Usability evaluation of e-learning applications,
A case study of It’s Learning from a student’s perspective

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ABSTRACT

The basic purpose of e-learning applications is to deliver knowledge, share information and help learners in their learning activities in an effective and efficient way by involving advanced electronic technologies. Usability of e-learning applications is of great significance because their success depends upon basic usability principles. The criteria for judging the success can be defined by user satisfaction level after the user’s interaction with interface of e-learning system. In this research report we present the results of a usability evaluation of an e-learning system.

Appropriate use of usability evaluation methods according to given scenarios is an important aspect of this report. Both end-users and usability experts participated in our study, during which we used different methods for usability evaluation of specific e-learning platform It’s Learning. The authors give recommendations for the improvement of It’s Learning after validating the results of methods used for usability evaluation. Moreover, the authors discuss the areas of e-learning with relation to usability where future could be more beneficial to learners by involving and adopting new technologies.

Keywords: Usability evaluation, e-learning, HCI (Human computer Interaction).
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1 **INTRODUCTION**

This “Introduction” chapter provides the basic understanding to the reader, concerning the research discipline and application area addressed. It discusses the case study and concepts of HCI in this research report.

1.1 **E-learning**

Emerging web-based technologies which support the individual’s personal web-based applications are gaining immense appreciation and adaptation worldwide. Among them, user profiling, communication servers, high-tech intelligent search systems and e-services are focal areas for researchers for future work.

Rapid growth in designing, development and implementation of e-service systems like e-health, e-government and e-business etc. has gone hand-in-hand with a growing demand for e-services. Similarly, increase in the diversity of learners, technological expansion and radical changes in learning tasks, present significant challenges and render the possibility of defining the context of use of e-learning applications more complex than ever (Zaharias, 2006).

Electronic learning (or e-learning) is a kind of technology supported education/learning (TSL) where the medium of instruction is through computer technology, particularly involving digital technologies. E-learning has been defined by Nichols as "pedagogy empowered by digital technology" (Nichols, 2008 PP.2).

The objectives of e-learning are to facilitate and assist people by delivering appropriate contents and services to fulfil user needs. The increase in demand of learning instantly from anywhere has resulted in e-learning systems on the web with the aim to provide effective and efficient learning platforms which create an environment for knowledge acquirement, predominantly in distance learning. Now the question that arises here is how the performance of an e-learning system can be judged, especially concerning user interaction with the interface of that system.

Researchers highlights the importance of HCI by saying that (Preece *et al.*, 2002) the human computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.
It is not the programming language codes that the user sees in an application but the interface, which has a huge influence on the success or failure of that application. Users want to see the interface of a system according to their needs and demands. If the interface is rigid, complex and boring, it will keep users from using that application. The user interface plays a crucial role in any application, but in e-learning, it is even more complex. The interface is a medium between human and computer for interaction and usability is a tool which provides measures for effective interaction to achieve specific goals.

Usability is the primary parameter of evaluation of e-learning technologies and systems. Major attributes of usability are efficiency, effectiveness and satisfaction. Usability stands for quality and putting users and their real need in the centre. Therefore investigation of usability and its integration or involvement in the learning process is worthwhile (Zaharias, 2004). This research focuses on usability evaluation techniques for e-learning applications. A literature review has been carried out concerning relevant research works to get more focused research on e-learning and usability evaluation.

1.2 Case Study
This research is composed of an case study with the ambition to evaluate the usability of the interface of an e-learning system in real time scenario. Methods used for the usability evaluation of the e-learning applications are based upon a well-known methodology in HCI research and practice with a focus on reliability and validity. The selected e-learning system for this research is one of the frequently used virtual learning environment applications, a learning platform which is used at Blekinge Institute of Technology and thus is easily available for our empirical study; It’s Learning. It is an internet based system, providing services in the e-learning sector in many parts of Europe.

It’s Learning is a virtual learning environment (VLE) designed for schools and universities. The website provides features like mobile login and web tutorials, which are designed to attract users but its major function is to provide pedagogical services. Many educational institutes and departments in Europe like UNI-C (IT Department in Danish Ministry, which provides “It’s Learning” for all Danish educational institutes), universities and colleges in Scandinavian countries and UK are using It's Learning services for pedagogical purposes (Wikipedia, 2008). Our research aim is to investigate the It’s Learning, user interface and evaluate its usability according to actual user experience. The main focus of this research is on the user experience of students at BTH who have periodic interaction with the system.
1.3 HCI Concept

According to O’Connor, in “Introduction to Human Factors in Computing”, during the last few years, Human Computer Interaction has become more important in user interface designing. Different disciplines and research fields are increasing their participation in the HCI community, such as Computer Science, AI, Philosophy, Art, Design, Psychology, and engineering. HCI has an imperative role in the designing and development of e-services applications. HCI areas such as interface planning interface designing, usability testing and evaluation are a main concern in the designing and development of the web. There are many challenges in web designing such as communicating your message to users, providing a good user experience while communicating with web and ensuring the user returns. (O’Connor, 2004)
2 BACKGROUND
This chapter presents details about the problem definition followed by objectives, research questions, goals and measures of study and in the end, relation between research questions and objectives.

2.1 Problem definition
Evaluating the usability of e-learning applications is not a trivial task. A boost in the diversity of learners, technological advancements, and major changes in learning tasks (learner interaction with a learning/training environment is often a one-time event) present significant challenges and render the prospect of defining the context of use of e-learning applications more complex than ever before. Identifying whom the users are and what the tasks are in an e-learning context impose extra difficulties. In the case of e-learning design the main task for the user is to learn, which is rather implicit and abstract in nature. (Zaharias & Poullymenakou, 2006)

As Notess (2001) argues “Evaluating e-learning may move usability practitioners outside their comfort zone.” Squires (1999) highlights the need for integration of usability and learning and points out the non-collaboration of workers in human–computer interaction (HCI) and educational computing areas. In fact, usability of e-learning designs is directly related to their pedagogical value. An e-learning application may be usable but not in the pedagogical sense, and vice versa (Albion, 1999; Quinn, 1996; Squires & Preece, 1999).

Educational software is developed to support learning. A vital task for designers and Human computer Interaction (HCI) researchers in the educational domain is to develop software tools to support learners and their learning even at distance, and to ensure adaptability of student with system. Usability features not only allow people to efficiently manipulate the interactive applications, but also be appropriate them for the intended learning task (Squires & Preece., 1996). Moreover Squires and Preece (1996) urges that the researchers have not considered enough the implication of usability features of an educational application in order to achieve educational goals.

Our research report is based on performing an analysis to evaluate usability of an e-learning system that is currently being used in many institutions in Europe for learning purposes. It’s Learning is widely used in Europe for learning purpose and has direct influence on learners and their learning. According to the It’s Learning company website, this application is one of
the leading learning platforms in European countries like UK, Netherlands, Norway, Sweden, Denmark, France and Italy. The number of users of It’s learning are growing in many parts of America as well. Its swift spreading gives an idea about the numerous users of It’s Learning but still no research documents are available to the author’s knowledge at present on usability evaluation of the It’s Learning user interface. The authors also observed that there is no podium available for the users of It’s Learning, where they can express their ideas, views and share problems faced when using It’s Learning. Though most users are bound to use It’s Learning in some institutes which act as medium between them and their learning, but there is no specific criteria for judging It’s Learning concerning effectiveness, efficiency and satisfaction level at the users end. Companies tend to present their products as perfect pieces of art for their business prospect, but only users of that product can judge its performance on the basis of their experience of using that product. This touches on an important issue discussed by Squires (1996), who stresses the need to consider the way in which usability and learning interact: According to Squires, Workers in HCI and educational computing areas rarely speak to each other or take note of each others’ work: The educational computing literature is littered with naive and simplistic interpretations of interface design issues, and many writers in the HCI literature appear to be unaware of the significant developments that have been made in theories of learning (Squires 1996; Soloway et al., 1996).

It’s Learning claims that their product follows key design principles. Our usability evaluation of It’s Learning interface aims to help to decide if it fulfils the requirements of a perfect e-learning system covering all important features of usability.

### 2.2 Objectives

The main goal of the research study is to evaluate the usability of an e-learning system, using It’s Learning as a specific case. The following objectives are defined to achieve this goal:

- Observing key features and factors which an effect the usability of It’s Learning user interfaces by using suitable evaluation methods.
- An assessment of It’s Learning functions in order to verify user satisfaction.
- To validate the ease of use and to verify the overall support provided by It’s Learning user interface when user interacts with It’s Learning user interface.

Norman asserts that a formative product should: be interactive and provide feedback, have specific goals, motivate, communicating a continuous sensation of challenge, provide suitable tools and avoid distractions and factors of nuisance interrupting the
learning stream (Norman, 1993). Emphasizing usability, our objective is to scrutinize whether It’s Learning fulfils the requirements for an excellent e-learning application or not.

2.3 Research Questions
The main questions for the thesis work are:

1- What is the user overall experience regarding the usability of It’s Learning user interface at BTH?

2- To what extent does the It’s Learning user interface support users’ especially students’ learning at BTH?

2.4 Goals and Measure for the Study
- Identify main features and factors which affect the usability of It's Learning user interface through detailed literature study and by informal discussion.
- Designing and conducting usability test and analyzing usability test results.
- Designing questionnaire, compiling and analyzing the collected data through questionnaires.

