

# **MCA**

**(DISTANCE MODE)**

**DMC 1645**

## **INTRODUCTION TO E-LEARNING**

**V SEMESTER**  
**COURSE MATERIAL**



**Centre for Distance Education**  
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## FOREWORD

The prime objective of education is conversion of human being into intellectual capital of a nation. Conventional education system has its own limitations to achieve this objective. Realizing this fact all over the world more and more traditional universities are rapidly transforming themselves from single mode of traditional education to dual mode of both traditional as well as distance education. Distance Education is becoming an accepted and indispensable part of the main stream of the educational system of any nation. Technology has made it possible to provide the best and the most up-to-date education at a reasonable cost and without geographical boundaries.

Anna University Chennai has started the Centre for Distance Education during 2006 with the aim of providing equity access to quality professional education to all the deserving aspirants. The Centre for Distance Education, Anna University Chennai has introduced MBA in General Management, Technology Management, Retail Management, Human Resource Management, Financial Services Management and Health Services Management, MCA with emphasis on Banking Technology, Call Centre Management, E-Learning, Trading and Equity Management, Health Care Management, and M.Sc in Computer Science, Information Technology, Software Engineering and Computer Technology. These programmes have been well received by all the stake holders. Anna University Chennai has absorbed large number of learners from multiple segments for all the programmes introduced. Yes, we have achieved impressive success to celebrate, and that induce us to perform much better, in the days to come.

The course materials play vital role in imparting knowledge, specially in distance education. These materials delivered to you were prepared by experts in the respective areas. Authors have prepared the course materials based on learner centric approach, fine tuned by self instructional mode. I am sure these materials will meet your learning requirements in full by inculcating a new learning culture.

As we move towards more knowledge intensive economy, acquiring and sustaining relevant skills and knowledge is becoming increasingly significant.

On this line Anna University Chennai, shall continue to contribute its best and thereby enable our nation a much more knowledge rich nation.

My hearty congratulations and best wishes to all.

(P. MANNAR JAWAHAR)



## **ACKNOWLEDGEMENTS**

This content material is prepared with the syllabus of “Introduction to E-learning” and is therefore based on the textbooks and reference suggested by the syllabus. The material has been adapted from the following material.

1. John Gardner, Bryn Holmes, “E-Learning: Concepts and Practice”, SAGE Publications Ltd, 2006.
2. Don Morrison, “E-learning Strategies: How to get Implementation and Delivery Right First Time”, John Wiley and Sons Ltd, 2003.
3. William Horton, “Web-Based Training”, John Wiley & Sons Inc, 2000.
4. MW Allen, “Michael Allen’s Guide to E-learning: Building Interactive, Fun and Effective Learning Program for any Company”, John Wiley & Sons Inc, 2003.
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Author



# **DMC1645 INTRODUCTION TO E-LEARNING**

## **1. INTRODUCTION**

Definition – Benefits – Challenges & opportunities – ROI metrics & evaluation – E-Learning cycle – Learning strategy – Business drivers – E-learning strategy.

## **2. DESIGN AND IMPLEMENTATION**

Role of tutor – Instructional design – Design issues – Types of learning engagements – Blended learning – Team – Infra structure – Vendor relationships – Learning management systems – Testing.

## **3. DELIVERY**

Multi-channel delivery – Learner support – Developing curriculum – E-learning standards – Instructional design – Content development process – Case studies – Future directions

## **4. WEB BASED TRAINING**

Definition – Need for WBT – Choosing an approach – Kind of courses – Technical standards – Metaphors – Course framework – registration – Running the course – resources – Feedback – Access.

## **5. LEARNING METHODOLOGY**

Organizing learning sequences – Common lesson structures – Creating building blocks – Designing learning sequences – Learning activities – Test and exercise learning – Planning tests – Selecting questions – Sequencing test questions – Feedback – Improve testing – Prevent cheating.

## **TEXT BOOKS**

1. John Gardner, Bryn Holmes, “E-Learning: Concepts and Practice”, SAGE Publications Ltd, 2006.
2. Don Morrison, “E-learning Strategies: How to get Implementation and Delivery Right First Time”, John Wiley and Sons Ltd, 2003.
3. William Horton, “Web-Based Training”, John Wiley & Sons Inc, 2000.

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3. Brandon Hall, “Web-Based Training Cookbook”, John Wiley & Sons, 1997.



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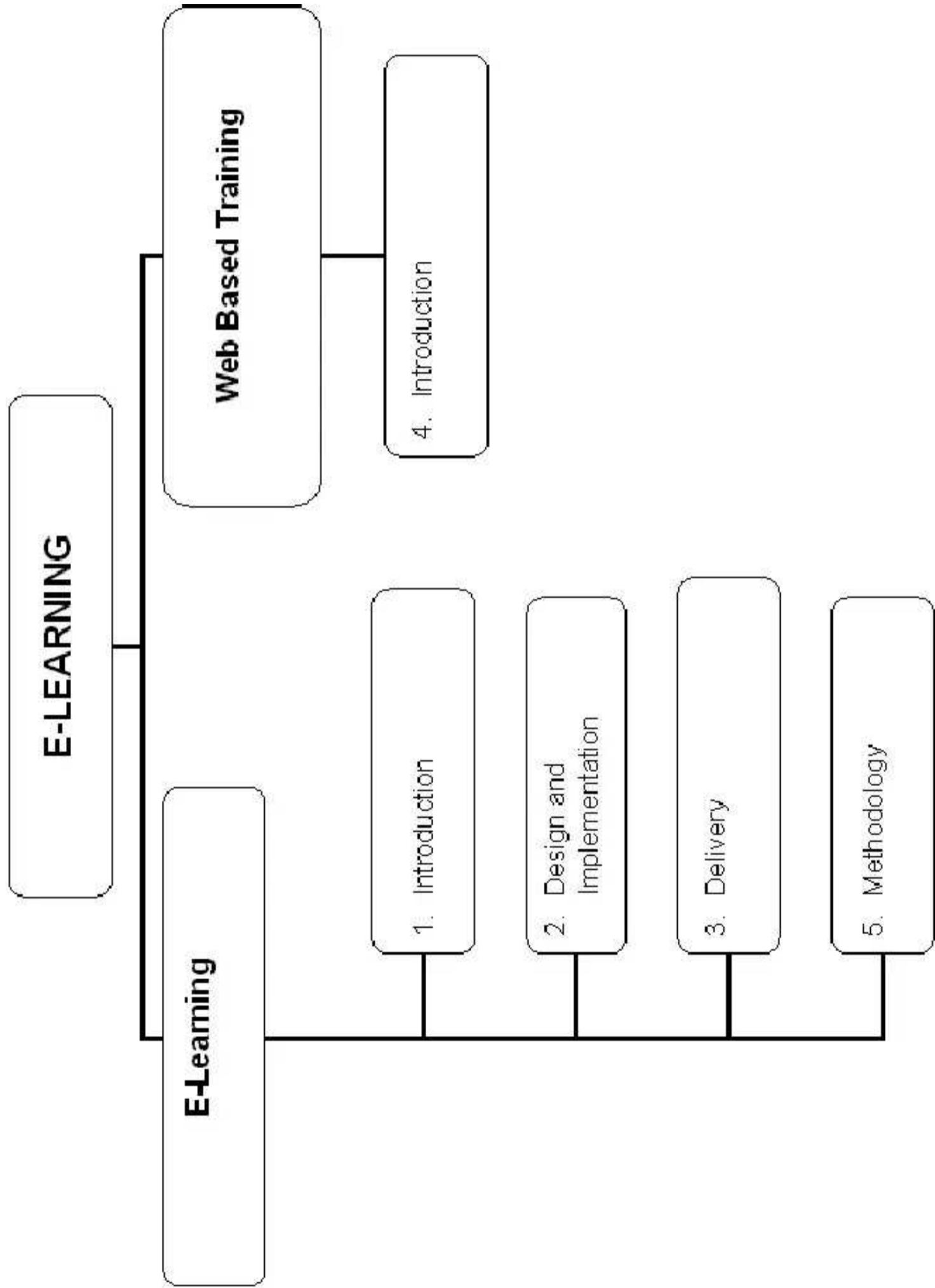
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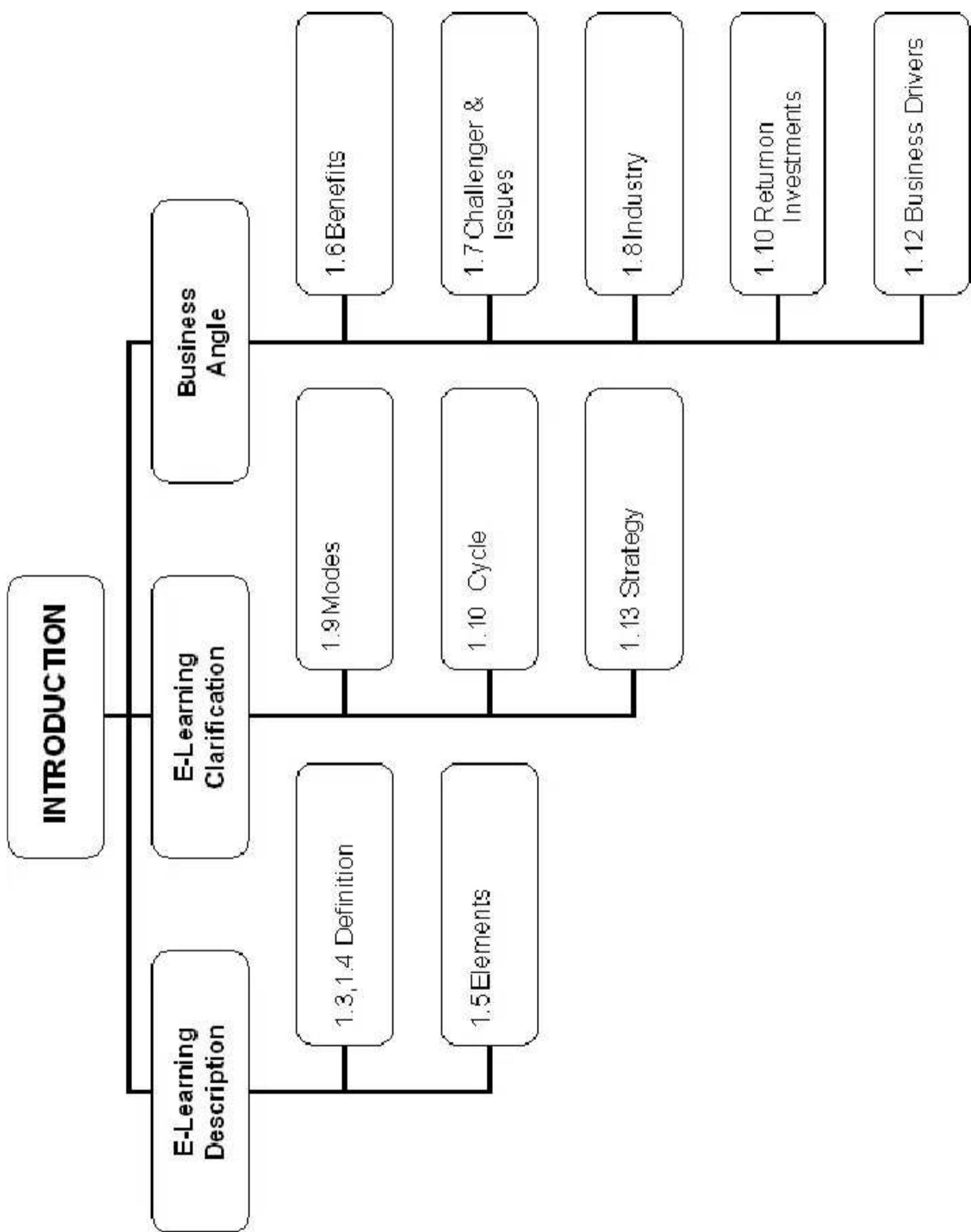
### **E-LEARNING METHODOLOGY**

