Chapter 3

The Design of the Proposed e-Learning System (ELS)

The design of the e-Learning System is like framing the skeleton of the e-Learning environment. The e-Learning tool should be convenient for the student in all aspects to learn the subject in a better way [21] [25]. This system will provide the access to the aspects of the e-Learning. Hence the design and implementation of e-Learning system (ELS) is very important task in the e-Learning industry. Design of ELS is one of the major and the first objective of our research work. This section describes the design of the proposed e-Learning System (ELS).

3.1 Introduction

The primary objective of the e-Learning is to make the education reachable for the learners at their own place via internet [45] [23] [69]. This kind of the learning is the best one compared to conventional class room learning method. The successful implementation of the e-Learning depends on the content, that is being delivered to the learner. This is one of the major aspect of the e-Learning. To achieve this object the design of the better e-Learning tool is the major challenge. In this chapter we describe the design of the e-Learning system. In the next sub section we discuss the aspects of the e-Learning which are implemented in proposed tool.

3.2 Aspects of e-Learning

To implement the e-Learning environment in an institute, an industry or at the corporate sector, the e-Learning tool should have all the aspects of the e-Learning [70] [71] [52] [72]. In this section we discuss the aspects of the proposed e-Learning tool. The Fig.3.1.shows the interrelation between the various e-Learning aspects. The main elements of e-Learning
environment are the teacher, learner, the tutorials or content, the evaluation or assessment methods, the different ways of the communication and the administrative related aspects.

Fig. 3.1 shows the aspects of the e-Learning which are implemented in the proposed e-Learning tool.

![Diagram of e-Learning aspects]

**3.2.1 The Teacher**

The teacher is one who takes care of the student and the content. He is the one who creates the content, creates the assessments and the communication in the proposed e-Learning system. In the proposed e-Learning system the teacher has the authority to modify the content and upload. He can have the continuous monitoring action on the learner.
3.2.2 The Learner

The learner is the main component of the e-Learning. He will access the content created by the teacher and uploaded in the proposed e-Learning system. If any doubts he has, he will contact the teacher through the communication mechanism. The teacher will respond immediately for the queries of the learner.

3.2.3 The Content

The content is the one “what is delivered as study material to the learner, this delivery of the content may be either direct or indirect”. The e-content is the one which is the soft copy, it may be the notes in doc files, pdf files, ppt slides, lectures, e-books, etc. In our research work the content is designed to meet some specific objectives. The Bloom’s Taxonomy aspects have been used in the design of the content.

3.2.4 Assessment

The evaluation or the assessing the performance of the students in the subject is very important. During the evaluation process all the parameters that will affect the learning performance should be considered. This is the major challenge in most of the existing e-Learning systems [73]. The evaluation process can also be used as the frequent feedback mechanism. The students can conduct the self tests and the teachers can conduct the tests for the students in their respective subjects. In the proposed e-Learning system, a special assessment or evaluation mechanism has been developed. That will be discussed in the later part of the thesis.

3.2.5 Communication and Collaboration

There should be continuous communication between the teacher, student and the admin in the e-Learning tool [74] [54] [75]. The better communication and collaboration methods
make the implementation of the e-Learning successful. In our proposed e-Learning system, the different ways of the communication are as follows:

**Teacher - Student:** The teacher will communicate with a particular student which is one-to-one communication. In this communication the teacher will give the assistance regarding the clarity of the subject. The teacher will give the feedback of the performance of the student in a particular subject.

**Teacher - Students:** In this communication the teacher will communicate with the whole class for the clarification. This type of the communication is also known as one-to-many.

**Student - Student:** In this type of communication the students will communicate among each other. This type of communication is known as many-to-many communication.

**Specialization Forum:** These are the discussion forums on the special topic or the subject. These will help for the learner in a better way to clarify the doubts. This is also many-to-many communication.

