The Adaptation Process for a Customizable E-learning System

Experiences from the implementation of Totara LMS

Irfan Ali Khan
Abstract

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Managing courses and programs in a traditional way is not an easy task to perform because it requires larger physical room space and human resources to arrange classroom sessions. Besides the other administrative tasks, scheduling the lectures and exams is quite hectic job for the teachers. There was a need for a system which could help the teachers in doing their tasks more effectively and efficiently. One of the solutions for their problems was to automate the manual tasks for the institution that could simplify the process and minimize the need of extra resources. Therefore, the idea of E-learning system was introduced to NVIT (Newvision Institute of Technology) which includes web-based learning, virtual classroom sessions and digital collaboration.

The purpose of this thesis was to experiment the adaptation process for a customizable E-learning system by experiencing the implementation of Totara LMS. The E-learning system was implemented for NVIT.

The thesis is divided into two sections: 1) The implementation of E-learning system by customizing the Totara LMS. 2) The evaluation of the system by using usability evaluation. The E-learning system covers the features such as course/program management, competencies and activities management, user management, theme customization management, reports management, and notification/template management. For system evaluation, user interviews on Skype and online survey forms were used to get feedbacks and recommendations which could be used to improve the system. The E-learning system was hosted on a private domain arranged by the NVIT. This system will improve the educational standards for the students. It will also help the NVIT in expanding its educational network to other cities and will influence the other institutions by introducing E-learning facilities to the students.
Acknowledgements

First and foremost, my sincere gratitude and praise go to Almighty Allah, without whose blessings and mercifulness it wasn't possible for me to finalize my Master thesis.

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I express my gratitude to my supervisor Lars Oestreicher for his guidance, support, and cooperation throughout the thesis work. I would also like to thank my examiner Mats Daniels for his valuable suggestions that helped me in improving my thesis report.

Last but not least, I wish to acknowledge my family and friends for their prayers and support. They kept me going on and this work wouldn’t have been possible without their input.
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1. Introduction

This chapter provides a brief introduction to the project and research work, which was required to complete this thesis. The chapter starts by giving an overview of the project background, the organizational details for the NVIT (Newvision Institute of Technology) followed by purpose, evaluation, and project limitations.

1.1. Background
Managing courses and programs in a traditional way is not an easy task because it requires larger physical room space and human resources to arrange classroom sessions. Besides, the other administrative tasks, such as scheduling the lectures and exams were a quite hectic job for the teachers. There was a need for a system that could help the teachers in doing their tasks more effectively and efficiently. One of the solutions to their problems was to automate the manual tasks for the institution that could simplify the process and minimize the need for extra resources. Therefore, the idea of the E-learning system was introduced to NVIT which includes web-based learning, virtual classroom sessions, and digital collaboration.

1.2. Organizational Background
The NVIT is a training institution that aimed at becoming a prominent part of the regionally growing learning industry. NVIT started its institutional activities in the year 2004 in Rawalpindi, Pakistan. The institution offers single courses as well as programs of computer sciences, accounting, and management sciences at the undergraduate level. It has improved in providing traditional learning facilities, and now the goal is to become a leading service provider in the emerging regional learning industry by providing the best user experiences to the users. With the growing number of students, there was a need for an E-learning system that could improve the learning process by providing a good learning-hub experience.

1.3. Purpose
The purpose of the work described in this thesis was to implement an E-learning system for NVIT which will provide them the opportunity to teach their students online by using the uploaded lectures, assignments, quizzes, and exams. After going through all the required steps for completing the courses/programs, students will get their grades and diplomas online. The system will target the students by providing solutions from E-learning to the comprehensive blended learning program. It will provide the facility to the system administrator to manage and
track the courses/programs, and user activities. Another important objective of this thesis was
the assessment of the complexity being involved in converting a general LMS (Learning
management system) framework into an actual working E-learning system. To achieve these
goals, a learning management system (Totara LMS) that is known to be good at handling
different types of training was being implemented and customized.

1.4. Evaluation
System evaluation was one of the major parts of this thesis. Among different types of evaluation
techniques, usability evaluation\textsuperscript{1,2,3} was being used to evaluate the system.

Usability evaluation is used for evaluating a system on the base of user experiences. The
usability concept reflects the user satisfaction and overall performance of the system. For a
system being useful means that the system fulfills the user requirements. Successful
implementation of usability techniques provides the basic means for examining how easy it will
be for the users to learn and utilize the system to achieve their goals.

Different types of users were involved during the evaluation process of the E-learning system.
The results of the system evaluation will help in improving the user experiences and overall
performance of the system.

1.5. Limitations
The following constraints were considered during all phases of the thesis work:

- The implementation, evaluation, and improvement phases were limited to 30 weeks and
  needed to be finish within this timescale.
- Due to time constraint at the university, evaluation techniques that require less time
  were used.
- Since the institution is rather small the number of teachers and students available for
  usability evaluation was limited.
- System users were not accessible for interviews due to being at different locations. The
  evaluation results could have been more refined if it had been possible to have face-to-
  face interaction with the users.

\textsuperscript{1} https://www.usability.gov/what-and-why/usability-evaluation.html
\textsuperscript{2} https://www.usability.gov/how-to-and-tools/methods/index.html
\textsuperscript{3} https://www.nap.edu/read/11893/chapter/10#265
1.5.1 Faced problems
Apart from the above-described limitations, some major problems occurred during the thesis work. The idea was to use Totara LMS for implementing the E-learning system. So initially, the Totara LMS seedling version was used to start the implementation. But during the process, it had been identified that the seedling version of Totara LMS was missing some basic features. The problem was that different roles had limited functionalities. For example, students were not able to completely finish up the process of course activities and teachers had limited access to students’ course activities, etc. Therefore, the implementation process could not be continued due to the mentioned issues. In that situation, some alternate solution was required to be adapted. Therefore, some research about the identified problems and their solutions took place and the problem turned out to be due to that the seedling version was introduced by Totara company only for demonstration purposes and could not be used for real projects. This problem led to the idea that some standard working versions of Totara LMS should be used to continue the implementation process. Therefore, one of the IT company was contacted to get the free standard full working version of Totara LMS in order to continue the implementation process.
2. Methodologies and tools

This chapter gives a brief introduction about the adaptation method, the evaluation method, and the different tools and technologies which are used throughout this project. One of the tools used in the project was Totara LMS which provides features such as reporting, support for user and role management, and a variety of learning activities. For the adaptation of Totara LMS, a rapid prototyping methodology was used which allowed the end-users to get involved in the continuous adaptation/review cycle. By using the rapid prototyping methodology, it becomes possible to implement and improve different parts of the system in a fast-paced environment. Usability evaluation techniques were used to evaluate the system because the evaluation was one of the major parts of the thesis.

2.1 Adaptation Method

This section describes the development methods and how different tools were used to achieve the project goals. The rapid prototyping methodology was used to complete the project implementation.

![Rapid Prototyping Model](http://www.broodware.com/software-prototyping)

Figure 1: Rapid Prototyping Model

The rapid prototyping methodology makes the requirements more precise and comprehensive which leads towards more effective communication, reduced risks, and improved software

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4 http://www.broodware.com/software-prototyping
5 https://www.researchgate.net/publication/265514993_Adaptation_of_Rapid_Prototyping_Model_for_Serious_Games_Development
quality. NVIT arranged a specified domain and web hosting to host the E-learning system. It helped in continuously deploying and testing the completed modules during the whole process. Since the Director of NVIT had been the part of the review process, therefore it was important for him to see the changes online and provide feedback.

2.2 Evaluation Method
The usability evaluation was used to evaluate the E-learning system where users such as Site administrator, teachers, and students were invited to participate in the evaluation. Usability evaluation comprises the following steps:

- Planning the usability test
- Running the usability test
- Reporting usability test results

The starting point of usability evaluation was to make the plan for usability test. The usability plan covered the following points:

- What and how the steps in the evaluation will be done
- What number of participants will be tested
- What scenarios will be used

Then usability test was executed where users went through different usability scenarios. During this process, some moderating techniques were used to record the participants’ feedback and recommendations as a result of the usability evaluation test. The last step was reporting the usability evaluation test results which were based on participants’ feedback and recommendations for different parts of the system.

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8 [https://www.nap.edu/read/11893/chapter/10#265](https://www.nap.edu/read/11893/chapter/10#265)
2.3 Tools

2.3.1 Totara

Totara is an open-source learning platform that has changed the way how people learn, connect, and perform. Totara is developed in PHP and JavaScript. It is famous for the following supportive features:

- Powerful reporting
- Support for users and roles management
- Management of competencies and goals
- Support for effectively varied learning (blended learning), including traditional classroom
- Dashboards designed to provide students and teachers a clear view
- Support for individual development, training programs and certifications

Description about how Totara works is included in the next chapter. Totara LMS 2.7 version is used for the implementation.

2.3.2 MySQL

MySQL is the world’s most popular open-source relational database management system (RDBMS). It delivers a very fast, multi-threaded, multi-user, and robust SQL (Structured Query Language) database server. MySQL Server is intended for mission-critical, heavy-load production systems as well as for embedding into the mass-deployed software. With its proven performance, reliability, and ease-of-use, MySQL has become the leading database choice for web-based applications, used by high profile web properties including Facebook, Twitter, YouTube, Yahoo! and many other applications to save time and money powering their high-volume websites, business-critical systems, and packaged software. MySQL Server 5.5.4 is used for the implementation.

2.3.3 Linux

Linux is a Unix-like computer operating system (OS) assembled under the model of free and open-source software development and distribution. Linux was originally developed as a free operating system for personal computers based on the Intel x86 architecture but has since

9 https://help.totaralearning.com/display/TL27/Home
11 https://en.wikipedia.org/wiki/MySQL
13 https://en.wikipedia.org/wiki/Linux
been ported to more computer hardware platforms than any other operating system. Linux, in its original form, is also the leading operating system on servers and other big iron systems such as mainframe computers and supercomputers. It also runs on embedded systems, which are devices whose operating system is typically built into the firmware and is highly tailored to the system; this includes mobile phones, tablet computers, network routers, facility automation controls, televisions, video game consoles, and smartwatches. The E-learning system is hosted on Apache server version 2.2.31, which is set up on the Linux server.