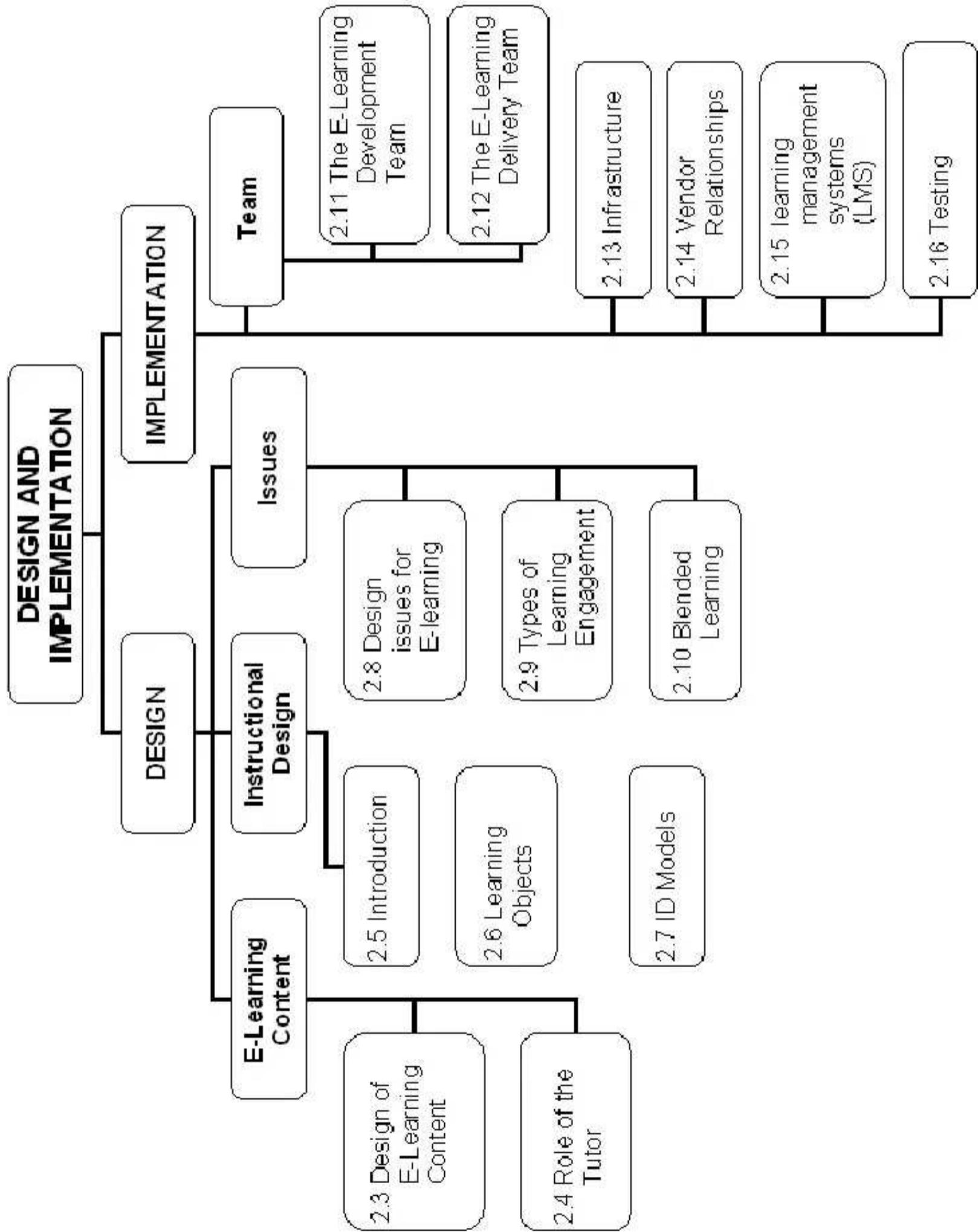
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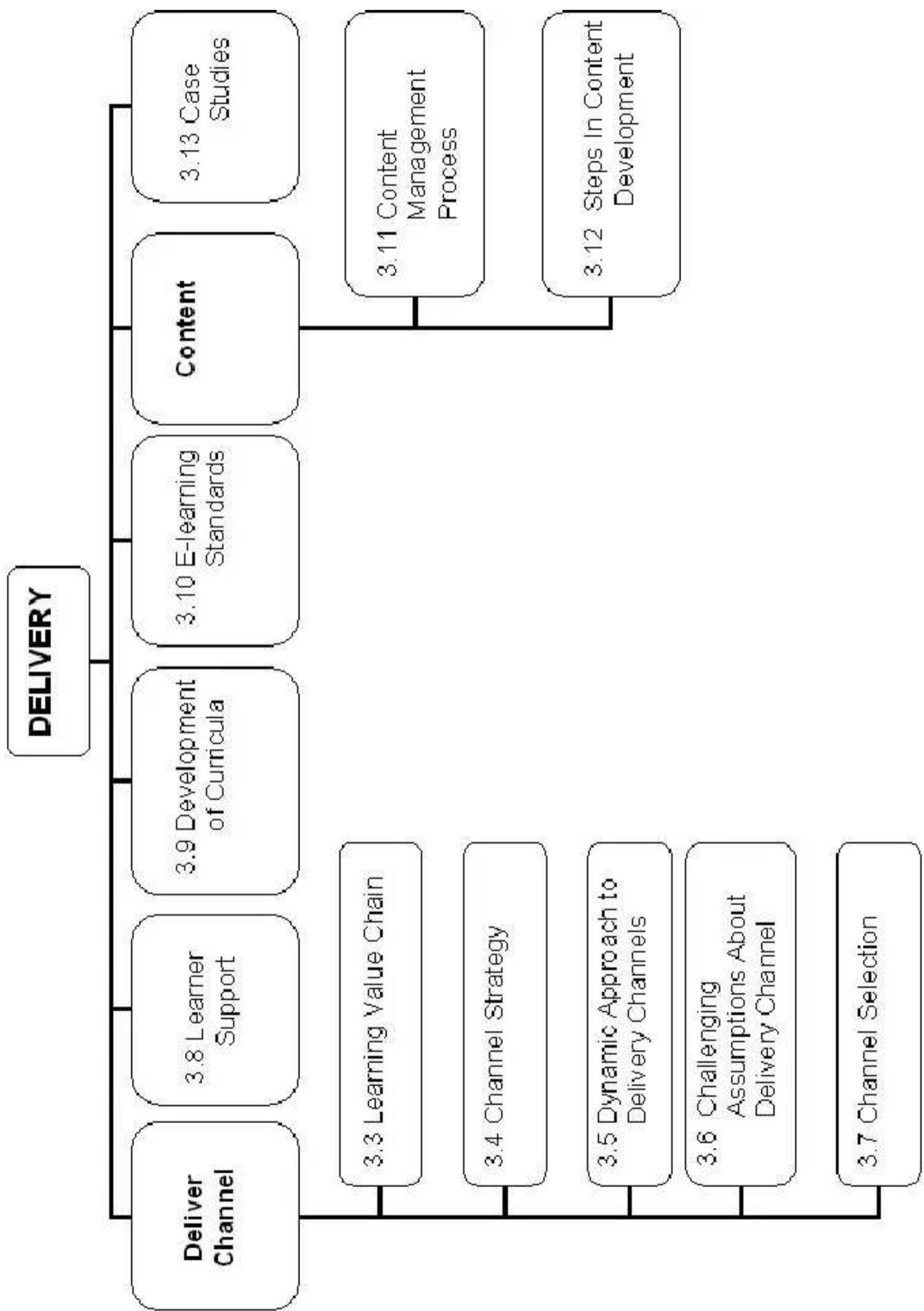
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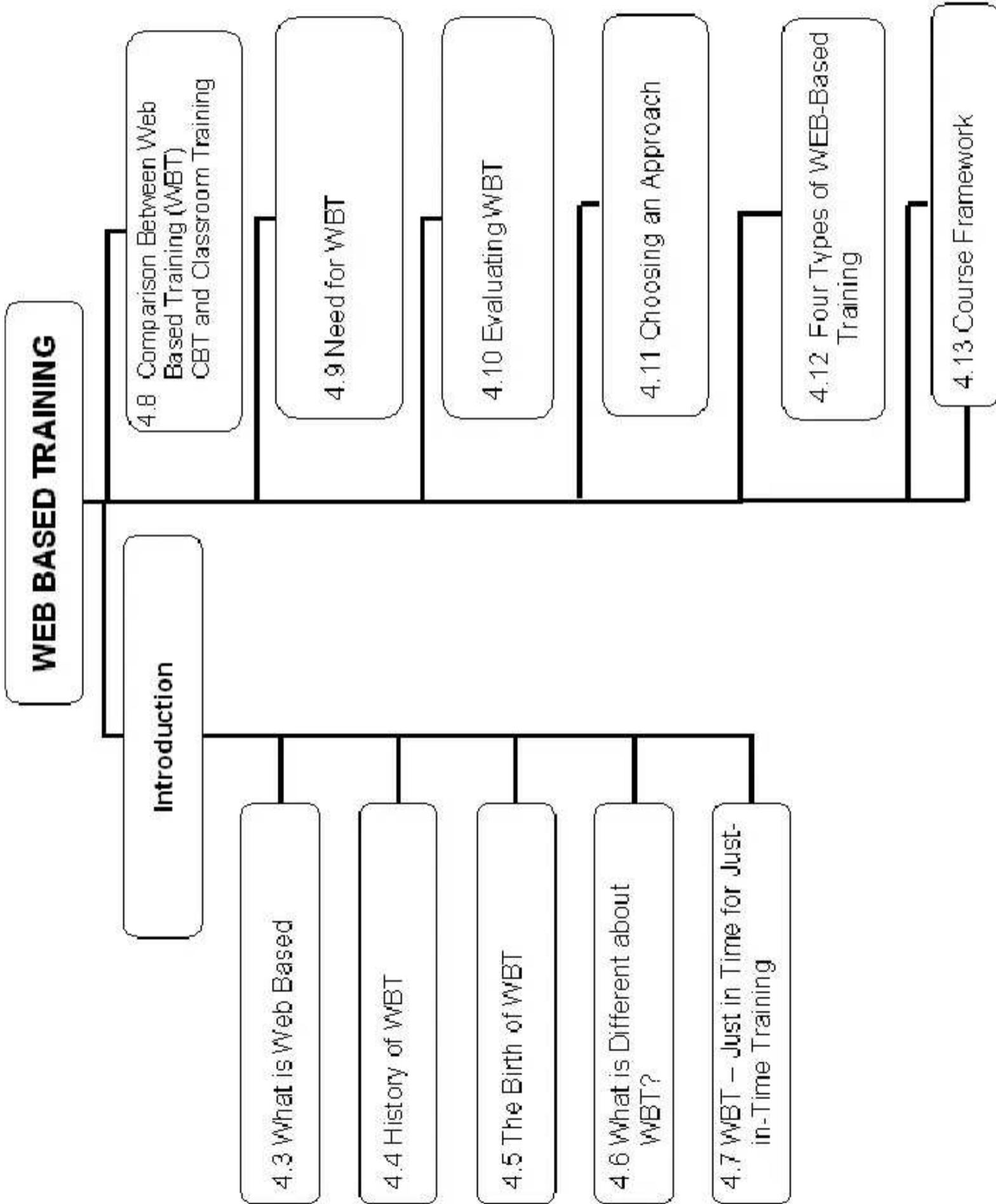
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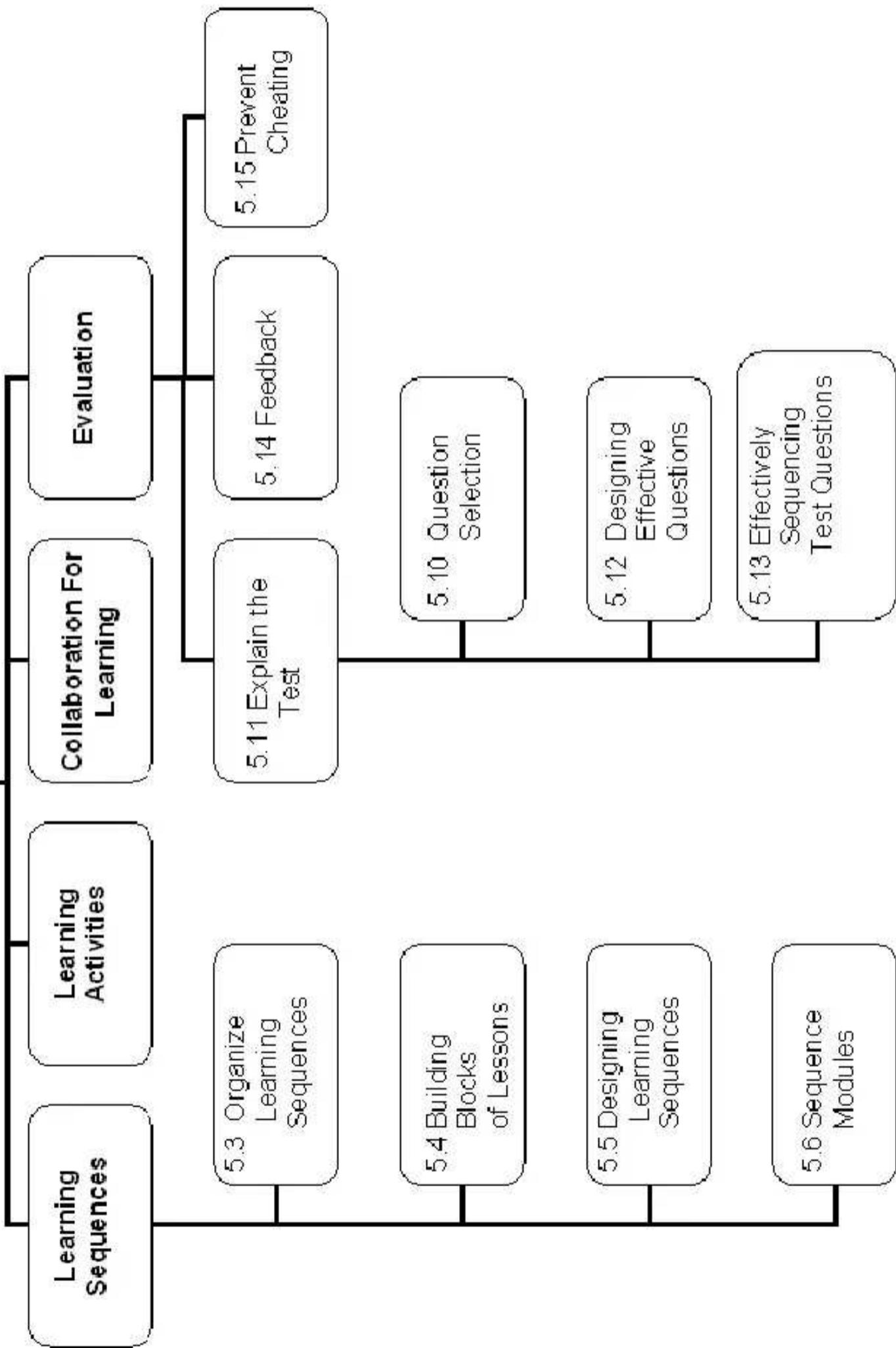