2.5 Relationship between Research Questions and Objectives
The research questions and objectives are interlinked with each other. The first research question is about the users overall experience when they interact with the It’s Learning user interface. It highlights the importance of whether the It’s Learning user interface fulfil the requirements of an efficient and effective interface and whether it possess the qualities of utility, learnability, memorability and safe interface or not. What are users’ views about the features, factors and functions of the It’s Learning user interface? The second research question demonstrates the significance of support when the users interact with the interface. The answer to this question will give an idea about the performance of the system at different levels during the users’ interaction with the interface of It’s Learning. And understanding of user needs, problems and performance of system will be developed through exploring and trying to answer this question.

2.6 Expected Outcome
The purpose of this research is to get a comprehensive assessment of functionalities and features of an e-learning system in use, as experienced by its users. Initially, the authors will
evaluate usability of the It’s Learning user interface. The outcomes from this research will give knowledge about the usability of the system and an idea about the user’s satisfaction level regarding their interaction with It’s Learning user interface at Blekinge Institute of technology. To be more precise, the result from the study will help to understand about effectiveness, efficiency, learnability, memorability, satisfaction and utility of the It’s Learning user interface. Furthermore, after concluding the results, the methods for measuring usability of e-learning websites may be improved which could be beneficial for new products and further improvement of existing systems. The research may also support It's Learning providers in understanding the user needs and requirements. On the basis of results, the authors aim to draw conclusion about the usability of system and give recommendations for improvement of the system.

Another aspect of this research report is knowledge gathering in which authors will consider the future research areas of research regarding usability evaluation of e-learning applications. Moreover, after applying the different techniques and methods for measuring the usability of an e-learning application, authors will draw conclusions about the effectiveness of techniques and methods used for usability evaluation.
3 \textbf{RESEARCH METHODOLOGY}

This chapter presents the research methodologies which have been used in our research work.

3.1 \textbf{Research methodology outline}

Usability evaluation is the usability analysis of a prototype or system where ambitions are to provide feedback in the iterative development process or the further improvement of computer applications. Usability evaluation guides in the development process to recognize and understand the problem. It helps to understand the underlying causes of problems and plan the changes to rectify the problems. (Rosson & Carroll, 2002)

This research consists of a mix research approaches, adopted by the authors during different phases of the research. In the first phase, a better understanding about It’s Learning mechanism and functions was developed after a comprehensive literature review. Direct comments via informal discussions with users helped to obtain more knowledge about the system from a user’s perspective. In the next step, usability testing was conducted by involving the users of system. Think aloud techniques were used by the authors to analyse the usability of the It’s Learning user interface. On the basis of our analysis of usability tests, questionnaires were designed and distributed among users, which was the second phase of research methodology. The feedback from the questionnaires gave a better idea about the usability of the It’s Learning user interface by the involvement of common user’s of system. The think aloud technique and questionnaires gave qualitative and quantitative data respectively. After analyzing the results from all the above techniques and methods, a qualitative study was performed again to validate the data. For this purpose, interviews were conducted with four users of the system to check and get confirmation of said results.
Figure 3.1  Research methodology used for usability evaluation
Usability evaluators use different methods to evaluate usability. There is no standardized method or a technique that is universally acceptable by all usability evaluators. Evaluators use different methodologies, techniques and approaches for usability evaluation. Authors used a mixed approach described by Adelman and Riedel (1997) who identify three types of usability evaluation methods:

- Heuristic
- Subjective
- Empirical

![Usability Evaluation Methods](image)

**Figure 3.2**  Adelman and Riedel classification of usability methods (Adelman & Riedel, 1997)

This report uses both the subjective methods, based on user opinion and the empirical method, based on user actions for usability evaluation.

### 3.2 Literature Review

The initial step was to get a broad knowledge about the current state of e-learning systems and techniques and methods used for research in the area of usability evaluation of e-learning systems. This was done through a systematic approach to search for literature relevant to the topic. Published literature from e-libraries, books, journals and papers related to the proposed topic were selected for the review. The authors contacted the It’s Learning support team in Norway to get more in-depth knowledge about the system being used. Some unpublished documents provided by It’s Learning sources were very useful in order to acquire technical information about the system. The authors used a number of distinct key search terms relevant to the topic to search the material published by several renowned researchers and scholars. The basic aim of the literature review was to provide a proper context for our research and learn from the previous work done by other researchers in this area (Dawson, 2005).
3.3 Informal Discussions
Sharing information is the main purpose of informal discussions. It is a frank and free flowing conversation, without set rules or layout plan and could take place at any stage. Informal discussions were conducted with the users of It’s Learning at Blekinge Institute of Technology. Mainly users are students who have to interact with the system for managing their courses. As a user, the teachers also have also great deal of interaction with It’s Learning but due to time constrains and limitations of the research report only students at Blekinge Institute of Technology were involved in the process of informal discussions. Responses from the users supported and directed us in approaching the next steps for usability evaluation process of It’s Learning.

3.4 Usability Test
After the detailed literature review and informal discussions, the authors decided to conduct usability tests with direct participation of user in the process of evaluation. During the usability tests, users performed task by using system as defined by evaluators. The evaluators evaluated the system usability after observing the results of the tests. In this report the
authors used the “think aloud” technique (Erikson & Simon, 1985) for usability evaluation. This choice was made due to the fact that we did not have access to a usability testing laboratory or technologies and tools for video-recording and detailed video-analysis. The test was conducted in different stages. A pre-test was designed and conducted with two users who were students at BTH. Their conversation was recorded which gave the authors an idea about user observations about the system. In this way, the authors became more precise about the tasks which lead them towards conducting tests individually and in groups.

![Diagram for think aloud protocol](image)

**Figure 3.4**  Diagram for think aloud protocol

### 3.5 Questionnaires
The questionnaire is a well known technique to collect demographic data and users opinions (Preece et al., 2002). Mostly questionnaires are used to gather data from large numbers of people. Questionnaires may consist of two types of questions. One type is open ended
questions in which respondents are free to respond in their own way. These questions are also known as subjective questions. The other type of questions is close ended questions in which respondents are restricted to choose the answer among already given options. These questions are also called objective questions. One should be very careful while designing a questionnaire because ambiguous and unnecessary questions as well as leading questions which influence the informant to answer in a specific way may lead to the failure of the process and wastage of resources (Preece et al., 2002).

The questionnaire technique can be used independently as well as in conjunction with other methods such as observation and usability testing (Preece et al., 2002). The questionnaire technique was also be used in the usability evaluation process that helped to collect the information from the users about their likes, dislikes, needs and understandings regarding the system.

Some different reasons for using questionnaires in usability evaluation are:
(Barriocanal et al., 2003)

- They can be repeatedly used for similar applications after completion of the design.
- They are very cost effective as users can fill in the questionnaires remotely without needing to have any interaction with the testers.
- The evaluators can analyze the user point of view.
- Data gathered through the questionnaires can be used as a reliable base for comparison.

In our research, the authors design questionnaire on the basis of findings from the usability test to get student opinions about the system. After distributing questionnaires among students at BTH, a set of open end and close end questions provided qualitative data about the system in response.
3.6 Interviews
For validation of results, informal interview will be conducted with four students at BTH which will give confirmation of said conclusion. During interviews, the authors asked open end questions with interviewees about their interaction with user interface of It’s Learning. The questions were design keeping in view the results of the usability test and statically obtained data from questionnaires.
4 Usability Evaluation and It’s Learning

This chapter provides awareness about Usability in HCI, e-learning and the focus area of our research i.e. usability evaluation of e-learning application. Moreover this chapter consists of a comprehensive review of It’s Learning which will provide knowledge about the selected system used as our case study.

4.1 Usability

Usability is a term which refers to the interaction of users with a system. It is often measured in terms of how easy it is to learn and use the system, and whether user is satisfied with system or not. Usability is defined most generally yet to the point in the ISO standards as “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” (ISO 9241-11: 1998). Table 4.1 illustrate different standards of defining the term Usability.

Table 4.1: Usability definitions according to ISO and IEE standards

<table>
<thead>
<tr>
<th>Definition</th>
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<td>“The capability of the software product to be understood learned, used and attractive to the user, when used under specified conditions.” (ISO/IEC 9126-1, 2000)</td>
</tr>
<tr>
<td>“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.” (ISO9241-11, 1998)</td>
</tr>
<tr>
<td>“The ease with which a user can learn to operate, prepares inputs for, and interprets outputs of a system or component.” (IEEE Std.610.12-1990).</td>
</tr>
</tbody>
</table>

Nielsen (1993) focused on usability as a sub part of system acceptability and made its own way about usability. The wider term “system accessibility” explains the system credibility through its acceptance by the stake holders and their satisfaction level regarding needs and requirements. The figure describes his definition which is still valid and widely accepted in the computer science field. (Nielsen, 1993)
Usability is based on efficiency, effectiveness, utility, learnability, memorability and safety. Efficiency means how a system supports users in doing their tasks. Effectiveness is an overall goal concerning how good a system is for doing what it is supposed to do and safety is about protecting users from dangerous conditions and undesirable situations (Preece et al., 2002, p. 14). Utility concerns to what extent a system provides the right functionality for doing what the users want to do whereas learnability of a system concerns how easy it is to learn to use a system (Preece et al., 2002, p. 16). Memorability concerns how easy it is to remember how to use a system, once learned (Preece et al., 2002, p. 17).
The main aspiration of usability engineering is to optimize the user experience with an interactive system. Obviously, ‘optimal user experience’ means different things for different systems. Like heuristics (Nielsen, 1994) which serve as guidelines in designing and evaluating an interactive system, such as consistency, error prevention and clear feedback, the work of the usability engineer always involves a creative part in finding ways to adapt existing knowledge on best practices in system design to the system that is currently under evaluation. E-Learning systems are no exception to this rule. In fact, they are probably amongst the more challenging objects of evaluation for usability engineers. This is due to the fact that the E-Learning sector is very heterogeneous with respect to content delivered as well as technologies employed, which makes it particularly necessary to incorporate knowledge from educational psychology and tailor the process of usability engineering to the particular system evaluated. (Melis et al. & Weber, 2003.)