2.3.4 Git

Git\(^{14}\) is a distributed revision control system with an emphasis on speed, data integrity, and support for distributed, non-linear workflows. Git was initially designed and developed by Linus Torvalds for Linux kernel development in 2005 and has since become one of the most widely adopted version control systems for software development. As with most other distributed revision control systems, and unlike most client-server systems, every Git working directory is a full-fledged repository with complete history and full version tracking capabilities, independent of network access or a central server. Such as the Linux kernel, Git is free software distributed under the terms of the GNU General Public License version 2. Git is primarily developed on Linux, although it also supports most major operating systems including BSD, Solaris, OS X, and Microsoft Windows. Git is used to transferring files and version control in the project.

\(^{14}\) https://en.wikipedia.org/wiki/Git_(software)
3. System Overview

This chapter describes the system requirements, the comparison of Totara with other LMS’s (Learning Management Systems), and the system architecture. At the end of this chapter, the system architecture diagram describes the implementation of the system requirements. The starting discussions with the NVIT (Newvision Institute of Technology) team identified the basic requirements for the system. Therefore, the comparison between Totara and other LMSs took place primarily in order to select the appropriate tool to implement the system requirements.

3.1. System Requirements

NVIT is offering different types of courses related to IT, accounting, and management sciences. The institution is being run by the Director who is responsible for managing all study-related issues. Since NVIT is located in Pakistan, therefore several scheduled meetings on Skype took place with the Director to discuss the system-related issues and to finalize the system requirements.

System requirements are divided into two types:

- E-learning requirements
- Administrative requirements

3.1.1 E-learning Requirements

The E-learning requirements include the management of courses and programs where teachers and students can participate in specific e-learning activities. Teachers can manage lectures’ material, enroll students, grade student’s assignments/exams, and monitor student’s activities in the system. Students can follow the lectures, participate in the assignments/quizzes/exams, and follow their course activities, etc.
Students should have the opportunity to participate either in a program that contains multiple courses or could enroll in a single course Figure 2. Following are the details for e-learning requirements.

3.1.1.1 Course/Program Management
The main feature of the E-learning system is the management of courses and programs. The system will act as a container for courses and programs, and it will be possible to organize them under different categories. Based on the institutional requirements, there will be a possibility to have subject-based categorization for courses and programs where activities such as assignments, quizzes, and exams will be part of the course. The teacher will upload learning materials for courses and the student will get their grades and diplomas online after finishing the courses. The system will also provide the facility to track and monitor the course activities for the users according to the user role.
3.1.1.2 Competencies and Activities Management

The activities are the features related to the courses such as students, for example, can upload an assignment, answer questions in a quiz, or go through the exams. Competencies are the completion conditions that are set on activities in a course, and these activities will be used as part of the overall course completion condition. The completion options for the activities will be locked if students have submitted the activity response, but the existing completion data will be invalid in case of changing the completion criteria of the activity. The system will provide an overview to let a student know how many activities are already finished in the course. The teacher can review the student’s overall progress for different courses/programs.

3.1.2 Administrative Requirements

E-learning system management is the main administrative requirement. It includes course/program creation, user management, site theme customization management, reports management, and notification/template management, etc.

3.1.2.1 User Management

There will be three types of users such as Site administrator, teachers, students who will interact with the system. The system provides a comprehensive collection of features required for managing users and the functionalities they perform. Users can manage all their tasks and activities based on their roles by using their simple but powerful dashboards. The user will navigate in the system such as profile, activities, and all the role-specific tasks through the dashboard.

3.1.2.2 Theme Customization and Management

The system will provide the facility to customize the look and feel according to the requirements. The site administrator can customize any available theme according to the requirements by changing the color scheme, the logo, favicon of the E-learning system, etc. by using Theme Selector in the administration panel. The design layout is fully responsive, which means it is adjustable seamlessly depending on the device such as desktop, laptops, smartphones, and tablets.

3.1.2.3 Enhanced Reporting

The system will allow the teachers to fulfill their reporting requirements with the built-in functionality of the report builder in Totara LMS. It is a flexible and powerful tool for building customized reports for students, course progress, and student’s progress for different courses/programs. The site administrator will be able to build reports and give access to the
teachers to view these reports. Reports can also be exported to Microsoft Excel for further analysis if required.

### 3.1.2.4 Notification/Template Management

The system will provide the functionality of sending automatic notifications through email at the time of performing different tasks such as registering new users, uploading new assignment/quiz/exam from the teachers, and submission of these materials to complete the activities by the students. Templates are the formats of different notifications that the site administrator can accordingly manage.

### 3.2 LMS’s Comparison

Based on the system requirements, there was a need for a tool that could be used to fulfill the requirements. For this purpose, [Capterra’s official website](http://www.capterra.com/learning-management-system-software) was used to find out the tool, but the list of LMSs’ was very long and it was not possible to compare all of them. Therefore, some of them were selected based on different criteria which are described in the chart [Tabell1].

<table>
<thead>
<tr>
<th>Average Ratings</th>
<th>Totara LMS</th>
<th>SharePoint LMS</th>
<th>BlueVolt</th>
<th>Edmodo</th>
<th>CANVAS</th>
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#### Features Checklist

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Table 1: LMS Comparison

The average ratings and features checklist of different LMS’s provides the reason for selecting Totara LMS. Among other LMSs, Totara LMS was finally selected to implement the E-learning
system because it was the system that was fulfilling the requirements of the project in the best way.

3.3. System Architecture
Since Totara LMS is the main development tool for this project and it comes with its own system architecture and there are not many possibilities to introduce new changes in the system architecture. (Figure 3)

![Diagram of E-learning system](image)

Figure 3: Abstract level view of E-learning system

The above diagram is an abstract level view of the E-learning system. It describes the working of a standard web application where the user sends a request for a dynamic page to the Web server using a client browser. The webserver finds the page and passes it to the E-learning system. E-learning system scans the page for instructions, accesses the database server, performs the transaction and passes back the finished page to the webserver. The webserver sends back the finished page to the requesting browser.
4. Implementation

This chapter describes the implementation of the E-learning system in detail. It explains the steps required for installation and configuration of Totara LMS, the following configuration of different modules, some details about different screen layouts and color schemes, etc.

The Totara LMS has been used to implement the E-learning system and there are many features that are not part of specific institutional requirements. For example:

- a dashboard to manage different activities for the user, and
- management of competencies and goals,
- a dashboard for managing reports, and
- notification templates to automatically send custom messages.

Therefore, a system that extends the functionality of Totara LMS according to the institution’s (Newvision Institute of Information Technology) requirements were required to be implemented.

4.1. Totara LMS Installation

4.1.1 Installation Requirements

Totara needs the following server settings before installations.

- A supported OS – Windows / Linux, or another Unix variant
- System clock should be synchronized with internet time servers
- Functional outbound email
- Supported web server software (Apache / IIS)
- PHP (minimum 5.4.4)
- PHP modules (required): gd, json, xml, dom, pcrc, spl, simplexml, zip, ctype, curl, iconv
- PHP modules (recommended): xmlrpc, mbstring, opcache, zlib, openssl, tokenizer, soap, intl
- PHP Memory limit of at least 256MB
- Access to a supported database (Mysql / Postgres / MariaDB / MSSQL)

4.1.2 Installation Steps

After ensuring that the server meets the installation requirements following steps are required to finish the installation.

- Create following directories on server for Totara files:
'wwwroot' - allowing 1GB of space and 'sitedata' - allowing 10GB of space

- Ensure that the sitedata directory is outside the wwwroot directory
- Ensure that the sitedata directory is writeable from web server
- Configure the web server to serve requests for domain from the wwwroot directory
- Move Totara source code into the wwwroot directory
- Create an empty database using the UTF8 character set
- Ensure that there is a non-root database user with write access to the database
- Using web browser visit the domain and step through the installation process
- Set up a cron task to execute the file admin/cli/cron.php every minute

4.2. Totara LMS Configuration
The site administrator is typically the prime user of the Totara LMS, but some tasks may be delegated to other users by assigning them a role such as a site manager.

4.2.1 Theme Customization
A theme is required to update the appearance by setting colors, fonts, and icons for the Totara LMS website. Themes can be updated by installing the customized themes using the Theme Selector in the administration panel.

4.2.2. Theme Settings
There are some general settings need to be set before updating the themes:

- **Theme designer mode**: For designing customized themes or developing code it is required to turn this mode on so that the user does not serve cached versions. The default value for this option is No.
- **Allow users to hide blocks**: This option is used to allow users to hide/show side blocks throughout the system. This feature uses JavaScript and cookies to remember the state of each collapsible block, and only affects the user's view. The default value for this option is Yes.
- **Allow blocks to use the dock**: This option is used to allow users to move blocks to a special dock until or unless it is enabled and supported by the selected theme. The default value for this option is Yes.
- **Enable device detection**: This option enables the detection of devices such as mobiles, smartphones, tablets or default devices (desktop PCs, laptops, etc.) for the application of themes and other features. Default value for this option is Yes.
4.2.3. Theme Selector

There are several themes available in the theme selector. To install a customized theme user should follow the following steps:

- Unzip the theme on the system
- Copy the folder to totara/theme directory on the server
- Click on Appearance in the Site Administration block, then Themes > Theme Selector
- Click the Use Theme button opposite the newly added theme, and the theme will be applied on the Totara LMS website

4.3. Modules Implementation

After the installation and configuration of the Totara LMS, it is required to configure the settings of the individual modules and overall layout of the website to fulfill the requirements of the E-learning system. The system is managed by the Site administrator who can be a teacher. The Site administrator configures all the required modules.

Figure 4: E-learning system design
According to the system requirements, the configuration and other settings of the following modules are discussed:

- Management of courses, programs, and course material
- Management of course activities, and competencies
- Account management of different types of users (site administrator, teachers, students)
- Theme customization and management
- Management of standard and customized reporting
- Management of notification and templates

### 4.3.1 Courses/Programs/Resources Management
The section describes how to manage categories, programs, courses, and course materials. Courses and programs are managed by categories. The site administrator can manage categories/programs/courses whereas the teacher can edit the courses and enroll students in those courses.

#### 4.3.1.1 Manage Categories

![Manage categories page](image)

*Figure 5: Manage categories page*

The categories are used to organize the courses and programs in the system and managed by the site administrator. The categories could be hidden/unhidden due to specific criteria. The categories page is accessible by the following breadcrumbs link:

Home > Site Administration > Courses > Manage Courses and Categories
4.3.1.2 Manage Programs

The programs contain different study materials and can also be a combination of materials from different courses. The programs are managed by the site administrator and can be set as hidden/unhidden due to specific criteria. Manage programs page is accessible by the following breadcrumbs link:

Home > Programs > Category Name > Manage programs

Figure 6: Manage programs page

4.3.1.3 Manage Courses

The courses contain different course materials and course activities. The courses are managed by the site administrator whereas the teachers can edit the course and enroll the students. The manage courses page is accessible by the following breadcrumbs link:

Home > Site Administration > Courses > Manage Courses and Categories

Figure 7: Manage courses page
The above breadcrumbs link navigates to the list of courses and categories. Changing the course categories link to courses displays the list of courses. By selecting the specific category from the dropdown list displays the course list available inside that specific category. Course-specific student progress is maintained on the base of course activities.