## **E-LEARNING METHODOLOGY**



# UNIT I

## NOTES

## INTRODUCTION

### 1.1. INTRODUCTION

This Unit gives an introduction to e-learning. E-learning is a new teaching methodology that utilizes IT and Web technology for design, development and delivery of learning content. This method of training is gaining ground in the industry where employees are required to update their knowledge and skills through training, but at the same time these employees

cannot spare the time to undertake this training through traditional methods of training. Most of the employees of enterprises of today have fundamental knowledge and are familiar with IT technology. It is in this context, that e-learning has gained popularity and acceptance both among employees and employers. In fact employers are actively utilizing e-learning to remove performance gaps in the skills and training of its employees. In addition, e-learning is gaining ground as a viable alternative to traditional distance education, because e-learning allows more effective utilization of scarce experts and helps to take quality education to remote corners of the world.

### 1.2 LEARNING OBJECTIVES

- To understand the context of e-learning and explain the concept
- To define e-learning
- To describe the various elements of e-learning
- To outline the various benefits of e-learning
- To understand the various issues of e-learning
- To discuss the different aspects of the e-learning industry
- To list the models of e-learning
- To explain the Return of Investments (ROI) with respect to e-learning
- To discuss the various types of e-learning cycles
- To outline the drivers of e-learning
- To explain the details of e-learning strategy

## NOTES

### 1.3 WHAT IS E-LEARNING?

As you know today's world is dominated by various types of electronic media and learning needs to keep in tune and exploit this wide spectrum of media facilities. Growing expectations, changing learning patterns, globalization and personalization have changed

the face of education. Moreover the necessity to keep abreast of fast changing developments in almost every field means that it is imperative to continue learning from many sources, levels and at any place, anytime, outside the spectrum of formal education. Thus was introduced the concept of "e-learning". If the full potential of media based learning is exploited it is possible to supplement and enhance the teaching learning process of conventional education. E-learning can support the continuing education process for meeting the needs of employers and workplace learners. E-learning is an effective methodology to cope with increasing student strength and limited teaching and infrastructure resources.

There are really no models of e-learning *per se* – only e-enhancements of models of learning.

- Essentially we use technology to achieve better learning outcomes, or a more effective assessment of these outcomes, or a more cost-efficient way of bringing the learning environment to the learners.
- It is all the more important, when implementing e-learning methodologies, to be clear about the underlying assumptions. A model of e-learning would need to demonstrate on what pedagogic principles the added value of the 'e' is operating.
- For example, the [redacted]

[redacted]. However, the role of the technology here is primarily to get remote learners into a position to learn as favorably as though they were campus-based, rather than offering a new teaching method. In such a case the enhancement should

be seen as pragmatic rather than pedagogic, achieving cost effective access to learning, rather than a new way to achieve deep understanding of a concept.

- Even something that looks like a new paradigm for achieving learning outcomes, a peer-to-peer learner-matching tool, for example, may represent only an incremental advance in pedagogic terms, though its educational value may be enormous if it could be exploited through an educational infrastructure which integrated its use with quality assurance methods. It is important, therefore, not to take too narrow a view of what constitutes e-learning, or of where its main value might lie.

Now let us look at some of the contexts in which e-learning is utilized.

[redacted] learning is widely used today by many organizations to help their employees to keep abreast of latest trends.

## NOTES

- In addition, e-learning is used by many institutes and universities for supplementing the teaching process and to enable students the flexibility of time, place and to a certain extent pace of learning.
- Moreover, e-learning provides wider opportunities for learning by giving access to wider range and type of learning material that would support different styles of learning.
- E-learning allows more flexible course management and moreover provides an almost one-to-one communication between the teacher and the learner.
- In addition e-learning can make available teachers from different parts of the globe to share their expertise with the learners.

Many aspects of the teaching learning process can benefit from the integration of educational technologies adopted by e-learning. These include:

- Easy availability of a wide variety of online resources to encourage discussion and collective deliberations, critical analysis and effective learning
- Presentation of realistic case studies to aid application oriented learning
- Online discussion boards in a secure environment to support collaborative learning and facilitate the participation of external experts
- Simulations and animations to explain complex processes
- Real-time communication tools such as chat, shared whiteboards and videoconferencing to promote collaboration and debate
- Computer-aided assessments to enable effective feedback to learners

Let us first understand what is meant by e-learning. E-learning can be described as a methodology of education that incorporates Information and Internet technologies. However *online learning*, *virtual learning*, *distributed learning*, *network* and *web-based learning* are also sometimes used to describe this mode of education. Although essentially all the terms refer to the educational process that utilizes information and communications technology to mediate asynchronous as well as synchronous learning and teaching activities.

### **1.3.1. What Makes E-learning Unique?**

Three instructional methods potentially valuable to e-learning are:

- **Practice with automated tailored feedback** – What is special about the computer's role in learning is that the learner's actions taken in the simulation are evaluated by a program that responds with hints or feedback supporting immediate corrections of errors
- **Integration of collaboration with self-study** – Learners can communicate by computer in real time through chats or at different times by e-mail and discussion boards. There are studies which indicate the benefits of learning together versus learning solo.

# NOTES

- **Use of Simulation to accelerate expertise** – here realistic job problems are compressed into a short timeframe to make the learner understand the real problem.

## Have You Understood?

1. Why was the concept of e-learning introduced?
2. What is the role of technology in e-learning?
3. What are the other terms used to describe this method of education?
4. What makes e-learning unique?

## 1.4 DEFINITION OF E-LEARNING

E-learning can take many forms. In its simplest form, elements of e-learning such as using presentation software and web uploading of data can be introduced into traditional teaching. Blended programs also exist which use elements of e-learning blended with traditional techniques. Finally there are e-learning programs which are offered completely online.

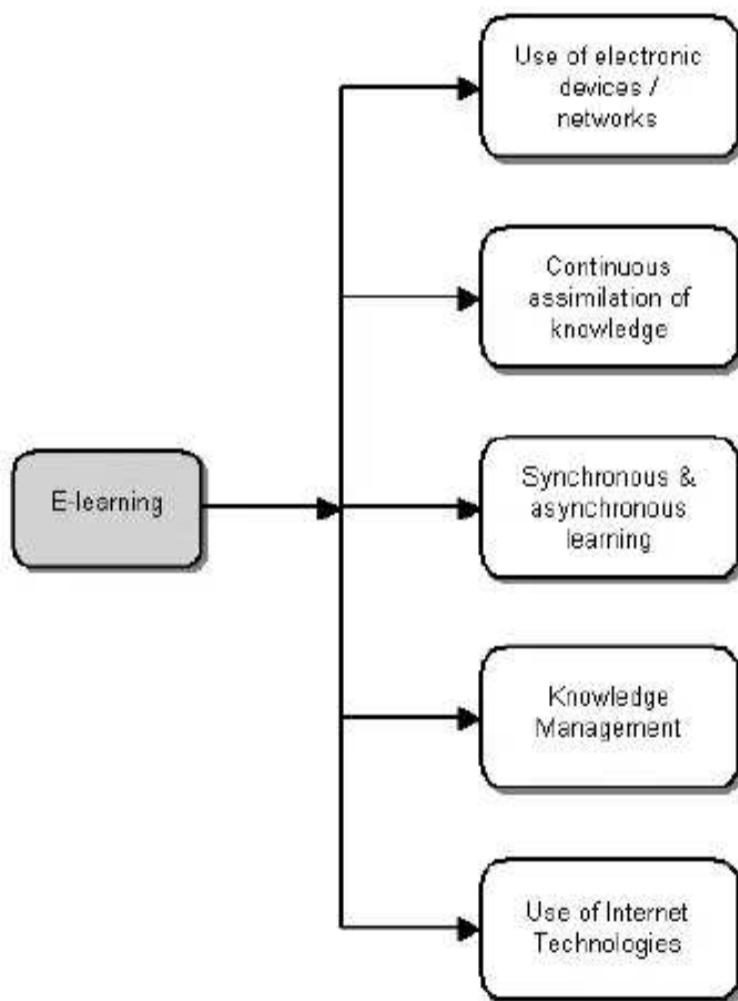
E-learning can be defined in many ways from different perspectives. E-learning can be defined as the “*The delivery of a learning, training or education program by electronic means. E-learning involves the use of a computer or electronic device (e.g. a mobile phone) in some way to provide training, educational or learning material.*” (Derek Stockley 2003). This definition only stresses the use of an electronic device to facilitate the teaching learning process. Som Naidu on the other hand defines e-learning as “*E-learning is commonly referred to the intentional use of networked information and communications technology in teaching and learning.*” (Som Naidu 2006). He refers to the use of both network and communication technologies as facilitators of e-learning. Wikipedia defines e-Learning is a general term used to refer to computer-enhanced learning. It is used interchangeably in so many contexts that it is critical to be clear what one means when one speaks of ‘eLearning’. “*In many respects, it is commonly associated with the field of advanced learning technology (ALT), which deals with both the technologies and associated methodologies in learning using networked and/or multimedia technologies*”.

