are facing while they are accessing e-resources. For learnability, 43% users are less satisfied and 5% are not satisfied. 27% and 21% of the users are satisfied and fully satisfied respectively.

#### **7.1.2 EASINESS**

The application should be easy to use so as to enhance users' interest when accessing library web page and resources. There are a lot of resources BTH library is providing for the users. 41% and 33% users are less satisfied and satisfied respectively because they feel that this interface is easy to use and overall results show that users show their satisfaction with easiness of accessing BTH library resources. But 17% of the users say that this interface makes their tasks more complex. There are a lot of sub links in a main link and users feel complexity in accessing e-material. It also shows that services of BTH digital library should be visible on main page so that if user has problem and wants to know about information he/she can easily interact with librarian to solve his/her problem and to find out more about the searching procedure of e-resources.

#### **7.1.3 TIME SAVING**

Time is an important factor, when users are performing their functions via the BTH library. Users utilize resources for different purposes and think that IT support should be time saving. User's intentions should be fulfilled in time. Our results show that 29% of the users are less satisfied and 41% are not satisfied with this criteria and it shows that this library is not time saving because it gives results only after many clicks. But 23% of users are satisfied.

#### **7.1.4 USER FRIENDLY**

The BTH digital library shows user friendly behavior because it motivates user to perform further actions as it gets into next resource pages. However, not negligible 23% users are not satisfied with its user friendly behavior because when users go into sub links user cannot understand the responses and it shows different responses because different systems are linked up in one interface. For accessing resources, user has to go to different resource pages and it shows different procedure for searching for every resource. 35% of users are less satisfied and 37% users are satisfied. A proper guideline should be provided to the users on the library interface for searching material in different databases and this guideline should be visible to user to get benefit from BTH digital library.

#### **7.1.5 COMFORTABLE**

Mostly users show their satisfaction with respect to this criterion, because users feel comfortable when they interact with the library interface and access resources. 21% users are fully satisfied and 42% of users are satisfied but 29% users are not satisfied with comfortability. This not satisfied behavior is only for the complexity of BTH digital library that comes in front of users due to the linking of a lot of resources at one place but users do not want to deal with such complexities when they are accessing their resources related to their interest. Another reason is that users feel that links are congested and are not understandable. These links should be clear and show their meaning and also show what is behind that link.

#### **7.1.6 VISIBILITY**

Visibility is a core issue in usability evaluation of BTH digital library that deals with the visibility of contents of web interface of BTH digital library system. 21% of users of the systems are not satisfied and 42% of users are less satisfied with the visibility of the contents due to the small text size, that links are mixed in relation to each other and they could not find important links on the first page. Page structure is very small due to which users cannot read text properly. Moreover, it does not follow the standard that is set by IBM and Microsoft.

#### **7.1.7 MEMORABILITY**

This is an important factor in the BTH digital library system because when users perform tasks on BTH digital library system it should be easily memorable for users because the tasks performed on this system are important for their educational and research purposes. 42% of users are not satisfied with its memorability and 21 % are less satisfied, while 33% are satisfied. Users who are not satisfied say it is because there are a lot of e-resources in BTH digital library system but it is not well managed so users forget what and how they have performed before on this system. Also the library website interface is changing day by day and it is not following the standards or offering meaningful links that help users to move forward in their tasks.

### **7.1.8 SATISFACTION**

This criterion shows the satisfaction of usability of library website and e-resources. Users of BTH digital library system shows their satisfaction according to the functionalities and services offered by the BTH digital library system. 42% of users are fully satisfied and 33% are less satisfied by the library website interface and e-resources but 17% are not satisfied because of functionalities because lack of information about e-resources and services that is offered by BTH digital library system. There should be proper guidance regarding e-resources that needs to be available on the website and it should be visible by meaningful ways so that users can easily understand functionalities and services and utilize those services for their academic and research purposes.

### **7.1.9 CONSISTENCY**

Consistency relates to similar tasks are performed to achieve same goal in searching e-resources and utilizing services at BTH digital library system. 38% of users are not satisfied and 21% are less satisfied because of BTH digital library system are facing problem in inconsistent behavior and when users perform some actions on the system, results open in new window that does not show its same behavior that is totally different from previous tasks. This system is not offering consistent picture of the functioning of searching resources and utilizing services of BTH digital library. While 29% shows their satisfaction regarding consistency by having working experience on it.

### **7.1.10 RELIABILITY**

Reliability is important factor in accessing e-resources and website interface. E-resources are also accessible from home. So students, teachers or researchers can access to e-resources from home. 46% of users are less satisfied and 50% are satisfied so that e-resources have ability to accessible from home location and users do not feel any problem in accessing e-material. 0% of users are not satisfied with it which makes it greater reliable application.

### **7.1.11 ERROR PREVENTION**

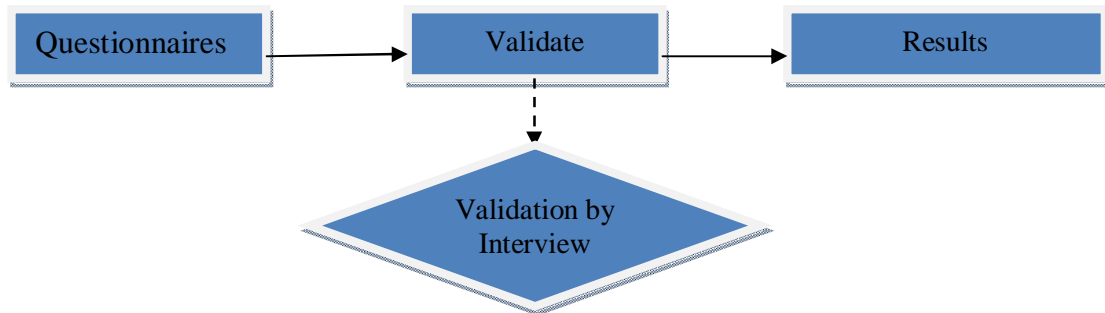
As users interact with BTH digital library for accessing e-resources and performing functions for different services so error prevention is having importance in it. 42% and 25% users are satisfied and less satisfied respectively due to direct access from university that is having an error that guides to the right path. While 25% users are not satisfied because when user tries to access e-material from home location it shows an error that is like a certificate error. It irritates user and user thinks that it is taking him into a non secure zone. User prefers to access e-material from home.

## **7.2 VALIDATION OF RESULTS**

The validation of results is important when we are using mixed methodology which was mentioned by authors in proposal of this research report. This research report combines of both qualitative and quantitative research approaches. Qualitative approach is main part of this report which gave us results according to the theoretical work and interviews conducted from the experts of BTH Library



who are working on this system and it lead authors towards the quantitative approach that deals with the questionnaire that comprises of questionnaires for showing satisfaction of users with BTH digital library. Then for validation of data authors are using technique that is suggested by Lincoln and Guba[41]. The authors are also using interviews conducted from users for validation so that data gathered from questionnaires and usability test should be verified can be shown in figure below.



**Figure 5: Validation of results by Interview**

The authors are using four criteria for validating results Credibility, Transferability, Dependability and Conformability.

### **7.2.1 CREDIBILITY**

The criteria for evaluating results tell authors about the findings that are found in this report are showing truthfulness of this system[41]. So by taking this in mind authors conducted interview from about 12 students that shows the precision of results gathered from usability test and questionnaires. Interviews that authors conducted from users of BTH digital library are in Appendix 2. From the questionnaires task results it is cleared from the graph 1 that more than 50% students are satisfied but there is also given that 28% of students are not satisfied with its functionality. These results are also verified through questionnaires that authors received from the questionnaires in appendix 1.