4.3.1.4 Course Page

Figure 8: Course page

The following shortcut can be used to access the course page.

Click on Find Learning tab on the header menu > Courses > Course name

Most of the course-related tasks are managed through the course page. Different options on the course page are based on a specific user role.

4.3.1.5 Manage Course Resource/Material

Figure 9: Turning edit mode on to add course material/resource on the course page
Course learning material is an important part of the course in the E-learning system. There is a mechanism for uploading the required course material. A teacher should access the course page to add course material/resource and follow these steps:

1. Click the 'Turn editing on' button at the top right corner of the course page.
2. Click 'Add an activity or resource' link, select course resource and click on the Add button in the activity chooser.
3. Enter the resource name and description.
4. Either drag and drop a file into the box with an arrow or click the Add button to open the File picker menu to choose a file from your computer or from any other location.
5. Select display and other options as required for that course resource/material.
6. Click the button 'Save and return to course' at the bottom of the page.

These course resources/materials can be managed from the course page. There are different types of resources such as book, file, folder, URL, page, etc.
4.3.1.6 User Enrollment

The teacher enrolls users into the course after the course creation. User enrollment can be done by accessing the course page. The teacher should follow these steps on the course page to enroll the user:

1. Click on ‘Enrolled users’ in the course administration section on left side of the course page.
2. Click on 'Enroll users’ button. A popup window will appear where user should be selected.
3. Click on 'Finish enrolling users' button at the bottom of the popup window.

*Figure 11: User enrollment to the course page*
The teacher can also assign other roles to the students after enrolling the user in the course. For example, a teacher can also have the role of a student in a course.

4.3.2 Course Activities/Competencies Management

After successfully adding the course with course material, the following steps are required:

- Add course activities for evaluating the student’s learning outcome of the course.
- Set up the competencies/completion condition in the course.

4.3.2.1 Managing Course Activities

Figure 12: Changing/Adding role for the user on user enrollment page

Figure 13: Adding course activity to the course
Adding the course activity is the main step required for setting up the course. The process of adding the course activity is like the process of adding the course material/resource. The teacher should follow these steps on the course page to add course activities:

1. Click on 'Turn editing on' button at the top right corner of the course page.
2. Click on 'Add an activity or resource' link. In the activity chooser, select any activity such as assignment, quiz etc. and click on the ‘Add button’.
3. Enter the activity name and description.
4. Select availability, activity completion, and other options as required for the activity.
5. Click on 'Save and return to course' button at the bottom of the page.

These course activities can be managed from the course page. There are different types of activities such as assignment, quiz, survey, certificate, etc. Users are required to complete the course activities to get their grades. After finishing the course activities, users get a course diploma as proof that they have completed the course.
4.3.2.2 Course Activity Layout

Quizzes are the most common activity in the course, which are used to examine the student’s ability and understanding of the course material. It is easy to design and manage by the teachers.

Figure 15: Student attempting the quiz activity in a course

Students can review the answers after attempting the quiz to understand the course material. The layout of the course activities is simple and interactive.

Figure 16: Student reviewing the quiz result after taking the quiz attempt
4.3.2.3 Managing Competencies/Course Completion

Some testing conditions must be fulfilled to complete the course, such as assignments, quizzes, etc. The purpose of setting up these conditions is to ensure that the required outcomes and goals of the course are met.

The results of the completed activities reflect in the course completion report.
4.3.3 User Management

The E-learning system provides a comprehensive way of managing users and their activities by setting up a customizable user dashboard based on the current user role. There are mainly three types of users such as Site administrator, Teacher, and Student. The site administrator can assign some specific rights to a teacher by assigning the role of the site manager to share some of the administrative tasks. The site administrator can also suspend/activates users. The following are the details of possible user roles and the tasks they can perform.

4.3.3.1 Site Administrator
The site administrator is the primary role in the E-learning system responsible for managing the whole E-learning system. The site administrator performs the following tasks in the system:

1. Manage the layout and theme customization in the system.
2. Manage different categories, programs, courses, course materials/activities.
3. Manage course completion settings, notification templates for messages.
4. Manage users/roles in the system.
5. Manage system/custom reports.
6. Manage overall site customization to meet the specific institutional requirements.

4.3.3.2 Site Manager
The site administrator can assign the role of the site manager to a teacher for sharing some specific rights to perform some administrative tasks.
4.3.3.3 Teacher
The teacher is the main role in the E-learning system which is used to provide the standard education. The teacher is responsible for managing courses/programs and materials. Following tasks are done by the teacher in the system:

1. Manage different programs, courses, course materials/activities.
2. Assess and grade the courses activities.
3. Manage user enrollments/un-enrollments in the programs/courses.
4. Access to program/course level reports.

4.3.3.4 Student
The role is assigned to a student who wants to attend a course in the E-learning system. A student goes through the course materials, participates in the course activities and gets a grade for the course activities. After completing all the course activities students get their certificates online.

4.3.3.5 Live Logs

Besides the user management, user live logs and their activities are also maintained by the system. The logs contain information such as Username, access time, performed event, event context, origin, accessing IP address, description, etc. These logs are very helpful for the site administrator to monitor the whole E-learning system.
4.3.4 Theme Customization and Management

The site administrator controls the site theme customization and management. The site administrator can manage themes and other layout settings by visiting the following breadcrumbs link.

Home > Site administration > appearance > themes > settings

Theme customization is described in these sections [4.2.1], [4.2.2], [4.2.3].

4.3.5 Reports Management

Figure 21: Theme selection and management page

Figure 22: Reports settings page
The E-learning system provides a report builder that allows the site administrator to create customized site-wide reports. These reports are distributed to the teachers so they can review and manage the performance of the students. The site administrator can apply general settings on reports which reflect on all types of reports in the system. The following breadcrumbs link can be used to access the general settings page.

Home > Site administration > Reports > Report builder > General settings

These settings allow the user to export the reports in different formats such as Excel, CSV, ODS, PDF, etc. These options are available at the bottom of the page. These exported reports are saved in a directory on the webserver.

4.3.5.1 Reports Builder

The report builder provides the facility of building reports and makes it available for the teachers to give an insight into student’s performance. The site administrator can also create customized reports. Following features can be used to create the customized reports:

- Selecting the available source of report
- Searching filters to search different fields
- Content controls for restricting the records availability at report view
- User role(s) that will be given permission to access the report
- Performance settings such as restricting reports to run with search criteria entered and caching versions of the report.
4.3.6 Notification/Templates Management

The E-learning system has the feature of sending messages to the students when certain events/actions occur on the site. For example, the system generates a notification regarding quiz overdue if a student misses a quiz. There are three types of notification settings such as “Not message at all”, “Message the user when logged in”, “Message the user when gets offline”. These notification settings can be managed by the site administrator. The following breadcrumbs link can be used to access the message notification settings page.

Home > My profile settings > Messaging

4.3.6.1 Template Customization
Language customization is a very helpful feature in the E-learning system. Different types of strings can be customized by using language customization pack. The template for different types of messages such as new user registration, activity submission, etc. which are customized by applying changes in the language pack. The following breadcrumbs link can be used to access the language customization page.

Home > Site administration > Language > Language customization

On language customization page the site administrator can follow these steps:

1. Search the specific system file
2. Find the specific template to modify
3. Update the message template accordingly
4. Click on ‘Save changes to the language pack’ button

### 4.3.7 Overall Site Customization

Totara LMS has been used to implement the E-learning system and many features that are not part of specific institutional requirements. Therefore, overall site customization is done to remove the unwanted features from the LMS to make it a customized E-learning system that fulfills the specific institutional requirements.

Totara LMS seedling version was used for the implementation at the beginning of this E-learning project. But some major issues had been identified during the process such as the Totara LMS seedling version was missing some basic features. The implementation could not be continued until some standard working version of Totara LMS could be arranged. Therefore, one of the IT solutions provider company was contacted to get the free standard full working version of Totara LMS to continue the implementation.
5. Needs for modification

The chapter describes the customization process which took place during the implementation phase, for example, by exemplifying how different modules from the Totara LMS are used to fulfill the extra requirements of an E-learning system. The adaptation process is normally used to customize any generalized system into a new system implementation focusing on some specified organizational requirements. It turns out that Totara LMS expedites the adaptation process for an E-learning system.

5.1 Focused Customization Issues

During the implementation, some issues caused a delay in the overall implementation process. Those issues are briefly discussed below:

- Managing courses/programs is one of the main objectives of the E-learning system. This module of Totara LMS was customized to make it the major part of the E-learning system. Besides this module, there were many extra features provided by Totara LMS, features that were not required for an E-learning system such as managing badges, locations, SCORM packages, and some advanced activities/resources, etc. These extra features were supposed to be removed/hidden from the system in a way so that the main features are not being disturbed.

- Different roles come up with a long list of features to perform their respective tasks. It was difficult to identify and set up the specifically required features relevant to different types of users such as teachers, students, etc. inside the E-learning system.

- After applying a new theme layout in the E-learning system, it was hard to test it at many different places inside the system to ensure that the new theme is applied unanimously throughout the system and fulfills the graphical layout requirements for the E-learning system.

Since the project was based on Totara LMS that itself is a huge system consisting of many different modules that are not directly related to E-learning systems, the customization of Totara LMS was done to transform it into an adapted E-learning system. During the process, the usage of prototyping models made it easier to fix the customization issues as they were handled in different iterations individually and were later tested as part of the overall system. This approach helped in reducing the implementation time and improving the development process.
5.2 Implementation Areas
The adaptation process focuses on the requirements which are gathered from NVIT. The different modules of the Totara LMS that are used to fulfill the requirements of an E-learning system will be described below:

5.2.1 Course/Program/Material Management
The Totara LMS provides the facility of managing courses/programs through a course manager. A site administrator or any authorized user can create and modify programs/courses, enroll users to the course/program, upload materials such as files, slides, audio/video, website links, etc. For an E-learning system, some new blocks were introduced on the course page such as current online users’ block and messages block, whereas some blocks were also removed such as search forums block. All unrelated links in the course administration section and the course page were hidden to make it easy to use and to improve the visibility of the tasks. Some courses/programs were added to provide the basic structure for the E-learning system.

