Chapter-6

Design and Development of E-Learning Prototype
CHAPTER-6

DESIGN AND DEVELOPMENT OF E-LEARNING PROTOTYPE

"If the only tool you have is a hammer, you tend to see every problem as a nail."

~ Abraham Harold Maslow (1908 – 1970)

6. E-Learning Web Portals

Web portals are like websites or internet gatekeeper that brings information in a cohesive way from diverse sources. Users obtain information on education, news, weather or stock by beginning their sessions on portals. Portals are some of the most visited sites on the internet. Making users stay for longer periods and driving internet traffic to their sites is the main aim of the portals. Internet advertising is the major source of revenue to them. In order to know more about the users for improving software design, service offerings etc. portals generate repeated use of their services. It is a common goal for web portals to develop a loyal user base that visits the site frequently and spend sufficient time per visit (Telang & Mukhopadhyay, 2005).

There are many types of web portals, depending on the subject area, industry, market or trend (Walker, 2006). Some of the main types of web portals will be described briefly while as e-learning portals related to the topic of interest will be discussed in detail. Some of the types are listed as under:

(a) Personal Portals
(b) News Portals
(c) Government web portals
(d) Social or cultural portals
(e) Corporate web portals
(f) Stock portals
(g) Search Portals
(h) Tender’s Portals
(i) Hosted web portals
(j) Domain specific portals

(k) E-Learning portals

(a) Personal Portals
A personal portal is more likely a site on World Wide Web providing personalized pathway to the customized content. It is mainly designed mainly to use distributed applications. Personal portals can provide information related to any specific topic of interest and provide links to varied content beyond our reach of services. Portals provide a path to new knowledge and capabilities apart from providing links or content on the web.

(b) News Portals
The news and media around the globe are fast adapting to the new digital technologies. This is setting the mark for the beginning of news portals all across the globe by media houses. It provides the opportunity to reach far and wide to the maximum number of viewers in less time than the print media.

(c) Government Web Portals
World Wide Web has provided opportunities for governments to reach to their citizens by enabling them to take benefit of the fast growing rapid digital technologies. They include some key portals to the governments as well as portals developed for specific consultation.

(d) Social or Cultural Portals
Cultural portals combine various digitized collections of libraries, galleries, archives and museums. These portals provide access to a huge collection of cultural content that are not indexed by search engines. The collection mostly includes hand written books, artworks, sound recordings, music, diaries and letters of historical importance, archived websites as well as descriptive metadata associated with the cultural work. These portals can be based around a specific cultural or ethnic group, region or nationality.

(e) Corporate Web Portals
In early 1990s, there was a boom of corporate intranets. They grew in size and complexity and their increasing number posed many challenges to webmasters for their management. Many companies developed tools for managing data,
applications and information more easily through personalized views and web portals. Portal solutions included workflow management, policy management, content management and collaboration between groups. There is always an increase in user generated content, disparate data, file formats etc. and the need is felt to classify that information. Corporate portals offer such options and also provide employees with self-service opportunities.

(f) **Stock Portals**

Stock portals, also known as stock market portals, stock exchange portals or stock share portals, are web-based applications that alleviate the process of informing share holders with substantial online data like latest news, latest price, bids, announcements and reports. Some of the stock portals use online gateways through a central depository system (CDS) for the visitors to manage their portfolio or to buy and sell their shares online.

(g) **Search Portals**

These portals work like Meta search engines, cumulating results from several search engines into one page. They also provide links to websites in a specific field with specific purpose.

(h) **Tender's Portals**

Tender's portals act as a gateway to search/submit/modify/archive data on tenders. The professional processing of continuous online tenders is also done through these portals. By tendering portals, the process of submitting proposals, administration and assessment are done more easily on the web. E-tendering or online tendering is carrying out the same process of traditional tendering in an electronic format using the internet. It facilitates bidders to receive notifications on the tenders, filling of forms, submitting of proposals and bids online.

(i) **Hosted Web Portals**

They are the hosted services that serve as a tool for publishing information or presenting correlated data from distributed databases. Hosted web portals automatically customize the content generated from different modules to provide a vivid experience to their users. A new form of hosted web portals,
also called as cloud portals are egressing and showcasing the power of API (Application Programming Interface) to accommodate machine to machine interaction creating more fluidic user experience.

(j) **Domain-Specific Portals**

These are the portals offering specific services to companies with a special domain. For example property portals that give access to information regarding estate agents, firms and solicitors that offers conveyancing. Many industry-specific portals are coming up now along the same lines.

(k) **E-Learning Portal**

An e-learning portal is a website that offers learners and organizations a consolidated access to a wide range of learning and training resources from multiple sources. “A learning portal more than just a web site containing links to online courses, upcoming classes, job aids, and links to web sites, programs etc. It may also include a rating system, search functionality, bookmarking ability, and more Schone (2009). A web portal is defined, according to the UNESCO Bangkok Asia and Pacific Regional Bureau for Education, as “a one-stop knowledge shop of extensive information resources produced from all sources all over the world that can be accessed with no effort at one location”. It provides an entry point to various online sources and resources dealing with a specific topic. Learning portals are usually education oriented, providing access to a wide array of educational material from different sources. It serves as a main entry point or a gateway to a wide range of services offered by an organization in a specific field of interest. There are four essential services usually associated with any learning portal:

1. search engine
2. e-mail
3. links to other related sites
4. personalized content.

It may also provide facilities such as members list, free downloads, chat etc. There are two basic types of e-learning portals. First one is the websites that offer e-learning courses where one can find information related to the courses
offered, mode of teaching and learning, duration of the course, fee structure and certification. Such information remains specific to the related websites only. The second type of e-learning portals more or less acts as e-learning search engines. There is a list of e-learning courses offered by different providers. The learner can search according to his/her interest the course they want to join and the best learning providers available through the portal. Both types of e-learning portals have their own benefits and weaknesses. In the first type, sometimes the information related to the provider is much more elaborative and in case of a particular service provider, we may not get information about other providers. In the second type, the information may not be found in detail, but from a wide range of options, we can compare and go for the best. Learning portals are easily accessible from any part of the world provided we have an internet connection and are flexible enough to be accessed at our own schedule round the clock. E-learning portals have not been fully used to their potential and they have the capability of making the global educational system more uniform, qualitative and cost-effective.