Other definitions given for e-learning include “*E-learning is the use of Internet and digital technologies to create experiences that educate our fellow human beings*” (Horton, 2001) and the one given by CISCO as “E-learning combines communication, education, information, and training and is a core element of a successful ebusiness strategy.” A more comprehensive definition has been given by Don Morrison . He defines e-Learning as “*E-learning is the continuous assimilation of knowledge and skills by adults stimulated by synchronous and asynchronous learning events – and sometimes Knowledge Management outputs – which are authored, delivered, engaged with, supported and administrated using Internet technologies.*” (Don Morrison 2003).

**NOTES**

These aspects are shown in Figure 1.1. In order to get a complete picture of what is meant by e-learning, let us discuss in detail the definition given by Morrison. According to him e-learning is only suitable for adults who have already finished formal education. E-learning implicitly requires the learner to be self motivated and share the responsibility in the teaching learning process.

An important component Morrison has included in the definition is the inclusion of synchronous and asynchronous learning events. Let us examine this aspect in detail. Synchronous learning takes place in real time with both the learners and the teacher being present at the same time although remotely. In other words, spontaneous interaction takes place with no time delay. The learning happens at fixed time i.e. virtual classrooms are scheduled. Learners can interrupt and ask for clarifications.



**Fig.1.1 Definition of E-learning**

There are various mechanisms by which this type of remote interaction can take place. These include the following:

- Telephone
- Video conference
- Virtual classroom
- Peer-to-peer communication based on Instant Messaging Technologies

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- Asynchronous learning on the other hand takes place according to the learner's convenience and at learner's pace. Asynchronous learning takes place anywhere and at any time it is needed. E-learning in one sense is a different way of knowledge management. Knowledge Management generally delivers processed knowledge. On the other hand, e-learning delivers knowledge processed to cater to the teaching learning process.
- Takes Subject content expertise
- Orient the content according to an instructional design process
- Presents the content in a suitable framework

Internet Technologies and protocols are the essence of an effective e-learning scenario and are actually the enablers of e-learning. Internet technologies support e-learning across the following spectrum of activities:

- Self paced e-learning courses are usually hosted on a web server and delivered through a standardized web browser or an e-learning customized web browser.
- Peer to peer collaboration through Instant messaging for synchronous learning
- Browser based e-learning and administration support
- Voice over IP techniques for telephone support could be browser based

**Table 1.1 The 'e' in e-learning**

Exploration	e-learners use the Web as an exploratory tool to access as a huge variety and amount of information and resources
Experience	Web offers e-learners a total learning experience, from synchronous learning to threaded discussions to self-paced learning
Engagement	Web captivates learners by enabling creative approaches to learning that foster collaboration and a sense of community
Ease of use	Web is easy to use for learners who are already familiar with the navigation capabilities of the medium as well as for content providers as they can easily make content immediately available to learners across all technical platforms
Empowerment	Web puts learners in the driver's seat with a set of tools that enables personalization of content and allows learners to choose the way in which they learn

Viewing from another perspective we can explain e-learning by understanding the 'e' of e-learning as given in Table 1.1. Thus the different definitions of e-learning give us a broad idea of the lower end and the higher end of the e-learning spectrum.

### Have You Understood?

1. Give three definitions of e-learning.
2. What are synchronous and asynchronous learning events?
3. How does Internet technologies support e-learning?

**NOTES****1.5 ELEMENTS OF E-LEARNING**

The elements of e-learning cover the complete process of imparting education including learner registration process, content creation, facilities for collaborative learning, and administration processes.

**1.5.1 Learner registration process:**

This process includes providing online facilities for registration by the learner. The various components include:

- **Information Brochure** – providing access to information regarding various programmes on offer
- **Logon** – provide the learner with unique ID and take care of security. Provision may be made to change security policies from time to time. In addition there may be provision for visitors, registered learners and registered teachers with different levels of security.
- **Registration** – allow registration of each student for a programme after checking necessary constraints.
- **Personal Profile** – collect the necessary personal details
- **Competency Assessments** – allow for conduct of Online tests for checking competency with provision to incorporate various admission policies

**1.5.2 Learner Personalization Process**

This process includes provisions necessary to track and personalize the learning process to suit the needs of individual user. The various components include:

- **Course enrolment Process** - provision for individual learner to enroll for a course subject to constraints
- **Pre-defined learning paths** – providing suggested organized pre-defined path of learning for each course. There may be different pre-defined paths to suit different levels of learners.
- **Personal Learning path** – providing individual learning path personalized to suit each learner.
- **Customizable Home Page** – providing options to learners to customize home pages.

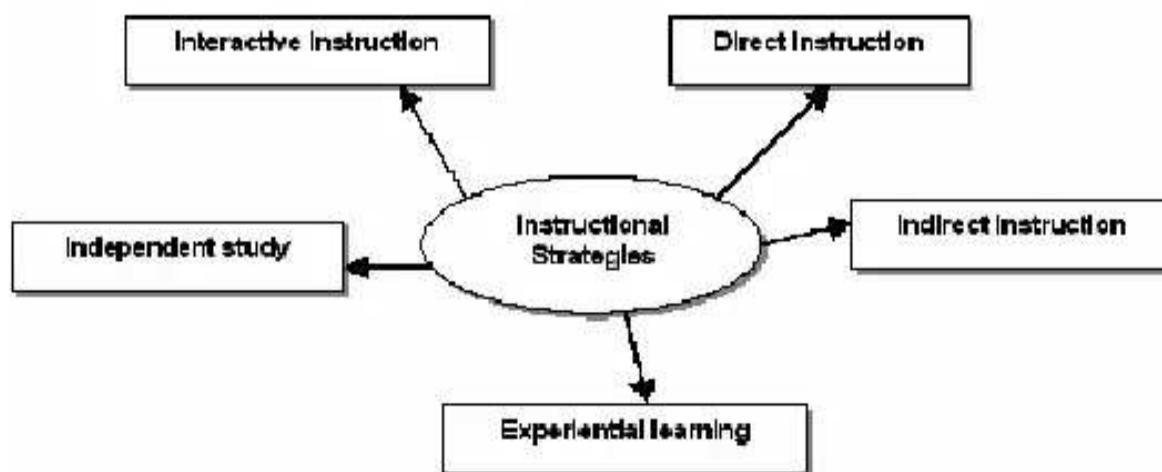
**1.5.3 Teaching Learning Process**

This process includes provisions for course delivery, deciding the elements of course material and source of course material and the methods of interaction between the different participants of the e-learning process.

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- **Course material** – the material can be outsourced or can be created in-house. Provision needs to be made to incorporate some of these elements into the Content delivered.
  - Text
  - Graphics, images, photographs
  - Streaming Animations, audio, video
  - Simulations
  - Interactive Exercises
  - Online and downloadable tools
  - Quizzes
  - Bookmarks
  - Online notepads
  - Feedback forms
- **Course material delivery and interaction:** - the mode of delivery of the course material can vary. In addition, the method of interaction between the group of learners, individual learner, and the teacher can be performed in many ways. Some of the methods are given below:
  - Courses or course elements can be downloaded
  - Electronic Performance support system
  - Formal and informal peer-to-peer communication using Message Boards
  - Informal peer-to-peer communication through Instant Messaging
  - Live and archived virtual classrooms, Web casts
  - Links to public or subscription web sites
  - Online help files/desks
  - Telephone help desks

Most of the instructional strategies or course delivery strategies which have been effectively used in traditional classroom can also be used in e-learning as given in Figure 1.2



**Fig. 1.2 Instructional Strategies**

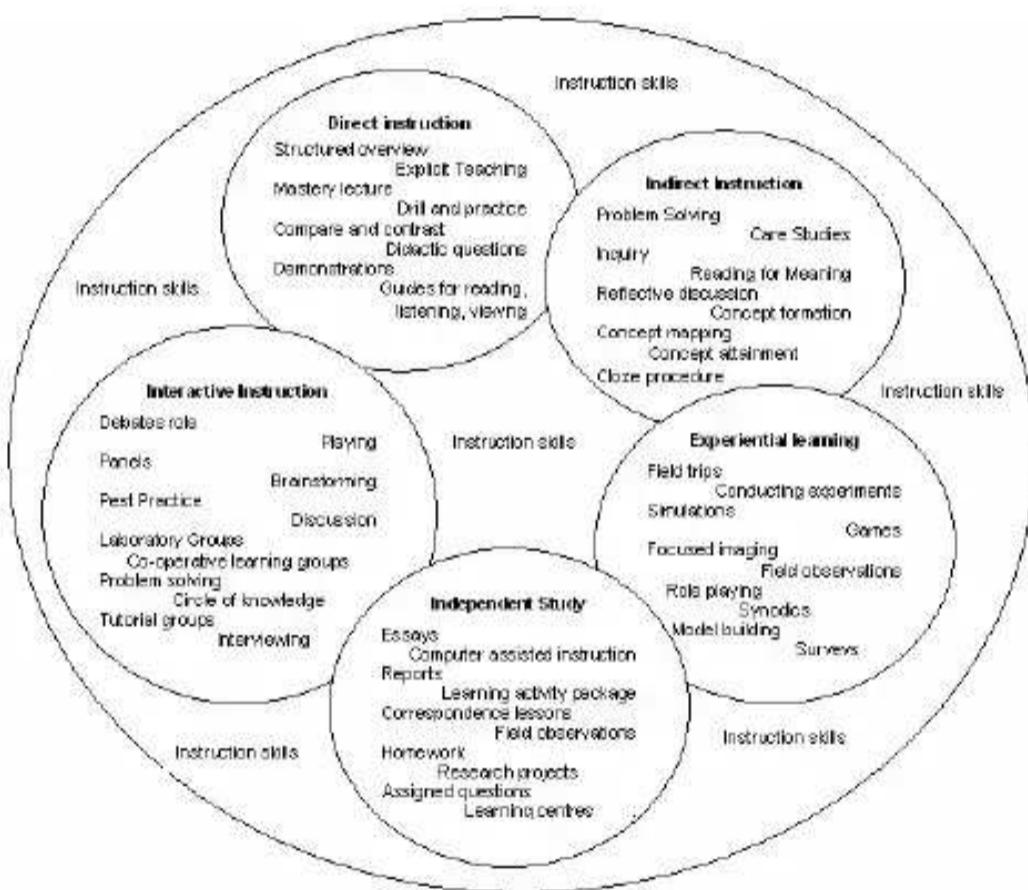
## NOTES

Each of the dimensions can be further extended in detail as given in Figure 1.3.