### 3.2.6 Administrative Aspects

The managing of all the components of the e-Learning System is one of the major challenges in the e-learning. The administrative aspects include the managing the content, maintaining the performances of the students. Another responsibility of the administrative aspects is the monitoring of the activities of the teachers and the students in the e-Learning tool. In our proposed e-Learning tool the teacher and the administrator both are in the same module since most of the responsibilities of the teacher are similar to the administrator. However these modules can be separated.
In this section we discussed the aspects of e-learning which are implemented in the proposed e-Learning tool. In the next section we discuss the design of the architectural frameworks of the proposed e-Learning tool where all the above discussed aspects are incorporated.

3.3 The Proposed Architectural Framework

To design the architectural framework of the e-Learning system all the aspects of the e-Learning will have to be considered. This section discusses the design of the architectural frameworks for the proposed e-Learning system. This system is designed and developed in two modules, those are:

i. Admin or Teacher’s module and

ii. Student’s or user module.

These modules contain all the components of e-Learning system. Here admin and teacher together have been considered as a single module because most of the works done by both will be similar. In the next subsections these frameworks are explained.

3.3.1 The Architectural Framework for the Registration and the Login Page

To access the facility of the e-Learning tool, the users or the students should get registered and they have login. We designed a frame work for that and developed the different fields which ask the students details. The fields will ask the details like user name, password, email id and personal details. Then the student will have the access to login to the system. The Architectural framework of the login page in the designed e-Learning is shown in Fig.3.2.
The flow chart for the registration of the student is shown in Fig. 3.3. In this section a student will register for the e-Learning tool by entering his all details.
The user or the student has to follow the following steps register in to the e-Learning system.

Steps to register for user or the student are as follows:

- Click on Registration section
- Enter user name and Password of their choice
- Enter the details, like First name, last name, gender, age, Phone number, email id, etc
- Click on submit

The sample screen shots of the student’s registration section in the proposed e-Learning system are shown in Fig.3.4 and Fig. 3.5.

![User Registration Page -1](image-url)
3.3.2 The Architectural Framework of the Administrator (Admin)

This section gives the details of the design of the Architectural framework of the administrator (Admin) module. The admin module is used to handle the important tasks like uploading the course contents or tutorials, designing the exams, managing the users, managing the discussion forums, etc.

The Architectural framework of the administrator screen of the designed e-Learning is shown in Fig. 3.6.
The proposed admin framework consists of the following sections:

- **Admin home**

  This section is the home page of the admin. This displays the list of all other sections to which he has the access. When working on other sections if admin clicks on the button “Admin home” the control will be transferred the access back to home page of the admin section.

- **Tutorials**

  This section displays the list of the subjects to which the tutorials or the material can be added. This section also allows the admin to create or upload the new content for an existing course subject.

- **Examinations**

  This section displays the list of the subjects or the courses created. The admin can create the examinations at different levels.
- Specialisation Forum or Discussion forum

  This section displays the list of specialisation forums. Also it provides the permission to the admin to create the new specialization forums.

- User management

  This section displays the list of the registered users. The admin can monitor the activities in the e-Learning system. The admin has permission warn or delete certain users if he finds any of the users are misusing the e-Learning system.

- Admin Management

  This section displays the list of the admins. The admin has the permission to make any of the users as admin or he can create another admin.

- Logout

  This section helps for the admin to logout from the e-Learning system which gives the security for the username and password of the admin.

**Login and access procedure**

The flow chart for the login in to and the access the e-Learning tool is shown in Fig. 3.5. It shows the login procedure in to the system. Once the system home page is opened, there are two options whether to login as user or admin. Depending on whether it is admin or user respective sections should be used.

Steps to login for admin:

- Open the login page

- Click on Admin section
• Enter valid user name and Password

• Click submit

If the username and password do not match the e-Learning system does not allow to login.