6.1 Benefits of an E-learning portal

The most noticeable benefits of an e-learning portal in the investigator's perspective are flexibility, accessibility and affordability. They provide access to learning from multiple sources by hosting, aggregating and distributing content. Portals can deliver learning to geographically dispersed and diverse workforce effectively. Some of the advantages offered by the learning portals are:

- Consolidated access to a wide range of aggregated content.
- Independence from a single content vendor.
- Immediate access to learning due to minimized deployment time.
- No large up-front technology and software acquisition costs.
- No cumbersome implementation behind firewalls.
- Flexible, fast access and convenient to learning from multiple locations.
- Low or no maintenance costs.
- Powerful assessment tools for assessing online instruction.
6.2 Evaluation of various select e-learning portals

The primary objective of the evaluation study is to identify and propose a unified campus-wide enterprise portal solution meeting the following definition: An integration platform that securely provides users with a central point for accessing, individualizing and configuring information and applications that are appropriate to their role(s) in the university. The portal also provides standard-based means to aggregate information for campus developers and information providers to offer applications and information to end users via an array of platforms including mobile.

The list of the select eight other universities for investigation which provide e-learning in various subject fields in India is given as under:

(i) IGNOU Online
(ii) Amity University, Noida U.P
(iii) Mumbai University (ILOL), CST Road, Mumbai
(iv) Delhi University (ILLL), New Delhi
(v) Kashmir University (EMMRC), J&K
(vi) Don Bosco University, Azara Guwahati
(vii) The Global Open University, Nagaland
(viii) Symbiosis International University, Pune

6.2.1 IGNOU Online

Indira Gandhi National Open University (IGNOU) is the world’s largest Open University with highest number of enrolments in the world for open and distance courses. IGNOU started its online delivery of lectures through a series of interactive channels like ghyan-darshan and gyan-vas. Apart from this, IGNOU started eGyankosh in 2006, a National Digital Repository of learning resources. The repository was developed using Dspace open source software, which ideates to store, index, preserve, distribute and share the digital learning resources of open and distance learning (ODL) institutions of the country. IGNOU started its online virtual classes from 2008 from a series of online
virtual classrooms for various subject fields including Library and Information Science through (Library and Information Science Virtual Education) LIVE web portal. However, IGNOU Online does not provide latest news and events, user’s count, graphics, multimedia, site search engine and web 2.0 items.

![Figure-25 IGNOU Online](image)

### 6.2.2 Amity University Online

Amity University was established in 2002 and it is one of the country’s biggest education providers and has established its online learning through Amity Centre for e-learning to give individuals and organizations the competitive edge. It has started its online end-term examination twice in a year and online contact program through interactive live virtual classes from anywhere in the world. All the classes are archived for those who missed the live classes. All the assignments are to be submitted online and there are no hard copies to be submitted. Students can interact with faculty and peers through email and can also change over from regular distance learning program to e-learning and vice-versa. Amity University is trying to eliminate the barriers of time and distance creating universal, learning-on-demand opportunities for people,
companies and countries. It provides faster learning at reduced costs, increased access to learning resources, and clear accountability for all participants in the learning process with its e-learning program. It does not provide newsletter, latest news and events, user’s count, A/V conferencing and web 2.0 items.

![AMITY UNIVERSITY ONLINE](image)

**Figure-26 Amity University Online**

### 6.2.3 Mumbai University DLLE

Mumbai University started its Department of Life Long Learning and Education (DLLE) in 1994 and from 2003, it started its first batch of e-learning programme. In the recent years, the University has designed and introduced many new short term and certificate courses in management, electronics and accounting. All the admission formalities are to be completed online along with the payment of fee, submission of application forms and a person can have live chat with the counselor in case of any queries or clarifications regarding the course structure and methods of delivery of learning and teaching.

The software used is an open source Joomla with clear learning objects and the portal is updated frequently with Interoperability compliance standards.
Continuing Education

The Department offers short term Continuing Education Certificates Courses. In the past years, the Department has designed and introduced few new courses and some of the short term courses are conducted number of registrations during the years.

Your Continuing Education

Courses | Online Instruction | Download Admission Form | Register Now

Certificates Courses
3. Certificate in Database Administration.
6. Certificate in Linux Administration.
7. Certificate in Fibre Optics Technology
8. Certificate in Basics of Share Market
11. Certificate in Corporate Writing Skills

Figure-27 Mumbai University DLLE

However, no content or study material, newsletter, user’s count, support and web 2.0 items are provided which is a major short coming of the portal.

6.2.4 Delhi University Virtual Learning Environment

Delhi University established its Virtual Learning Environment in the year 2007. It is providing education in various open courses online. It also provides open educational resources on various subject fields like sciences, humanities and social sciences. The University is covered in National Mission on Education through Information and Communication Technology (NME-ICT) project. The university is trying to incorporate web 2.0 items in the online learning web-portal like podcasts. The downloadable content on various subject fields in portable document format is also given along with the video lectures.

A clear, complete course overview or details is provided. All the sources of information are scholarly without personal opinions or bias. The website is updated frequently and follows International interoperability standards. Course architecture permits experts to add content, activities and assessments to extend learning opportunities. Objectives are matched to content requirements and to
the grade and skill levels of the intended audience. But some items like newsletter, news and events, user's count, support, content references or A/V conferencing are missing in its web portal. However, podcasts in the web 2.0 items are available for use.