### **7.2.2 DEPENDABILITY**

It shows the validation of results in consistent manner whether it is repeated in research study[41]. Our primarily results that the authors attained from usability test that shows user satisfaction with tasks performed on the system are similar as it is attained from questionnaire that was designed for usability evaluation with different criteria afterwards. Feedback of users encourage authors to get more stronger and coherent results from interview and it shows more detailed and descriptive form of users suggestions and shortcomings that users have in their minds regarding this BTH digital library system. Moreover, these results can be carried out in every situation that explains the circumstances of users when they are interacting with the system and shows their satisfaction.

### **7.2.3 TRANSFERABILITY**

According to the Guba and Lincoln, transferability relates to external validity that means to draw conclusions which can be transferable in further times, people and situations and settings[41]. This research study has explained results that authors got from different types of users that have different study background currently studying at Blekinge Tekniska Hogskolan. The results attained from this research study are applicable also when BTH digital library system is transferred to another place when library system is manual. Transferability factor is achievable according to these results, the authors achieved from this BTH digital library system during usability evaluation procedure.

### **7.2.4 CONFORMABILITY**

It describes the relationship of accuracy of results achieved from usability test and questionnaires with findings[41]. The authors have also described the findings in chapter six how users show their satisfaction regarding their interaction with BTH digital library and perform different operation on its interface to access e-material. As author used mixed methodology in this research study that describes the results attained from questionnaires for tasks are similar to the questionnaire for usability evaluation criteria. Those results are further validated by the interview from the users to confirm that the functionalities, contents, services and e-resources that are offered by the BTH digital library system that shows that users are less satisfied with this library system but the percentages of students are same that are satisfied and not satisfied. The reasons are explained in chapter six by the authors that are gathered by the questionnaire for satisfaction level for each usability evaluation criteria.

## CHAPTER 8: CONCLUSION

The purpose of this research study is to evaluate BTH digital library system to make it more effective and efficient for users of BTH. For this purpose authors adopted a research methodology that helps them towards their desired goals to achieve the usability evaluation of BTH digital library system. Six Students from different study programs were selected for conducting usability test because they are studying at BTH and they are familiar with BTH digital library. Students are classified into two groups as Advanced and novice users. 4 Different tasks were given to the users to perform on this system to get results for usability evaluation of BTH digital library. Informal discussion was conducted from the experts of BTH Library i.e. Librarians who are working on this library web for designing and developing interface and also managing the e-resources. The results gathered from our research study show the satisfaction level regarding the research material and services provided by the BTH digital library as well as interface of library web page. The authors then conducted usability test from the selected students and derived some results after observing the behavior of the students while they were performing usability test. They were also given questionnaires to be filled by them. We also distributed questionnaires to some other users including teachers, students and researchers so that results can be achieved from every kind of users who are interacting with the system. Moreover, Interviews were conducted from the 12 users to validate results that authors achieved from questionnaires from usability evaluation criteria.

### 8.1 ANSWER TO RESEARCH QUESTIONS

To answer the research questions, the authors will explain the answers on the basis of the results collected from this study.

**ANSWER RESEARCH QUESTION 1:** BTH digital library has the bunch of e-resources that helps students, teachers and researchers in their academic and research purposes. The first question relates to qualitative approach and it is about the functionalities, contents and services that are offered by the BTH digital library system. According to the authors as students from different ethnic background are studying at BTH so they do not know about the e-resources that are offered by this digital library. The answer to first questions is already explained in theoretical work shows the complete understanding of the most important e-resources and services that can be helpful for the users for their education purposes. It has LIBRIS as national library of Sweden that contains the records of all resources available for education and as well there are a lot of reference management resources that helps students and researcher to manage referencing in their research papers and articles. A lot of other resources and contents have already being discussed in theoretical work section 4.

**ANSWER RESEARCH QUESTION 2:** The second research question relates to the quantitative approach that contains the usability test and questionnaires to get results. The results, authors found from usability test, questionnaires and interviews are explained in chapter 5 empirical study and in chapter six results and analysis. The authors followed a procedural work that was helpful in getting results efficiently according to the usability evaluation of BTH digital library system. From questionnaires authors got statistical data that afterwards validated by the interviews taken from users. This data is more valuable because this describes the overall satisfaction of the users for this BTH digital library system.

Results from questionnaires are calculated according to twelve different usability criteria. Then results are represented in graphical structure that explains clearly the user overall usability evaluation satisfaction level. Mostly students are less satisfied which means that there are some issues regarding usability that needs to be improved for enhancing user interest while they are accessing e-resources or services. These issues will be discussed in next answer of research question 3. While the percentages of satisfied students and not satisfied in graph 3 for usability are same. Overall results showed from empirical analysis are that mostly users are less satisfied with BTH digital library system.

**ANSWER RESEARCH QUESTION 3:** As BTH digital library is made accessible hundreds of resources as databases and it is cleared from the usability evaluation result graph that mostly users are less satisfied from the test conducted from the users. Results are analyzed and different suggestions and shortcomings will be listed. There will be discussed some benefits regarding usability issues, contents and services that can be provided to the users.

## **8.1.1 RECOMMENDATIONS**

### **8.1.1.1 USABILITY RELATED RECOMMENDATIONS**

- It is good to follow guidelines provided by the ISO, IBM and Microsoft so that standards can be achieved for interface design and it will cover the naturalness feature of innovation.
- The main library page is congested and it looks small for that reason a lot of information that should be presented to the user could not be able to be presented in front of users. The page should be expanded from both left and right side so that users can find important information and links for which they are looking for easily.
- Text size shown on the main library web page is very small and mostly users do not feel comfortable to read text, its size should be increased so that visibility can be achieved to enhance users interest while studying and accessing e-material at this BTH digital library system.

- From the main library page, authors observed from usability test, links on the right side that are Find Databases, LIBRIS, Find E journals, and all links in this SHORTCUTS list are mixed up and users feel difficulty to find its relevant link or new user cannot look at the main link to e-resources that is Find Database. Therefore these links should not only be visible but these must be more visible. The text size of these links should be increased, line spacing among these links should also be increased and these should be written in alphabetical order so that it shows sequence so that users can easily understand and empty space when main page scrolls down, it can be utilized.
- Most of results show BTH digital library system interface is not user friendly which means links should be written in such wordings that shows perceptible information in front of users. The main benefit for this information is that users can quickly get what they are looking for. Moreover, there should be facility for users when they write first character of book or article in samsök or ebrary for searching it should show the name of all the books and articles starting from that character written by the user. The perceptible information can be easily viewed by the user. This facility is already implemented for electronic journals in Find E journal.
- One of the most important issues in BTH digital library page is display of large graphical icons and text links in comparison of those graphical icons are very small. Most important information resides in text on main library page. Therefore, graphics and text should be balanced to achieve information presentation in efficient and effective manner.
- There is a quick search bar at the main library page and below the search bar there are different e-resources shown that have been written for quick searching. There should be mentioned some information that represent the search bar is designed for the e-resources mentioned below. Here it should represent standard of innovation interfaces that tells us about the searching information from e-resources mentioned below. These e-resources should be written above and text field should be shown below so that users do not get confused about the search bar.
- There is a service available for book a librarian and chat with librarian. But users can access this service after two links it should be on the first page. When user first time interacts with the system he/she should know from where user can solve his/her problems because there is a lot of space available at main page.
- When users select extended search option in Libris it is difficult for user to identify the filtration procedure. There are some guidelines provided for the user but it should be provided in a link that could be visible for users.
- The links which appear on the main library page on the left side also appear when users access book a librarian page. These links have no concern with book a librarian so that it

should be removed from there and other links like chat with librarian and booking group rooms should be shown there for achieving usability.