### 4.2 Usability Evaluation of E-learning Applications

Usability plays an imperative role for the success of e-learning applications. If an e-learning system is not usable, the learner is forced to spend much more time trying to understand
software functionality, rather than understanding the learning content (Wong et al., 2003). Moreover, if the system interface is rigid, slow and unpleasant, people feel frustrated are likely to walk away and forget about using it.

Usability of pedagogical systems is key feature in the pedagogy domain. According to Granic and Glavinic (2002), lack of an appropriate usable and user-cantered interface design of different computerized educational systems decreases the interface’s effectiveness and efficiency. This underlines the importance of the main goal of our research study which is to evaluate the usability of the interface of a widely used educational system.

Increased maturity in learning approaches has increased the importance of and challenges for usability design in the domain of learning. In an e-learning environment, the traditional task and work-related usability seem to have limited value while at the same time the need to approach the learner experience in a more appropriate holistic way becomes stronger (Zaharias, 2004). This challenge requires a focus on the affective aspects of learning (O’Regan, 2003; Picard et al., 2001).

To evaluate the usability of system and to determine usability problems, it is important to select appropriate usability evaluation method/methods (Fitzpatrick, 1999; Ssemugabi, 2006.) by considering efficiency, time, cost-effectiveness, ease of application, and expertise of evaluators (Gray & Salzman, 1998; Parlangeli et al., 1999). One of the goals of any learning systems is to avoid any distraction in order to keep all the content fresh in the learner’s minds as they accommodate new and foreign concepts. In the specific case of e-learning, the challenge is to create an interactive system that doesn’t confuse learners. It is often noticed that an e-learning application is a mere electronic transposition of traditional material, presented through rigid interaction schemes and awkward interfaces. When learners criticize the web based training or express a preference for classroom based instruction, it is often not the training, but rather the confusing menus, unclear buttons, or illogical links that scare them off (Ardito et al., 2005).

In the view of Melis et al. & Weber (2003) designing an e-learning system which is more usable, basically involve two aspects. The first aspect is technical usability and the second is pedagogical usability. Technical usability involves methods for ensuring a trouble-free interaction with the system, while pedagogical usability aims at supporting the learning process. Both aspects of usability are intertwined and tap the user’s cognitive resources. The main goal should be minimizing the cognitive load resulting from interaction with the system in order to provide a resourceful learning environment. (Melis et al. & Weber 2003)
The most prominent affective learning factor in e-learning, which can greatly influence users, is interactions with an e-learning application (Schunk, 2000). Thus, it becomes essential to evaluate the usability of e-learning designs with focus on the users’ (learners’) perspective.

4.3 It’s Learning system overview

It's Learning uses technologies like SCORM, QTI IMS by using ASP.NET platform. SCORM (Sharable Content Object Reference Model) is a set of interrelated technical specifications built upon the work of the AICC, IMS and IEEE to create one unified content model (wiki, 2007).

SCORM enables the learning management systems (LMS) to reuse the web base contents. IMS question and test Interoperability Specification (QTI) are standard formats used by It’s Learning for assessment of questions, tests and other corresponding educational reports. This data model enables exchanging the data in the learning system through authorized tools. The questions, assessment material and results are collected through XML data binding. The IMS QTI is designed to support interoperability and innovation through well defined extension points. These extension points are used to wrap the data through XML. (Source: Literature provided by Jan Åge Skaathun)

The It’s Learning expert puts heavy emphasis on the importance of accessibility by describing that It’s Learning meets international accessibility standards: W3C’s WCAG (Web Content Accessibility Guidelines) in addition to the American requirements in section 508. (Source: Literature provided by Jan Åge Skaathun)

It’s Learning provides an environment to integrate the pupils and teacher. Students can work individually as well as collectively on joint projects and assignments. They can create a discussion forum and can communicate with each other with a variety of ways such as chat, instant messenger, process oriented writing tools, notice boards and e-mail. These tools are available for the end-users. (Source: Literature provided by Jan Åge Skaathun)

Students and teachers are periodic users of It’s Learning at Blekinge Institute of Technology (BTH).
4.3.1 Teachers
It’s Learning supports different learning modalities, learning styles, teaching styles and teaching contexts. It’s Learning provides teachers with the possibility of personalizing the learning processes so that materials and methods fit with the preferred learning modality and style of the students. With It’s Learning, the teacher can operate in several teaching contexts and utilize optimal communication patterns. (Source: Literature provided by Jan Åge Skaathun). See figure 4.3. At BTH it is not unusual for several teachers to cooperate in supervising one or several students in their project work, which means there is an additional communication pattern besides the ones presented in figure 4.3 namely many to one.

![Figure 4.3 Teaching Contexts and Optimal Communication Patterns (Jan Åge Skaathun).](image)

4.3.2 Students
Learners can collect, organize, share, discuss and present information and thus be personally engaged in the learning material. They can integrate new information with existing knowledge to build new understanding, and they can reflect on their own learning process and knowledge in an individual or socio-cultural context. (Source: Literature provided by Jan Åge Skaathun).
It’s Learning can bring together many arenas in the learning processes. For young learners, one such arena may be the home. For older students such arenas may include tutoring while in-service or in-practice. (Source: Literature provided by Jan Åge Skaathun)

4.3.3 User Interface In “It’s learning”
It’s Learning claims that the user interface of its learning is the result of repeated usability tests with end-users, both teachers and learners. Instruction has also been taken from internationally celebrated experts such as Bruce Tognazzini, Jakob Nielsen and Steve Krug for improving the usability if It’s Learning. (Source: interview with Jan Åge Skaathun)
5 **USABILITY TEST**

This chapter is about planning of usability test, task definition, selection of users who will perform the tasks, equipment used in the test, conducting the usability test, test statistics, observations and in the end analysis which will give merits and demerits of It’s Learning”.

5.1 **Planning for Usability Test**

Extracted knowledge about the system helped authors to conduct usability test with direct involvement of users. The test was designed to evaluate the system in well organized way which will give more precise and accurate results about the system. The test has three different phases. Before conducting the tasks, authors give little presentation to users about the task definition and guideline about the tasks.

In the first phase authors decided the strategies for conducting the test. Selection of tasks, selecting the users and equipments for the test were discussed and decided at this stage. Pre-test was also part of this phase. Authors select two students who were users of system for conducting pre-test. This was to ensure that the tasks defined are understandable and every user can do it without any hindrance. After getting feedbacks form pre-test users, some improvements in the tasks make it more logical. Test parameters were also defined by authors after observing pre-test results.

The second phase was actual test conducting phase in which user perform tasks individually while their individual observation was noted down by authors. Total of 6 individuals were selected for this task. Among them two were usability expert having background knowledge of usability and Human computer interaction (HCI), while remaining four were random users of the system. One of these four users was novice user. Common thing between these users was that they all have interaction with the system interface in routine.

In the third phase 9 users were divided into 3 groups having 3 users in each group. Group members were allowed to discuss about the system during the test. All the 3 groups perform tasks and author noted their collectivize observations. After the test analysis, findings were noted down by authors for usability evaluation process.
5.2 Task Definition
Usability test consist of four major tasks. Each task has different set of action to be performed by users. Each action covers different range of fields which are relative to usability and these fields cover main features of system. These entire tasks are simple and brief. For more understanding of the tasks, some hints are given at the end of statement. Users are free to ask questions about the task if they fell any complication. Results obtained from the task could help evaluator to evaluate the system in better way.

5.3 Selection of participants
In the usability test, total of 17 students were selected who were at different levels as described in table 5.2. All the users were students of BTH and were selected from different programs like software engineering, computer science, security engineering and business administration but common thing among them was that they were all user of same system. For better understanding about the usability test, it is important participants should know that what the task is all about. For this, language used during test has important role. English language is mode of communication in BTH and nearly all students can communicate in English. Because students are studying in international environment so the language selected for the test was “ENGLISH”. It’s noticed that sometimes it became hard for fewer to explain their real observations or feelings in second language, so language used in the task is very simple and easily understandable. Before selecting participants, good command over English language was pre-requisite, so that each individual or group express their observation clearly while speaking English.

Before conducting tasks, particulars of each participants were noted down which include, their names, area of discipline (courses), approximate time period(in months) of their attachment with the system and their interaction with system on daily/weekly/monthly basis.

5.4 Equipment used in the test
The test was conducted in natural and friendly environment. Equipments like computers, printouts, time calculating device were same in all three phases as described in table 5.2. Web browsers used in the test was Microsoft Internet Explorer (version 7). BTH lab was used for conducting test and audio recording was done with prior permission of participants.