Figure-28 University of Delhi VLE

6.2.5 Kashmir University E-Learning
Educational Multimedia Research Centre (EMMRC) has been established in 1987 and from 2007, Kashmir university is using some features of e-learning like overhead projectors and video-conferencing mode of learning and teaching. However, the full-fledged e-learning courses are yet to come and the beta version of University of Kashmir e-learning is under construction. The major flaws in the website of e-learning is its inaccuracy, infrequent updation, poor responsiveness, no support, graphics, site search, multimedia and lack of web 2.0 items.
6.2.6 Don Bosco University

Established on 29th March 2008, Assam Don Bosco University aims to mould intellectually competent, morally upright socially committed and spiritually inspired persons at the service of India and the world of today and tomorrow, by imparting holistic and personalized education. It offers courses from the fields of Library and Information Science, management and engineering. It provides videos, discussion related opportunities through discussion boards and online counseling for students and learners. It provides online content and reading material like articles, news and e-books store. Using a state-of-art virtual classroom platform, DBU global students attend classes over the internet, interacting with teachers and experts of the finest institutions of the nation and fellow students placed across the globe. However, it does not provide any content or study material, newsletter, news and events, user's count, additional references, graphics, site search and web 2.0 items.
6.2.7 The Global Open University

It was established in the year 2006 and it worked its way towards technology enabled learning and developed its online campus. It is providing a platform for providing internet enabled online education with 24x7 support, downloadable content, video lectures and live support for teaching and learning. However, it does not provide any newsletter, user's count, additional references, graphics, web 2.0 items and site search. Lack of A/V conferencing is a major drawback of the web portal.

Figure-31 The Global Open University Online
6.2.8 Symbiosis International University

Symbiosis International University, Pune has become one of the largest autonomous distance education institutions in India after its inception in 2001. It has introduced the concept of blended learning and e-learning in distance education in 2002, combining all the three forms of learning, namely, published/printed self-learning material, e-learning, pre-recorded DVD lectures and faculty interaction (Chat Sessions and Virtual Classroom Facility). It has introduced highly interactive e-learning content as a supplementary learning methodology to improve the understanding of concepts through case studies and practical examples, thereby bridging the gap between a book and the classroom. The Virtual Classroom facility with the Faculties has removed the distance barrier between the teacher and the taught. This facility provided by SCDL is an additional student support service to interact with faculty members online and live. There is a Modular Course System with Credit Banking Facility and ability to take any single course and bank and accumulate credits for future transfer to other programs of SCDL thus providing flexible pathways of learning. However, no study material, user’s count or web 2.0 items is provided. It is the most complete web portal among all the other select eight universities.

Figure-32 Symbiosis Centre for Distance Learning
Various evaluation criteria have been adopted by many universities all over the world that have been published for evaluation of web-portals and websites. The present evaluation criteria is devised as an amalgamation of various excellent evaluation criteria's adopted by:

1. The University of the Aegean  
   (http://www.washington.edu/oea/pdfs/reports/OEAReport0211.pdf),

2. University of Illinois  
   (http://www.library.illinois.edu/bix/pdf/genguide/WebEval.pdf)

3. Xavier University Library  
   (http://www.xavier.edu/library/students/documents/website_evaluation.pdf) and

4. National Health Service Education for Scotland  
   (http://www.knowledge.scot.nhs.uk/media/4088630/quality_assurance_checklists.pdf)

The criterion devised is formulated on the following categories of evaluation listed as under:

1. Accuracy  
2. Objectivity  
3. Up to Date (Currency)  
4. Audience  
5. Content/Study Material  
6. Study Material  
7. Newsletter  
8. News and Events  
9. Software  
10. Accessibility  
11. Coverage  
12. Usability  
13. Functionality  
14. Reliability  
15. Effectiveness  
16. Suitability  
17. Responsiveness  
18. Clarity  
19. User's Count  
20. Support  
21. Standards Compliance  
22. Stability  
23. Additional References  
24. Graphics  
25. Multimedia  
26. Web 2.0 Items  
27. A/V Conferencing  
28. Style  
29. Site Search Engine  
30. Credibility  
31. Technical Properties  
32. First Impression  
33. Quality
<table>
<thead>
<tr>
<th>Criteria</th>
<th>IO</th>
<th>AU</th>
<th>MU</th>
<th>DU</th>
<th>KU</th>
<th>DBU</th>
<th>GOU</th>
<th>SIU</th>
<th>LL</th>
</tr>
</thead>
<tbody>
<tr>
<td>accuracy</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>activity</td>
<td>To the point and free of bias</td>
<td>To the point and free of bias</td>
<td>To the point and free of bias</td>
<td>To the point and free of bias</td>
<td>To the point and free of bias</td>
<td>To the point and free of bias</td>
<td>To the point and free of bias</td>
<td>To the point and free of bias</td>
<td>To the point and free of bias</td>
</tr>
<tr>
<td>twice (currency)</td>
<td>Updated less frequently</td>
<td>Updated weekly</td>
<td>Updated weekly</td>
<td>Updated less frequently</td>
<td>Updated frequently</td>
<td>Updated frequently</td>
<td>Updated more frequently</td>
<td>Updated every day</td>
<td></td>
</tr>
<tr>
<td>silence</td>
<td>Students and in-service learners</td>
<td>Students</td>
<td>In-service and elderly learners</td>
<td>Students</td>
<td>Students</td>
<td>Students</td>
<td>Students</td>
<td>Students, experts, professionals and services</td>
<td></td>
</tr>
<tr>
<td>Study Material</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>visit Events</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Inverse</td>
<td>PHP</td>
<td>Asp.net</td>
<td>Joomla</td>
<td>Word Press</td>
<td>Asp.net</td>
<td>Drupal</td>
<td>PHP</td>
<td>Asp.net</td>
<td>Joomla</td>
</tr>
<tr>
<td>accessibility</td>
<td>Only to registered members</td>
<td>Only to registered members</td>
<td>Only to registered members</td>
<td>Only to registered members</td>
<td>Only to registered members</td>
<td>Only to registered members</td>
<td>Only to registered members</td>
<td>Only to registered members</td>
<td>Accessible to all and to registered users also</td>
</tr>
<tr>
<td>capability</td>
<td>Learning Objects are appropriate for the scope it aims to cover</td>
<td>Learning Objects are appropriate for the scope it aims to cover</td>
<td>Learning Objects are appropriate for the scope it aims to cover</td>
<td>Learning Objects are not clearly defined</td>
<td>Learning Objects are appropriate for the scope it aims to cover</td>
<td>Learning Objects are appropriate for the scope it aims to cover</td>
<td>Learning Objects are appropriate for the scope it aims to cover</td>
<td>Learning Objects are appropriate for the scope it aims to cover</td>
<td>Learning Objects are appropriate for the scope it aims to cover</td>
</tr>
<tr>
<td>Functionality</td>
<td>A clear, complete course overview or details is not provided</td>
<td>A clear, complete course overview or details is not provided</td>
<td>A clear, complete course overview or details is not provided</td>
<td>A clear, complete course overview or details is not provided</td>
<td>A clear, complete course overview or details is not provided</td>
<td>A clear, complete course overview or details is not provided</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------</td>
<td>------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>All the sources of information are scholarly and well defined</td>
<td>All the sources of information are scholarly and well defined</td>
<td>All the sources of information are scholarly and well defined</td>
<td>All the sources of information are scholarly and well defined</td>
<td>All the sources of information are scholarly and well defined</td>
<td>All the sources of information are scholarly and well defined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testability</td>
<td>Objectives are matched to content requirements and to the grade and skill levels of the intended audience</td>
<td>Objectives are matched to content requirements and to the grade and skill levels of the intended audience</td>
<td>Objectives are matched to content requirements and to the grade and skill levels of the intended audience</td>
<td>Objectives are matched to content requirements and to the grade and skill levels of the intended audience</td>
<td>Objectives are matched to content requirements and to the grade and skill levels of the intended audience</td>
<td>Objectives are matched to content requirements and to the grade and skill levels of the intended audience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td>Course architecture permits learners to add content, activities and assessments to extend learning opportunities</td>
<td>Course architecture permits learners to add content, activities and assessments to extend learning opportunities</td>
<td>Course architecture permits learners to add content, activities and assessments to extend learning opportunities</td>
<td>Course architecture does not permit learners to add content, activities and assessments to extend learning opportunities</td>
<td>Course architecture does not permit learners to add content, activities and assessments to extend learning opportunities</td>
<td>Course architecture does not permit learners to add content, activities and assessments to extend learning opportunities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usability</td>
<td>Average response and normal web</td>
<td>Average response and normal web</td>
<td>Average response and normal web</td>
<td>Poor response and average web</td>
<td>Good response and normal web</td>
<td>Average response and dual web</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Design and Implication of E-learning Portal*
<table>
<thead>
<tr>
<th></th>
<th>Accessibility</th>
<th>Accessibility</th>
<th>Accessibility</th>
<th>Accessibility</th>
<th>Accessibility</th>
<th>Accessibility</th>
<th>Accessibility</th>
<th>Accessibility</th>
<th>Accessibilit</th>
<th>Learn</th>
<th>Learn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity</td>
<td>Content and learning activities are clearly aligned with learning outcomes</td>
<td>Content and learning activities are clearly aligned with learning outcomes</td>
<td>Learning activities are clearly aligned with learning outcomes</td>
<td>Content and learning activities are clearly aligned with learning outcomes</td>
<td>Content and learning activities are not clearly aligned with learning outcomes</td>
<td>Content and learning activities are not clearly aligned with learning outcomes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Users Count</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Support</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Standards Compliance</td>
<td>The course is constructed in compliance with technical interoperability standards and SCORM 1.2 or IMS Content Packaging 1.1.2 compliant at a minimum</td>
<td>The course is constructed in compliance with technical interoperability standards at a minimum</td>
<td>The course is constructed in compliance with technical interoperability standards at a minimum</td>
<td>The course is constructed in compliance with technical interoperability standards and SCORM 1.2 or IMS Content Packaging 1.1.2 compliant at a minimum</td>
<td>The course is constructed in compliance with technical interoperability standards and SCORM 1.2 or IMS Content Packaging 1.1.2 compliant at a minimum</td>
<td>The course is constructed in compliance with technical interoperability standards and SCORM 1.2 or IMS Content Packaging 1.1.2 compliant at a minimum</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Stability</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Procedure of acquiring username and password, correct transaction, encrypting</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Additional Content/References</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphics</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (mp4, mp3, pdf, txt, gif)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web 2.0 Items</td>
<td>Nill</td>
<td>Nill</td>
<td>Nill</td>
<td>Podcast</td>
<td>Nill</td>
<td>Nill</td>
<td>Nill</td>
<td>Nill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AV conferencing</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Style**
- Design is clear, consistent and provides appropriate instructions for navigation and interaction.
- Design is simple and does not provide proper navigation and interaction.

**Its Search Engine**
- Yes

**Credibility**
- Free of grammatical, spelling, or typographical errors.

*Note: The table continues with more columns and rows.*
### Technical Properties

<table>
<thead>
<tr>
<th>First Impression</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance between textual and visual elements</td>
<td>Accepted Expressive Language</td>
</tr>
<tr>
<td>Balance between textual and visual elements</td>
<td>Accepted Expressive Language and good quality</td>
</tr>
<tr>
<td>Aesthetic and well organized</td>
<td>Expansive and Interpretable Data</td>
</tr>
<tr>
<td>Balance between textual and visual elements</td>
<td>Accepted Expressive Language</td>
</tr>
<tr>
<td>Aesthetic and well organized</td>
<td>Expansive and Interpretable Data</td>
</tr>
<tr>
<td>Balance between textual and visual elements</td>
<td>Accepted Expressive Language</td>
</tr>
<tr>
<td>Balanced between textual and visual elements and attractive content presentation (aesthetic)</td>
<td>Accepted Expressive Language, good quality and Ease of understanding / Interpretable Data</td>
</tr>
</tbody>
</table>

#### Table 49 Evaluation of various select E-Learning web-portals

1. IO- IGNOU Online
2. AU- Amity Online
3. MU- Mumbai University
4. DU- Delhi University
5. KU- Kashmir University
6. DBU- Don Bosco University
7. GOU- Global Online University
8. SII- Symbiosis International University
9. LI- Liselarn
On the basis of the evaluation of the websites/web portals under study, it can be stated that all the e-learning systems are accurate except Kashmir University as the beta version of its portal is under construction and not functional. The objectivity of all the portals is to the point and free of bias with frequent updation of the information. Government universities like IGNOU, Mumbai University and Delhi University have audience which mainly consists of students, in-service candidates and elderly learners, whereas the private universities mainly focus on the learning and training of students only. However, the designed prototype Lislearn is for students, experts, professionals and novices as well.