- New students mostly got confused with a link “Find database” which does not make sense that after clicking on it what kind of database they will access. So this link can be replaced with a suitable link like “Electronic Resources”.

#### **8.1.1.2 FUNCTIONALITY AND SERVICE RELATED RECOMMENDATIONS**

- When users click on the Book a librarian link it shows a form. In this form visibility and error prevention is handled at fields by mentioning ‘\*’ when user click on the send button to send request there should be a function to be able to get printout of booking a librarian or email should be send to his email address entered by the user. This will confirm user that librarian has been booked and user can check confirmation from email. It is good if “send request” is used instead of “send order” on the send button to send request to users.
- There should be guest access available for all the e-resources contents can be viewed by the outsiders of university.
- There should be a login facility available to the user so that users can be able to share e-material with other users online as they share documents online in Google Docs or Think Free.
- There should be a proper login facility at library main page so that user can easily maintain his history of searches from all the e-resources with date. This will help user not to know about his previous searches. When a new book or e-book or any other material takes into library then email or mobile message should be sent to user so that they can easily know about the new material arrive at BTH digital library.
- The BTH digital library must be equipped with some other kind of study helping material like audios and videos of lectures and conferences.
- There is a service to book a group room for the users. Although the interface of book a group room is fulfilling usability issues but there is a technical error that is about “one user can book more than one group rooms for the same time”. Therefore mostly users complain that they cannot find the empty slot when they want to reserve group room. So, this error should be corrected.

## **8.2 FUTURE WORK**

In this research, usability of BTH digital library System which is part of e-learning is evaluated but there are a lot of other issues that can be discussed it to make library more usable and secure for users. Therefore, regarding usability, there is a National library of Sweden LIBRIS which is available for users at BTH digital library main page and provides books in all academic libraries of Sweden and it

has a lot of functionalities that can evaluate by usability. This can be helpful for users to satisfy by using it. Moreover, the connectivity of Learning Management System with Libraries can also be implemented to share information among these two different systems and more usability issues can be explored in this area.

## EXECUTIVE SUMMARY

The summary of the writing is that the authors evaluated usability of digital libraries and selected BTH digital library system as a case study. As BTH offers a lot of e-resources but users still feel difficulty in accessing these e-resources and services. The goal of this research study is to explain the importance of usability in digital libraries and as well to measure user satisfaction level regarding usability of BTH digital library system. These problems are identified by using different usability evaluation techniques with different criteria and possible suggestions for improvements have been given in this research work. Usability testing (Think aloud protocol) and usability inquiry (questionnaires, interviews) methods were used in usability evaluation of BTH digital library system. Usability evaluation has been done by selection of different usability evaluation criteria namely satisfaction, memorability, learnability, efficiency, effectiveness, aesthetic, reliability, simplicity, visibility, user friendly, relevancy and easiness.

The usability tests have been conducted from six users including three novice and three advanced users. Four different important tasks have been defined in usability testing procedure for users. Users performed these tasks on BTH digital library system. One of the authors was observing the users behavior and the other author was writing the problems and suggestions given by the participants on the paper. Time of each task was also recorded and it was checked that whether users have completed their tasks within time or not. Afterwards, behavior of users was analyzed and explained issues from which users were quite satisfied in performing their tasks. Severity level assessment has been done to explain those issues from which users were not satisfied. Then questionnaire has been designed in which questions contain all usability evaluation criteria characteristics. The authors also conducted interviews from 12 users about the usability of BTH digital library. Questionnaires were distributed among 30 users and they got 24 positive responses. Findings of questionnaire were analyzed with each criterion and these were explained in both tabular and graphical representations.

Validation of our research work is based on available data obtained from questionnaires and interviews. Overall usability of BTH digital library is shown in graphical representations. This clearly shows that the most of the users are satisfied with BTH digital library system regarding usability but there are some users who are less satisfied and not satisfied with the usability of BTH digital library system due to some problems faced by them. These problems regarding usability have been identified and suggestions for improvements in BTH digital library interface are given that can be helpful to make BTH digital library more efficient and effective.

The suggested improvements have been categorized as usability related recommendations and functions and service related recommendations. The main usability related recommendations are that the main library page must be expanded from both sides. The text links and iconic links must be balanced and line spacing between these links should be increased so that links can be read properly. Links on the main page of library must contain meaningful words relevant to the library context that give users perceptible information. Our main functions and service related recommendations are that login profile should be provided to the users so that users can maintain their search and access history. Users should be given the facility of taking printout of the booking of librarian. Guest access should be for the outsiders of BTH. There should be a limit to book a group room for reservation. The BTH digital library must be equipped with some other kind of study helping material like audios and videos of lectures and conferences.



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# APPENDIX 1: RECOMMENDATIONS FOR LIBRARIAN

## USABILITY RELATED RECOMMENDATIONS

- It is good to follow guidelines provided by the ISO, IBM and Microsoft so that standards can be achieved for interface design and it will cover the naturalness feature of innovation.
- The main library page is congested and it looks small for that reason a lot of information that should be presented to the user could not be able to be presented in front of users. The page should be expanded from both left and right side so that users can find important information and links for which they are looking for easily.
- Text size shown on the main library web page is very small and mostly users do not feel comfortable to read text, its size should be increased so that visibility can be achieved to enhance users interest while studying and accessing e-material at this BTH digital library system.
- From the main library page, authors observed from usability test, links on the right side that are Find Databases, LIBRIS, Find E journals, and all links in this SHORTCUTS list are mixed up and users feel difficulty to find its relevant link or new user cannot look at the main link to e-resources that is Find Database. Therefore these links should not only be visible but these must be more visible. The text size of these links should be increased, line spacing among these links should also be increased and these should be written in alphabetical order so that it shows sequence so that users can easily understand and empty space when main page scrolls down, it can be utilized.
- Most of results show BTH digital library system interface is not user friendly which means links should be written in such wordings that shows perceptible information in front of users. The main benefit for this information is that users can quickly get what they are looking for. Moreover, there should be facility for users when they write first character of book or article in samsok or ebrary for searching it should show the name of all the books and articles starting from that character written by the user. The perceived information can be easily viewed by the user. This facility is already implemented for electronic journals in Find E journal.
- One of the most important issues in BTH digital library page is display of large graphical icons and text links in comparison of those graphical icons are very small. Most important information resides in text on main library page. Therefore, graphics and text should be balanced to achieve information presentation in efficient and effective manner.
- There is a quick search bar at the main library page and below the search bar there are different e-resources shown that have been written for quick searching. There should be mentioned some information that represent the search bar is designed for the e-resources

mentioned below. Here it should represent standard of innovation interfaces that tells us about the searching information from e-resources mentioned below. These e-resources should be written above and text field should be shown below so that users do not get confused about the search bar.

- There is a service available for book a librarian and chat with librarian. But users can access this service after two links it should be on the first page. When user first time interacts with the system he/she should know from where user can solve his/her problems because there is a lot of space available at main page.
- When users select extended search option in Libris it is difficult for user to identify the filtration procedure. There are some guidelines provided for the user but it should be provided in a link that could be visible for users.
- There should be a proper login facility at library main page so that user can easily maintain his history of searches from all the e-resources with date. This will help user not to know about his previous searches. When a new book or e-book or any other material takes into library then email or mobile message should be sent to user so that they can easily know about the new material arrive at BTH digital library.
- The links which appear on the main library page on the left side also appear when users access book a librarian page. These links have no concern with book a librarian so that it should be removed from there and other links like chat with librarian and booking group rooms should be shown there for achieving usability.
- New students mostly got confused with a link “Find database” which does not make sense that after clicking on it what kind of database they will access. So this link can be replaced with a suitable link like “Electronic Resources”.