5.5 Conduction of Usability Test
The test was conducted at different timings according to availability of participants and labs at BTH. Authors noted down the observation of participants and recorded the whole task on audio recording device. Start time of the test and end time for each group and individual was noted down by authors.
Table 5.1 Usability test - Tasks List

<table>
<thead>
<tr>
<th>Task No 1. Main page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Open “It’s learning” using the home page of BTH website.</td>
</tr>
<tr>
<td>2- Login to the page with username and password.</td>
</tr>
<tr>
<td>3- Select a course from course list.</td>
</tr>
<tr>
<td>4- View personal report of that course which you have selected in step 3. (Hint: select course and then go to status and follow up link on menu list.)</td>
</tr>
<tr>
<td>5- Go to main page and select another course from course list.</td>
</tr>
<tr>
<td>6- Search any file from the menu list of course, selected in step 5, and open that file to view it.</td>
</tr>
<tr>
<td>7- Add a new course in course list.</td>
</tr>
<tr>
<td>8- Select a course which is no more in use for you and remove it from main.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task No. 2. Searching criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Go to search page.</td>
</tr>
<tr>
<td>2- Enter key words to search any course which already enrolled.</td>
</tr>
<tr>
<td>3- View the course detail which is searched in step 2.</td>
</tr>
<tr>
<td>4- Go back to search page.</td>
</tr>
<tr>
<td>5- Enter key words to search any course which is not enrolled.</td>
</tr>
<tr>
<td>6- Come back to search and select internet search.</td>
</tr>
<tr>
<td>7- Enter key word to search on internet by using Google search engine.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task No 3 Help and Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Open “Help/About” page by using main page.</td>
</tr>
<tr>
<td>2- Click on “Courses” to see the help for registering the course. (Use menu list on left of the page, a video tutorials that deal with courses registration).</td>
</tr>
<tr>
<td>3- Go on messages and click on new message.</td>
</tr>
<tr>
<td>4- Upload a file and send this e-mail message to someone who is using the system.</td>
</tr>
<tr>
<td>5- Click on to message setting.</td>
</tr>
<tr>
<td>6- Forward your messages to your external E-mail address (HINT: Any other email address like hotmail, gmail etc.).</td>
</tr>
</tbody>
</table>
Task No. 4. Preference setting and E-portfolio

1- Click on my settings
2- Update your personal information
3- Click on e-portfolio
4- Create portfolio and view it.

5.6 ANALYSIS OF USABILITY TEST

5.6.1 Test Statistics

Table 5.2 describes the time spent in all the phases during the test. Each participant performs a task at different time intervals so average time with maximum and minimum time consumed while performing the tasks both by individual and group tasks was calculated. There were some unexplored features of the system which were unfamiliar for some of the participants. In the author opinion, these could be the reasons for the maximum and minimum time gap.

Table 5.2 Summary of time for Usability test

<table>
<thead>
<tr>
<th>Phases</th>
<th>Test's Participants</th>
<th>Number of Participants</th>
<th>Maximum time in minutes</th>
<th>Average time in minutes</th>
<th>Minimum time in minutes</th>
<th>Difference between minimum and maximum time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre- Test</td>
<td>Users</td>
<td>2</td>
<td>37.37</td>
<td>34.5</td>
<td>32.14</td>
<td>5.23</td>
</tr>
<tr>
<td>Individual test</td>
<td>4 users 2 experts</td>
<td>6</td>
<td>41.28</td>
<td>33.16</td>
<td>24.04</td>
<td>17.23</td>
</tr>
<tr>
<td>Group test</td>
<td>3 users per group</td>
<td>9</td>
<td>31.05</td>
<td>29.17</td>
<td>27.29</td>
<td>3.76</td>
</tr>
</tbody>
</table>
Though all participants have previous experience of using It’s Learning but there were some novice users as well who were not completely familiar with all the features of system.

Table 5.3  Summary of Participants Interaction with system

<table>
<thead>
<tr>
<th>Phase</th>
<th>Participant ID</th>
<th>Participant Discipline</th>
<th>Approx. Time of attachment with system (in months)</th>
<th>Interaction with system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td>1</td>
<td>CS</td>
<td>20</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Pre test</td>
<td>2</td>
<td>SE</td>
<td>20</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Individual</td>
<td>3</td>
<td>CS</td>
<td>16</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Individual</td>
<td>4</td>
<td>CS</td>
<td>16</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Individual</td>
<td>5</td>
<td>EE</td>
<td>3</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Individual</td>
<td>6</td>
<td>EE</td>
<td>0.5</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Individual</td>
<td>7</td>
<td>SE</td>
<td>9</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Individual</td>
<td>8</td>
<td>BA</td>
<td>9</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Group 1</td>
<td>G1</td>
<td>EE, SE, SE</td>
<td>16,16,9</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Group 2</td>
<td>G2</td>
<td>SE, CS, CS</td>
<td>4,20,20</td>
<td>Yes No No</td>
</tr>
<tr>
<td>Group 3</td>
<td>G3</td>
<td>BA, BA, BA</td>
<td>16,16,16</td>
<td>Yes No No</td>
</tr>
</tbody>
</table>

Table 5.3 describe about the participant’s experience of using It’s Learning. The table also demonstrate participant field of study where CS stands for Computer Science, SE for Software Engineering, EE for electrical engineering and BA stands for Business administration. G1, G2, G3 are used for Group 1, 2 and 3 respectively. Furthermore table 5.2 also gave an idea about the period that for how long participants are using the system and on which routine they interact with system like on daily, monthly, or weekly basis. Data like this will help authors to evaluate many usability features.
Table 5.4  Summary of Task time and Status

<table>
<thead>
<tr>
<th>Phases</th>
<th>Individual/Group</th>
<th>Total time in minute</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Task 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Time (min)</td>
<td>Status</td>
<td>Time (min)</td>
<td>Status</td>
</tr>
<tr>
<td>Pre-test</td>
<td>Individual</td>
<td>37</td>
<td>9</td>
<td>C</td>
<td>7</td>
<td>C</td>
</tr>
<tr>
<td>Pre-test</td>
<td>Individual</td>
<td>32</td>
<td>8</td>
<td>C</td>
<td>6</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>Individual</td>
<td>35</td>
<td>9</td>
<td>PC</td>
<td>6</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>Individual</td>
<td>24</td>
<td>6</td>
<td>PC</td>
<td>5</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>Individual</td>
<td>28</td>
<td>7</td>
<td>C</td>
<td>5</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>Individual</td>
<td>33</td>
<td>8</td>
<td>C</td>
<td>7</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>Individual</td>
<td>36</td>
<td>9</td>
<td>PC</td>
<td>8</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>Individual</td>
<td>41</td>
<td>14</td>
<td>PC</td>
<td>9</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>Group 1</td>
<td>31</td>
<td>6</td>
<td>C</td>
<td>7</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>Group 2</td>
<td>27</td>
<td>9</td>
<td>C</td>
<td>5</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>Group 3</td>
<td>29</td>
<td>7</td>
<td>C</td>
<td>5</td>
<td>C</td>
</tr>
</tbody>
</table>

Table 5.3 is summary of task time and status of the task, where “C” stands for “Completed”, “PC” for “Partially Completed” and “NC” stands for “Not Completed”. When the status marked “C” it means than individual or group has completed the task, if status marked “PC”, its mean that individual/group have leave the task uncompleted or have done some parts of it. If the status is marked “NC”, it shows that participants didn’t complete the task or tried it but were unable to complete it.

5.7  Observation
Authors monitor the participants while they were performing the tasks and Here are brief collective observations noted by authors during usability test:
5.7.1 Task 1:
The major tasks in this section were related to login to its learning website and exploring features of “main page” and “course page” after login. BTH administration allot user name and password to the each users which allow them to access it’s learning website as a BTH user. There are some alternates to login to the system without using BTH website, but in this case study, we have used BTH website as gateway for enter into the system. Following points were observed by the authors while participants performed task 1.

5.7.1.1 Login procedure
- Most of the participants were not satisfied with login process. Login procedure is very lengthy and time consuming which consist of several steps.
- After reaching the login page of It’s learning, login/password frame has common style and page has some hyperlinks which were ignored by all the participants.

5.7.1.2 Main Page
- Participants did not find the main page attractive. The major contents of the page consist of list of tasks and list of courses in separate frame.
- Participants appreciate date highlight feature which is indication for new updates in course.
- Expert’s participants draw author’s attention to the main page contents setting and describe them as not well organized.
- “View personal report” feature of the system was not familiarized by many participants. Some participants were using it for the first time. Hints were also provided for their convenience but still some were unable to do the task. Though participants like this feature but they were confused after viewing long list of tasks and their status.