Out of the eight university portals evaluated, three universities do not provide study material for download which includes Mumbai University, Don Bosco University and Symbiosis International University. All university e-learning portals have designed on the platform of open source softwares like Joomla, Drupal and PHP etc. showing the trend in the selection of software by the universities in India. Learning objects of all the portals are appropriate and well defined for the scope and aims to cover except for the Global Open University which are not clearly defined.

None of the government universities have provided a clear and complete overview of the courses, whereas a clear and complete course details are provided by all the private university e-learning portals. However, the private universities do not permit the tutors to add content, activities or assessments on their own which in turn hampers the extension of learning opportunities.

Apart from the missing additional references by some universities, web 2.0 items are missing in almost all the universities except Delhi University and Lislearn. Audio/video conferencing is also missing in Amity University, Delhi University and Global Open University.

Information on the websites/web portals is available in a format that require special viewers and plug-ins except in Mumbai University, Delhi University, Don Bosco University and the prototype designed by the investigator. All the drawbacks found in these e-learning portals have been eliminated in Lislearn.
6.3 Lislearn: An e-learning prototype (www.lislearn.in)

The e-learning market is on a boom world over and is predicted to follow an upward swing with more and more organizations implementing this mode. The ability of e-learning lies in its potential to provide right information in an instance irrespective of the geographical boundaries and barriers. The ICT led initiatives in the form of e-learning support, open courseware, digital repositories are now seen in majority of the open and distance learning systems. There is a lack of full-fledged e-learning system in library and information science education. Here is the need to develop an e-learning system in LIS education after ascertaining some of the select web-based learning systems, which will provide free access to LIS professionals, teachers and students. Lislearn is one such attempt to overcome the lacking of such a system in library and information science.

LISLearn is basically an e-learning portal specifically designed for Library and Information Science professionals and students. It is an initiative to bring together all the library and information science professional community at one single platform, so that they can share their expertise and views.

It is developed in English language and envisages a space for teachers, students and other professionals to express their ideas and share their thoughts on the subject. It also involves the uploading of content created by and for library professionals. These will be articles on various topics, short articles written by teachers on subjects of their choice including classroom practice, their experiences in library and information science schools and the ideas they have tried to experiment on. Links are provided to websites, gateways, universities, blogs and forums to provide access to valuable and important sources of information to library and information science professionals and students.

6.3.1 About Technology and Software Used

Joomla (www.joomla.org) is one of the world's most popular open source CMS (content management system) used for everything from creation of websites, portals, blogs and intranets. It is a free software package designed
using sound pedagogical principles, to help educators create effective online learning communities.

The name Joomla is derived from the Swahili word "Jumla", a phonetic spelling, which means all together or as a whole. It is mostly used by programmers and education theorists. Joomla is a software package for producing internet or web based courses and websites. It is specially designed and premeditated to maintain a social constructionist framework of online education. Joomla keeps track of all content on our website or portal, much like a library keeps track of books and stores them. Content may include text, images, audio/video or just anything we can think of. It is available freely as open source software (under GNU General Public License). Basically, this means Joomla is copyrighted, but users have additional advantages and freedom. Users are allowed to copy, use or modify as per their own requirements. It offers that user agree to:

(a) provide the source to others
(b) not remove or modify the original license and copyrights and
(c) apply the same license to any derivative work.

Joomla installs on any computer that can run PHP (Hypertext Preprocessor) and can support an SQL (Special Query Language) database for example, MySQL. The latest release of Joomla is 2.5 and 3.1.0 which for the first time includes multi-database support with the addition of Microsoft SQL server apart from MySQL server. It can be run on Mac operating systems, windows and many flavours of Linux (Red Hat or Debian GNU).

6.3.2 Requirements

- PHP
  - PHP 5.2.0 or newer version is needed with session support and the Standard PHP Library (SPL) extension.
  - To support uploading of ZIP files, PHP zip extension is needed.
  - To support of multibyte strings (eg. UTF-8, which is currently default), mbstring and ctype extensions needs to be installed.
GD2 support in PHP is required to display inline thumbnails of JPEGs ("image/jpeg: inline") with their original aspect ratio.

When using the "cookie" authentication method, the mcrypt extension is required for 64-bit machines and is strongly suggested for most users. Not using mcrypt cause phpMyAdmin to load pages significantly slower.

- MySQL 5.5 or newer
- Web browser with cookies enabled.

phpMyAdmin manages the whole MySQL server (needs a super-user) as well as a single database. To accomplish the task, we need to properly set up MySQL user who can read/write only the desired database. It's up to the administrator to look up the appropriate part in the MySQL manual.

Currently phpMyAdmin can:

- Browse and drop tables, fields, views, indexes and databases.
- Create, copy, rename and alter databases, fields, tables and indexes.
- Maintenance of server and databases with proposals on server configuration.
- Edit, bookmark and execute any SQL-statement, even batch-queries.
- Load text files into tables.
- Read and create dumps of tables.
- Export data to various formats: PDF, CSV, XML, ISO/IEC 26300 – Open Document Text and Spreadsheet, Word, Excel and \text{T}_{\text{E}}\text{X} formats
- Administer multiple servers.
- Manage MySQL users and privileges.
- Verify referential integrity in MyISAM tables.
- Use Query-by-example (QBE), create complex queries automatically connecting required tables.
- Generate PDF graphics of your Database layout.
- Search globally in a database or a subset of it.
• Convert stored data into any format using a set of predefined functions, like displaying BLOB-data as image or download-link.
• Support foreign keys and InnoDB tables.
• Support mysqli, the improved MySQL extension.
• Communicate in 57 different languages.