## **FUNCTIONALITY AND SERVICE RELATED RECOMMENDATIONS**

- When users click on the Book a librarian link it shows a form. In this form visibility and error prevention is handled at fields by mentioning ‘\*’ when user click on the send button to send request there should be a function to be able to get printout of booking a librarian or email should be send to his email address entered by the user. This will confirm user that librarian has been booked and user can check confirmation from email. It is good if “send request” is used instead of “send order” on the send button to send request to users.
- There should be guest access available for all the e-resources contents can be viewed by the outsiders of university.
- There should be a login facility available to the user so that users can be able to share e-material with other users online as they share documents online in Google Docs or Think Free.

- There is a service to book a group room for the users. Although the interface of book a group room is fulfilling usability issues but there is a technical error that is about “one user can book more than one group rooms for the same time”. Therefore mostly users complain that they cannot find the empty slot when they want to reserve group room. So, this error should be corrected.
- The BTH digital library must be equipped with some other kind of study helping material like audios and videos of lectures and conferences.

## APPENDIX 2: QUESTIONNAIRE FOR USERS

### QUESTIONNAIRE FOR TASKS

Numbers	STATEMENTS	STRONG LY SATISFIE D A	SATISFI ED B	LESS SATISFIE D C	NOT SATISFIE D D	STRONGLY NOT SATISFIED E
1	I feel easy to complete my tasks and I am satisfied with it.					
2	It saves my time while I was performing tasks.					
3	It makes me satisfied with results received on the accomplishing of tasks.					

### QUESTIONNAIRE FOR USABILITY EVALUATION CRITERIA

Numbers	STATEMENTS	STRONGLY SATISFIED A	SATISFIED B	LESS SATISFI ED C	NOT SATISFI ED D	STRONGLY NOT SATISFIED E
1	It assists me to get my results in effective manner					
2	It makes me even more creative in my work.					
3	It boosts up my knowledge related to my interested field.					
4	I accomplish all my tasks with easiness.					
5	It is time saving when I am using it.					
6	It gives me results according to my desired search.					
7	It shows responses according to my expectations.					
8	It is simple and easy to use.					
9	It doesn't take time to search e-material.					
10	I do not need any guideline to use this system.					
11	This system shows positive feedback at every step.					
12	It is consistent and it is not difficult to remember all steps.					



13	It shows learnability, I learn a lot by using it.					
14	I became skillful quickly while I am using it.					
15	I should recommend this to my colleague.					
16	I think I should use it to improve my research.					
17	It is reliable and gives me information according to my needs.					
18	I am satisfied with its use.					
19	I am satisfied that I can see clearly all the links and understand their meanings.					

## **APPENDIX 3: INTERVIEWS CONDUCTED FROM USERS**

### **STUDENT 1:**

#### **Q.1. How do you find (what is your opinion about) BTH Digital library?**

The BTH digital library provides a major source to find the research articles, e-books, etc for the purpose of research.

#### **Q.2 what are your reasons to use this BTH digital library?**

One of the primary use for me to use the BTH digital library is to provide me the full access to find and downloads the e-books, articles etc. I am very useful to use it and easy to access all the way.

#### **Q.3 What is the exciting/interesting part you have found in digital library of BTH?**

The most exciting part which I found to the BTH library is to issue the book from the library. The system is well organized I fill the form and then wait for the availability of the book. When the book is available and I am in the top of the list the alert email or notification is sent to me.

#### **Q.4 In your opinion, what you find most complicated part while using this digital library?**

One of the most complicated part when I using the BTH digital library that the links are too much mix up. Links inside the links and so on and it is very difficult to find the desire link because the links are not that much open for the users.

#### **Q.5 What can you say about advantages of this Library system?**

The main advantage of the BTH library is to help me in the research. It is very helpful for me to provide a common platform for my desire search for different type of research material and so on.

#### **Q.6 What do you say about the drawbacks of BTH digital Library?**

There are few drawbacks in the BTH digital library which are as under:

- The is no link available for the site map
- Notification by SMS is not available
- It is not a animated site
- For the usability view point to many icons

#### **Q.7 What are your additional constraints/requirements about this system?**

From my view point the BTH library should provides a complete checklist of all the material which is available in the library. More important the new research materials which are help the student in the research.

#### **Q.8 What are more issues to improve this system in your opinion?**

Some of the points which can improve the system:

- Provide the complete guideline
- Try to reduce the icon and provide maximum visibility to the text
- Provides the links for the incoming research event around the globe

#### **Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

I think the searching mechanism is according to the mark and there is no need to modify the interface.

## **STUDENT 2:**

### **Q.1. How do you find (what is your opinion about) BTH Digital library?**

It is good source to find my e-books, e- journals, and research papers.

### **Q.2 what are your reasons to use this BTH digital library?**

I often use library for books, and to read the thesis of old students.

### **Q.3What is the exciting/interesting part you have found in digital library of BTH?**

That part that connect it to IEEE, ACM digital library from home, and Elin

### **Q.4 In your opinion, what you find most complicated part while using this digital library?**

Find database from home

### **Q.5 What can you say about advantages of this Library system?**

- I can use it from home,
- It is available 24 hours
- The same resources can be used by multiple students at the same time
- Information retrieval, means searching is easy
- It save space,
- It save cost and time

### **Q.6 What do you say about the drawbacks of BTH digital Library?**

- Some time quality of image is not so good
- Copyrights problems
- It is difficult for some people to red documents in e-form,
- Failure may deny access to hole library

### **Q.7 What are your additional constraints/requirements about this system?**

Speed, copyrights, some books are not available in e-form,

### **Q.8 What are more issues to improve this system in your opinion?**

User Manuals and one interface for searching books, e-journal and articles.

### **Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

One interface, with user friendly environment,

## **STUDENT 3:**

### **Q.1. How do you find (what is your opinion about) BTH Digital library?**

It is good library, all the online resources required by students are present.

### **Q.2 what are your reasons to use this BTH digital library?**

For searching of research papers

### **Q.3What is the exciting/interesting part you have found in digital library of BTH?**

Online data base of different research papers

### **Q.4 In your opinion, what you find most complicated part while using this digital library?**

New student didn't have any information about online databases. And there is no information about it on web site. So new user find complication in finding research papers.

**Q.5 What can you say about advantages of this Library system?**

Can find the entire database at one place.

**Q.6 What do you say about the drawbacks of BTH digital Library?**

I didn't saw any draw back

**Q.7 What are your additional constraints/requirements about this system?**

This system is ok. But it need some more user friendly GUI

**Q.8 What are more issues to improve this system in your opinion?**

There should be categorized by the librarian of these resources so that I can understand which resource what provides.

**Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

There should be some icons for it.

**STUDENT 4:**

**Q.1. How do you find BTH Digital library?**

It is an important source to get maximum study material so we may get benefits out of it if we learn to use it early in our studies.

**Q.2 what are your reasons to use this BTH digital library?**

It provides us a lot of study material which is very helpful to prepare our assignments and projects. So it's a good facility provided by BTH.

**Q.3What is the exciting/interesting part you have found in digital library of BTH?**

We can get a large number of databases and which one we think is better we can find data from that database.

**Q.4 In your opinion, what you find most complicated part while using this digital library?**

I often get confused when I don't get required stuff. And also when I perform filtration and sorting of data.

**Q.5 What can you say about advantages of this Library system?**

A lot of study material.