Fig. 3.7 shows the flowchart which is the common for both the admin and the user login in the beginning. Depending on the person whether it is the admin or the student the continued flowchart will be extended with the connectors. The flowchart continuation for the admin is shown in Fig.3.8. The flow chart indicates that the admin can switch from one section to another section whenever he wants. After the accessing the required sections of the system, the admin should logout for the safety of the data and the contents in the different sections. Once he logged out, he has to login in the system to access the different sections. The steps to access the different sections of the admin are explained in the subsequent section.
Fig. 3.7: Flow chart for the login of admin and user.
The access steps of the admin section are explained step by step in the subsequent sections.

The steps to create new subject are as follows:

- Click admin section
- Enter admin user name and password
- Click on create subject
- Type the subject id and name of the subject
- Click on submit.
Fig. 3.9 shows the snapshot of the screen to create the subject. To create the subject, the subject id and the name of the subject are to be added.

Fig. 3.9: Snapshot of the screen to create the subject.

Fig. 3.10 shows the snapshot of the screen which shows the list of the created subjects.
The steps to add the content or the tutorials are as follows:

- Click admin section
- Enter admin user name and password
- Click on Tutorials
- Click subject
- Select the Level
- Select the content file
- Click on Submit
Add content section

This section provides the facility to add the content or the study material to the different subjects.

Fig.3.11 shows the snapshot of the screen which shows the list of the Tutorials.

Fig.3.11: Snapshot of the screen with the list of the Tutorials.
Fig. 3.12 shows the Add Content Section. It shows the snapshot of the screen to add the word file.

Fig. 3.12: Snapshot of the screen to add the word file.
Fig. 3.13: Snapshot of the screen to add the ppt file.

Fig. 3.14 shows the snapshot of the screen to add the pdf file.

Fig. 3.14: Snapshot of the screen to add the pdf file.
Examination section

In the examination section the admin can create the examinations and add the questions to the existing examinations. There is the facility to add the questions at different levels of examinations. Fig. 3.15 shows the snapshot of the examinations section which shows the list of the different courses of subjects. The examinations can be added to these different subjects at different levels. In this section the examinations can be added at six levels corresponding to the Bloom’s Taxonomy objectives.

The steps to create the examinations are as follows:

- Click admin section
- Enter admin user name and password
- Click on Examinations
- Select the subject and click on it
- Click on add questions
- Type the questions and the answers in the respective fields
- Select the Level
- Click on submit
Fig. 3.15: Snapshot of the list of subjects in examinations section.

Fig. 3.16 shows the snapshot of the add questions in examinations section. This allows the admin to add the questions to the question bank in examination section. It also allows to add the questions to the question bank in different levels.
Discussion forums

This section is used to create the discussion forums for the different subjects. Also in this screen the new specialization groups or forums can be created.

The steps to add the content or the tutorials are as follows:

- Click admin section
- Enter admin user name and password
- Click on discussion forums or specialization forums
- Click on add groups
• Type the forum or the group name

• Click on Submit

Fig. 3.17 shows the snapshot of the screen with the list of the discussion forums or the specialization forums.

![Fig. 3.17: The snapshot of the discussion forums section.](image)

Fig. 3.17: The snapshot of the discussion forums section.

Fig. 3.18 shows the snapshot of the discussion forums section to add the new group of new specialization forums.
User Management Section

In this section the admin can manage the users. He can block or delete the suspected user.

The steps to manage the users are as follows:

- Click admin section
- Enter admin user name and password
- Click on user management section
- Click on delete or block
- Click on Submit

Fig.3.19 shows the snapshot of the user management section.
Fig. 3.19: The snapshot of the screen of user management Section.

Admin management

In this section the new admins can be created or any user can be made as admin.

Fig. 3.20 shows the snapshot of the admin management section.
3.3.3 The Architectural Framework of the User or the Student

This section describes the design of the Architectural framework of the user or the student module. The admin module is used to handle the important tasks like uploading the course contents or tutorials, designing the exams, managing the users, managing the discussion forums, etc.

In students or user module each one should log in to their account and select course he is looking for, can access the content and take the examinations.