5.2.2 Course Activities/Competencies Management
Different course activities are used to evaluate the user’s ability for course/program. Competencies are the passing criteria required to complete the program or course. Some of the activities/resources within the courses were focused on the E-learning system such as assignments, quizzes, certificates, and resources such as File, Page, and URL, etc. All other unrelated activities/resources were made hidden to make the activities page simple and easy to use. Following activities-related changes applied in the E-learning system:

- Some questions with the answers inside question bank were added to provide the basic structure for different activities.
- Some course-wise changes were made in competencies inside the course completion.
- Assignments, quizzes, lectures, and projects in the course completion were included as required.

5.2.3 User Management
Totara LMS provides the facility to manage users, their roles, their activities, and other role-specific tasks in a very comprehensive way. In the E-learning system, the user dashboard was customized by hiding the unrelated links and setting up different panels based on user roles. Moreover, the following two new roles were introduced:

- Teacher with the permission of trainer and assessor.
• Student with standard learner permission.

In the E-learning system, there is a special functionality where the site administrator can log in as another user to see how different sections in their dashboards look like. It helps to improve the user experience and the proper design of the content.

5.2.4 Theme Customization and Management
The site administrator or any authenticated user can set up different settings for themes and can also customize the standard themes according to the requirements. By following the NVIT pattern, a new theme with the styles, fonts, color scheme, and logo was implemented by customizing the standard Totara responsive theme. Thereafter, the customized theme was applied to the E-learning system. The new theme is also customizable according to the changing layout requirements. The user interface of the E-learning system was tested to ensure that everything worked fine after implementing the new theme.

5.2.5 Reports Management
In the E-learning system, all unrelated built-in reports were made to be hidden and some new customized reports were created instead to fulfill the modular requirements. These customized reports can be found in the user-generated reports section on manage reports page and these newly created reports are fully manageable.

5.2.6 Notification/Templates Management
Some terms/headers were being modified inside the language customization pack of Totara LMS to give it the look of the E-learning system. In the message settings, all unrelated links were made hidden to make the notification/templates settings management easy.

5.2.7 Overall Customization
Some of the built-in features of Totara LMS were not required for the E-learning system. These non-required features were hidden, using administrative settings or CSS styling techniques. Following are some customization examples:

• There was a need for adding new header links in the header menu. Therefore, new headings were added into the ‘custom menu items’ field in theme settings and applied to the header menu to show the new header links.

• All the non-required links such as (appraisals, badges, languages, etc.) in administration panel on the left side of the page were made hidden by using CSS styling techniques.
• The layout of different pages such as the login page, users page, and reports page was customized accordingly.

• Some non-required links inside user panels were hidden to provide a good user experience.

5.3 Adaptation Process Problems
There were some major issues being faced during the implementation process of the E-learning system. These problems are briefly described below:

• The E-learning system implementation was started by using a Seedling version of Totara LMS. But during the process, it was identified that the seedling version of Totara LMS was missing some basic features and could cause problems during the implementation process. Therefore, one of the IT company was contacted to get the free standard full working version of Totara LMS and continued the implementation process.

• Totara LMS provides a long list of options to specify different types of tasks that could be assigned to different roles. Therefore, it was a challenge to select all those options which could be used in transforming Totara LMS into an E-learning system. It took a lot of time to go through the options list and compare it with the system requirements for connecting the tasks with the right user roles. The permissions for these tasks can be managed in capability overview inside user permissions sections of the administration panel.

• The concerning person from NVIT did not have any clear idea about how different administrative tasks can be divided into different system-specific roles. For example, who has the ability to act as the site administrator, site manager, or how they can introduce new user roles for performing limited administrative tasks if they will be needed in the future? Therefore, some discussion sessions were arranged to finalize them.

• During the implementation phase, it was required to have a dedicated server online for uploading and testing the finished modules, therefore the concerning person from NVIT could also view and give feedback for the completed modules. The issue was discussed with the NVIT persons and then, as a result, they came up with the solution to have a separate domain/hosting for the E-learning system.

The output of the adaptation process should be a product that fulfills the requirements from a customer perspective as well as a technical perspective. Most of the adaptation problems occur
due to the changing scope of the requirements which must be addressed to ensure that all requirements are being met. During the implementation process of the E-learning system, almost all the adaptation problems were addressed and being solved successfully.

5.4 Refraction experience regarding adaptation process
At the start of the thesis, the main idea was to implement an E-learning system that could fulfill the requirements of NVIT so that they will be able to manage programs/courses online and provide a quality learning experience to their students. The solution should be reliable, easy to use, cost-effective, and flexible. It should be a web-based solution and should be accessible 24/7 by the users to perform their tasks without any hassle.

The overall process for implementation of the E-learning system became a mixture of both easy and difficult tasks containing different types of problems, as mentioned in Section 5.3 and it was not an easy project to implement. It took a large amount of time to resolve those issues.

The project itself has been a great source of learning by giving so many good and bad experiences from the first phase of requirements gathering until the last phase of testing. But after large efforts and with the cooperation of people from NVIT, almost all the requirements were implemented in the end.
6. Evaluation

This chapter constitutes a major part of the thesis and describes the different steps involved in the evaluation of the E-learning system in detail. Several different evaluation techniques are available but usability evaluation suits well for this project. The usability evaluation\(^\text{16}\)\(^\text{17}\)\(^\text{18}\) was selected because it evaluates the system on the base of user experiences and the idea that how users can learn and utilize the system to achieve their goals. This process also measures the satisfaction level of the users during their interaction with the system.

There are several methods of usability evaluation mentioned on usability.gov\(^\text{19}\) website. As mentioned earlier in the limitations section of the first chapter that participant of the usability evaluation was not directly accessible, therefore the selection of the usability methods was limited to the following methods:

- Planning the usability test
- Running the usability test
- Reporting usability test results

6.1 Planning the usability test

Usability testing was started by developing a plan for the test. It addressed questions such as what and how are we going to do? Who will be the participant of the usability test? What scenarios will they follow to achieve the goal? The elements of the usability test plan were reflected in test scenarios.

6.1.1 Usability scenarios

Some usability scenarios for different activities were created. These scenarios were performed by the users such as site administrator, teachers, and students. Following is the overview of different activities, but more structural descriptions of the activities are added in the Appendix section.

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\(^\text{18}\) https://www.nap.edu/read/11893/chapter/10#265
\(^\text{19}\) https://www.usability.gov
### 6.1.1.1 Site administrator

<table>
<thead>
<tr>
<th>Activity</th>
<th>Purpose</th>
<th>Expected problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log in to the system</td>
<td>It is required to enter the system for performing different tasks based on user roles.</td>
<td>Forgotten password. Non-existing account.</td>
</tr>
<tr>
<td>Manage Users</td>
<td>It is required to perform different tasks related to the users such as View, Add, Edit, Delete the users.</td>
<td>Defining a user that is already entered in the system. Mistakenly deleting a user.</td>
</tr>
<tr>
<td>Manage courses</td>
<td>It is required to perform different tasks related to the courses such as View, Add, Edit, Delete the courses.</td>
<td>Entered a wrong course. Deleted a course by mistake.</td>
</tr>
<tr>
<td>Manage programs</td>
<td>It is required to perform different tasks related to the programs such as View, Add, Edit, Delete the programs.</td>
<td>Entered a wrong program. Deleted a program by mistake.</td>
</tr>
<tr>
<td>Manage user interface design layout</td>
<td>It is required to manage the overall user interface layout of the system.</td>
<td>Applied a theme with font/color that makes the site contents difficult to read.</td>
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</tbody>
</table>
### 6.1.1.2 Teacher

<table>
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<th>Purpose</th>
<th>Expected problems</th>
</tr>
</thead>
<tbody>
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<td>Log in to the system</td>
<td>It is required to enter the system for performing different tasks based on user role.</td>
<td>Forgotten password.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-existing account.</td>
</tr>
<tr>
<td>Manage course</td>
<td>It is required to perform different tasks such as view/edit course, or other course-related activities like lecture/quiz/assignment etc.</td>
<td>Entered a wrong course activity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deleted a course activity by mistake which can cause deletion of activity-related data.</td>
</tr>
<tr>
<td>Manage program</td>
<td>It is required to perform different tasks such as view/edit program.</td>
<td>Entered wrong information while editing the program.</td>
</tr>
<tr>
<td>Marking course assignments</td>
<td>It is required to mark different types of course assignments which is necessary for preparing the course results.</td>
<td>Entered wrong grade to the course assignment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity</th>
<th>Purpose</th>
<th>Expected problems</th>
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</table>

43 | P a g e
Monitoring students’ performances

It is required to improve the course results. If students are facing problems which are reflected in the results, then teacher can personally contact and guide them by using messages functionality.

Teacher could send messages to the wrong student.

### 6.1.1.3 Student

<table>
<thead>
<tr>
<th>Activity</th>
<th>Purpose</th>
<th>Expected problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log in to the system</td>
<td>It is required to enter the system for performing different tasks based on user role.</td>
<td>Forgotten password.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-existing account.</td>
</tr>
<tr>
<td>Interacting with course</td>
<td>It is required to perform different course-related tasks such as view course details, go through course materials/activities, upload the assignments, attempting quizzes/exams.</td>
<td>Uploaded the wrong assignment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sent the incomplete quiz.</td>
</tr>
<tr>
<td>Interacting with program</td>
<td>It is required to perform different program-related tasks such as view program details, go through program materials/activities, upload the assignments, attempting quizzes/exams.</td>
<td>Uploaded the wrong assignment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sent the incomplete quiz.</td>
</tr>
</tbody>
</table>
Monitor own performance / Interact with teachers and other students

It is required to improve personal results and overall academic performance. If a student is facing problems in the course/program which are reflected in the results, then he/she can directly contact the teacher and he/she will provide the guidance. It is also possible to exchange views/experiences with other students that help in improving academic performance.

Student could send messages to the wrong teacher.

6.2 Running the usability test
The next step in the usability evaluation was the actual running of the usability test. The main objective of this phase was to invite end-users with different roles such as site administrator, teacher, and student from NVIT to go through the system and perform the role-specific tasks. The written usability test scenarios were given to them and while testing the system they followed the questions/points mentioned in the usability scenarios. During the test session, users were asked to perform several activities based on their role including signing up/signing in the users, managing programs/courses, interacting with programs/courses, etc. Users were provided with the survey forms which they filled in during performing the activities.