I can use it from remote locations.

I can access E books which are sometimes not available in physical library.

**Q.6 What do you say about the drawbacks of BTH digital Library?**

Its interface needs to improve to increase its visibility, consistency and learnability factors.

Links of databases must be given on home page.

**Q.7 What are your additional requirements about this system?**

Text links must be more visible as compared to icons. I want some guidance regarding better usage of BTH digital library.

**Q.8 What are more issues to improve this system in your opinion?**

Home page of BTH digital library must be improved. Some guidance must be provided how to use further resources it.

**Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

E books relevant to course of students must be notified to student according to his course and subjects.

**STUDENT 5:**

**Q.1. How do you find BTH Digital library?**

It is good for students. We can get e material including E books, journals and different research articles.

**Q.2 what are your reasons to use this BTH digital library?**

We can study e resources to increase our knowledge.

**Q.3What is the exciting/interesting part you have found in digital library of BTH?**

Students can access books which are not mostly available in physical library.

**Q.4 In your opinion, what you find most complicated part while using this digital library?**

it is difficult for me to decide that which data base I can find maximum data which will be relevant to my research and course program.

**Q.5 What can you say about advantages of this Library system?**

A large amount of knowledge is easily in my access. I can use it for my studies easily and without much effort.

**Q.6 What do you say about the drawbacks of BTH digital Library?**

I find sometimes difficult to find links for which I m looking for. I often forget about the links I have already used.

**Q.7 What are your additional requirements about this system?**

Course books and text books must be separate from other books. Interface must be more easy to use for every kind of users.

**Q.8 What are more issues to improve this interface in your opinion?**

Icons are very big and they are not much productive. Text data must be more prominent and little bigger in size.

**Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

Its good to find books, e journals but filtration of these becomes very complex.

**STUDENT 6:**

**Q.1. How do you find BTH Digital library?**

We have a lot of options to get valuable knowledge books and e resources from this library.

**Q.2 what are your reasons to use this BTH digital library?**

I use it for E books which are not only my course books but other than course books. I use IEEE and ACM databases for reliable research papers.

**Q.3What is the exciting/interesting part you have found in digital library of BTH?**

Libris is a good database to find much kind of valuable resources.

**Q.4 In your opinion, what you find most complicated part while using this digital library?**

Sometimes it's complicated to get desirable data easily. Because there are many resources which are not much easy to manage.

**Q.5 What can you say about advantages of this Library system?**

A large amount of knowledge is easily in my access. I can use it for my studies easily and without much effort.

**Q.6 What do you say about the drawbacks of BTH digital Library?**

I find sometimes difficult to find links for which I'm looking for. I often forget about the links I have already used.

**Q.7 What are your additional requirements about this system?**

Course books and text books must be separate from other books. Interface must be more easy to use for every kind of users.

**Q.8 What are more issues to improve this interface in your opinion?**

Icons are very big and they are not much productive. Text data must be more prominent and little bigger in size.

**Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

It's good to find books, e-journals but filtration of these becomes very complex.

**STUDENT 7:**

**Q.1. How do you find (what is your opinion about) BTH Digital library?**

It's good

**Q.2 what are your reasons to use this BTH digital library?**

As we are scholars here so it's the best resource to find technical solution from this

**Q.3 What is the exciting/interesting part you have found in digital library of BTH?**

It covers all related databases

**Q.4 In your opinion, what you find most complicated part while using this digital library?**

In my opinion it's not such complicated

**Q.5 What can you say about advantages of this Library system?**

There are a lot of advantages while using this library as it covers hell many areas of Information

**Q.6 What do you say about the drawbacks of BTH digital Library?**

I think no draw back as it is the information resource

**Q.7 What are your additional constraints/requirements about this system?**

Digital means its online and required pc n internet to access

**Q.8 What are more issues to improve this system in your opinion?**

As I have only seen this in BTH so u can find improvement while comparing it with other digital libraries

**Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

There should be defined for category and it should contain important sources that should present in front of me.

## **STUDENT 8:**

### **Q.1. How do you find BTH Digital library?**

- Complex structure
- Difficult to understand
- All contents are just mixed up
- Information is available but its hard to find

### **Q.2 what are your reasons to use this BTH digital library?**

- To search the required book
- To search the articles and papers
- To know about plagiarism rules
- To meet the librarian
- To see the visiting hours
- To use online facility
- To have a look of available books

### **Q.3What is the exciting/interesting part you have found in digital library of BTH?**

- When you search the book or article it will give you more advanced form of search based of publishing date, Author name and so on. In other way it guides you through out the searching.
- Online chat facility with librarian so we can discuss the issues related to library

### **Q.4 In your opinion, what you find most complicated part while using this digital library?**

- The most complicated part is where to find your desired items on this extensive list of links. All items are just mixed up , lack of structure.

### **Q.5 what can you say about advantages of this Library system?**

- To search the required book
- To search the articles and papers
- To know about plagiarism rules
- To meet the librarian
- To see the visiting hours
- To use online facility
- To have a look of available books

### **Q.6 What do you say about the drawbacks of BTH digital Library?**

- There is no such draw back because it is very useful for students. The only draw back is that even they have all the resources but the resources are not utilized perfectly. In my opinion after making their interface more usable they can attract more users.

### **Q.7 what are your additional constraints about this system?**

- Maintain each visitor's history from his/her login facility.

### **Q.8 what are more issues to improve this system in your opinion?**

- Make the interface more useable
- Structure should according to requirements of the users
- Provide the search items in each link according to search string instead of listing extensive lists of search items.

### **Q.9 what are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

Well in my opinion the current searching criteria is according to my expectation.

## **STUDENT 9:**

### **Q.1. How do you find (what is your opinion about) BTH Digital library?**

BTH digital library is good like others digital libraries. Like other digital libraries, it efficiently satisfies needs of users.

### **Q.2 what are your reasons to use this BTH digital library?**

BTH digital library is part of university. It's a resource provided to university students. BTH digital library provides various features and facilities to its subscribers/users like online searching, reserve books, issues books. And most important is that BTH digital library has subscription at many international databases and research organizations e.g. IEEE, ACM, Springer etc. It's become beneficial for BTH library users to easily access the online resource of various scientific resources.

### **Q.3 What is the exciting/interesting part you have found in digital library of BTH?**

Various interesting features and facilities:

- a. BTH library has subscription at various scientific organizations and international databases.
- b. BTH thesis and licentiate achieves available online to all users
- c. Reserve books
- d. Chat with librarian

### **Q.4 In your opinion, what you find most complicated part while using this digital library?**

I have not yet found any complicated part.

### **Q.5 What can you say about advantages of this Library system?**

Various advantages

1. Its within reach of users
2. Almost all library resources are available online, which can be access from anywhere.
3. Good opening and closing time.

### **Q.6 What do you say about the drawbacks of BTH digital Library?**

Limited resources of hard books. e.g. there are limited reference books available at library.

### **Q.7 What are your additional constraints/requirements about this system?**

I need complete guideline for important resources. All important resources should be mentioned in front page so that I can get benefit from these resources.

### **Q.8 What are more issues to improve this system in your opinion?**

This system provides a lot of sources I can access and I am satisfied with it.

### **Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

There should be a separate category for search books, journals and research articles.