### 1.5.4 Administrative processes

In order to effectively conduct e-learning programmes some modules needs to be available. These include:

- **Tracking Mechanisms** - this process is to enable the tracking of all activities of the education process including tracking the complete stay of a student in the programme, admission process, a particular group progress, a particular subject progress, a particular teacher's activity etc.



**Fig. 1.3 Details of Instructional Strategies**

- **Reporting Tools** – the tools will enable creating reports of all information including current number of students on rolls for each programme, assessment details of students, etc.
- **Certification Process** – this process will enable certification after checking for all constraints.
- **Maintenance of skills database** - a database containing all details regarding teachers, their areas of expertise etc needs to be maintained.

## NOTES

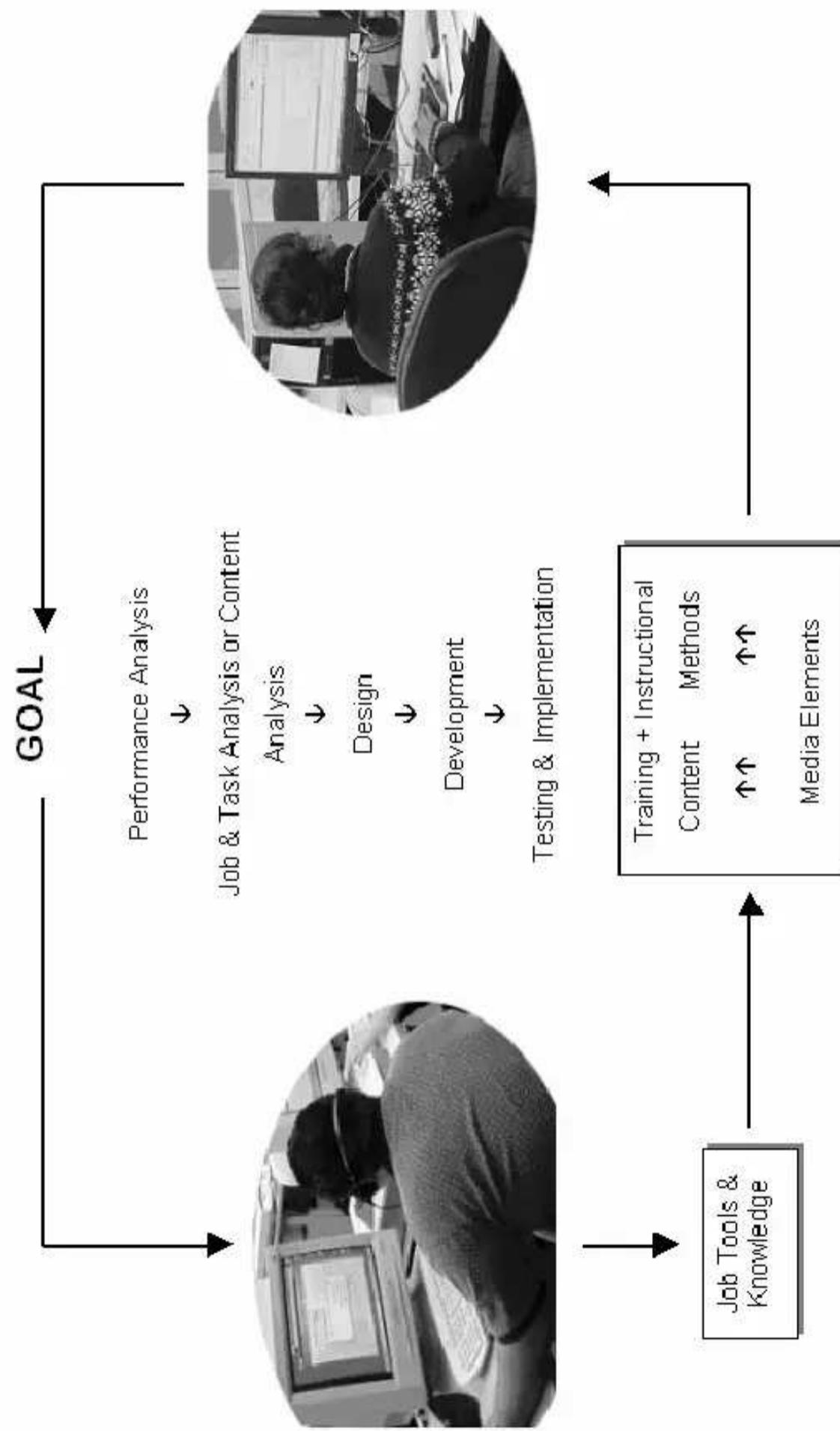


Fig. 1.4 Steps in E-learning development

- **Integration with other administration software** – Links with other administrative processes including human resources, salaries, fees collection etc. needs to be established.
- **Tools Maintenance** – tools such as course management tools, learning management tools, localization tools and content authoring tools needs to be procured and maintained.

## NOTES

The elements of e-learning detailed above are all required components of a complete system. Only a small subset of the components is present in most systems. In order to be really effective the incorporation of e-learning elements into the teaching learning process and the personalization process are essential.

### 1.5.5 Complete E-learning Development Process

E-learning can be oriented towards improving organizational performance of an enterprise. The steps in the e-learning development viewed from this perspective are shown in Figure 1.4.

#### Have You Understood?

1. What are the components of the Learner Registration Process?
2. What are the methods of Course material delivery and interaction?
3. What are the elements that can constitute content material?
4. What are the important components of the administration process of e-learning?

## 1.6 BENEFITS OF E-LEARNING

Undoubtedly E-learning is here to stay. E-learning is beneficial in many ways. Let us explore some of the benefits of e-learning.

### 1.6.1 Learner-Centric

One of the important benefits of e-learning is that e-learning is controlled by the learner. It is the learners who decide how, what and when they want to access information. The whole concept of e-learning is designed around the learner. The learner can make available content on demand and control their interaction. In other words, learning is self paced allowing the learner to vary the pace of learning to suit his need, is self-directed allowing learners to decide the level and methodology of content delivery. Students can adapt well to e-learning because it accommodates different types of learning styles. Students can learn through a variety of activities that apply to many different learning styles learners have. Learners can fit e-learning into their busy schedule. If they hold a job, they can still be working while accommodating e-learning. If the learner needs to do the learning at night, then this option is available. In conclusion, e-learning provides a learner centered environment which can be tailored to meet the learning needs of individual learners.

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### 1.6.2 Portability and Flexibility

One of the major benefits of e-learning is the flexibility of learning from any place at any time. Education is available when and where it is needed. E-learning can be done at the office, at home, on the road, 24 hours a day, and seven days a week. International and remote locations can access information outside regular timings and have access to expertise available at remote locations.

### 1.6.3 Situated learning

The technology used in e-learning allows access from home and work and the learner can easily integrate the ideas being discussed on the course with the working environment, or access resources on the Internet as required on the job.

### 1.6.4 Dynamic configuration

The content delivery can be dynamically configured to suit environment and learner needs. In other words the content can be transformed and presented in a personalized and customized manner. The e-learning process can be configured to suit learner preferences where the content presentation can be changed, pace of learning can be varied and the elements of the content material can be modified.

### 1.6.5 Collaborative interactive learning

Allows collaborative, interactive learning L2L, (Learner to Learner), E2L (Expert to Learner), L2E (Learner to Expert), E2E (Expert to Expert), L2C (Learner to Content), C2L (Content to Learner). E-Learning supports increased communications between teachers and learners, and amongst students, providing frequent and timely individual feedback, for example through computer assisted assessment, and positive reinforcement. E-learning strives to motivate learners through appropriate use of interactive courseware. The concept implicitly and explicitly supports active learning, encourages learners to take responsibility

of learning and orients learners towards collaborative learning. Learners are able to meet in a virtual space with other members and practitioner experts to discuss issues, answer questions and even participate in simulations and management games without having to leave their office or home. Collaborative learning in addition provides motivation where synchronous systems focus the energy of the group, thus learners have an added motivation to keep up with their peers and continue with their studies. Learners develop group cohesion and the sense of being part of a learning community through real time interaction that conveys tone and nuance. The good feedback mechanism allows learners to receive quick feedback on ideas as well as consensus and decision making in group activities, thus enlivening e-learning from a distance.

**NOTES****1.6.6 Reusability**

Content of any media can be granularized and made as an independent module to enable assembly and dynamic presentation of learning material in an effective and meaningful manner. E-learning allows ease of updation and alignment to ever shortening product cycles.

Flexible and reusable objects mean that editing, updates and changes can happen without reissuing materials, which saves time and money. E-learning thus supports economic reuse of high quality, expensive resources.

**1.6.7 Availability of expertise and resources**

This increases availability and productivity of subject experts. Instead of answering a question over and over to different people, expert information is captured and available when needed. In addition, e-learning provides access to a range of resources and materials which may not otherwise be available or accessible, for example graphics, sound, animation, multimedia.

**1.6.8 Infrastructure saving**

E-learning eliminates static overhead of expensive classroom space, managing books and binders, computers, projectors, food and repeated need for subject experts.

**1.6.9 Measurable Assessments**

E-learning also has measurable assessments which can be created so that both the instructors and students will know what the students have learned, when they've completed courses, and how they have performed. ROI (Return of Investment) is easier to determine by using "hit" reports from web areas, access reports by module and other tools to determine spread and impact of modules. We can get objective usage reports about the effectiveness of the e-learning programme.

**1.6.10 Incentives to Industry Personnel**

- This encourages industry to provide e-learning opportunities to their employees either to update their skills or to improve their educational qualifications. Providing these opportunities could help the industry to retain their employees and provide a better working environment.

**1.6.11 Informality in learning**

Learning does not always take place in a formal setting. More exchange and assimilation of information takes place in informal settings such as chat rooms, and one to one interactions and discussions. E-learning complements traditional e-learning where learning can take place at the learner's own pace. Moreover learning in a more familiar, non-threatening environment can extend the learning experience. E-learning has encouraged more people to take up learning. In other words e-learning helps to develop positive attitudes to learning, builds confidence and encourages people to return to learning

**NOTES****1.6.12 Minimal incremental delivery cost**

Very small incremental cost is needed to support 10 or 10,000 learners.

**1.6.13 Development of ICT skills**

Learners improve ICT skills through e-learning. In addition due to collaborative techniques required for e-learning the learners acquire skills to present their work.

In spite of some of the obvious benefits of e-learning, there are some challenges and issues that need to be addressed before e-learning can take off.

**1.6.14 Pitfalls of E-learning**

Despite impressive capabilities of e-learning, there are three main barriers to the realization of e learning which has been summarized in Table 1.2.

**Table 1.2 Pitfalls of E-learning**

Pitfall	Result
Failure to define job knowledge and skills	Lessons do not build knowledge and skills that transfer to the job
Failure to accommodate learning processes	Lessons overload cognitive processes and learning is disrupted
Attrition	Learners do not complete their instruction

**Have You Understood?**

1. What are the learner centric benefits of e-learning?
2. What do you mean by collaborative interactive learning?
3. Why is e-learning also considered as an informal process?