5.7.1.3 Add/Remove Course
- To add new course there is no “Add course” link or button available on the main page. The processes for adding new course in the complicated and novice user faced some difficulties.
- Participants faced hitches during the searching and downloading of course lectures/files. It was observed that some courses have many folders in menu list which create ambiguities in selecting the right folder.
- A course which is no more in use can’t be removed from the main page. Some experience users were able to do it, but they move to “course page” for conducting this task. Following things were observed here by participant’s reaction to the tasks:
5.7.2 Task 2:
Task 2 is related to search tools used by the system. Most of participants say that they rarely use system search page. Participants perform task while author observed following main points:

5.7.2.1 Course search
- The search page has simple structure and easily understandable.
- When Participant enter name of course for search, it’s give relevant results and a list was generate by system.
- Expert participants describe it that “title” should come after the “course title”.
- Date is mentioned at corner which is usually remains out of sight from users.
- System searches the contents of the registered course with priority to “date” instead of key words entered for search.
- Participants entered name and codes of unregistered course as key words for searching them in system. Instead of no result or comments like “you are not participant in this course” there was long list of searching output of other subjects.
- Some participants claim that sometime the system does not give any output of course content although these contents are uploaded on the system.
- There are no options for participant to set the search priority.

5.7.2.2 Internet Search
- The system provides the facility for searching on the internet with different search engine like Google, AltaVista, etc. the participants consider it as good feature.
- There is technical problem with tabs setting. When participants press entered key after entering search word, it didn’t work but it worked properly with mouse click.
- Some of the search engine didn’t work with the system.
5.7.3  Task3:
The 3rd task of the test was about Help and supporting tools of the system. Participants were asked to perform task to relating to help and support of system. Authors sum up following results by examining participants performing tasks:

5.7.3.1  Help and support
- Help is available for all types of users including teachers, administrator and students but participants faced difficulties finding the help.
- Few participants were unable to find help even with the help of hints.
- Participants were expecting special help from the help page which have to be student specific only, but it was more complex.
- Those participants who completed this task appreciated the tutorials for guideline and help.

5.7.3.2  Messaging
- The system provides fast messaging facility to the students.
- Participants can send the internal message but system doesn’t provide internal internet chat platform.
- The system doesn’t provide message forward facility to external e-mail servers like hotmail, yahoo etc.
- Participants were not satisfied with the upload mechanism of system.
- There is another pop up window for uploading the file.
- Although the subjects happy with the message forwarding facility to their BTH e-mail account but they feel difficulty to reach the message setting.

5.7.4  Task4:
Task 4 includes customizing the system by using my-setting and creating e-portfolio where participants explore these features. Following are the observation noted down by author:

5.7.4.1  My-settings
- Participants faced difficulty to find link for adding personal information because there was no clear link for adding personal information.
- The available link was only “change details”.
- The other links under “My settings”, participants described then unnecessary.
- Some participants were confused over the pop up window for uploading the file.

5.7.4.2  E-portfolio
- The authors notice that most Participants have no information of “e-portfolio”.

• Participants want to change the skin of their e-portfolio but the link for change skin is small.
• Many participants accept that they never use these features of system but they describe them interesting.

5.8 Summary of observations
The observations for each group, individual and pre-test participant is summarized in Table 5.4 for all tasks:

<table>
<thead>
<tr>
<th>Table 5.5 Summary of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tasks</td>
</tr>
<tr>
<td>Task 1</td>
</tr>
<tr>
<td>Task 2</td>
</tr>
<tr>
<td>Task 3</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Good “help” related material is available but not used by students frequently, it’s difficult to access help related topics, tutorials and video clips are more supportive, system internal messaging speed is good, no chat room available, Messages forward facility is good but have flaws.</td>
</tr>
<tr>
<td>Task 4</td>
</tr>
</tbody>
</table>

### 5.9 Analysis
In these tasks, participants were asked to verbalize their feeling, thoughts and opinions during their interaction with system. Think aloud technique is very useful in covering wide
range of cognitive activities. Participant’s body language and their remarks, while they were performing the tasks was main source to analyze the system. Author describe the merits and demerits of system by focusing usability pillars according to ISO standard (ISO9241-11, 1998) i.e. effectiveness, efficiency and satisfaction.

5.9.1 Merits of It’s Learning
Here are merits of it’s Learning system which authors draw during the analysis of system by using think aloud technique:

Generally, It’s Learning is liked by users and they consider it comprehensive platform for learners and their learning activities at BTH. Although, users have some critical view about the system but system overall performance, features, and facilities satisfied them.

The system speed and response is good. Some feedback features of the system are good like, the way of alerting the students by changing the date colour into red, when any data or information is added to the course. It also covers feature like, the link “Today’s Activities” which help students to manage the activities per day. “Tasks” function on the main page is another good feature and effective way to remind users about deadlines of assignments and other activities. Main page also display unread messages, which are shown at the end of page.

The “Discussion Forum” for every course is another feature supportive for the students. Through this feature, students and teachers can post their suggestions, problems and updates on the system and get feedbacks. Participants of the test were impressed by this facility which helps them to interact with other course participants and teachers as well. The facility of watching the online users is also popular feature of the system although icon used for this feature is small. The participant seems satisfied with the features of “Grade book” and “Personal report” of a particular course. They also like the features “Participants” and “Card list” where they can know about their course participants.

Participants feel satisfied with “Search Internet” feature. It provides the facility of searching on the Internet with different popular search engines like Google, yahoo etc. They also took interest in “My setting” and “E-portfolio” despite of the fact that they are least used features of the website. The system also provides the facility of setting home page with different colour settings. They can set the view permission and can manage their private and public files easily.

5.9.2 Demerits of “It’s learning”
Along with the list of merits, system is critical viewed by participants and have many demerits as well. First thing that goes against It’s Learning is that the smallest task requires
large effort. Suppose a student wants to find out its exam date, he has to go through long process including a lengthy login process. After login to the system he has to search for course and then course contents where he has to download file to look at the exam date schedule.

The main page of system is not well structured and has un-attractive interface. Main page is composed of different section and need to be managed properly. If a user has too many courses in main page, it faces problem in finding and reading the course related literature. Adding new course is complex and confusing. Terminologies used for links are not appropriate for add/remove courses.

If a student wants to get information about the course, he has to enrol into it first, after enrolment; it can read about the course structure, view course description and old assignments/exams. Some features are not available by system, like if a user wants to remove the courses permanently from the system, there is no such facility provided for doing this task. It can only be remove from the main page but most of but process of removing the course from main page is difficult to explore for novice users.

Internet search facility is good but there are some technical problems in the search section of system. Tab setting and search engines compatibility is not adjusted with the system, which appears as bug in system. During the course search query, system displays the long list of results and subjects feel difficulty to find required contents according to their search string. “Search Guide” link is available on the system but it is useless for many participants because contents are written in different languages. Help/about feature of the system is supportive but it is confusing, it is hard to find help material related to student’s problems to a specific task. Users have to find help/guideline from long list in the help page section of the system. The system consists of much of irrelevant material which like are of no use for student. No proper hyperlinks are available for some of the important features of system.
6 QUESTIONNAIRES & INTERVIEWS
This chapter covers important parts of this research report. It contains questionnaires design phase, questionnaire distribution process and questionnaires analysis.

6.1 Questionnaires planning and distribution
Questionnaires were planned with purpose of obtaining quantitative data. An objective for questionnaires was to find out strength and weakness of the systems. After the completion of questionnaires, statistical analysis will be carries out to analyze the final results of questionnaires. Hardcopy of questionnaires were distributed to 16 students at BTH. Students from different programs were selected but common thing was that they all use the system at same level.

6.2 Questionnaire Design phase
The questionnaire designing phase starts after the analysis of usability test which gives authors a better understanding about system and how users interact with the system. The questionnaire format was designed by adopting Lund Arnold (Arnie) M. (2001) method for measuring usability with USE questionnaires. The questionnaire consists of 37 questions. Among them, 35 questions are close ended and 2 questions are open ended and it is divided into 8 groups. Each group has several close ended questions which covers different aspects of usability. 5 levels have been adjusted for agree or disagree with the questions. If student don’t want to comment on any particular question, it can mark on “N/A”. Besides close ended questions there are 2 open ended question which are about system support and student personal opinions and recommendation for improvement of the system. In addition to open ended and close ended questions, the questionnaire also demands student’s personal information like name, course program and contacts (telephone number or e-mail address). Student can give additional remarks about the system on a separate column provided at the end of questionnaire. Overall questionnaire pattern and format is easily understandable. Table 6.1 describe questionnaire in detail:
### Table: 6.1 Questionnaires

<table>
<thead>
<tr>
<th>Ser.</th>
<th>Questions</th>
<th>Disagree</th>
<th>Levels for disagree or agree</th>
<th>Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Visibility of system status &amp; Contents</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>The interface of website is pleasant and attractive.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The System is easy to understand and highlights the tasks that you think of most importance.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Font (size, style, and colour) are easy to read on-screen.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Contents of system are organized in proper manner.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Language usage in system like terms, phrases and symbols are easy to understand.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Terminologies related to task are appropriate.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Site Navigation, organization and structure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>The site has a simple navigational structure and related information is place together.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>System layout remains same when you navigate from one page to other.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Every page has the required navigation buttons or hyperlinks (links), like as previous (back) next and home.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Navigation through browser like previous (back) and next is supportive by the system.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Consistency &amp; Relevance of site content</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>The same words, concepts, situation, symbols or actions refer to the same thing.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>The system follows common platform standards.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Contents are attractive, relevant, appropriate and clear to students.</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>System is free from irrelevant material (which is not used by students).</td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>Error Prevention, recovery from errors &amp; Feedback</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>15 The system helps user not to make serious errors.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>16 System display appropriate messages in case of any error.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>17 Displayed error message defines problem and immediately provide instructions for recovery.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>18 System provides proper academic feedback about student activities like project deadline or exams date etc.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learnability (Ease of Learn) &amp; Accessibility</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 It is easy to learn how to use the system.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>20 It is easy to remember how to use it.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>21 It is easy to become skilful to control the system.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>22 User can explore new features by using trials and learning from errors.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>23 You never observe any technical problem (hyperlink errors, programming errors etc.) while using the system.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>24 System speed is good and system is reliable</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flexibility and efficiency of use</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 System is flexible and users can adjust settings which suit themselves i.e. to customise the system.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>26 System is easy to use and requires fewest steps to accomplish desired tasks.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>27 Using the system is effortless and can be use without written instructions.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>28 Both novice and expert users can use it without any difficulty.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Help and Support</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 The site has a help facility and other documentation to support student’s needs.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
<tr>
<td>30 Information in above mentioned facilities is easy to search, appropriate and support to accomplish tasks.</td>
<td>Disagree</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
</tr>
</tbody>
</table>
### Effectiveness and Satisfaction