Many people find it difficult to understand the concept of user management with regards to phpMyAdmin. When a user logs in to phpMyAdmin, that username and password are passed directly to MySQL. All users must be valid MySQL users; phpMyAdmin only allow manipulating the MySQL user account information. phpMyAdmin can compress (GZip, Zip-RFC 1952- or Bzip2 formats) dumps and CSV exports if we use PHP with Zlib support (---with-zlib) and/or Bzip2 support (---with-bz2). Appropriate support may also need changes in php.ini.

6.3.3 Download and Installation
Installing Joomla is very easy and it comes with a built-in installer which makes setting up our site very easy. Before installing Joomla, there are a couple of prerequisites that need to be installed first.

• Hosting - whether it is a dedicated server, or shared hosting plan, some sort of web hosting is needed that meets the following requirements:
  • PHP v. 5.2+
  • MySQL 5.04+
  • Apache 1.3 or above
• MySQL Database - An access to a MySQL database is needed, as well as the following credentials:
  • DB Name
  • Host Name
  • Username
  • Password
• FTP Client - for transferring files to our server, if we don’t already have an FTP client.
When the above requirements are met, Joomla is ready to be installed. To begin installation, the following steps need to be followed:

**Pre-Installing Steps**

- **Step 1.** Create a MySQL database from cPanel->MySQL Databases and add a user to it.
- **Step 2.** After downloading the archive file of Joomla 2.5 with the latest stable version from the official website, we need to store it in a folder on our local computer and extract the archive.
- **Step 3.** All the content is uploaded from this local folder to the directory on the server where Joomla 2.5 is stored. The easiest way to upload the files and folders is through an FTP client.
- **Step 4.** Open the URL of the newly-uploaded Joomla script. If the content is uploaded in the main web directory, we use http://yourdomainname.com. Then the domain and the directory names are replaced with the ones for our web site.

**Installation Steps**

- **Step 1.** The Joomla installation page gets loaded:

![Joomla 2.5.0 Installation](image)

*Figure-33 Joomla 2.5.0 Installation*

Then the language for installation is selected and is valid only during installation.
→ Step 2. On the next page Joomla will check whether the system requirements are met on the server.

If one or more are not met, a corresponding message will be shown. SiteGround servers are fully compatible with Joomla 2.5.0:

![Pre-installation check for Joomla 2.5.0](image)

**Figure-34 Pre-installation check for Joomla 2.5.0 stable**

→ Step 3. After making sure that all system requirements are met, we proceed by clicking on the Next button from the top right menu. On the next page we read and accept Joomla's license.

![GNU (General Public License)](image)

**Figure-35 GNU (General Public License)**
Again we click next to continue

→ Step 4. Here we enter the MySQL details for the new Joomla 2.5 installation. Using the ones set in Step 1. In the following screenshot we find an example entries and explanations for these fields:

![Database Configuration](image)

**Figure-36 Database Connection Settings**

→ Step 5. Next, we can set our File Transfer Protocol (FTP) configuration.

Keeping the default settings we click Next to proceed.

![FTP Configuration](image)

**Figure-37 FTP Configuration**
→ Step 6. On the current page the main Joomla 2.5 configuration is defined. We specify our site name, meta description and keywords, admin user, email and password.

![Figure-38 Main Configuration](image)

Click on Next to proceed.

→ Step 7. In the last page of the installation wizard we receive a confirmation that Joomla 2.5 has been successfully installed.

![Figure-39 Finishing Installation](image)

In order to access our new Joomla 2.5 web site we must delete the installation directory. This can be done with our FTP client. Our Joomla website is now installed.
6.4 Different Sections on the Portal

The different sections on the portal include the following:

6.4.1 Top Menu

- Home

A homepage, also known as index page or simply home, is the first page when we open any website from a web browser. Homepage is a gateway to vast knowledge resources through a single interface. A home page gives us information about the website, provides links to other web pages, provides login facility if available, and enlist items in the form of menus. Most of the homepages display upcoming events and latest news and updates related to their specific field.

A homepage is also used outside the context of websites to refer to the principal screen or home screen of a user interface or mobile device. At any point during browsing in a website, when home button is pressed, it takes us back to the main or index page of the web-portal or website.

![LISLearn Homepage](image)

*Figure-40 LISLearn Homepage*

- Download (Content)
  - Pdf
Chapter 6  Design and Implication of E-learning Portal 1 234

- Audio
- Video
- Newsletter

This section includes the study materials or courseware such as articles, policy documents, manuals, tools and modules in pdf, audio, video form by experts in the field is made available on the either directly or through links.

- Results
  - B. Lib Results
  - M. Lib Results

- FAQ

Frequently asked questions are the listed questions and answers commonly asked in some context pertaining to a particular topic or topics. Rather than an acronym, it is pronounced as 'initialism'. Its pronunciation varies from 'fack', 'faak' 'fax' to 'facts' commonly heard. Depending on the usage, the terms may refer to a single frequently asked question or a group of assembled questions.

This section provides answers to frequently asked questions about e-learning and training, answers about portal usage, course details, admission procedure and other related questions for online delivery of learning and training.

- e-Thesis and Dissertations

This menu provides the link to various online theses web-portals and repositories so as to provide a gateway to vast sources of knowledge from a single access point.

- Site Map

A sitemap is a list of web pages in a website accessible to users. It is either in a document form or a webpage from typically organized in hierarchical fashion. There are two popular versions of sitemap; XML sitemap and HTML sitemap. Site map gives information about the modules, menus options and links provided in the portal.