Survey forms contain different task-specific questions to get user feedback. The questions included in the survey forms were formulated with the help of the Director and the teachers at NVIT. The main objective of the survey forms was to get the insight into users’ expectations from the E-learning system.

The system evaluation was conducted on following systems:

- System running Windows 7 Professional, and viewed at a 1280 x 1024-pixel screen resolution using Google Chrome 55.0 browser.
- System running OSX El Capitan (version 10.11), and viewed at a 1680 x 1050-pixel screen resolution using Safari 9 browser.

Users answered the questions, shared their views/experiences about different sections in the system after performing role-specific tasks. This usability evaluation exercise helped in
gathering the task-specific feedbacks from the users which are reported in the next section. On the base of reported feedbacks, all the possible improvements need to be done to improve the overall user experience in the system.

6.3 Reporting the usability test results
The third and last step in usability evaluation was reporting the usability test results. The purpose of this phase was to document the usability test results received by the users in the form of feedbacks. This step provides the building blocks for improving the user experience in the final product. But it is not possible to improve the system according to all recommendations and suggestions due to constraints such as time and cost.

6.3.1 Highlighting severity rating of problems
While performing usability testing, some problems were faced by users. These problems were classified based on their severity level. Following are those classified groups:

- **Low:** The user may experience some time delays or little annoyance, but will be able to complete the scenario.
- **Medium:** The user may experience noticeable delay or frustration, but will be able to complete the scenario with extra effort.
- **High:** The user will be frustrated, and will not be able to complete the scenario.

6.3.2 Test results
The following are the usability test results and recommendations which are divided according to the tasks related to specific users:

6.3.2.1 Administrator
The following are the usability test results based on the scenarios completed by administrators.
6.3.2.1.1 Login to the system

The scenario was to login to the system, and administrators answered different questions related to the scenario. Above are the average answers to the scenario questions.

**Issues:**
- The “Login as guest” button on the login page confuses the user. (**Low**)
- Textbox size for username/password needed to be increased. (**Low**)
- It takes longer time to login. (**Medium**)

**Reflection:**
The first two issues are relatively easy to solve because these are related to the user interface and can be fixed in less time. The third issue is related to server bandwidth and cannot be fixed.
The scenario was to perform different tasks related to the users such as View/Add/Edit/Delete the users, and potential users answered different questions related to the scenario. Above are the average answers to the scenario questions.

**Issues:**
- One of the column headers on managing users page called “Edit” which confuses the user because this heading represents different user-related functionalities such as Edit, Delete, Suspend user. So, it should be changed with something meaningful title. *(Low)*
- It takes a longer time to load the user-related pages. *(Medium)*

**Reflection:**
The first issue is relatively easy to solve because it is related to the user interface and can be fixed in less time. The second issue is related to server bandwidth and cannot be fixed.
The scenario was to perform different tasks related to the courses such as View/Add/Edit/Delete the course, and potential users answered different questions related to the scenario. Above are the average answers to the scenario questions.

**Issues:**
- If we click on a course title on manage courses page then it reloads the page and apparently, nothing happens. But when we scroll down the page then we see the course details of that course with some course-related functionalities such as (view, edit, enrolled user, hide, etc.) appear exactly below the course list. This behavior of the system confuses the user. *(Low)*
- It takes a longer time to load the course-related pages. *(Medium)*

**Reflection:**
The first issue is related to the functionality of Totara LMS and it is solvable, but it requires code customization which is time-consuming. The second issue is related to the server bandwidth and cannot be fixed.
6.3.2.1.4 Manage Programs

The scenario was to perform different tasks related to the programs such as View/Add/Edit/Delete the program, and potential users answered different questions related to the scenario. Above are the average answers to the scenario questions.

**Issues:**

- If we click on a program title on manage programs page to view the program details, the system redirects to another page where we can see program title, description, and a button to edit program details. This extra page should be removed and the user should be able to go direct to the edit program page. *(Low)*

- If we try to add individuals to the program then a popup displays on the screen where we select the user to add in the program. But the usernames inside the user selection popup are not visible, so it should be fixed. *(Low)*

- It takes longer time to load the program-related pages. *(Medium)*
Reflection:
The first issue is related to the functionality of Totara LMS and it is solvable, but it requires code customization which is time consuming. Second issue is relatively easy to solve because it is related to the user interface and can be fixed in less time. Third issue is related to the server bandwidth and cannot be fixed.

6.3.2.1.5 Manage user interface design layout

The scenario was to perform different tasks related to interface design layout such as managing the theme settings, managing overall design layout of the website etc. and the potential users answered different questions related to the scenario. Above are the average answers to the scenario questions.

Issues:
- It takes longer time to load the user interface design layout page. (Medium)

Reflection:
This issue is related to the server bandwidth and cannot be fixed.

6.3.2.2 Teacher
Following are the usability test results based on the scenarios completed by the teachers.
The scenario was to login to the system, and teachers answered different questions related to the scenario. Above are the average answers to the scenario questions.

**Issues:**
- The “Login as guest” button on the login page confuses the user. (Low)
- Textbox size for username/password needed to be increased. (Low)
- It takes longer time to login. (Medium)

**Reflection:**
The first two issues are relatively easy to solve because these are related to the user interface and can be fixed in less time. The third issue is related to the server bandwidth and cannot be fixed.
6.3.2.2.2 Manage courses

The scenario was to perform different tasks related to the courses such as View/Edit the course, manage course materials/activities, and assess/grade the course activities etc. Teachers answered different questions related to the scenario. Above are the average answers to the scenario questions.

Issues:
- If we click on course title on manage courses page then it reloads the page and apparently, nothing happens. But when we scroll down the page then we see the course details of that course with some course-related functionalities such as (view, edit, enrolled user, hide etc.) appear exactly below the courses list. This behavior of the system confuses the user. (Low)
- Course icon image is overlapping the course title on view courses page. (Low)
- It takes longer time to load the course-related pages. (Medium)

Reflection:
The first issue is related to the functionality of Totara LMS and it is solvable, but it requires code customization which is time consuming. Second issue is relatively easy to solve because
it is related to the user interface and can be fixed in less time. Third issue is related to the server bandwidth and cannot be fixed.

6.3.2.2.3 Manage programs

The scenario was to perform different tasks related to the programs such as View/Edit the program, manage user enrollments, and view the program reports etc. Teachers answered different questions related to the scenario. Above are the average answers to the scenario questions.

Issues:
- If we click on program title on manage programs page to view the program details, then system redirects to another page where we can see program title, description, and a button to edit program details. This extra page should be removed and user should be able to go direct to the edit program page. (Low)
- It takes longer time to load the program-related pages. (Medium)

Reflection:
The first issue is related to the functionality of Totara LMS and it is solvable, but it requires code customization which is time consuming. Second issue is related to the server bandwidth and cannot be fixed.
The scenario was to perform different tasks related to assessing the course activities. Teachers answered different questions related to the scenario. Above are the average answers to the scenario questions.

**Issues:**
- When teacher grade the assignment then student should be informed through email as well. *(Low)*
- It takes longer time to load the course activity pages. *(Medium)*

**Reflection:**
The first issue is not a bug and can be solved, but it requires code customization which is time consuming. The third issue is related to the server bandwidth and cannot be fixed.
6.3.2.2.5 Monitoring students’ performances

The scenario was to perform different tasks related to monitoring student’s performance. Teachers answered different questions related to the scenario. Above are the average answers to the scenario questions.

**Issues:**
- It takes longer time to load the student performance reports. (Medium)

**Reflection:**
The issue is related to the server bandwidth and cannot be fixed.

### 6.3.2.3 Student
Following are the usability test results based on the scenarios completed by the students.
6.3.2.3.1 Login to the system

The scenario was to login to the system, and students answered different questions related to the scenario. Above are the average answers to the scenario questions.

Issues:
- The “Login as guest” button on the login page confuses the user. (Low)
- Textbox size for username/password needed to be increased. (Low)
- It takes longer time to login. (Medium)

Reflection:
The first two issues are relatively easy to solve because these are related to the user interface and can be fixed in less time. The third issue is related to the server bandwidth and cannot be fixed.
6.3.2.3.2 Interacting with the course

The scenario was to perform different tasks related to the courses such as viewing course details, going through the course materials/activities, uploading the course assignments, and attempting the quizzes/exams. Students answered different questions related to the scenario. Above are the average answers to the scenario questions.

Issues:

- In the administration block on left side of the page there is a link named ‘Positions’ which makes the students confuse, because it has nothing to do with students’ tasks. So, it should not be appeared in the students account. (Low)
- It takes longer time to load the course-related pages. (Medium)

Reflection:
The first issue is relatively easy to solve because it is related to the user interface and can be fixed in less time. The second issue is related to the server bandwidth and cannot be fixed.
6.3.2.3.3 Interacting with the program

The scenario was to perform different tasks related to the programs such as viewing program details, going through the program materials/activities, uploading the program assignments, and attempting the quizzes/exams. Students answered different questions related to the scenario. Above are the average answers to the scenario questions.

Issues:

- In the administration block on left side of the page there is a link named ‘Positions’ which makes the students confuse, because it has nothing to do with students’ tasks. So, it should not be appeared in the students account. (Low)
- When we click to view programs then header menu collapses and disturbs the page layout. It should be fixed. (Low)
- It takes longer time to load the program-related pages. (Medium)

Reflection:

The first two issues are relatively easy to solve because they are related to the user interface and can be fixed in less time. Third issue is related to the server bandwidth and cannot be fixed.
6.3.2.3.4 Monitoring student’s own performance

The scenario was to perform different tasks related to the student’s performance such as viewing courses/programs grades and overall performance, going through the remaining activities so that the assignments’ results could be improved. Students answered different questions related to the scenario. Above are the average answers to the scenario questions.

Issues:
- If we see the detailed view of course completion report then it looks little congested and it’s difficult to read all the text. So, the layout of this page should be improved. (Low)
- It takes longer time to load the performance reports. (Medium)

Reflection:
The first issue is related to the functionality of Totara LMS and it is solvable, but it requires code customization which is time consuming. The second issue is related to the server bandwidth and cannot be fixed.
6.3.2.3.5 Interacting with teachers/students

The scenario was to perform different tasks related to the teachers/students’ interaction such as contacting the respective teachers using messaging service to discuss different study-related questions, contacting other course mates to discuss different things related to different activities of the courses/programs, configuring notification methods for incoming messages. Students answered different questions related to the scenario. Above are the average answers to the scenario questions.