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>The system helps me to become more effective and productive.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>The system gives me control over my learning activities and save my time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Activities and facilities available in system encourage student-teacher and student-student interaction.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>I am satisfied with the system and it is fun to use it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>I work the way I want it to work.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>What are your suggestions for improvement of system?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>To which extent system supports your overall learning.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6.3 Analysis of questionnaire

To get the accurate results of questionnaires, authors calculated student’s response against each question and each group. Graphs and tables are used to show statistical data obtained from questionnaires.
6.3.1 Close ended questions
This section of chapter gives a comprehensive view of the feedbacks of questionnaires with the help of tables, diagrams and graphs.

**Graph 6.1**  Graphical representations of results for each group of questionnaire

![Graphical representation of results](image)

6.3.2 Analysis of close ended questions

6.3.2.1 Visibility of System status & Contents
The first portion of the questionnaire “Visibility of System status & Contents” provide following:
According to above figures nearly 59% students give the opinion above the average level and looks satisfy with this feature. 32% students consider visibility and contents of system are in average range. Only 8% disagree and no one strongly disagree to this feature.
6.3.2.2 Site Navigation, Organization and structure
“Site Navigation, Organization and structure” portion of the questionnaire contains four questions to detect usability empirically. The authors collect following results:
In response to this feature 52% students agree and 17% are strongly agree, this shows 69% students consider it above the average level. Only 3% strongly disagree and 11% are disagreeing to this feature.

6.3.2.3 Consistency & Relevancy
The 3rd portion of the questionnaire “Consistency & Relevancy” provides following analytical data:
Almost 69% of the students think that consistency of the system is over the average standard including 28% highly agree value for this feature. Only 8% consider it below the standard.

6.3.2.4 Error Prevention and Recovery from errors & feed backs
In this portion of the questionnaire the authors gets useful information to measure this feature. Subsequent of this portion are as follow:
9% of the students strongly disagree, nearly 13% disagree and 28% consider average level of error prevention and recovery of the system. 50% of the students consider system above average level against this feature.

6.3.2.5 Learn ability & Accessibility
It is 5th portion of questionnaire and is an important feature of usability. Students respond to this feature of system numerically gives following output:
42% of the students agree to this system, almost 19% are strongly agreed and 60% as whole consider system helping in learn ability and accessibility. 26% consider this feature at average level. 13% of the students think this feature below the average.

6.3.2.6 Flexibility & Efficiency
The 6th portion of the questionnaire is related to “Flexibility & Efficiency”. The statistical outcome of this feature is as follow:
50% of the participants consider the system is above the average level regarding flexibility and efficiency. 35.5% consider it at average level. 14% consider this feature below the level.

6.3.2.7 Help & support
This portion of questionnaire produces following quantitative data:
47% of the students agree, only 6% strongly agree and 28% consider system help and support feature is average level. 18.75% consider it below the level.
6.3.2.8 Effectiveness & Satisfaction
In this section of questionnaire determines the response of participants analytically as below: 69% of the students consider the system regarding effectiveness and satisfaction above the average level where as 24% consider it at average level. Only 8% consider it under the average.

Table 6.2 Percentage values of Usability Features

<table>
<thead>
<tr>
<th>Different segments of questionnaire</th>
<th>1 Disagree</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visibility &amp; Contents</td>
<td>0</td>
<td>8,33</td>
<td>32,292</td>
<td>40,625</td>
<td>17,7</td>
</tr>
<tr>
<td>Navigation &amp; structure</td>
<td>3,125</td>
<td>10,94</td>
<td>17,19</td>
<td>51,56</td>
<td>17,1875</td>
</tr>
<tr>
<td>Consistency &amp; Relevancy</td>
<td>3,125</td>
<td>4,6875</td>
<td>23,4375</td>
<td>40,625</td>
<td>28,12</td>
</tr>
<tr>
<td>Error Prevention &amp; Recovery</td>
<td>9,375</td>
<td>12,5</td>
<td>28,125</td>
<td>28,125</td>
<td>21,875</td>
</tr>
<tr>
<td>Learnability &amp; Accessibility</td>
<td>2,08</td>
<td>11,46</td>
<td>26,042</td>
<td>41,67</td>
<td>18,75</td>
</tr>
<tr>
<td>Flexibility &amp; Efficiency</td>
<td>1,5625</td>
<td>12,5</td>
<td>35,94</td>
<td>37,5</td>
<td>12,5</td>
</tr>
<tr>
<td>Help &amp; Support</td>
<td>0</td>
<td>18,75</td>
<td>28,125</td>
<td>46,875</td>
<td>6,25</td>
</tr>
<tr>
<td>Effectiveness &amp; Satisfaction</td>
<td>1,25</td>
<td>6,25</td>
<td>23,75</td>
<td>56,25</td>
<td>12,5</td>
</tr>
</tbody>
</table>

6.3.2.9 Overall Response of students to questionnaire:
The quantitative data collected through questionnaire to evaluate the usability of system and authors implement some mathematical operations to get useful information about the system.

Table 6.3 Student’s overall response to the questionnaire

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Average</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>3%</td>
<td>10%</td>
<td>27%</td>
<td>42%</td>
<td>18%</td>
</tr>
</tbody>
</table>
Figure 6.1 describe the statistical data presented in table 6.4 in diagrammatic view:

**Figure 6.1** Overall students response to the questionnaire

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Total number of respondents</th>
<th>Levels of Agreed and Disagree (%age of responses against each question)</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td>0 12,5 31,25 56,25 0</td>
<td>–</td>
</tr>
<tr>
<td>2</td>
<td>16</td>
<td>0 6,25 43,75 31,25 18,75</td>
<td>–</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
<td>0 0 31,25 43,75 25</td>
<td>–</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>6,25 6,25 37,5 50 0</td>
<td>–</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>0 12,5 25 31,25 31,25</td>
<td>–</td>
</tr>
<tr>
<td>6</td>
<td>16</td>
<td>0 12,5 25 31,25 31,25</td>
<td>–</td>
</tr>
<tr>
<td>7</td>
<td>16</td>
<td>0 18,75 18,75 56,25 6,25</td>
<td>–</td>
</tr>
</tbody>
</table>

6.3.2.10 Individual assessments of each question

Table 6.5 gives the more precise calculations of student’s responses against each question.

**Table 6.4** Individual assessments of each question
<table>
<thead>
<tr>
<th>8</th>
<th>16</th>
<th>0</th>
<th>18,75</th>
<th>12,5</th>
<th>43,75</th>
<th>25</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>16</td>
<td>6,25</td>
<td>0</td>
<td>31,25</td>
<td>50</td>
<td>12,5</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>16</td>
<td>6,25</td>
<td>6,25</td>
<td>6,25</td>
<td>56,25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>16</td>
<td>0</td>
<td>12,5</td>
<td>25</td>
<td>37,5</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>0</td>
<td>6,25</td>
<td>18,75</td>
<td>50</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>16</td>
<td>6,25</td>
<td>0</td>
<td>37,5</td>
<td>31,25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>16</td>
<td>6,25</td>
<td>0</td>
<td>12,5</td>
<td>43,75</td>
<td>37,5</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>6,25</td>
<td>12,5</td>
<td>31,25</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>18,75</td>
<td>25</td>
<td>12,5</td>
<td>25</td>
<td>18,75</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>16</td>
<td>12,5</td>
<td>12,5</td>
<td>50</td>
<td>6,25</td>
<td>18,75</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>18,75</td>
<td>56,25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>16</td>
<td>0</td>
<td>6,25</td>
<td>25</td>
<td>50</td>
<td>18,75</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>16</td>
<td>0</td>
<td>6,25</td>
<td>12,5</td>
<td>62,5</td>
<td>18,75</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>16</td>
<td>0</td>
<td>6,25</td>
<td>31,25</td>
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<td>56,25</td>
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</tbody>
</table>
6.3.3 Analysis of open ended questions
In response of open ended question most of students stated that they are satisfied with the system but 80% of them also emphasize on improvements. Some students also highlighted the problems faced by them during their interaction with system. Authors describe their suggestions and problem in chapter 7 which is about discussions and validation.
7 DISCUSSION AND VALIDATION STATEMENT
This chapter contains discussion, answering the research question and validation assessment of the thesis. First section of this chapter “Discussion” consist of issues like usefulness, effectiveness, efficiency of the system while the second chapter is about the validation assessment of the results obtained.