The proposed user framework consists of the following sections:

- Subjects

  This section shows the list of the subjects or the courses he can opt.

- Tutorials

  This section shows the list of the tutorials or the contents he can access.
• Specialization forums

This section shows the list of the specialization forums he can join for discussion or to clarify the doubts.

• Search Forum

This section gives him to search for the forums he is interested in.

• Take exam

This section lists the courses on which the learner can take the exam.

• Logout

This section is to logout from the e-Learning system.

The Architectural framework of the user or the student screen of the designed e-Learning is as shown in Fig. 3.20.
Once the student is logged in to the system, he can access the above sections. The continued flowchart of Fig. 3.7 to access the user section is shown in Fig. 3.22. Here if the user id and password are not valid, he is not allowed to go ahead to access the tool.

Fig. 3.21: Architectural framework of user access.

Fig. 3.22: Flowchart Continuation for User access.
Login section:

Once the student is registered with all his details he can login with his username and password through login section. Fig. 3.23 shows the user login page. The following procedure is followed to login in to the proposed e-Learning tool.

Steps to login as user in to the tool:

- Open the login page
- Click on user login section
- Enter the username
- Enter the password
- Enter submit

If the username and password do not match the e-Learning system does not allow to login.

Fig. 3.23: Snapshot of the User Login Page.
Fig. 3.24 shows the snapshot of the student module. Here the student accesses the different sections.

![Snapshot of the student module](image)

**Fig. 3.24: Snapshot of the home page of the student section.**

The steps to access the discussion forum are as follows:

- Click user section
- Enter user’s user name and password
- Click on Discussion forums
- Select the particular Discussion forums
- Click on submit

Fig. 3.25 shows the snapshot of the discussion forum section. It allows the user to select the specialization forum he is interested in.

![Snapshot of the discussion forum section](image)
Fig. 3.25: Snapshot of the Discussion Forum Section.

Fig. 3.26 shows the snapshot of the screen search forum section. It allows the user to search for a particular forum.

Fig. 3.26: Snapshot of the Search Forum Section.

Fig. 3.27: Snapshot of the Search Forum Section screen-1.
Fig. 3.27: Snapshot of the Search Forum Section screen-1.

Fig. 3.28 shows the snapshot of the Search Forum Section screen-2.

Fig. 3.28: Snapshot of the Search Forum Section screen-2.

Content access section
In this section the content is accessed by the student.

The steps to access the content are as follows:

- Click user section
- Enter user’s user name and password
- Click on Tutorials
- Select the particular subject
- Select the particular file
- Click on submit

Fig.3.29 shows the snapshot of the Access the Content Section.

![Fig.3.29: Snapshot of the Access the Content Section.](image-url)
The steps to search the content are as follows:

- Click user section
- Enter user’s user name and password
- Click on Search Contents
- Type the particular subject
- Select the particular file
- Click on submit

Fig.3.30 shows the snapshot of the Search Content Section.

Fig.3.30: Snapshot of the Search Content Section.
Fig. 3.31 shows the snapshot of the Access the Content Section.

Exam section

Here the student will take the exam in a subject in different levels.

The steps to start with the exams are as follows:

- Click user section
- Enter user’s user name and password
- Click on Take exam
- Select the particular subject
- Select the particular level
- Click on submit
The sample screen shots of the exam sections in the e-Learning system or Learning Management System (LMS) are shown in the figures below.

Fig.3.32 shows the snapshot of exam section in Level-1.

Fig.3.32: Snapshot of the exam section in Level-1.

Fig.3.33: Snapshot of the exam section in Level-1 results.

Fig.3.33: Snapshot of the exam section in Level-1.
3.4 Implementation

Implementation of the designed architectural framework of the proposed e-Learning system is one of the challenges. It needs the proper technology and the software.

To design and implement the e-Learning System the following software are used.