Issues:
- If we go to the messages page and click on a user to start messaging then we can see a link to setup the positions for the user with whom we are doing messaging. This link is confusing and should be removed. (Low)
- It takes longer time to do the messaging. (Medium)

Reflection:
The first issue is relatively easy to solve because it is related to the user interface and can be fixed in less time. The second issue is related to the server bandwidth and cannot be fixed.
6.3.3 Qualitative assessment

Qualitative assessment methods help in gathering information that cannot be measured by or translated into numbers. These methods can present a clearer picture of the situation based on user’s feelings and experiences about the system. Individual unstructured interview was one of the qualitative assessment methods used in this project. The interview was conducted from the representative of the NVIT who provided a list of issues related to the system. These issues are divided by the following severity rating of problems:

Medium priority issues
- It takes longer time to load different pages and to perform different course/program related tasks.

Low priority issues
- “Login as guest” button on the login page confuses the user.
- Textbox size for username/password needed to be increased.
- One of the column header on manage users page called “Edit” which confuses the user because this heading represents different user-related functionalities such as Edit, Delete, Suspend user. So, it should be changed with something meaningful title.
- If we click on course title on manage courses page then it reloads the page and apparently, nothing happens. But when we scroll down the page then we see the course details of that course with some course-related functionalities such as (view, edit, enrolled user, hide etc.) appear exactly below the courses list. This behavior of the system confuses the user.
- Course icon image is overlapping the course title on view courses page.
- If we click on program title on manage programs page to view the program details, then system redirects to another page where we can see program title, description, and a button to edit program details. This extra page should be removed and user should be able to go direct to the edit program page.
- If we try to add individuals to the program then a popup displays on the screen where we select the user to add in the program. But the usernames inside the user selection popup are not visible, so it should be fixed.

21 https://tomprof.stanford.edu/posting/1199
▪ When teachers grade the assignment then the student should be informed through email as well.

▪ In the administration block on left side of the page there is a link named ‘Positions’ which confuses the students, because it has nothing to do with students’ tasks. So, it should not be appeared in the students account.

▪ When we click to view programs then header menu collapses and disturbs the page layout. It should be fixed.

▪ If we see the detailed view of course completion report then it looks little congested and it’s difficult to read all the text. So, the layout of this page should be improved.

▪ If we go to the messages page and click on a user to start messaging then we can see a link to setup the positions for the user with whom we are doing messaging. This link is confusing and should be removed.

Some of the qualitative data was also collected from online user surveys with the help of user comments. It provides the insight of the problems exist in the system.

Users suggested improvements in the design layout and color scheme because according to them design layout doesn’t look attractive and doesn’t appeal to the user. The content on some pages is difficult to read due to color scheme. It is also being pointed out that links on some pages are confusing and doesn’t help the user in understanding the purpose of it.

One of the users raised a point that some of the tasks require performing unnecessary steps which should be reduced to fewer steps for making it easier. Furthermore, the system is new for the users therefore a user manual could be useful to understand the system.
7. Conclusion

The purpose of this thesis was to describe the adaptation process for a customizable E-learning system through the implementation of Totara LMS as an example. The E-learning system was implemented for Newvision Institute of Technology (NVIT).

NVIT is a training institution which is focused on getting a prominent place in the regional growing learning industry. It started its institutional activities in the year 2004 in Rawalpindi, Pakistan. The institution offers courses and programs in computer sciences, accounting, and management sciences at undergraduate level. With the growing number of students, there was a need for an E-learning system which could improve the learning process by providing a good learning-hub experience.

The thesis is divided into two sections: 1) The implementation of E-learning system by customizing the Totara LMS. 2) The evaluation of the system by using usability evaluation. The E-learning system covers the features such as course/program management, competencies and activities management, user management, theme customization management, reports management, and notification/template management. For system evaluation, user interviews on Skype and online survey forms were used to get feedbacks and recommendations which could be used to improve the system. The E-learning system was hosted on a private domain arranged by the NVIT.

This system will improve the educational standards for the students. It will also help the NVIT in expanding its educational network to other cities and will influence the other institutions by introducing E-learning facilities to the students.
8. Future Work

The main purpose of this thesis was to document the implementation of an E-learning system for NVIT (Newvision Institute of Technology) by customizing the Totara LMS. During the implementation, some new ideas appeared which could be useful for improving the E-learning system. Following are the details for system improvements and upcoming features in the E-learning system:

- **Improved design layout**
  An improved theme with the new color scheme will be introduced.

- **Fixing navigation links issues**
  The navigation links issues will be resolved by removing unnecessary links or changing the place of the links.

- **Reducing unnecessary steps to perform the tasks**
  Unnecessary steps to perform different tasks will be removed to improve the system usability.

- **Introducing video conferencing facility for Live lectures**
  Teachers will be able to deliver live online lectures by using video conferencing facility and the students will be able to book and attend online live video lectures. This facility will also be used for group discussion on any course topic between teachers and students.

- **Payment gateway integration**
  There will be a facility for the students to pay their course/program/semester fees online by using the E-learning system. Fees management will be done by the site administrator in the E-learning system.
References


   [Accessed on 2016-02-06].


   [Accessed on 2016-02-13].


   2017-12-17].

   URL
   URL https://www.nap.edu/read/11893/chapter/10#265 [Accessed on 2017-12-17].
[14] Stanford Tomorrow’s Professor Postings, Quantitative and Qualitative and Assessment Methods.
Appendix

Requirements

- Course, Program, Course Resource/Material Management
- Competencies and Activities Overview
- Layout Customization
- Enhanced Reporting
- Usability Evaluation based Research

Usability scenarios

<table>
<thead>
<tr>
<th>Activity</th>
<th>Log in to the system</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>It is required to enter the system for performing different tasks based on user role.</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td>Desktop, Laptop, Mobile/Smartphone</td>
</tr>
<tr>
<td><strong>Role</strong></td>
<td>Site administrator</td>
</tr>
</tbody>
</table>
| **Tasks**         | • Open the E-learning website in the browser  
                   • Login to E-learning system by using given credentials |
| **Questions**     | • What is your general opinion about the main page of E-learning system?  
                   • Was it easy to find the login form?  
                   • What is your opinion about the layout and color scheme? |
| **Quantitative matrix for login** | Successful | Error rates | Time on task |

Test Scenario 1: Login

<table>
<thead>
<tr>
<th>Activity</th>
<th>Manage Users</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>It is required to perform different tasks related to the users such as View/Add/Edit/Delete the users.</td>
</tr>
<tr>
<td>Equipment</td>
<td>Desktop, Laptop, Mobile/Smartphone</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Role</td>
<td>Site Administrator</td>
</tr>
</tbody>
</table>
| Tasks           | • Open the users’ page to view users.  
                   • Add a new user from users’ page.  
                   • Edit user information on the user page.  
                   • Delete user from users’ page.  |
| Questions       | • What is your general opinion about the users’ page of E-learning system?  
                   • Was it easy to find the information required to perform user related tasks?  
                   • What is your opinion about the presentation of information on users’ pages?  
                   • Did you find any specific problem while performing the user related tasks?  |
| Quantitative matrix for manage users | Successful | Error rates | Time on task |

Test Scenario 2: Manage users

<table>
<thead>
<tr>
<th>Activity</th>
<th>Manage courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>It is required to perform different tasks related to the courses such as View/Add/Edit/Delete the courses.</td>
</tr>
<tr>
<td>Equipment</td>
<td>Desktop, Laptop, Mobile/Smartphone</td>
</tr>
<tr>
<td>Role</td>
<td>Site Administrator</td>
</tr>
</tbody>
</table>
| Tasks          | • Open the courses’ page to view courses.  
                   • Add a new course from courses’ page.  
                   • Edit course information on the course page.  
                   • Delete course from courses’ page.  
                   • Enroll users into courses.  |
Questions

• What is your general opinion about the courses’ page of E-learning system?
• Was it easy to find the information required to perform course-related tasks?
• What is your opinion about the information structure on courses’ pages?
• Did you find any specific problem while performing the course related tasks?
• Do you have any suggestion to improve the performance for course related pages?

Quantitative matrix for manage courses

<table>
<thead>
<tr>
<th>Activity</th>
<th>Manage programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>It is required to perform different tasks related to the programs such as View/Add/Edit/Delete the programs.</td>
</tr>
<tr>
<td>Equipment</td>
<td>Desktop, Laptop, Mobile/Smartphone</td>
</tr>
<tr>
<td>Role</td>
<td>Site Administrator</td>
</tr>
</tbody>
</table>
| Tasks             | • Open the programs’ page to view programs.  
                   • Add a new program from program’s page.  
                   • Edit program information on program’s page.  
                   • Delete program from programs’ page.  
                   • Enroll users into programs. |
| Questions         | • What is your general opinion about the programs’ page of E-learning system?  
                   • Was it easy to find the information required to perform program related tasks?  
                   • What is your opinion about the information structure on programs’ pages? |
Did you find any specific problem while performing the program related tasks?
Do you have any suggestion to improve the performance of program related pages?

<table>
<thead>
<tr>
<th>Quantitative matrix for manage programs</th>
<th>Successful</th>
<th>Error rates</th>
<th>Time on task</th>
</tr>
</thead>
</table>

Test Scenario 4: Manage programs

<table>
<thead>
<tr>
<th>Activity</th>
<th>Manage user interface design layout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>It is required to manage the overall user interface layout of the system.</td>
</tr>
<tr>
<td>Equipment</td>
<td>Desktop, Laptop, Mobile/Smartphone</td>
</tr>
<tr>
<td>Role</td>
<td>Site Administrator</td>
</tr>
<tr>
<td>Tasks</td>
<td>• Open the front page settings layout page to apply different settings for improving user interface layout of the system.</td>
</tr>
</tbody>
</table>
| Questions| • What is your opinion about the layout and color scheme?  
          • Was it easy to apply different settings?  
          • Do you have any particular suggestion to improve user interface layout of the system? |

Test Scenario 5: Manage user interface design layout

<table>
<thead>
<tr>
<th>Activity</th>
<th>Log in to the system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>It is required to enter the system for performing different tasks based on user role.</td>
</tr>
</tbody>
</table>
### Test Scenario 6: Login to the system

**Activity**  
Manage course

**Purpose**  
It is required to perform different tasks such as View/ Edit, or other course-related tasks.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Desktop, Laptop, Mobile/Smartphone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
<td>Teacher</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Open the E-learning website in the browser</td>
</tr>
<tr>
<td>• Login to E-learning system by using given credentials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What is your general opinion about the main page of E-learning system?</td>
</tr>
<tr>
<td>• Was it easy to find the login form?</td>
</tr>
<tr>
<td>• What is your opinion about the layout and color scheme?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quantitative matrix for login</th>
<th>Successful</th>
<th>Error rates</th>
<th>Time on task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Test Scenario 6: Login to the system**

**Activity**  
Manage course

**Purpose**  
It is required to perform different tasks such as View/ Edit, or other course-related tasks.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Desktop, Laptop, Mobile/Smartphone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
<td>Teacher</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Open the course page to view course details.</td>
</tr>
<tr>
<td>• Edit course information from course page.</td>
</tr>
<tr>
<td>• Manage students’ enrollment in the course through Enrolled users page.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What is your general opinion about the course page in the E-learning system?</td>
</tr>
<tr>
<td>• Was it easy to find the information required to perform course-related tasks?</td>
</tr>
<tr>
<td>• What is your opinion about the information structure on course page?</td>
</tr>
<tr>
<td>• Did you find any specific problem while performing the course related tasks?</td>
</tr>
</tbody>
</table>
## Activity

### Purpose
It is required to perform different tasks such as View/Edit, or other program related tasks.

### Equipment
Desktop, Laptop, Mobile/Smartphone

### Role
Teacher

### Tasks
- Open the program page to view program details.
- Edit program information on program page.
- Manage students’ enrollment in the program through Enrolled users page.