7.1 Discussion
The purpose of this research report was to evaluate the usability of e-learning application by using appropriate techniques and tools. For this purpose a broadly used e-learning platform It’s Learning was selected as case study. To evaluate the system in better way, authors adopted a well organized systematic approach.

Diverse methods and techniques are used internationally to evaluate the usability. Each usability evaluation method/technique touches different mind approaches. It is not necessary that all the usability evaluation methods give same results. Suppose, if one specific method solves all the problems regarding usability, then there is no need for any others method. In order to get more refine results, authors used “think aloud” technique and “questionnaires” as main tool to analyze the system.

According to Fallman (2003), challenge in an information-rich world is not only to make information available to people whenever and wherever they need and in any form but specifically to say the right thing at the right time in the right way. Particularly talking about the pedagogy domain where learner objectives are dependent on the information provided by system, evaluating usability is of great significance.

7.1.1 Principles of User Interface Design

7.1.1.1 Visibility
Not all the students were fully satisfied with the system’s interface. Many of them say that they have no complaint with it. What authors extract from the usability test results was that the system needs little improvement on visibility, whereas statistical data of questionnaires presents good ratio of user satisfaction level. Font size and text colours scheme are admired by students but overall interface of the system is not so attractive. Contents setting were not much appreciated. System consists of much irrelevant material on different sections which are not in common use of students. Because of user’s daily interaction with the system, sometimes they get bored by using the same interface, but in general it’s learning covers much of usability issues under the area of visibility.
7.1.1.2 Feedback
Feedback is about design of system which keeps user informed of actions they perform; the changes which take place after any action, errors and recovery from errors. In e-learning system, feedbacks have important role. Simple, clear and immediate feedbacks should be provided by system to its users. It’s learning provides feedback in efficient way but in few case, there is lack of this facility. The analysis shows that users are satisfied with the academic feedback provided by the system.

7.1.1.3 Simplicity
Simplicity means that the design of system should be simple, common tasks could be perform easily, provide good understanding to its users. It’s Learning” is not as simple as it should be as an e-learning platform but it is easy to learn. The system supports learnability. As describe earlier, student daily interaction with the system make them confident to use system easily. For novice user it is no simple but it is requirement of users. Repetition of same process in routine makes the system simple for them to handle most of its features. If users trying to explore any hidden feature of system for the first time, it may face some hurdles.

7.1.1.4 Structure
Some improvements can be made in the structure of the system. Analysis of results shows that some important features of system are not in easy access of students. System needs more refinement to manage the contents. In some cases, users have to go through several steps to view their desired stuff. There are complexities in some sections like add/remove course page, help etc.

7.1.1.5 Tolerance
Tolerance in the system concern with measures which: reduce the chances of mistake, flexibility of system and error prevention wherever possible etc. It’s Learning possesses the quality for reduction of mistakes as much as possible. Flexibility is the issue which is not appreciated by the users of system. It’s Learning didn’t fully support flexibility issues. There are some preference setting but they are not of in common use of student. These available preferences setting options are minor and have no major effect on interface of the system.

7.1.1.6 Affordance
According to Norman (1988) an affordance is the design aspect of an object which suggests how the object should be used. It’s learning partially support affordance.
7.1.1.7 Consistency
Regarding to consistency, the system provides consistency and use common platform standards. The size of text fields, text style, text colour and size remain consistent. Students seems satisfied with features like same words, situation, symbols used by the system. In some section of system, dual language creates little confusion in users.

7.1.2 ISO Usability standards
For “Discussion” ISO Usability standards are used i.e. Effectiveness, Efficiency and satisfaction.
Lohr (2000) describes these standards as:

Effectiveness: Learner interprets instructional interface function correctly; instructional interface function performs according to the learner’s expectations.

Efficiency: Learner experiences minimal frustration interpreting instructional interface function; learner experiences minimal obstacles in using instructional interface element.

Satisfaction: Learner seems comfortable in the environment overall.

Authors draw a summary of “discussion” by following ISO usability standards as presented in table 7.1

<table>
<thead>
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<th>Table 7.1 Summary of discussion</th>
</tr>
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<tbody>
<tr>
<td><strong>Effectiveness</strong></td>
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<tr>
<td>Accomplishing the tasks</td>
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<tr>
<td>Handling the system</td>
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<tr>
<td>Tasks achieving time</td>
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<tr>
<td><strong>Efficiency</strong></td>
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<tr>
<td>Number of good and bad characteristics describe by users</td>
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<tr>
<td>Navigation</td>
</tr>
<tr>
<td>Recovery from errors</td>
</tr>
<tr>
<td>Error’s prevention</td>
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</tbody>
</table>
## Efficiency

**Documentation or help’s use frequency**

“Help” related material provided by system is good but it is not presented in efficient way. User seldom uses help from system. “Help” section of system need improvements.

**System overall efficiency**

“It’s learning” is a massive system and all of its features and function could not be perfect. Many of its section provide efficiency in performance but some are inefficient as well.

### Satisfaction

**Users favorable and unfavorable comments**

System fulfils basic academic requirements of the users. Many users are satisfied in this particular field but many of users also suggest that there is need to improve features system’s relating to academic activities and provide more user friendly environments for work.

**User frustration level**

Sometimes users get frustrated by using the system for long period. More customization preferences should be provided by system to avoid user getting bored.

**Users satisfaction with functions**

System provides some very good function which could be helpful for learners but very few of users are familiar with all these function. There should be some mechanism which instructs users to utilize most of the features of system according to their need and requirements.

### Learnability

**Time to learn**

System support learnability and users can get familiar with it easily.

## 7.2 Answering research question

In order to finding answers for the research questions, a stepwise process was adopted throughout the system. After the literature review, usability test was the primary mean to investigate the answers to the research questions followed by questionnaires. The data gathered through usability test and questionnaires response to research question in a systematic way.

Author’s find that students have mix approach regarding it’s learning usage. Mostly students appreciated the overall performance of the system but they also highlighted many dark sectors in the system as well. Although, the results shows that system is not completely effective and supportive to the students and need major improvements in sectors like
interface, contents setting, terminologies etc. but it still fulfils basic requirement of students at BTH.

7.3 Validity statement
Mix approach (quantitative and qualitative) has been adopted by authors in this research report and research results are assessed in accordance with the given criteria by Trochim (2006). The criteria contains: Creditability, Transferability, Dependability and Conformability. Following subsection discussed them one by one:

7.3.1 Creditability
Creditability means (Trochim, 2006) the reasonable results of research are according to acceptance of participants. To achieve the creditability authors use systematic approach throughout the research. Each phase of the research, starting for informal discussion to questionnaires analysis has dependency on each other. Informal discussion and literatures give knowledge and idea to conduct usability test. The results of usability test are basis of questionnaires. After obtaining the data from questionnaires, authors conducted interview with 4 students at BTH for the validation of results which will give them accuracy about the creditability of research.

7.3.2 Transferability
Transferability refers to the degree to which the results of qualitative research can be generalized or transferred to other contexts or settings (Trochim, 2006). One of the objectives of this research report is to define criteria for judging the usability of e-learning application. The techniques and methods used in this research report to measuring the usability can be applied to any other e-learning system like It’s Learning. There may be some possible threats because of different educational back ground, different cultures or language etc., but usability test and questionnaires were designed by following internationally predefined usability standards.

7.3.3 Dependability
Dependability is about (reliability) occurring of changes during the study over time which means to conduct the study in a smooth, persistent and consistent way (Trochim, 2006). Usability test of It’s Learning was conducted on different timings according to availability of participants. Difference in timing could effect on performance of the participants. In think aloud technique, difficulty in delivering the appropriate words to express the opinion about the system could be a validity threat to the results. Questionnaire was designed on the basis of results obtained from usability test. So the whole process is dependent on each other. If one fails, this could lead to the research on wrong direction. To minimize this validity threat,
participant having good command over English were selected who could verbalize their opinion frequently.

7.3.4 Confirmability
Confirmability is the extent to which the results can be confirmed by the other researchers (Trochim, 2006). In order to achieve confirmability, each section of report is properly documented. Chapters of the report make a sequence as describe in figure. 3.1. Usability test and its results are presented in section 5 of the report. Summary of observations during the usability test, participant’s status and task time is described in table 5.4, 5.3 and 5.1 respectively. Questionnaire designing process, questionnaire and their analysis is presented in section 6 of this report.
8 EPILOGUE
This chapter contains conclusion, recommendation for improvement of system and future work.

8.1 Conclusion
The main objective of this report was not only the evaluation of the usability of user interface of an e-learning application but also to analyze the system’s support to learner’s learning activities. Usability evaluation is done empirically and different methods were selected for this purpose. One usability evaluation methods couldn’t identify all usability problems so multi-method approach has been adopted by involving those users who have regular interaction with the system. Different usability evaluation methods may give different results because each method touches different mind approaches. Some methods are more precise and contain factual theoretical data. On the other hand, some give statistical data which facilitate evaluator to analyze outcome.

In pedagogy domain usability has significant importance and used as basic parameter to evaluate the usability of e-learning technologies. Learning style effects on learning, so good user interface means achieving higher user satisfaction level. Two major methods were used in this report for the usability evaluation of It’s Learning user interface: Thinks aloud technique and questionnaires. Interviews were conducted to validate the analysis of results. For any e-learning application, judging criteria for success is that it should incorporate with the three basic characteristics of usability i.e. efficiency, effectiveness and user satisfaction.