**1.7 CHALLENGES AND ISSUES**

E-learning does not entail mere transfer of information. In this context, it is important for you to note that the mere availability of technologies and communication facilities is not by itself sufficient for e-learning.

**1.7.1 Use of new technologies for teaching**

A very important component of this e-learning scenario is the innovative teaching ability of the teacher to utilize these technologies and facilities for effective teaching. As new technologies appear that can potentially transform education, we must not be driven

**NOTES**

by the functionality these technologies offer but must concentrate on the potential use of these technologies to enhance the teaching-learning process. Many aspects of the teaching learning process can be enhanced by some of the following facilities:

- Availability of a rich variety of online resources that can enhance the level of teaching and learning
- Problem based learning using multimedia case studies
- The use of real-time communication tools such as online discussion boards, chat rooms, and video conferencing for collaborative learning
- Availability of technologies for simulations and animations to support experiments, practical exercises and teach complex phenomena
- The use of online testing and assignments to improve speed and quality of feedback.

Another issue in providing effective e-learning is that teachers have their own preferred methods of teaching which suit their style and discipline. For many of the teachers the carefully thought out integration of e-learning tools can enhance teaching approaches and

enable enhanced interaction with students at all levels, both on and off classrooms. An integration of all aspects of teaching would enhance the learning experience offered to learners. In conclusion, you can understand that innovative teaching methods need to be explored in order to expose the full potential of e-learning.

The core skills of a good e-learning instructor includes:

- good communication skills
- good planning skills
- good technical skills
- good organization
- familiarity with the structure of the course
- subject expertise
- enthusiasm
- ability to deploy resources effectively
- good relationships with learners
- a flexible approach.

### **1.7.2 Shared Responsibilities of learner**

E-learning involves much more than the simple transfer of information. Moreover e-learning is an effective understanding of shared responsibility between the teacher and learner. In addition, we must realize that it is important for the learner to set aside his conventional outlook to the learning process and adapt and utilize all facilities at his disposal

## NOTES

in an effective manner. Thus you must now realize, for e-learning to really succeed there has to be a synergy between technology, the teacher and the learner. In essence learners need to be encouraged to take some responsibility for their own learning.

The learners themselves have an important role to play to facilitate effective learning, they need to be:

- Self motivated
- Posses good written and oral communication skills
- Able to take responsibility for the learning
- Willing to participate and take an active role in their learning process
- Committed & disciplined
- Acquainted with minimum technology skills
- Posses good time management skills
- Believers of e-learning

### 1.7.3 Cost Factor

While we have explained that e-learning provides good return of investment it must be stressed that initial costs are high and the cost of developing course content is significant especially if we want good quality content from the e-learning perspective. The expert creating the material not only needs to be a subject expert but also be well versed in utilizing and optimizing the use of technology in effectively capturing the learners' attention and focus.

### 1.7.4 Integration

Another important challenge facing e-learning is the need to integrate all tools involved including the authoring tools, the learning management systems and other HR applications. There is no ready end-to-end solution that manages all aspects of e-learning. Therefore integration using modules from different vendors is an important aspect of e-learning.

#### Have You Understood?

1. Why is sharing responsibilities with learner considered as an important challenge associated with e-learning?
2. How does use of technologies in e-learning pose a challenge?

**NOTES****1.8 E-LEARNING INDUSTRY**

As you would have understood by now, e-learning is an important aspect of the IT industry and is an important player in the education scenario. We can identify three main segments namely content, technology and services in the e-learning industry.

**1.8.1 Content**

As far as content segment is considered there are Generic Course Providers, Content Developers, Simulation Developers, Test/Assessment Services, Content Aggregators and finally Subject Matter Experts. As you can see the creation of content is an important activity and is supported by many subsidiary services in addition to core subject matter experts.

**1.8.2 Technology**

The systems needed to provide basic administrative as well as infrastructure support are grouped under this segment. These include Learning Management Systems, Content Management Systems, Collaboration Applications, Virtual Classroom Applications, authoring tools and knowledge management systems.

**1.8.3 Services**

Additional services that can be provided include System integrators, content Hosting, Learner Support and mentoring, streaming media authors, learning needs assessors, consultants and knowledge/data providers.

**Have You Understood?**

1. What are the business opportunities of e-learning?

**1.9 MODELS OF E-LEARNING**

One model of teaching and learning online consists of five levels of competence for interactive computer assisted learning. The five levels are:

- **Level 1: Gaining access** - Is able to log on and motivated to continue. Posts first 'joining' message when instructed.
- **Level 2: Becoming familiar with the on-line environment** - Possesses basic technical skills and is confident in sending and receiving messages to and from tutor and other students.
- **Level 3: Seeking and giving information** - Is confident in using all features of the software. Freely offers, receives and processes information from others on line.
- **Level 4: Knowledge construction** - Demonstrates actions on-line that are likely to lead to knowledge construction, including

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- Creative and active thinking (asking challenging questions, reflecting, suggesting ideas);
- Interactive thinking (critiquing, negotiating interpretations, summarizing, proposing actions based on ideas)
- **Level 5: Autonomy and development** - Takes responsibility for own continuing development in on-line learning and is able to set up and support own virtual group.

Basically there are two models of imparting knowledge. They are the push model of teaching and the pull model of learning. The push model of teaching is the conventional method of education which is essentially teacher centric. In this model the teacher decides on what and how to impart knowledge and the teaching is pushed to the learners at a centralized location. On the other hand the pull model of learning is learner centric where customized and personalized learning is the norm. E-learning provides exactly this model of imparting knowledge.

Viewed from another perspective, the models can be based on the types of e-learning goals. Lessons in e-learning initiatives on one hand, can be aimed at building awareness or providing information, and on the other hand, can be aimed at building specific skills. These goals can be summarized as given in Table 1.3

**Table 1.3 Inform and Perform e-learning Goals**

Goal	Definition	Example
Inform	Lessons that communicate information	<ul style="list-style-type: none"> <li>● Company History</li> <li>● New Product Features</li> </ul>
Perform - Procedure	Lessons that build procedural skills (also called near transfer)	<ul style="list-style-type: none"> <li>● How to log on</li> <li>● How to complete an expense report</li> </ul>
Perform - Principle	Lessons that build principle-based skills (also called as far transfer)	<ul style="list-style-type: none"> <li>● How to close a sale</li> <li>● How to design a Web page</li> </ul>

Although all e-learning is delivered on a computer, different courses reflect different assumptions of learning. From another perspective, three views about the education process have evolved during the last hundred years of education – information acquisition, learning as response strengthening, and learning as knowledge acquisition (Table 1.4).

**NOTES****Table 1.4 Three Types of e-learning**

Type	Builds Lessons that	Used for
Receptive: Information Acquisition	Include lots of information with limited practice opportunities	Inform Goals
Directive: Response Strengthening	Require frequent responses from learners with immediate feedback	Perform-Procedure Goals
Guided Discovery: Knowledge Construction	Provide job-realistic problems and supporting resources	Perform-Principle Goals

**Have You Understood?**

1. What are the push and pull perspectives of education?
2. What are the three types of e-learning?

**1.10 ROI (RETURN ON INVESTMENTS)**

According to Edward Trolley ROI is perceived customer value over investment. ROI can be defined as the benefit an organization receives for its investment of financial, physical, and human resources. ROI is calculated as

$$\text{ROI} = \text{Benefit received} - \text{Resources invested}$$

Edward Trolley gives another very interesting explanation stating that if you are clear what is that you want to measure; you can go out and measure it. Deciding on what to measure in an education scenario depends on the model of imparting knowledge. Essentially e-learning is a pull model of learning and we need to define parameters we want for this model. Another aspect is that while some argue that Return On Investments (ROI) and monetary terms are important, others argue that e-learning ROI is not about monetary value but is about value of knowledge.

ROI can be predictive or historical. For predictive ROI to really work you have to depend on historical data. However in some cases historical data is not available. In such cases we cannot predict a specific ROI. However we can consider experience of other business in similar situations, consider the opinion of e-learning consultants, take factors affecting ROI in traditional learning scenario and make a conservative estimate of the ROI. After a year of operation the predictive ROI can be verified with historical data. Full learning evaluation is really practical. In most cases learning departments have equated ROI with showing that the delivery of e-learning is cheaper per learner than the delivery of instructor led classroom learning. The savings in travel expenses, accommodation and infrastructure costs are easy to demonstrate.

**NOTES****1.10.1 Tracking Learner Inputs**

One perspective of measuring ROI is tracking learner inputs. Some of the aspects that are tracked include:

- Number of e-learning offerings each learner utilized
- Total offerings utilized
- Number of programmes /courses registered, completed, passed
- Number of logins per course per learner
- Length of attendance per session
- Total hours logged per month for individual learner
- Percentage of learner's curriculum completed
- Type of delivery utilized

A large amount of information can be gathered from learner's inputs and demographics.

However if in an industry you are proposing to introduce e-learning as a mechanism to enhance the capabilities of your employees, then just tracking learners inputs is not sufficient. In such cases you need to factor into ROI the impact of e-learning, such as increase in size and frequency of orders, reduction in wastage, increased repeat business, lower inventory levels etc.. In other words, e-learning has to improve the organization's performance and e-learning then is about outcomes not inputs.

From the viewpoint of e-learning forming a part of a regular university's offerings, what are to be measured is the efficiency and the profit in such offerings. However if e-learning is part of the learning department of an enterprise then effectiveness is the most important criteria, that is the business performance enhancement as a result of e-learning.

**1.10.2 Kirkpatrick Model for Evaluation of Learning**

Donald Kirkpatrick designed a model for the evaluation of learning which was adopted in 1997 by the American Society for Training and Development (ASTD). The levels of the model have been considered as taxonomy of learning evaluation. The following (Table 1.5) are the levels of the model and the series of questions associated with each level.

**Table 1.5 Kirkpatrick's Levels of Evaluation****NOTES**

<b>Level Number</b>	<b>Name</b>	<b>Questions</b>
Level 1	<b>Reaction</b> : a measure of learner satisfaction	<ul style="list-style-type: none"> <li>• Did the learners like it?</li> <li>• What do you plan to do with what they have planned? (for organizations)</li> </ul>
Level 2	<b>Learning</b> : a measure of learning	<ul style="list-style-type: none"> <li>• Did the earners get it?</li> <li>• Have their skills, knowledge or attitudes changed as a result?</li> <li>• How much have they changed?</li> </ul>
Level 3	<b>Behavior</b> : a measure of behavior change	<ul style="list-style-type: none"> <li>• Can the learners go out and do it?</li> <li>• Has the behavior changed as a result of learning?</li> </ul>
Level 4	<b>Results</b> : a measure of results	<ul style="list-style-type: none"> <li>• Do the learners use what they have learned?</li> <li>• Does the change in their behavior have a positive and measurable impact on the business?</li> </ul>

As you can see the model is about evaluating learning from the perspective of an organization and the effectiveness of the learning process to improve the performance of the organization. Now the question is whether the model described by Kirkpatrick is applicable to e-learning. Kirkpatrick views the web as another learning channel and declares that his model of evaluation fits e-learning as well. Kirkpatrick's model is characterized by four levels of evaluation and views the learning process as a holistic coherent process. Therefore the model is sometimes viewed as a framework or taxonomy rather than a model. Most courses are evaluated at level one and almost none at level four because of the complexity of evaluation as you move up the levels.

#### **1.10.2.1 Collecting Data**

In one sense in the model cumulative data from each level is carried forward to the next level. As we move up the level, collecting fresh data becomes more time-consuming and expensive.