### Questions
- What is your general opinion about the program page in the E-learning system?
- Was it easy to find the information required to perform program related tasks?
- What is your opinion about the information structure on program page?
- Did you find any specific problem while performing the program related tasks?

## Quantitative matrix for manage program

<table>
<thead>
<tr>
<th>Successful</th>
<th>Error rates</th>
<th>Time on task</th>
</tr>
</thead>
</table>

Test Scenario 8: Manage program

## Activity

### Marking course assignments
### Purpose
It is required to mark different types of course assignments which are necessary for preparing the course results.

### Equipment
Desktop, Laptop, Mobile/Smartphone

### Role
Teacher

### Tasks
- Open the course assignment page to view student’s response for the assignment.
- Mark the assignment and then grade it.

### Questions
- What is your general opinion about the page layout?
- Was it easy to perform the assignment’s related tasks?
- Did you find any specific problem while performing the tasks?

### Quantitative matrix for marking assignment

<table>
<thead>
<tr>
<th>Successful</th>
<th>Error rates</th>
<th>Time on task</th>
</tr>
</thead>
</table>

Test Scenario 9: Marking course assignments

### Activity
Monitoring students’ performance

### Purpose
It is required to improve the course results. If students are facing problems which are being reflected in the course results then the teacher can personally contact and guide them properly by using messages functionality.

### Equipment
Desktop, Laptop, Mobile/Smartphone

### Role
Teacher

### Tasks
- Open the course completion report to view the student’s activities.
- Open the course participation report to view the student’s overall participation in the course.
- Contact individual student through messages for guidance (if required).

### Questions
- What is your general opinion about the reports layout?
- Did you find all the required information on course reports regarding students’ performances?
- Did you find any specific problem on the reports?

<table>
<thead>
<tr>
<th>Quantitative matrix for monitoring performance</th>
<th>Successful</th>
<th>Error rates</th>
<th>Time on task</th>
</tr>
</thead>
</table>

Test Scenario 10: Monitoring students’ performance

<table>
<thead>
<tr>
<th>Activity</th>
<th>Log in to the system</th>
</tr>
</thead>
</table>

**Purpose**

It is required to enter the system for performing different tasks based on user role.

**Equipment**

Desktop, Laptop, Mobile/Smartphone

**Role**

Student

**Tasks**

- Open the E-learning website in the browser
- Login to E-learning system by using given credentials

**Questions**

- What is your general opinion about the main page of E-learning system?
- Was it easy to find the login form?
- What is your opinion about the layout and color scheme?

<table>
<thead>
<tr>
<th>Quantitative matrix for login</th>
<th>Successful</th>
<th>Error rates</th>
<th>Time on task</th>
</tr>
</thead>
</table>

Test Scenario 11: Login to the system

<table>
<thead>
<tr>
<th>Activity</th>
<th>Interacting with course</th>
</tr>
</thead>
</table>

**Purpose**

It is required to perform different course related tasks such as view course details, go through course materials/activities, upload the assignments, attempting quizzes and exams.
### Equipment
Desktop, Laptop, Mobile/Smartphone

### Role
Student

### Tasks
- Open the course page to view course details.
- Go through different course materials and activities.
- Upload course assignment.
- Attempt quiz/exam.

### Questions
- What is your general opinion about the course page in the E-learning system?
- Was it easy to find the information required to perform course-related tasks?
- Did you find course page and other course-related activities helpful?
- Did you find any specific problem while performing the course related tasks?

### Quantitative matrix for course interaction
<table>
<thead>
<tr>
<th>Successful</th>
<th>Error rates</th>
<th>Time on task</th>
</tr>
</thead>
</table>

Test Scenario 12: Interacting with course

### Activity
Interacting with program

### Purpose
It is required to perform different program related tasks such as view program details, go through program materials/activities, upload the assignments, attempting quizzes and exams.

### Equipment
Desktop, Laptop, Mobile/Smartphone

### Role
Student

### Tasks
- Open the program page to view program details.
- Go through different program materials and activities.
- Upload program assignment.
- Attempt quiz/exam.
### Questions

- What is your general opinion about the program page in the E-learning system?
- Was it easy to find the information required to perform program related tasks?
- Did you find program page and other course-related activities helpful?
- Did you find any specific problem while performing the program related tasks?

### Quantitative matrix for program interaction

<table>
<thead>
<tr>
<th>Activity</th>
<th>Monitoring student’s own performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>It is required to improve the personal results and overall course related performance. If a student is facing problems which are being reflected in the course results then he/she can contact the teacher to discuss the problems and teacher will guide him/her by using messages functionality.</td>
</tr>
<tr>
<td>Equipment</td>
<td>Desktop, Laptop, Mobile/Smartphone</td>
</tr>
<tr>
<td>Role</td>
<td>Student</td>
</tr>
</tbody>
</table>
| Tasks    |  - Open the course completion report to view the overall course performance of own.  
           - Open the course grade report to view the grades earned in the course. |
| Questions|  - What is your general opinion about the reports layout?  
       - Did you find all the required information on course reports regarding performances?  
       - Did you find any specific problem on the reports? |

### Successful | Error rates | Time on task

Test Scenario 13: Interacting with program
<table>
<thead>
<tr>
<th>Quantitative matrix for monitoring student’s own performance</th>
</tr>
</thead>
</table>

**Test Scenario 14: Monitoring students’ performance**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Interacting with teacher/students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>It is required to interact with course teacher and other students enrolled in that course. Since it is the way of exchanging views/experiences which help in improving the overall academic performance.</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td>Desktop, Laptop, Mobile/Smartphone</td>
</tr>
<tr>
<td><strong>Role</strong></td>
<td>Student</td>
</tr>
</tbody>
</table>
| **Tasks** | • Open the messages page from profile settings to view all the messages categorized by course/contacts.  
• Send a message to teacher/student to discuss the course. |
| **Questions** | • What is your opinion about the page layout?  
• Was it easy to exchange messages and to find the required information?  
• Did you find any specific problem while performing the task? |

<table>
<thead>
<tr>
<th>Quantitative matrix for teacher/student interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful</td>
</tr>
</tbody>
</table>

**Test Scenario 15: Interacting with teacher/students**
Online user survey forms

Administrator

NVIT E-learning System
User feedback for Administrator
* Required

1. Email address *

2. Name *

3. Age group *
   Mark only one oval.
   - 18-25
   - 26-35
   - 36-45
   - 46-55

4. Internet usage *
   Mark only one oval.
   - Once a month
   - Once a week
   - Daily usage

Login

5. What is your general opinion about the main page of E-learning system? *
   Mark only one oval.
   - Very satisfied
   - Satisfied
   - Neither satisfied nor dissatisfied
   - Dissatisfied

6. Was it easy to find the login form? *
   Mark only one oval.
   - Yes
   - Somehow yes
   - No

https://docs.google.com/forms/d/1x/EIP7xG5US5154LaW7tSRJkJk/un奥迪501BiDmAA/edit
7. What is your opinion specifically about the layout and color scheme? *  
   Mark only one oval.
   - Nice color scheme and layout
   - Should be improved
   - Not good at all

8. What was the completion rate for login function? *  
   Mark only one oval.
   - 75-100%
   - 50-75%
   - 25-50%
   - Did not work at all

Manage Users

9. What is your general opinion about the user-related pages in E-learning system? *  
   Mark only one oval.
   - Very satisfied
   - Satisfied
   - Neither satisfied nor dissatisfied
   - Dissatisfied

10. Was it easy to find the information required to perform user related tasks? *  
    Mark only one oval.
    - Very easy
    - Easy
    - Should be improved

11. What was the average time it took for you to perform the individual task? *  
    Mark only one oval.
    - 5 minutes
    - 10 minutes
    - 15 minutes

12. What was the task completion rate? *  
    Mark only one oval.
    - 75-100%
    - 50-75%
    - 25-50%
    - Did not work at all

13. Did you find any specific problem while performing the user related tasks?
Manage Courses

14. What is your general opinion about the course-related pages in E-learning system? *
   Mark only one oval.
   - Very satisfied
   - Satisfied
   - Neither satisfied nor dissatisfied
   - Dissatisfied

15. Was it easy to find the information required to perform course-related tasks? *
    Mark only one oval.
    - Very easy
    - Easy
    - Should be improved

16. What was the average time it took for you to perform the individual task? *
    Mark only one oval.
    - 10-15 minutes
    - 15-25 minutes
    - 25-40 minutes

17. What was the task completion rate? *
    Mark only one oval.
    - 75-100%
    - 50-75%
    - 25-50%
    - Did not work at all

18. Did you find any specific problem while performing the user related tasks?

19. Do you have any suggestion to improve course related pages?

Manage Programs

20. What is your general opinion about the programs-related pages in E-learning system? *
    Mark only one oval.
    - Very satisfied
    - Satisfied
    - Neither satisfied nor dissatisfied
    - Dissatisfied
21. Was it easy to find the information required to perform program-related tasks? *
   Mark only one oval.
   - Very easy
   - Easy
   - Should be improved

22. What was the average time it took for you to perform the individual task? *
   Mark only one oval.
   - 10-15 minutes
   - 15-25 minutes
   - 25-40 minutes

23. What was the task completion rate? *
   Mark only one oval.
   - 75-100%
   - 50-75%
   - 25-50%
   - Did not work at all