- Photo Gallery

This section includes the images and photos of various eminent personalities in library and information science across the world.
Contact Us

This section includes the query form basically designed for those users who wish to know something about the facilities provided regarding online registration, learning and other things.

Figure-41 Contact Us

Newsletter

A newsletter is a regularly distributed publication generally about one main topic that is of interest to the subscribers. Newsletters delivered electronically have gained more acceptances over printed correspondence. General attributes of newsletters include news and upcoming events of the related organization as well as contact information for general inquiries. Any user can subscribe the newsletter facility by just providing his/her name and e-mail address.

6.4.2 Slider Menus

About Us

- E-Learning Portal
- Vision and Mission
Chapter 6  Design and Implication of E-learning Portal

- Objectives and Values

This section includes information about Lislearn, its vision and mission along with the objectives on which it is designed and the values that are strictly to be followed.

- Admissions
  - Programs Offered
  - Entry Requirement
  - Fees for All Programs

This section provides information regarding the courses that are offered, the essential requisites for getting admission and the fees for each program to ease up the admission process.

- Applicants
  - Apply Now
  - Study and Examination Rules
  - Learning Method
  - Brochure and Syllabus

This portion on the portal gives information about the examination rules, the methods of learning that will be followed, brochure and syllabus around which the study will follow.

- Faculty Corner
  - Alphabetical list of LIS faculty in India

- Professional corner
  - Professional Development Programs
  - Workshops and Training
  - Conferences and Seminars
  - Symposia and Debates

- Research Corner
  - M.Phil in LIS
Figure-42 M.Phil Courses in various Universities in India

- Ph.D in LIS

Figure-44 Ph.D Courses in various Universities in India

- Theses Awarded in LIS

This section provides news about research (M.Phil/Ph.D), fellowships, conferences and workshops, theses awarded etc. in LIS in India.
6.4.3 News and Events

It is the communication of the select information on current events presented to mass audience. This section provides the latest updates of news and events in library and information science profession.

6.4.4 Login Form

In computer terminology, login (also known as logging in or on and signing in or on) is the process by which individual gains access to a computer system and is controlled by identifying and authenticating user referring to credentials provided by the user. Users can logoff or logout when the access is no longer needed after having previously logged in. Once the user is logged in, login tokens may be used to track the actions user has taken while connected to the site.

The portal provides three types of login options according to the user types. They are listed as under:

- Login for Students
  - Profile Info
  - Calendar of Events
  - Chat
  - Side bar containing links to forums, discussions and activities.
  - Enter the Classroom

- Login for Teachers
  - Profile Info
  - Calendar of Events
  - Chat
  - Side bar containing links to forums, discussions and activities.
- Deliver Lecture

- Login for Professionals

Users and professionals can register themselves by just filling the user form through which they can become the registered users. Users need to pay to get registered on quarterly, half yearly and yearly basis.

![User Registration Form](image)

*Figure-44 User Registration*

### 6.4.5 Site Search

In a search engine, a web-portal and most of the websites, a search box is provided for searching articles or topics of interest. The results page shows the most relevant topics first and least relevant topics in the end. It saves the browsing time of a user and can directly display the appropriate information what a user is looking for. A search box in the portal is provided at the top for locating and finding information within the site. Any user can search particular world and phrase according to his/her desire.
6.5 System Analysis for Current Study

A system approach was taken to develop information system which is known as System Development Life Cycle (SDLC). It is a step-by-step process which refers to a methodology for developing systems. It provides a consistent framework of tasks needed to develop systems (Mishra, 2002). The SDLC methodology can be reduced to include only those activities that are appropriate for a particular project, whether the system is automated or manual, whether it is a new system or an enhancement to existing systems.

![System development Life Cycle (SDLC)](image-url)
Chapter-6  Design and Implication of E-learning Portal

SDLC methodology tracks a project from an idea developed by the user, through a feasibility study, systems analysis and design, programming, pilot testing, implementation, and post-implementation analysis. Documentation developed during the project development is used in future when the system is re-assessed for its continuation, modification, or deletion.

6.5.1 System Development Life Cycle (SDLC)

The System Development Life Cycle (SDLC) is a conceptual model used in project management that describes the stages involved in an information system development project from an initial feasibility study through maintenance of the completed application. Various SDLC methodologies have been developed to guide the processes involved including the waterfall model (the original SDLC method), rapid application development (RAD), joint application development (JAD), the fountain model and the spiral model (Whitten et al. 2004). Several models are combined mostly into some sort of hybrid methodology. Documentation is crucial regardless of the type of model chosen or devised for any application, and is usually done in parallel with the development process. Some methods work better for specific types of projects, but in the final analysis, the most important factor for the success of a project may be how closely a particular plan was followed.

The system development life cycle (SDLC) is the entire process of formal, logical steps taken to develop a software product. The phases of SDLC can vary somewhat but generally include the following:

1. Conceptualization;
2. Requirements and cost/benefits analysis;
3. Detailed specification of the software requirements;
4. Software design;
5. Programming;
6. Testing;
7. User and technical training;
8. And finally, maintenance.
6.5.2 Brief Description of Different Phases

(a) Feasibility

Feasibility study is used to determine whether a project is worth doing and should go ahead. Feasibility studies are undertaken under tight and fixed time constraints and normally culminate in a written and oral feasibility report. The author has taken two weeks to study feasibility study with the co-developer. The contents and recommendations of this study helped as a sound basis for deciding how to proceed for system development. It helped in taking important decisions in deciding the software and hardware combinations etc. to be used. A set of alternatives and their feasibility is also considered in case of any failure in the proposed system. Thus, feasibility study is an important part in software development.

There are three main phase of feasibility study:

(i) Technical Feasibility

Technical feasibility determines whether the work can be done with the existing equipments, software technology and expertise at hands. It is concerned with specifying tools, instrumentation and software that will satisfy user requirements. It checks whether the available hardware and software resources meet the established requirements of the analyzed system. It also invokes the study of new alternative to solve the given problem.