- Java
- HTML
- CSS
- Oracle DBMS
- Apache Server

Since e-Learning is internet based learning, the concept of the web technology is utilised to implement the e-Learning System (ELS). The features of Java programming language are so that applications can run on a computer that contains a special environment which Java Virtual Machine (JVM). These virtual machines can be embedded in the web browsers and operating systems.

The e-Learning system which is proposed in this thesis is designed and implemented using java programming language and web technology. Java is a synonym for Internet Programming, hence Java, HTML and CSS are used in the front end to design the various web pages to access the resources of the Learning Management System(LMS). Oracle is used as the database management system in the backend. Tomcat Apache Server is used as the interface between the web pages and the Data Base Management System(DBMS).
3.5 The ERRC Grid

To represent the quality of the work, the Eliminate-Reduce-Raise-Create Grid (ERRC) is the best way to practice. Table 3.1 shows the ERRC grid.

<table>
<thead>
<tr>
<th>Eliminate</th>
<th>Reduce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminate or avoid the unwanted things: like waste of time, money, etc.</td>
<td>Reduce the certain parameters: like expenses, time consumption, errors in the system, etc.</td>
</tr>
<tr>
<td>Raise</td>
<td>Create</td>
</tr>
<tr>
<td>Increase or Raise in some parameters: Like quality, performance, Profit, etc.</td>
<td>Create the New things: Like Implementation of new things, features, new and expected change in the performance or behaviour, etc.</td>
</tr>
</tbody>
</table>

Table 3.1: The ERRC Grid.

The ERRC grid has been utilised for all the objectives of our research work in this thesis. The ERRC gives the overall contribution of the objective.

The ERRC grid is used to present the benefits and contribution of the proposed research work with respect to the first objective.
Table 3.1 shows the ERRC Grid of the design of e-Learning System.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Eliminate</th>
<th>Reduce</th>
<th>Raise</th>
<th>Create</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>Travelling time</td>
<td>Lectures</td>
<td>Repeated content access</td>
<td>Interest in learning new concepts</td>
</tr>
<tr>
<td></td>
<td>Travelling cost</td>
<td>Energy to prepare for examinations.</td>
<td>Learning Skills</td>
<td>Self discipline in the subjects</td>
</tr>
<tr>
<td></td>
<td>Apathy</td>
<td>Time to prepare for examinations.</td>
<td>Technology-enhanced Learning (TEL)</td>
<td>Develop the explaining skills of the concepts and experimental skills</td>
</tr>
<tr>
<td></td>
<td>Traditional boring lectures by the teachers.</td>
<td>Cost of Education</td>
<td>Feedback mechanism of their learning</td>
<td>Passion towards learning</td>
</tr>
<tr>
<td></td>
<td>Unnecessary and irrelevant discussions in the regular classrooms</td>
<td>Dependency on the instructor for clarification</td>
<td>Interaction with others through discussion boards</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accommodates the needs of all students</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Participation in</td>
</tr>
<tr>
<td>2 Teachers</td>
<td>Regular Lecturing</td>
<td>Preparation Time for class</td>
<td>Teaching Skills</td>
<td>New ideas/skills of creating content</td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
<td>-----------------------------</td>
<td>-----------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Frequent meeting of the learners</td>
<td>Travelling cost</td>
<td>Connectivity with the students outside the school hours</td>
<td>Innovative Teaching methodology</td>
</tr>
<tr>
<td></td>
<td>Traditional boring lectures to the learners</td>
<td>Problem of monitoring the discipline in the campus</td>
<td>Flexibility in teaching methodologies</td>
<td>Innovations in experimental skills</td>
</tr>
<tr>
<td></td>
<td>Problems of required teaching-learning environment</td>
<td>Accessibility to their contents</td>
<td>Passion based learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technology gap in the teaching learning process</td>
<td>Improved Pedagogy</td>
<td>Analyzing skills because of self reflection of their own classes</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Institutions/Management</td>
<td>Time to Communication with parents</td>
<td>Passion towards creating new options in the e-Learning tool</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feedback mechanism of their teaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Linking Research to Learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exam Material like stationary and its cost</td>
<td>Problem of monitoring the discipline in the campus</td>
<td>Scalability of resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Better ideas to implement innovative technology in education</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Travel expenses associated with bringing teachers/employees to a centralized training facility.</td>
<td>Complaints from the parents</td>
<td>Profile of the institution due to better results</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Better results and metrics</td>
<td>Opportunity to contribute towards building a better Nation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>National/Global Competency in education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sl. No.</td>
<td>Industries</td>
<td>Problem of searching a well trained teacher/Instructor</td>
<td>Physical costs of space and technologies on-site.</td>
<td>Vehicles Parking in the institutions</td>
</tr>
<tr>
<td>--------</td>
<td>------------</td>
<td>--------------------------------------------------------</td>
<td>------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>4</td>
<td>Industries</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.2: The ERRC Grid of the design of e-Learning System.