24. Did you find any specific problem while performing the program related tasks?

25. Do you have any suggestion to improve the program related pages?

---

Manage user interface design layout

26. What is your opinion about the layout and color scheme? *
   Mark only one oval.
   - Very nice
   - Good, but needs improvement
   - Not good at all

27. Was it easy to apply different layout settings? *
   Mark only one oval.
   - Very easy
   - Easy
   - Should be improved
28. **What was the average time it took to perform a task?**

*Mark only one oval.*

- 5-10 minutes
- 10-15 minutes
- 15-20 minutes

29. **What was the task completion rate?**

*Mark only one oval.*

- 75-100%
- 50-75%
- 25-50%
- Did not work at all

30. **Do you have any particular suggestion to improve user interface layout of the system?**

---

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Google Forms

https://docs.google.com/forms/d/1x3EP7xG5US5154LaW70-SRjJkxUHapwqiKolBdAa40/edit
NVIT E-learning System
User feedback for Teacher

* Required

1. Email address *

2. Name: *

3. Age group: *
   Mark only one oval.
   - 18-25
   - 26-35
   - 36-45
   - 46-55

4. Internet usage: *
   Mark only one oval.
   - Once a month
   - Once a week
   - Daily usage

Login

5. What is your general opinion about the main page of E-learning system? *
   Mark only one oval.
   - Very satisfied
   - Satisfied
   - Neither satisfied nor dissatisfied
   - Dissatisfied

6. Was it easy to find the login form? *
   Mark only one oval.
   - Yes
   - Somehow yes
   - No
7. What is your opinion specifically about the layout and color scheme? *
   Mark only one oval.
   - Nice color scheme and layout
   - Should be improved
   - Not good at all

8. What was the completion rate for login function? *
   Mark only one oval.
   - 75-100%
   - 50-75%
   - 25-50%
   - Did not work at all

Manage Courses

9. What is your general opinion about the course-related pages in E-learning system? *
   Mark only one oval.
   - Very satisfied
   - Satisfied
   - Neither satisfied nor dissatisfied
   - Dissatisfied

10. Was it easy to find the information required to perform course-related tasks? *
    Mark only one oval.
    - Very easy
    - Easy
    - Should be improved

11. What is your opinion about the information structure on courses’ pages? *
    Mark only one oval.
    - Very good
    - Good
    - Not good

12. What was the average time it took for you to perform the individual task? *
    Mark only one oval.
    - 5-10 minutes
    - 10-15 minutes
    - 15-20 minutes

https://docs.google.com/forms/d/1fA8nM3HhY_XCo9KPV4azYx7g77X7yJy3vW_75dYb/cdr
13. What was the task completion rate? *  
Mark only one oval.

☐ 75-100%
☐ 50-75%
☐ 25-50%
☐ Did not work at all

14. Did you find any specific problem while performing the user related tasks?

15. Do you have any suggestion to improve course related pages?

Manage Programs

16. What is your general opinion about the programs’ page of E-learning system? *  
Mark only one oval.

☐ Very satisfied
☐ Satisfied
☐ Neither satisfied nor dissatisfied
☐ Dissatisfied

17. Was it easy to find the information required to perform program-related tasks? *  
Mark only one oval.

☐ Very easy
☐ Easy
☐ Should be improved

18. What is your opinion about the information structure on programs’ pages? *  
Mark only one oval.

☐ Very good
☐ Good
☐ Not good

19. What was the average time it took for you to perform the individual task? *  
Mark only one oval.

☐ 5-10 minutes
☐ 10-15 minutes
☐ 15-20 minutes
20. **What was the task completion rate?** *
   *Mark only one oval.*
   - ☐ 75-100%
   - ☐ 50-75%
   - ☐ 25-50%
   - ☐ Did not work at all

21. **Did you find any specific problem while performing the program related tasks?**

22. **Do you have any suggestion to improve the program related pages?**

---

**Assessing course activities**

23. **What is your general opinion about the course activities page layout?** *
   *Mark only one oval.*
   - ☐ Looks great
   - ☐ Good
   - ☐ Not good

24. **Was it easy to perform the activities-related tasks?** *
   *Mark only one oval.*
   - ☐ Very easy
   - ☐ Easy
   - ☐ Should be improved

25. **Did you face any problem while performing the activities?**
   *Mark only one oval.*
   - ☐ Yes
   - ☐ No

26. **What was the average time it took to perform a task?** *
   *Mark only one oval.*
   - ☐ 5-10 minutes
   - ☐ 10-15 minutes
   - ☐ 15-20 minutes

---

https://docs.google.com/forms/d/1fA8nuM8r3Ay_Yo9Kc9pKP4v4aZYYd7Xc9yJ3gW_756Bn/c/edit
27. **What was the task completion rate?** *  
*Mark only one oval.*

- 75-100%
- 50-75%
- 25-50%
- Did not work at all

28. **Did you find any specific problem while performing the tasks?**

---

**Monitoring students’ performance**

29. **What is your general opinion about the reports layout?** *  
*Mark only one oval.*

- Very satisfied
- Satisfied
- Neither satisfied nor dissatisfied
- Dissatisfied

30. **Did you find all the required information on course reports regarding students’ performances?** *  
*Mark only one oval.*

- Yes
- Somehow yes
- No

31. **How was your experience with the messaging system?**  
*Mark only one oval.*

- Very good
- Good
- Not good

32. **What was the average time it took for you to perform the individual task?** *  
*Mark only one oval.*

- 5-10 minutes
- 10-15 minutes
- 15-20 minutes

33. **What was the task completion rate?** *  
*Mark only one oval.*

- 75-100%
- 50-75%
- 25-50%
- Did not work at all

https://docs.google.com/forms/d/1fA8NeM3HbY_GCoPjKJV4oX3YudD7Xc9y3jW_75dBe/ed
34. Did you find any specific problem in the reports?
NVIT E-learning System
User feedback for Student
* Required

1. Email address *

2. Name: *

3. Age group: *
   Mark only one oval.
   - 18-25
   - 26-35
   - 36-45
   - 46-55
   - Other:

4. Internet usage: *
   Mark only one oval.
   - Once a month
   - Once a week
   - Daily usage

Login

5. What is your general opinion about the main page of E-learning system? *
   Mark only one oval.
   - Very satisfied
   - Satisfied
   - Neither satisfied nor dissatisfied
   - Dissatisfied

6. Was it easy to find the login form? *
   Mark only one oval.
   - Very true
   - True
   - Not true

https://docs.google.com/forms/d/1x5NGs3BFQph-mos0KZYU-WDvI1a9BrJpJic60XHLBMr6jY/edit
7. What is your opinion specifically about the layout and color scheme? *  
Mark only one oval.  
☐ Nice color scheme and layout  
☐ Should be improved  
☐ Not good at all  

8. What was the task completion rate? *  
Mark only one oval.  
☐ 75-100%  
☐ 50-75%  
☐ 25-50%  
☐ Did not work at all  

Interacting with course  

9. What is your general opinion about the course page in E-learning system? *  
Mark only one oval.  
☐ Very satisfied  
☐ Somewhat satisfied  
☐ Neither satisfied nor dissatisfied  
☐ Dissatisfied  

10. Was it easy to find the information required to perform course-related tasks? *  
Mark only one oval.  
☐ Very easy  
☐ Easy  
☐ Should be improved  

11. Did you find course page and other course-related activities helpful? *  
Mark only one oval.  
☐ Quite helpful  
☐ Somehow Helpful  
☐ Not helpful  

12. What was the average time it took for you to perform the individual task? *  
Mark only one oval.  
☐ 5-10 minutes  
☐ 10-15 minutes  
☐ 15-20 minutes  

https://docs.google.com/forms/d/1sNGu3BFJ9b-3osDKKYUl-WDvdR9bIPgko6GERHL6Mb6jYe/edit
13. What was the task completion rate? *  
Mark only one oval.

- 75-100%
- 50-75%
- 25-50%
- Did not work at all

14. Did you find any specific problem while performing the course related tasks?

15. Do you have any suggestion to improve course related pages?

Interacting with program

16. What is your general opinion about the program page of E-learning system? *  
Mark only one oval.

- Very satisfied
- Satisfied
- Neither satisfied nor dissatisfied
- Dissatisfied

17. Was it easy to find the information required to perform program related tasks? *  
Mark only one oval.

- Very easy
- Easy
- Should be improved

18. Did you find program page and other program-related activities helpful? *  
Mark only one oval.

- Yes
- Somehow yes
- No

19. What was the average time it took for you to perform the individual task? *  
Mark only one oval.

- 5-10 minutes
- 10-15 minutes
- 15-20 minutes
20. What was the task completion rate? *
   Mark only one oval.
   - 75-100%
   - 50-75%
   - 25-50%
   - Did not work at all

21. Did you find any specific problem while performing the program related tasks?

---

**Monitoring student’s own performance**

22. What is your general opinion about the activity reports? *
   Mark only one oval.
   - Looks great
   - Good
   - Not good

23. Did you find individual course reports helpful?
   Mark only one oval.
   - Very helpful
   - Helpful
   - Not helpful

24. Did you find all the required information on course reports regarding performances? *
   Mark only one oval.
   - Very easily
   - Easily
   - Should be improved

25. What was the average time it took to perform the performance-related task? *
   Mark only one oval.
   - 5-10 minutes
   - 10-15 minutes
   - 15-20 minutes

26. What was the task completion rate? *
   Mark only one oval.
   - 75-100%
   - 50-75%
   - 25-50%
   - Did not work at all

https://docs.google.com/forms/d/1xNGsBFQqb-3eoDKKUYU-WDvBi9bILqko6GHLBMr6jY/edit
27. Did you find any specific problem while performing the tasks?

Interacting with teacher/students

28. What is your opinion about the layout of messages section in overall e-learning system? *
   *Mark only one oval.*
   - Looks great
   - Good
   - Should be improved

29. Was it easy to exchange messages and to find the required information? *
   *Mark only one oval.*
   - Very easy
   - Easy
   - It was difficult

30. What is your opinion about the messaging page? *
   *Mark only one oval.*
   - Very satisfied
   - Satisfied
   - Neither satisfied nor dissatisfied
   - Dissatisfied

31. What was the average time it took to perform a task? *
   *Mark only one oval.*
   - 5-10 minutes
   - 10-15 minutes
   - 15-20 minutes

32. What was the task completion rate? *
   *Mark only one oval.*
   - 75-100%
   - 50-75%
   - 25-50%
   - Did not work at all

33. Did you find any specific problem while performing the tasks?