## **STUDENT 10:**

### **Q.1. How do you find BTH Digital library?**

- Helpful to find the required data.
- Invisible/Complex menu links.
- Lengthy Procedure to complete the tasks.
- Some time down bth server.
- Low iconic presentation with links
- Irrelevant data on page



**Q.2 what are your reasons to use this BTH digital library?**

- A number of resources (find databases) to search the required data
- Official/Secure data

**Q.3 What is the exciting/interesting part you have found in digital library of BTH?**

- Find Database with advance search

**Q.4 In your opinion, what you find most complicated part while using this digital library?**

- Page Layout
- Data Presentation
- Language option for non Swedish

**Q.5 what can you say about advantages of this Library system?**

- Availability of databases
- Find database with (Titles, Locate, Category)

**Q.6 What do you say about the drawbacks of BTH digital Library?**

- Page structure (layout)
- Data presentation (complex)
- Irrelevant data for visitors
- Complex
- Language options for non Swedish

**Q.7 What are your additional constraints about this system?**

- I also need login facility to save my activities on digital library.
- I need direct link (basket) to save data when I download data from different resources.

**Q.8 What are more issues to improve this system in your opinion?**

- No visitor activities history to about search with time and date
- Need user assistant on each step during use the library
- Need more visible data presentation

**Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

- Need to visualize the different categories (e-books, e-journals and research papers) with scrolls items on one page.

**STUDENT 11:**

**Q.1. How do you find BTH Digital library?**

In my point of view it has a large number of resources and it helps me in academic reports.

**Q.2 what are your reasons to use this BTH digital library?**

I use it for searching of electronic material like e-books, articles, journal articles and etc.

**Q.3 What is the exciting/interesting part you have found in digital library of BTH?**

It contains a lot of databases and most interesting thing for me is reference management that I do in my research reports.

**Q.4 In your opinion, what you find most complicated part while using this digital library?**

It is difficult for me to know about all resources and search specially advanced search is a most complicated part. It takes time for finding data. But it is efficient in getting results. Main page of

library is not consistent and links appear on the main library are mixed into each other. Its text size should be enhanced.

**Q.5 What can you say about advantages of this Library system?**

- Large databases
- Provide Access to a lot of sources
- I can book group room, librarian and can even chat with librarian
- Borrowed books can be renewed online.

**Q.6 What do you say about the drawbacks of BTH digital Library?**

- Links are mixed up
- I cannot understand the structure of the main library page.
- There is not a proper guideline available for users.
- Links should have meanings
- Text and Graphics are not balanced

**Q.7 What are your additional requirements about this system?**

- I can have my own account at library.
- software packages for free.
- Important links should be shown at main library page

**Q.8 What are more issues to improve this system in your opinion regarding interface?**

Page should be expanded so that all the links should be larger and clear to me.

**Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

In my opinion it is good enough but may be the information for these links should be provided at the main library page.

## **STUDENT 12**

**Q.1. How do you find BTH Digital library?**

Its good for students. It provides easiness to find out any kind of material regarding their desire topic.

**Q.2 what are your reasons to use this BTH digital library?**

With the help of BTH digital library, I can access all the e- resources to boost up my knowledge.

**Q.3What is the exciting/interesting part you have found in digital library of BTH?**

The most interesting part for me. It provides A to Z databases. I can access the entire databases to get my search relevant data.

**Q.4 In your opinion, what you find most complicated part while using this digital library?**

It provides a lot of databases which shuffle my mind that which one will be suitable for me to get my relevant data.

**Q.5 What can you say about advantages of this Library system?**

I can find my desired data.

**Q.6 What do you say about the drawbacks of BTH digital Library?**

I did not find any drawbacks

**Q.7 What are your additional requirements about this system?**

There should be some sort of graphical things at first page.

**Q.8 What are more issues to improve this interface in your opinion?**

Interface should be richer in the term of content and all these content should be prominent. So every kind of users pick their relevant information in first look.

**Q.9 What are your suggestions to make it more clear about searching e-books, e-journals and research papers?**

Filtration of data is very complex. It should be improve in future

## APPENDIX 4: SCREEN SHOTS

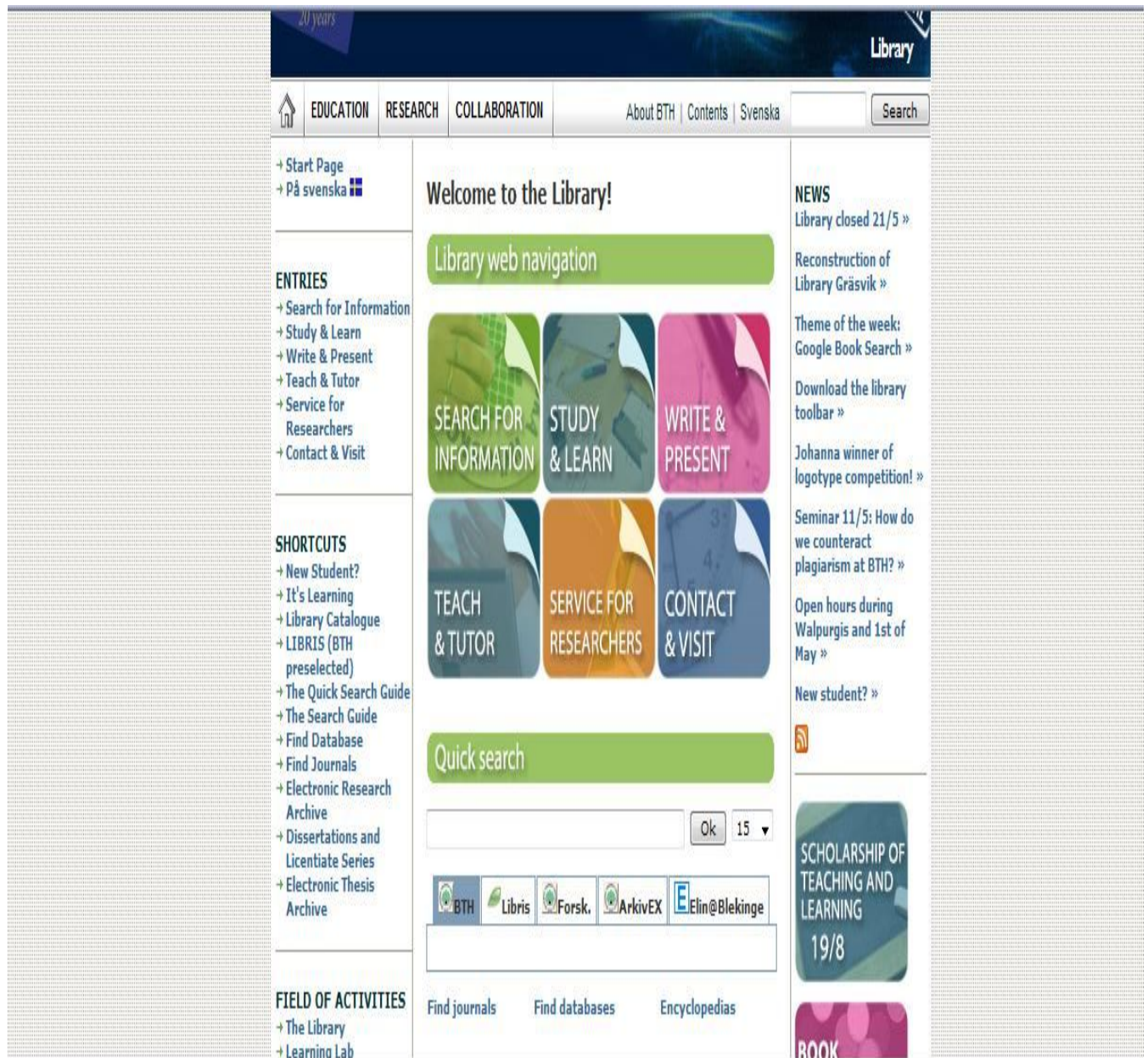



Figure 6: Main library page



# BLEKINGE INSTITUTE OF TECHNOLOGY

CLIMATE NEUTRAL

Library

[Home](#)
[EDUCATION](#)
[RESEARCH](#)
[COLLABORATION](#)
[About BTH](#)
[Contents](#)
[Svenska](#)

[Start Page](#)  
[På svenska](#)

### ENTRIES


- [Search for Information](#)
- [Study & Learn](#)
- [Write & Present](#)
- [Teach & Tutor](#)
- [Service for Researchers](#)
- [Contact & Visit](#)

### CONTACT & VISIT

- [Welcome film](#)
- [Gräsvik, Karlskrona](#)
- [Infocenter, Ronneby](#)
- [Piren, Karlshamn](#)
- [Support](#)
- [Book a Librarian](#)
- [Book a Group Room](#)
- [Chat](#)
- [Theme of the Week](#)
- [Staff](#)
- [Contact Librarians](#)

### FIELD OF ACTIVITIES

## Contact & Visit



### Contact & Visit


Welcome to the library at Blekinge Institute of Technology! In this section you find information about our three libraries and how you can contact us.