Data for level 1 is the most easiest to collect. Most learning programmes have a simple questionnaire that the learner completes. This questionnaire is also called as smile sheet. The purpose of the smile sheet is to determine whether the learners enjoyed the learning experience and whether it was relevant to them. However smile sheets elicit subjective data and may reflect personal opinions unconnected to the performance related course objectives. The problem is that most learners answer questions with answers such as the course met their expectations. However to understand this, we need to know what the expectations are.

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Data for level 2 evaluations are usually collected by analyzing pre and post course assignments. Data collection for level 3 is more time consuming and include interviews with learners, the learners' managers etc. Level 4 evaluates the impact of the learning programmes on performance for example, reduce in wastage, increased orders, etc. Level 4 evaluates the positive and measurable impact of the changed learner behavior on the business goals. In other words level 4 actually measures Return on Expectation or ROE. Level 4 data is actually available and recorded by other normal business processes. Effective collection of such data before and after the learning process and comparison of such data sets is the job of the level 4 evaluator.

### ***1.10.2.2 Adding a New Level***

In 1996 Jack Phillips updated Kirkpatrick's model by adding a fifth level of Evaluation – return on investment. The new level poses the question: "Did the monetary value of the results exceed the cost of the training?" Positive results at levels 1, 2, 3 and 4 is irrelevant if it fails at level 5 that is at the ROI level. In other words the organization will not be willing to invest in a positive impact on business if the cost of that impact exceeds the benefits. Moving a learning department from efficiency mode to effectiveness mode with a measurable ROI is essential for the success of the learning process.

### ***1.10.2.3 Implementation Guidelines***

We need to use the four levels of Kirkpatrick' model along with Philip's Fifth level of ROI in order to evaluate e-learning. Kirkpatrick himself has outlined some implementation guidelines level by level as given in Table 1.6.

## **1.10.3 Defining Costs**

In order to answer the question whether the monetary value of the results exceeds the cost of training, we need to consider three issues:

- Cost of developing and delivering e-learning. Laurie Bassi analyses learning development and delivery costs and breaks them into direct costs, indirect costs and opportunity.
- Return of benefits
- Period for which the benefits are calculated

### ***1.10.3.1 Direct Costs***

According to Bassi, the direct costs of learning can be divided into two components as classroom costs and e-learning costs. Classroom costs include wages and salaries of trainers, payments to outside vendors, facilities expenses, cost of development, production and distribution of materials, travel expenses and administrative and support costs. E-learning costs include development costs, purchase and licensing of software and hardware

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for delivery. Infrastructure costs do not form part of costs as a network capable of delivering e-learning is assumed to be in place.

The fixed cost of e-learning includes content development which includes intellectual property development and licenses, instructional design, studio costs and programming costs. The content may be developed for tens or thousands of users, however the initial development cost remains the same. Sometimes the development costs can include extending or upgrading the network. These costs must be spread over all the courses offered since all the courses benefit from the improved infrastructure. Fixed costs of e-learning are much higher compared to that of classroom learning. This higher cost is due to the more sophisticated resources and technology required to develop e-learning content.

The variable or marginal costs of classroom learning are directly proportional to the number of learners. On the other hand, the variable costs of e-learning are negligible. Normally stepped costs are not associated with e-learning. However a large increase in the number of learners can result in increase in distribution and server up-gradation costs. The size of the virtual classroom can also result in stepped costs. The usual norm is to have one instructor for every 20 learners to ensure effective interaction. When the size of the virtual classroom increases, it is advisable to have one assistant instructor for every additional 20 learners. The assistant instructors can prioritize questions and leave the instructor free to effectively teach the content. The cost of the additional assistant instructors is more than compensated by the savings in travel and opportunity costs of the learners.

**Table 1.6 Kirkpatrick's Implementation Guidelines**

Level	Guidelines
1 Reaction	<ul style="list-style-type: none"> <li>• Determine what you want to find out</li> <li>• Design a form that will quantify reactions</li> <li>• Encourage written comments and suggestions</li> <li>• Attain immediate response rate of 100%</li> <li>• Seek honest reactions</li> <li>• Develop acceptable standards</li> <li>• Measure reactions against the standards and take appropriate action</li> <li>• Communicate the reactions as appropriate</li> </ul>
2 Learning	<ul style="list-style-type: none"> <li>• Use a control group if feasible</li> <li>• Evaluate knowledge, skills or attitudes both before and after the training</li> <li>• Attain a response rate of 100%</li> <li>• Use the results of the evaluation to take appropriate action</li> </ul>

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3 Behavior	<ul style="list-style-type: none"> <li>• Use a control group if feasible</li> <li>• Allow enough time for a change in behavior to take place</li> <li>• Survey or interview one or more of the following groups: trainees, their bosses, their subordinates, and others who often observe trainee's behavior on the job</li> <li>• Choose 100 trainees or an appropriate sampling</li> <li>• Repeat the evaluation at appropriate times</li> <li>• Consider the cost of evaluation versus the potential benefits</li> </ul>
4 Results	<ul style="list-style-type: none"> <li>• Use a control group if feasible</li> <li>• Allow enough time for results to be achieved</li> <li>• Measure both before and after training, if feasible</li> <li>• Repeat the measurement at appropriate times</li> <li>• Consider the cost of evaluation versus the potential benefits</li> <li>• Be satisfied with the evidence if absolute proof is not possible to attain</li> </ul>

### *1.10.3.2 Indirect Costs*

Indirect costs are defined by Bassi as the wages and benefits paid to learners while they are learning as well as overhead costs associated with both direct and indirect costs.

### *1.10.3.3 Opportunity Costs*

Opportunity costs are business opportunities lost because employees are busy learning and not available for other responsibilities. Normally opportunity costs are equal to or greater than indirect costs. Opportunity costs can be very high if the learner works in sales and marketing. In the case of e-learning because it is time-effective and avoids learning related travel, opportunity costs are much lower than classroom learning. It is often claimed that the indirect costs of e-learning is three to five times lower than that of classroom learning. E-learning reduces costs in general but especially reduces indirect and opportunity costs.

### *1.10.3.4 Costs: Classroom Learning versus E-learning*

In order to compare the costs of classroom learning and e-learning we need to find out about the value of each hour of learning in both cases. It is claimed that one hour of self-paced e-learning is about 25% to 60% more time effective than one hour of instructor led classroom learning. Laurie Bassi has developed a worksheet for comparing the costs of traditional learning and e-learning. E-learning is more cost effective than traditional learning. For e-learning costs of trainer's compensation, material development, production and distribution, travel expenses, learner's compensation and opportunity cost. are considered

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insignificant by Bassi. Bassi has considered material development costs as marginal since development costs do not increase as the number of learners increase. Sometimes more investment is made in course content development where the learner base is large. For traditional learning the hardware and software costs are considered insignificant.

#### **1.10.4 ROI Calculation**

In order to calculate ROI, we need to first determine the total cost an e-learning process. The total cost is calculated as follows:

Total Cost = all fixed costs + ( number of learners x variable cost)

ROI is calculated as

ROI = Customer defined value / Total cost

This definition of ROI, stresses the fact that ROI is defined by the customer's business requirements.

ROI can also be expressed as a percentage,

Net Monetary benefits /costs x 100 = ROI (%)

(Monetary benefits – Total cost of learning)/Total cost of learning x 100 = ROI(%)

In addition to the definition with cost-benefit ratio, time can also be considered as a parameter

Cost/Benefit x period = Time to break even

#### **Example**

An organization launches a new product that is very different from anything currently available. However, the launch fails. It was then found out that the sales team found it difficult to explain clearly the benefits of the new product to the customers. In this scenario, the learning department is required to develop a learning program comprising 1 hour virtual class and 3 hour self paced e-learning program to educate the sales personnel about the new features of the product. The product being new, it has to be developed from scratch. We also assume the infrastructure is already in place and so there is no additional cost. We also assume that the learning process takes place during early morning hours so that it does not in most cases effect client servicing. In this way the opportunity costs were reduced.

Information Given:

Cost of developing material for Virtual Classroom = Rs. 5,00,000

Cost of developing self paced Programme (for 3 Hours) = Rs.45,00,000

After six months half yearly profit target was found to be = Rs. 75,00,00,000

and the contribution due to the learning initiative was judged as 5%.

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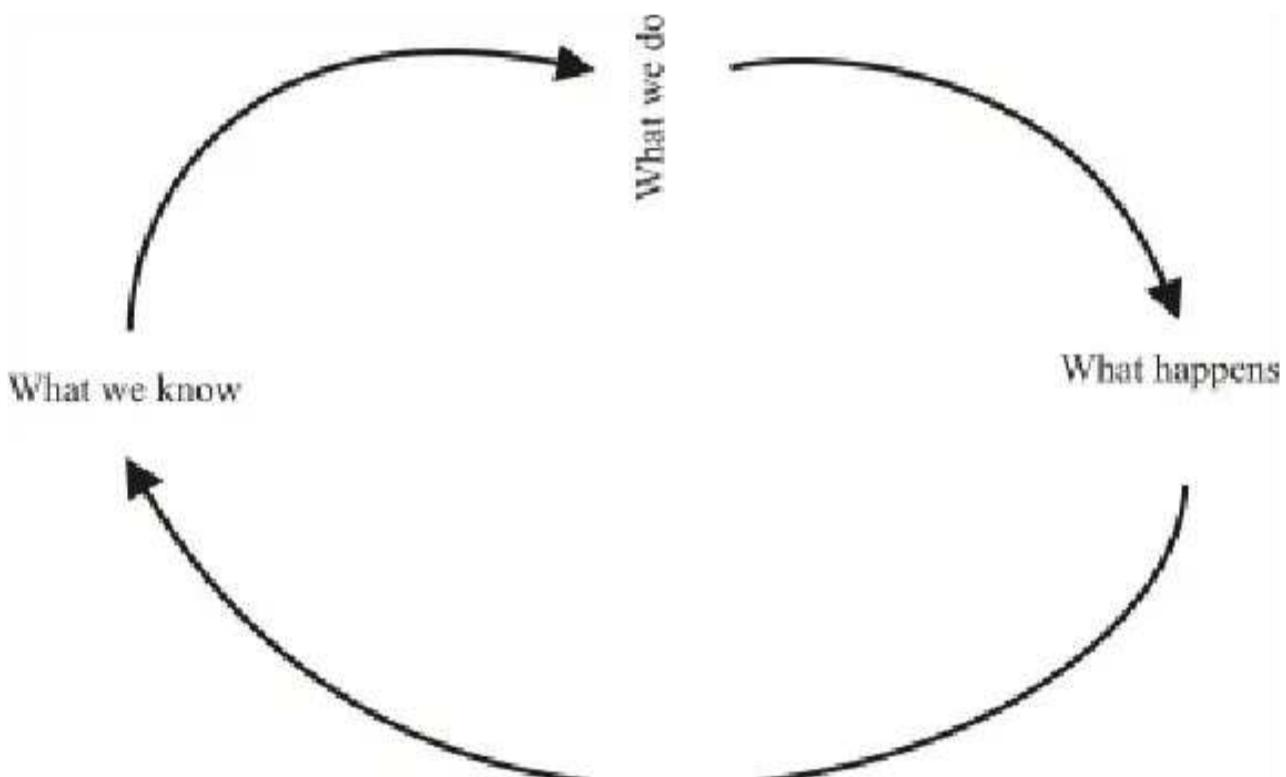
## Have You Understood?