<table>
<thead>
<tr>
<th>5</th>
<th>Society</th>
<th>space and technologies on-site.</th>
<th>Searching for better school nearby</th>
<th>Traffic problem</th>
<th>Quality of life style</th>
<th>New ideas to implement for better quality of life.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Schools/College/ Universities which produce fake degrees</td>
<td>Fear of learning new concepts</td>
<td>Engaging people in life long education without age barrier</td>
<td>Better students/civilians</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Huge expense on the elementary to professional education</td>
<td></td>
<td></td>
<td>Create scientific attitude</td>
</tr>
</tbody>
</table>
3.6.1 Students’ feedback on the performance of the e-Learning tool

The tool is allowed to use for 30 students and tested. Most of the students are happy with the usage of the tool and the benefits they received. Most of the students were happy in accessing the tool and in the faster navigation between the different sections of the proposed e-Learning tool. Out of 30 students majority of them have given the better rating for the tool as below.

Table 3.3 shows the feedback from the students on the e-Learning tool or Learning Management System(LMS).

<table>
<thead>
<tr>
<th>Performance Response</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Students</td>
<td>5</td>
<td>21</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Percentage</td>
<td>17%</td>
<td>70%</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 3.3: Feedback from the students on the performance of the e-Learning tool.

Fig. 3.35 shows the feedback by the students on the e-Learning System(ELS).
Fig. 3.35: The feedback by the students on the e-Learning System (ELS).

Feedback by the teachers on the performance of the e-Learning tool designed and developed. The tool is allowed to use for 25 teachers and tested. Most of the teachers are happy with the usage of the tool and the benefits they got. Out of 25 teachers majority of them have given the better rating for the tool.

Table 3.4 shows the performance feedback by the teachers on the LMS.

<table>
<thead>
<tr>
<th>Performance Response</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of teachers</td>
<td>7</td>
<td>14</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Percentage</td>
<td>28</td>
<td>56</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 3.4: Performance feedback by the teachers on the LMS.

Fig. 3.36: Overall Performance Feedback by the Teachers on the LMS.

3.6.3 Feedback by the people working in the companies and industries on the performance of the e-Learning tool designed and developed

The tool is allowed to use for 10 industry people and tested. Among 10 employees most of the people appreciated the performance of the tool and given better ratings.

Table 3.5 shows the Feedback by the industry people on the overall performance of LMS.
Table 3.5: Feedback by the industry people on the overall performance of LMS.

The Fig. 3.37 shows the graphical representation of the performance of the designed e-Learning tool by the industry people.

![Overall Performance Feedback From Industry People](image-url)
3.7 Summary

In this section we discussed the design of the e-Learning System (ELS) or the Learning Management System (LMS). The architectural frameworks for the admin and the user modules were designed based on the aspects of the e-Learning. The architectural frameworks have been implemented using the software tools Java, HTML, CSS, Oracle DBMS and Apache Server. The surveys conducted also show that the proposed e-Learning System (ELS) is user friendly. The better graphical user interface (GUI) for both users and the teachers is one of the contributions of the proposed system.