Learning Lab and Educational Development are also part of the library organization.

- [Learning Lab](#)
- [Educational Development](#)

### Our Libraries


Follow the links below to see phone numbers, e-mail addresses, opening hours, addresses and road directions for our libraries.



[Library Gräsvik, Karlskrona](#)  
+46 (0) 455-385101



[Library Infocenter, Ronneby](#)  
+46 (0) 457-



[Library Piren, Karlshamn](#)  
+46 (0) 454-385900  
niren@bth.se

[It's learning support](#)

[LEARNINGLAB](#)

[CHAT](#)

[THEME OF THE WEEK](#)

[Need of extra equipment?](#)

<http://www.bth.se/bib/eng/contact.nsf/pages/contact>

Internet | Protected Mode: On

**Figure 7: Contact and Visit link for Book a librarian**







BLEKINGE TEKNISKA HÖGSKOLA  
BIBLIOTEKET

## Find journal

English

Title Category Locate CitationLinker

0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z Å Ä Ö Others

Title:



Starts with



Contains

Go

Powered by SFX@Blekinge

Figure 10: Find E journal



BLEKINGE TEKNISKA HÖGSKOLA  
BIBLIOTEKET

## Find journal

English

**Title** / Category / Locate / CitationLinker

0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z Å Ä Ö Others

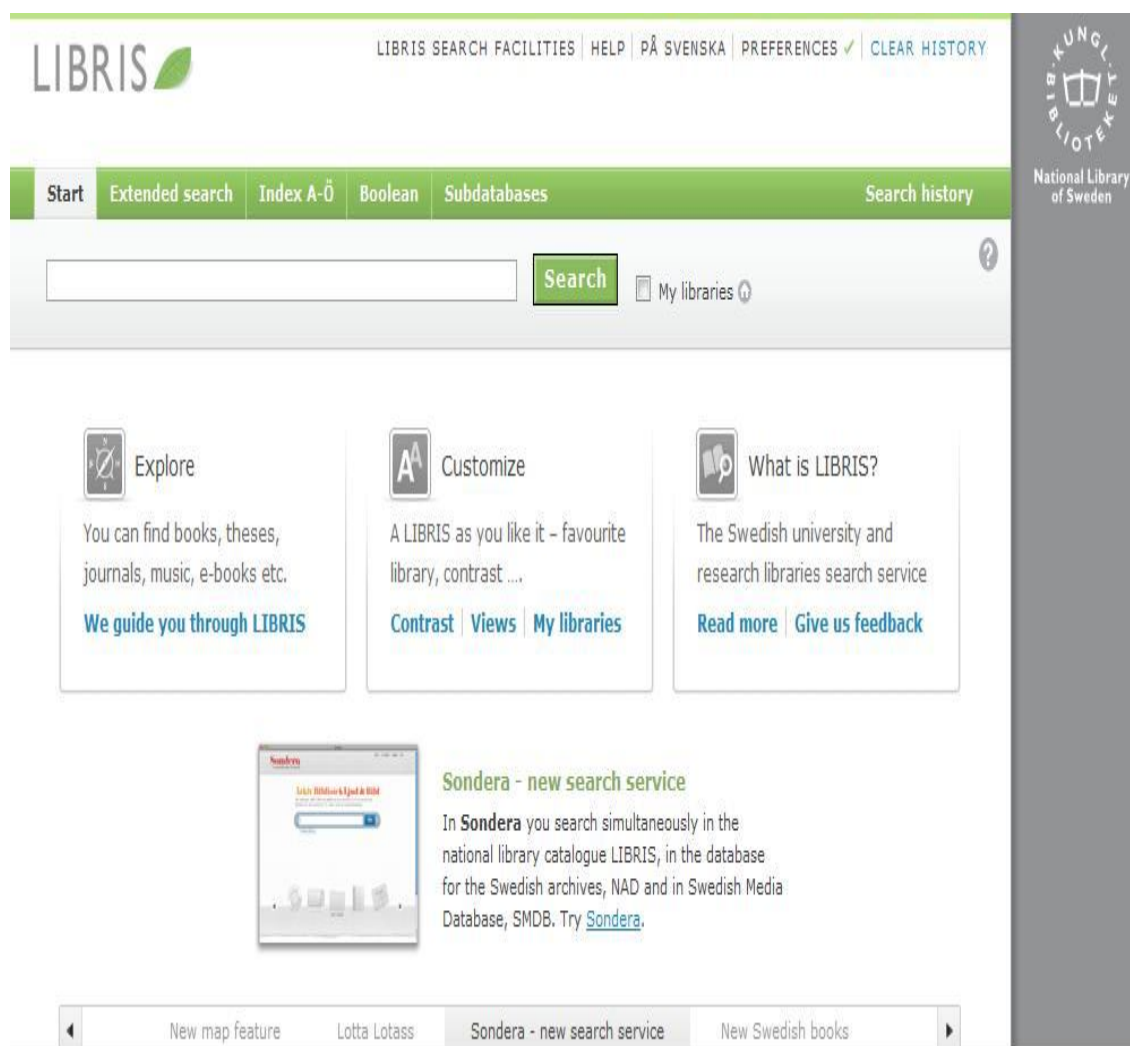
Title:  ☐ Starts with ☒ Contains

Powered by


- CUU: ACM Conference on Universal **Usability**
- Journal of **usability** studies
- No solo **usabilidad**

Figure 11: Ajax Implementation in Find Journal





**Figure 12: Main LIBRIS page**



LIBRIS SEARCH FACILITIES
HELP
PÅ SVENSKA
PREFERENCES ✓
CLEAR HISTORY

Start
Extended search
Index A-Ö
Boolean
Subdatabases

Search history

Search

?

Search: usability Engineering






Result 1-10 of 46 [1] 2 3 4 5 ▶

Sort by: relevancy

Group by: none

Hits per page: 10

?

1.	 <div> Nielsen, Jakob (author)  <a href="#">Usability engineering / Jakob Nielsen</a>  1993. - [New ed.]   Book </div>	21 libraries
2.	 <div> Faulkner, Kristine (author)  <a href="#">Usability engineering / Kristine Faulkner</a>  2000   Book </div>	21 libraries
3.	 <div> Nielsen, Jakob (author)  <a href="#">Usability engineering / Jakob Nielsen</a> </div>	9 libraries

▼ Refine your search

Favourites

- Only my libraries

Author

- Seffah, Ahmed (4)
- Nielsen, Jakob (3)
- Ågerfalk, Pär J., 19 ... (2)
- Carroll, John M. (2)
- Carlshamre, Pär (2)
- Mayhew, Deborah J. (2)
- show more...