(ii) Economical Feasibility

Economic feasibility determines the cost effectiveness and cost benefits of the system. It establishes the return on investment (ROI) and signifies savings in terms of monitory gains and the level of user satisfaction regarding its pre-assumed cost for developing a system. During the economical feasibility test, a balance was maintained between the operational and economic feasibilities as the two were conflicting. For example the solution that provides the best operational impact for the end-users may also be the most expensive and, therefore, the least economically feasible. The genuine consideration of the system developed is the approach the author followed to look the system in the way it is useful for the end users.
(iii) Operational Feasibility
Operational feasibility criteria measure the urgency of the problem (survey and study phases) or the acceptability of a solution (selection, acquisition and design phases). People are inherently resistant to change, and computers have known to facilitate change. An estimate should be made of how strong a reaction the user staff is likely to have towards the development of a computerized system. It is common knowledge that computer installations have something to do with turnover, restraining, transfers, and changes in employee job status. Therefore, it is understandable that the introduction of a candidate system requires special effort to educate, sell and train the staff on new ways of delivering knowledge.

(b) Requirement Analysis and Design
This stage includes a detailed study of the needs and objectives of the organization. During these phases, the software's overall structure is defined. Analysis and Design processes are very crucial in the whole development cycle. Any glitch or anomaly in the design phase could be very expensive to solve in the later stage of the software development. Much care is taken during this phase. The logical system of the product is developed in this phase.

(c) Coding and Implementation
Coding and implementation requires high level of expertise. In this phase, the designs are translated into codes understood by the computers. Computer programs are written using a conventional programming language or an application generator. Programming tools like Compilers, Interpreters, and Debuggers are used to generate the code. Different high level programming languages like C, C++, Pascal, and Java are used for coding. With respect to the type of application, the right programming language is chosen.

(d) Testing
In this phase, the programs are written as a series of individual modules, subject to separate and detailed test. The system is then tested as a whole by bringing together the separate modules as a complete system. The system is tested to ensure that the links and interfaces between modules work (integration
testing), the system works on the intended platform with the expected volume of data (volume testing) and the system does what the users require (beta testing).

(e) Maintenance

Inevitably, the system needs maintenance on regular basis. Software needs to undergo upgradation or updation in order to incorporate new features. System needs to be checks for bugs and errors. Unwanted cookies and files needs to be deleted in order to regulate the speed of the site loading and browsing. No or less used modules, options or links need to be deleted and latest trends to be incorporated.

(f) Time Scheduling

Management tools such as PERT, CPM, Gantt charts, work breakdown structures and personnel staffing charts may be used to track and control progress. Basic planning uses bar chart that shows system activation and amount of time it will take. The Gantt chart uses horizontal bars to show the duration of actions and tasks. The left end marks the beginning of the task, the right end its finish. Time is projected in days.

![Figure-47 Requirement Analysis and Design](image-url)
The heavy horizontal bars are activities and the light horizontal bars are tasks. Broken horizontal bars are estimated time delays or slack time.

6.5.3 Process and Dataflow Diagrams for System Analysis

(a) Process Diagram

![Process Diagram for System Analysis](image)

(b) Query Form

![Query Form](image)
(c) User Registration

Registration

Name

Username

Email id

Password

Verify Password

Submit form

Figure- 50 User Registration

(d) Login to Website as a Registered User

Login Form

User name

Password

Figure-51 Login to website as a registered user
(e) If forget password

Figure - 52 Forgot Password

(f) Newsletter

Figure - 53 Newsletter
6.6 System Testing

System testing is the expensive and time-consuming process. There are two strategies for testing software that we use for testing our system: Code Testing and Specification Testing. In Code testing, we developed those cases to execute every instructions and path in the program. In specification testing, we examined the program specification and then wrote test data to determine how the program operates under specified condition. The different levels of testing are used in the testing process. The basic levels are unit testing, integration testing, system testing, and acceptance testing. These different levels of testing detect different types of faults.

![Diagram of System Testing]

Figure- 54 System Testing

6.6.1 Levels of testing

We have tested each module separately i.e. have completed unit testing first and system testing was done after combining /linking all different Modules with different menus and thorough testing was done. Testing is a very important part of SDLC and takes approximately 50% of the time. Once the system is a live one, maintenance phase is important. Service after specified time is a must and users/learners must be helped after the system is
implemented. If he/she faces any problem in using the system, one or two trained persons from developer's side can be deputed at the client’s site, so as to avoid any problem and if any problem occurs, immediate solution may be provided.

The following are some attributes of a good test:

- A good test has a high probability of finding an error. To achieve this goal the tester must understand the software and attempt to develop a mental picture of how the software may fail. Ideally the classes of failure are probed.

- A good test is not redundant: testing time and resources are limited. There is no point in conducting the test that has the same purpose as another test. Every test should have a different purpose.

- A good test should be best of breed. In a group of tests that have a similar intent time and resource limitations may militate for the execution of only a subset of these tests. In such cases the tester that has the highest likelihood of uncovering a whole class of errors should be used.

- A good test should be neither too simple nor too complex: although it is sometimes possible to combine a series of tests into one test case, the possible side effects associated with this approach may mask errors. In general each test should be executed separately.

6.7 Discussion and Future Scope

It can be concluded that LISLearn can be very much beneficial for the academic point of view. It can help Library and Information Science schools who want to promote their institute through online mode of learning and teaching.

The future prospect of the web portal involves contributing content and learning to various academic institutions using membership options. It will also take into the consideration that many more academic prospects could be attached to the web portal that will help the learners to find multiple learning options in a single interface easily using the web portal to help them in increasing their knowledge about their topics of interest.
References


Delhi University (2014). Virtual Learning Environment (VLE). Retrieved June 18, 2014 from vle.du.ac.in

Don Bosco University (2014). Open and Distance Education. Retrieved June 17, 2014 from www.dbuglobal.com/site/