The authors conclude that after improvements as suggested in recommendations of our report, It’s Learning could be more effective and efficient for users.

8.2 Recommendations
The recommendations suggested by the authors to improve the system based on observations from usability test and analysis of questionnaires results. These recommendations could be helpful for improvement the system. It’s Learning is a learning platform and its efficiency and effectiveness is proportional learning activities of learners. Following are the recommendations suggested by authors:

Main page should be more attractive. There is lot of empty space in the structure of main page. This space must be utilized by providing links for important features of system.
There should be more customizable interface like skin, colours, text which makes the system more interactive. Through this, user will work in more friendly environments. This will also help to those users who may have problems like colour blindness. These users can’t read highlighted text like “dead line date” or “warning signs” which mostly appears in red colour.
There should be pop-up for each important feature to improve the learnability of system. There should be a well defined mechanism for add/remove courses for the system and student should have access to that.

The link “Course catalogue” should have additional “Add new course” and “Remove course” link button on main page so that novice user understand these functions easily.

Terminologies must be well defined in accordance with the tasks.

There system should provide some space to the students for storing their data like assignments, reports and projects etc.

The system has many useful features but mostly not used by students. Every section of the system should have its own introduction session which inform user about the benefits of that particular section.

Good “help” related material is available to user for their guidance but there should be a separate “Help” section contains material related to Student specific tasks.

Each Section of system must provide a separate “help” link which give guidance and help to student about that specific section of system.

Students want to know about the plan and schedule of the course before registering for any course, therefore contents of the course should be viewable on the system before registering.

Feature of the system more specific to studies should be improved to make them user friendly and more supportive to students.

“Search” is an important feature of the system. Although the response time of the searching is good but system displays long list of irrelevant contents as well against the search string. Search results should be displayed according to searching criteria and there should be no irrelevant material which make user confuse.

“My setting” and “e-portfolio” are interesting features of system but some student faced problems in managing and viewing e-portfolio. These functions should be simplified for ease of user.

There should be online chat facility available in the system for students and teachers which increase interaction between them.

It’s learning is being used in many countries at different levels of education. It has thousands of users across the globe and common thing about them is they are all using it’s learning as learning platform. It’s Learning should make a community for its users internationally. Students having same fields of learning and interest can share their problems and exchange their views ideas and experiences.

8.3 Future work

This thesis is an effort to contribute in the area of usability evaluation of e-learning applications. Besides finding way to evaluate usability of e-learning application, another
important field of study in which not much has been done according to author’s knowledge is usability of E-learning through serious game. Serious games are designed with the ambitions to improve some specific aspects of learning. Learning through serious game is used in corporate education, military training, emergency services training, health care, and in many other sectors. Specifically talking about pedagogy, serious games are found at every level of education, at all kinds of schools and universities around the world. Game type, complexity, and platforms are as varied as those found in casual games. Results of study will help authors to reflect their own vision for the upcoming research areas in usability evaluation of e-learning through serious games. Moreover the same study can be conducted by involving teachers and students of other institutes besides BTH.
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**Journals**


**Unpublished Documents**

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**Papers and Articles from Conference Proceedings (Published)**


Ardito, C., Costabile, M. F., Marsico, M. De., Lanzilotti, R., Levialdi, S., Roselli, T., Rossano, V. *An approach to usability evaluation of e-learning applications*, published online: 8 December 2005

**Web Resources**


Carol M. Barnum, Usability Testing and Research (Longman, 2002) Southern Polytechnic State University, Marietta (Georgia), USA. Retrieved March 12, 2009, from www.elearnmag.org


Gate Brochs, O.J., “it’s Learning”, Retrieved (March 12, 2009) from www.itslearning.eu


Screen 1: Login Page of System

**Viktigt om inloggning!**
All inloggning till BTH:s Lärplattform ska ske på webadressen [http://www.bth.se/ims](http://www.bth.se/ims), både för lärare och studenter.

När du loggat in finns det mer information under "Nyhetor" om hur du hittar din kurs
by Admin, Admin 2008-04-21 14:33

**Important about log in!**
All log in to the Learning Management system (LMS) at BTH is done at [http://www.bth.se/ims](http://www.bth.se/ims) for both students and teachers.

by Admin, Admin 2007-11-12 11:05
Screen 2: Main page of It’s Learning
Screen 3: Main Page view problem
Screen 4: Page view problem 2

HOME ASSIGNMENT (VPN)

Published: 02 April 2009 by Fredrik Erlandsson
Mandatory: Yes
Deadline: 03 May 2009 08:00
Assessment: UWG
Plagiarism control: Yes
Allowed file types in answers:
- Microsoft Word (doc), Microsoft Word 2007 (docx), Internet file (htm), Internet file (html), Open Office (odt), Adobe Acrobat (pdf), Rich text format (rtf), Open Office (sxw), Text document (txt)

Use groups:
Do not use groups
Assignments:
Please upload the Home Assignment for the VPN laboration here. You have to upload Home Assignment 2 Days (48 hours) before the laboration start else you are not allowed to attend the Laboration/lab.

Remember, this is an individual assignment! That means that you will have to think (AND write) for yourself. Do NOT copy from the Internet or your classmates. Your submitted work will be checked for plagiarism and if not passed your submission will fail. Remember that the Internet exists so that you can search for information about this subject.
### Screen 5: Search Results of System

#### Search in It's Learning

**Search for:** verification and validation

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Screen 6: Search Guide page of System
Screen 7: Help page of System
Screen 8: My Setting Page of System
Directory Listing Denied

This Virtual Directory does not allow contents to be listed.
Screen 10: Portfolio page problem

The portfolio "ifan" is not available.
APPENDIX 2  INTERVIEWS

Interviewee 1

Question 1: What is your impression about the system??
Answer: We use system on daily basis, so the first thing which came into my mind is my studies because we are using this system for purely educational purposes. System is good but some time it’s difficult to use some of its section.

Question 2: What are the problems you faced during interaction with the system?
Answer: Sometimes it’s hard to find specific data of any subject. Otherwise system is good.

Question 3: To what extent system supports you with your learning activities?
Answer: It’s Learning is supportive. Because I have never used any system like this, so I must say that this is good system and helps me in my learning activities.

Question 4: What are the advantage and disadvantages of It's Learning”.
Answer: One of the advantages of It’s Learning is that it save my time and secondly it help me to be more systematic with my studies. We are dependent on It’s Learning in some way or other. Until now it didn’t noticed any disadvantage but once a technical problem occur on It’s Learning and that effect us all.

Question 5: What are your suggestions for improvements of system?
Answer: System must introduce some additional features which concern with studies and students support.

Interviewee 2

Question 1: What is your impression about the system??
Answer: I like It’s Learning. We have to use it by all means but it has many good features as well. We usually don’t know about the much features of It’s Learning.

Question 2: What are the problems you faced during interaction with the system?
Answer: I face problem is adding new course and removing unwanted course. When a course of no more relate to my studies, I can’t remove it from system and I receive deadline date for submitting assignments. If I am not using that course, why it is giving me updated for that course

Question 3: To what extent system support you with your learning activities?
Answer: System is supportive. Our studies are relying on it. Until now it supports me.

Question 4: What are the advantage and disadvantages of It’s Learning?
Answer: It has many advantages few disadvantages as well. Sometime combination of different languages makes us confuse. Searching particular documents is not easy task.

Question 5: What are your suggestions for improvements of system?

Answer: There should me common chat room for student having same subject through which they interact with each other and share their problem faced by them during studies.

Interviewee 3

Question 1: What is your impression about the system?

Answer: System is good and it provides us all necessary things that are used by us. Interface is not impressive but fulfils the basic requirements. It’s our need now.

Question 2: What are the problems you faced during interaction with the system?

Answer: Its interface varies if we use it on any other operating system or web browser. Its changes almost 20% to 35%.

Question 3: To what extent system support you with your learning activities?

Answer: If you are fully familiarize with the system than it is very useful and supportive to studies.

Question 4: What are the advantage and disadvantages of “it’s learning”.

Answer: An advantage is that we can access it 24 hours from any remote location. Some time it’s boring to study e-lectures or course literature on system.

Question 5: What are your suggestions for improvements of system?

Answer: System should give some important link at same place like e-libraries student portal. By giving user name password once, we access to all these facilities.

Interviewee 4

Question 1: Explain your impression about the system?

Answer: It’s Learning is a very good source of knowledge for students to study their course material and all required information during their study period. Overall system is good and helping a lot to improve our knowledge and skills.

Question 2: What are the problems you faced during interaction with the system?

Answer: There are some problems while interacting with the system. Some time home assignments and other files are not uploaded properly. The course material available on the system is very limited.

Question 3: To what extent system support you with your learning activities?

Answer: The system supports learning activities and the student’s skill abilities. Students can approach the study material easily and can enhance their skills in their respective field.
Question 4: What are the good advantage and disadvantages of It’s Learning?

Answer: It is a comprehensive platform where students and teachers can interact with each other. Students can get solution of any problem from not only teachers as well as they can discuss their difficulties with their class fellows.

Question 5: What are your suggestions for improvements of system?

Answer: There are still some deficiencies and opportunities to enhance the functionality of system. It can be more users friendly and helpful by adding some extra features.