Type

- book (46)
- e-resource
- theses

**Figure 13: Book searched on LIBRIS with simple search option**

LIBRIS

LIBRIS SEARCH FACILITIES | [HELP](#) | [PÅ SVENSKA](#) | [PREFERENCES](#) ✓ | [CLEAR HISTORY](#)

LIBRIS KUNGL. BOKHUS

National Library of Sweden

Preferences

My favourites

Views and language

Size and contrast

?

### Preferences

Here you can customize parts of the interface to suit your needs. Read more [about preferences](#) in LIBRIS help.

### Saved preferences

**My region**  
Southern Sweden [Edit](#)

**Language**  
English [Edit](#)

**Permanent link for the above preferences**  
<http://libris.kb.se/preferences.jsp?sp=t&region=Sodra&language=en&r=start&ow=t>  
Paste this link in a web browser to access LIBRIS home page with your preferred settings saved

CLEAR

MAIL PREFERENCES

SAVE AND CLOSE

Copyright © LIBRIS - National Library Systems

**Figure 14: Preferences set for selection of libraries**

?

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[QuickSearch](#) | [Find Database](#) | [Find e-Journal](#) | [MetaSearch](#)

[Find Database](#) | [Database List](#)

## Find Database

**Titles**

Locate

Category

ABCDEFGHIJKLMNOPQRSTUVWXYZÅÖOther

Titles:

☒ Starts with ☐ Contains ☐ Exact

GO

[Turn Off Auto Refresh](#)

**Figure 16: Main Find Database page**

[QuickSearch](#) | [Find Database](#) | [Find e-Journal](#) | [MetaSearch](#)

[Find Database](#) | [Database List](#)

## Database List

Search for "Starts with = Ebrary"

[Brief list](#) | [Extended list](#)

Start with :  

ebrary - Intute

Go to [MetaSearch](#)

[<Previous](#) [Next>](#)

### ebrary

Discover over 35,000 full-text books in multiple academic and general interest subject areas, sheet music titles and reports.

E-Book   

### ECLAS

European Commission Libraries Catalogue. ECLAS is a bibliographic data base consisting of ca. 350 000 completed catalogue records in the domain of European affairs; about 7 000 new records are added annually.

Library  

### EconPapers




Collection of online Economics working papers and journal articles.

Electronic Archives   

### Elektronische Zeitschriftenbibliothek (EZB)

The Elektronische Zeitschriftenbibliothek EZB (Electronic Journals Library) offers an effective use of both scientific and academic journals publishing full text articles in the internet.

This service has been developed at the Universitätsbibliothek Regensburg (University Library of Regensburg) ...

Reference database   

### Elin@Blekinge

ELIN@Blekinge: Electronic Library Information Navigator integrates data from several publishers, databases and e-print open archives.

ELIN@Blekinge service allows you to search documents from multiple sources using one single user-friendly interface

**Figure 17: Ebrary Search from Find Database**

Blekinge Tekniska Hogskola

Info

Search

QuickView

Bookshelf

English

My Settings

Sign In

Search ebrary

Advanced

All Subjects

ebrary is pleased to announce new product features, including integration with RefWorks and EndNote, printing with QuickView, and search by collection! [Sign up for training by clicking here.](#)

Welcome to ebrary!

Your library subscribes to [Academic Complete](#), a growing e-book collection spanning all academic subject areas.

Getting Started

1. Choose a viewing option under My Settings. For a comparison of viewing options, please [click here](#).

Please note your institution may have determined which option(s) are available to you.

2. Create a personal bookshelf in order to create and save highlights, notes, and more.

3. Conduct a search using simple or advanced, by keyword, full-text, publisher, or author. Use Boolean or proximity operators.


» SIGN UP FOR TRAINING

» HELP & SUPPORT

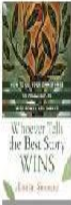
» PROVIDE FEEDBACK

Sample Titles

To open a document, click on the jacket or title.



*Twenty-First Century Gateways: Immigrant Incorporation in Suburban America*,  
 by Audrey Singer  
 (Brookings Institution, 2008) [VIEW THIS TITLE](#)



*Whoever Tells the Best Story Wins: How to Use Your Own Stories to Communicate with Power and Impact*,  
 by Annette Simmons  
 (AMACOM, 2007) [VIEW THIS TITLE](#)

**Figure 18: Main Ebrary page for searching E-books**

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Blekinge Tekniska Hogskola

Info

Search

QuickView

Bookshelf

English

My Settings

Sign

Usability Engineering

Search ebrary

Advanced

All Subjects

BOOK RANK

CHAPTER RANK

RECENT

▼ Focus your search using:

☒ Any of the selected subjects (e.g. Math OR Science)
 ☐ All of the selected subjects (e.g. Math AND Science)

☐ United States
 ☐ Research
 ☐ Management Information Systems
 ☐ Congresses

☐ Information Technology
 ☐ Evaluation
 ☐ Digital Libraries
 ☐ Human Engineering

☐ Web Sites
 ☐ User Interfaces (Computer Systems)
 ☐ Library Science
 ☐ Engineering

☐ Management
 ☐ Case Studies
 ☐ Information Storage And Retrieval Systems

Search ebrary

Showing 1 - 20 of 2,102 documents

Sort results by: Relevance | Title | Contributor | Publishe

Usability Success Stories : How Organizations Improve by Making Easier-to-Use Software and Web Sites

Author: Sherman, Paul

Publisher: Ashgate Publishing, Limited

Released: 2006

Subjects: New products -- Management, Customer relations, User interfaces (Computer systems)

Show Table of Contents

Find Similar

Mobile Usability : How Nokia Changed the Face of the Mobile Phone

Author: Lindholm, Christian Keinonen, Turkka

Publisher: McGraw-Hill Companies, The

Released: 2003

Subjects: Nokia (Firm) Cellular telephones, User interfaces (Computer systems)

**Figure 19: E-book search from Ebrary with Simple Search**



Blekinge Tekniska Högskola

Info
Search
QuickView
Bookshelf

English
My Settings
Sign In

Usability Engineering

Search ebrary

[Hide Advanced Option](#)
[All Subjects](#)

BOOK RANK
CHAPTER RANK
RECENT

Click the "Search ebrary" button when you've finished describing your search.

Search in
Text and Key Fields
for
Usability Engineering

+

-

... and in
Text and Key Fields
for

+

-

▼ Focus your search using:
☒ Any of the selected subjects (e.g. Math OR Science)
☐ All of the selected subjects (e.g. Math AND Science)

☐ United States
☐ Information Technology
☐ Web Sites
☐ Management

☐ Research
☐ Evaluation
☐ User Interfaces (Computer Systems)
☐ Case Studies


☐ Management Information Systems
☐ Digital Libraries
☐ Library Science
☐ Information Storage And Retrieval Systems

☐ Congresses
☐ Human Engineering
☐ Engineering

Search ebrary

Showing 1 - 20 of 2,102 documents

Sort results by: Relevance | Title | Contributor | Publisher



[Usability Success Stories : How Organizations Improve by Making Easier-to-Use Software and Web Sites](#)

Library Reader

Author: [Sherman, Paul](#)  
Publisher: [Ashgate Publishing, Limited](#)  
Released: 2006  
Subjects: [New products -- Management.](#) [Customer relations.](#) [User interfaces \(Computer systems\)](#)

[Show Table of Contents](#)
[Find Similar](#)

**Figure 20: Advanced Search option in Ebrary**