1. What is ROI from the e-learning perspective?
2. How are learner's inputs tracked?
3. What are the levels of Kirkpatrick's evaluation?
4. What are differences between direct, indirect and opportunity costs?

### 1.11 E-LEARNING CYCLE

#### 1.11.1 Closed-loop Structure:

One important point to note is that e-learning is a continuous process. In e-learning we implement once but actually deliver multiple times, in other words there is continuous delivery of e-learning. This continuous process has been depicted by a closed-loop structure by Jay W. Forrester as given in Figure 1.5.



**Fig. 1.5 Closed-Loop Structure**

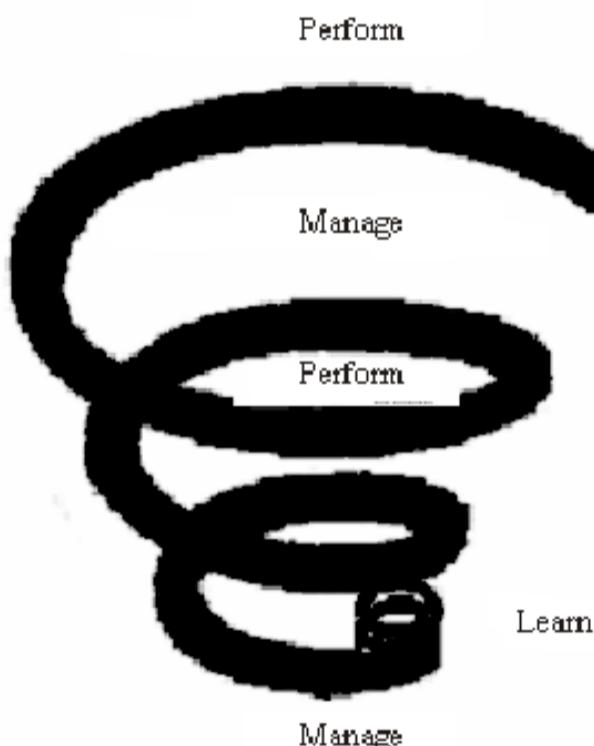
#### 1.11.2 Learnativity Spiral

Forrester has described e-learning as a continuous reaction to one's own actions and to the actions of others. Wayne Hodgins has described this aspect using a spiral which he called as learnativity spiral (Figure 1.6).

Learnativity actually defines a spiraling effect where there is conversion and interaction between the tacit knowledge and explicit knowledge as we move from one level to the next in the spiral. The various stages in a level are capture, manage, learn and perform. Capture essentially entails

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understanding the tacit knowledge from different available sources. The manage stage attempts to convert explicit knowledge into various forms that can be conveniently shared. In the e-learning scenario this involves deciding curricula, learning paths, and all other activities involved in facilitating the learning process. Learn stage is the actually learning process utilizing all resources and facilities available at one's disposal. Finally in the perform stage, what has been learned is applied to solve problems at all levels – individual, team and enterprise.



**Fig. 1.6 Learnativity Spiral**

### 1.11.3 Double Loop Learning

In other words the closed loop learning cycle and the mandate or governing programme do not interact and are independent structures.

- Therefore the double loop learning was defined by Christopher Argyris, Professor of Education at Harvard University. The main characteristic of

in accordance with the overall objectives resulting in a new framework for learning. In addition, for e-learning to be effective it must be possible to revisit and revise the original drivers based on the implementation of the learning process.

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### 1.11.4 Domains of learning

- [REDACTED] of learnativity takes place. This domain provides context, the e-learning content and the delivery channels.
- [REDACTED] The learner provides another type of content in the form of knowledge experience questions and real time learning. This domain is responsible for feedback and evaluation. Facilitating e-learning is one aspect but finally the learner is responsible for the learning process.

The two domains discussed have different but related cycles.

#### **Business Domain Cycles:**

Business Domain Cycles provides context, infrastructure and content

- Responsibility – business & learning department
- Learner involved only in evaluation

#### **Components of Business Domain Learning Cycle:**

- 1 Align with business strategy and objectives:
  - Objective – to ensure that all members of the enterprise are enabled to work to their best potential through the e-learning process.
  - Changing Requirements – e-learning should be able to modify its objectives to suit the changing agenda & requirements of the enterprise.
- 2 Establish competencies and Performance targets
  - Support for Business Objectives – components and levels of performance as required for each role in the enterprise
- 3 Measure performance gaps
  - Determine Performance gaps – quantify what exists and measure performance gaps.
  - Measurements - on predictive basis – by making employees perform Competency and activity assessments.
  - Some Learning Management Systems – competency models have competency modules – allow assessments Online – gather data and analyze automatically.
  - Can also be observed operationally by managers
4. Set Learning Objectives – learning objectives for learning paths and individual courses to close the performance gaps
5. Capture Tacit knowledge – work with internal or external subject experts to capture tacit knowledge.

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6. Design/Develop or buy learning content - start designing and develop learning Content – if possible save time and money by buying off-the-shelf content. Content development is itself a recursive process involving preliminary designing, detailed designing, developing content, reviewing quality, conducting technical tests, performing user acceptance tests, modifying design.
7. Deliver Learning – is an important activity and you need to leverage the whole learning value chain using both off line processes and managed processes – delivering self paced courses, simulations, archived web casts and peer-to-peer platforms through off line mode and virtual classes, mentoring, live web casts and classroom-based learning through appropriate learning management systems.
8. Evaluate Learning – the e-learning needs to be properly evaluated especially in terms of how it affects the next stage in the Business Domain cycle.
9. Reflect and make adjustments – this is a critical stage – and involves in examining the various parameters at each stage and making adjustments as and when necessary.

**NOTES****1.11.5 Learner Domain Cycles**

- Learner Domain Cycles is where the learning happens –in a classroom, an aircraft, learner’s office, factory floor, client site or in a hotel room.
- Learning often happens after the learning event – where learner assimilates content by applying in a work context.
- If learning is instructor led – some control by the business domain is possible.
- Most e-learning systems – this is not possible

**Learning Cycles:**

**Kolb and Fry:** suggested a four stage learning cycle for experimental learning. The learning cycle can begin at any of the four stages. The four stages are:

- Experience – immersing yourself in the learning
- Reflection – the aspects that you notice
- Conceptualization – the meaning of what you see
- Planning – what will happen next and what are the activities that will follow

**Honey and Mumford:** suggested a learning cycle that accounts for the different preferences of learners for different stages in the learning cycle suggested by Kolb. These preferences are called **learning styles**. At different points in time in spite of individual preferences, in order to complete learning, the learner has to adopt every role in the learning cycle –

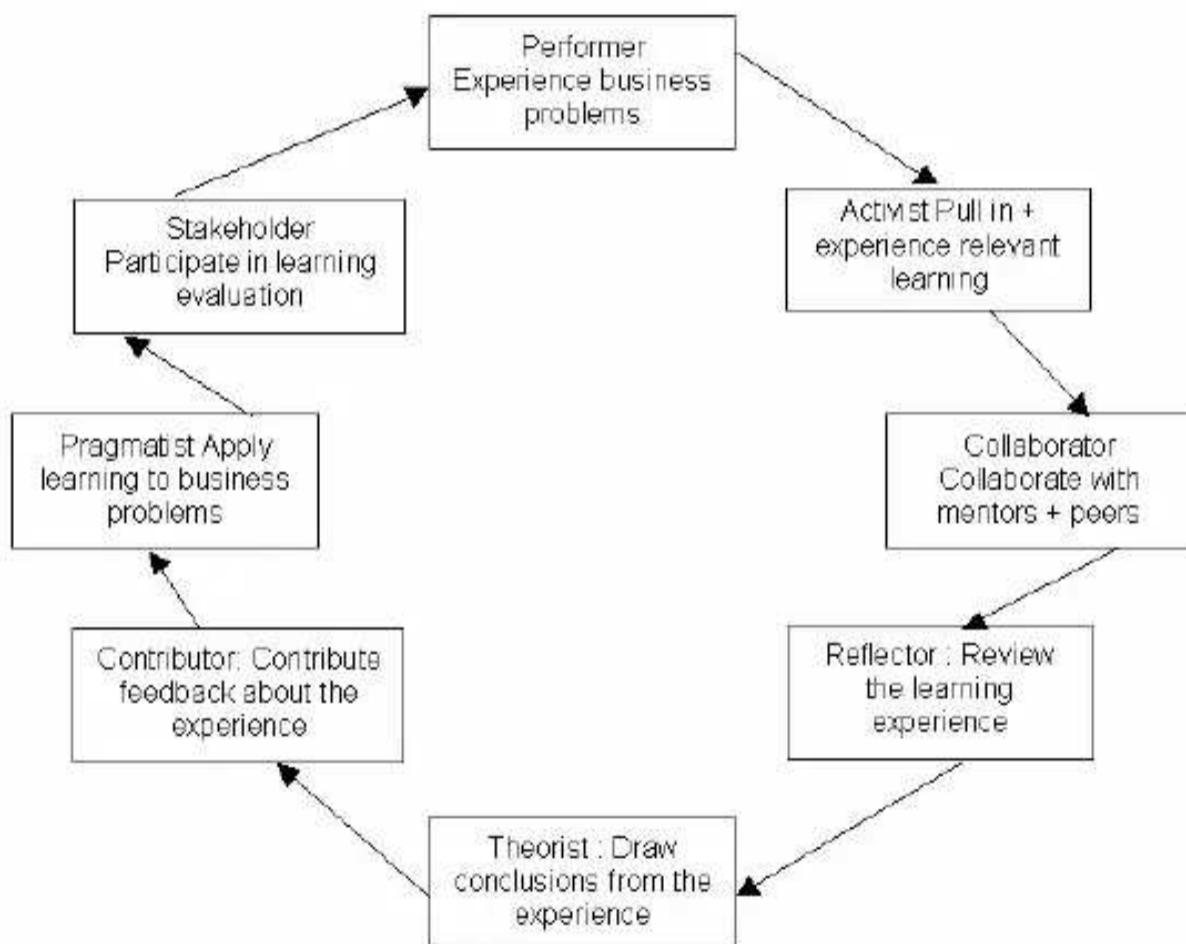
- Stage 1- Activist – Having an experience
- Stage 2 – Reflector – Reviewing the experience
- Stage 3 – Theorist – concluding from the experience
- Stage 4 – Pragmatist – Planning the next steps

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**Double-loop Cycle:** Both the Kolb and Fry cycle and Honey and Mumford cycle are single loop processes. However, if there is a failure in the learning process, or in other words, the employee's performance does not improve there is no method to help in diagnosing the failure. The cycles assume that the learner is motivated and the content is fit

for the purpose it is intended. If these assumptions prove to be wrong there must be a method to influence the Business Domain to correct these assumptions. The new learning cycle for the Learner Domain needs to be aware of the context of the Business Domain and support double-loop learning (Figure 1.7). Four new stages and roles support double-loop learning.



**Fig. 1.7 Learner domain E-learning cycle**

### Have You Understood?

1. Why is e-learning considered as a spiral?
2. What is the main characteristic of double learning cycle?
3. What are the domains of learning?
4. What are the four stages of Kolb and Fry's learning cycle?

**INTRODUCTION TO E-LEARNING****Table 1.7 Drivers for E-learning**

S.No	Driver	Description
1	Geography	Reach people who could not be otherwise be accessible
2	Time	Shift time to accommodate schedules and save time
3	Frequency	Train more frequently – just in time
4	Expense Management	Decrease training budget and development time
5	Revenue Growth	Increase sales
6	Instructional design	Accommodate varied learning styles and provide personalized training

**Table 1.8 Drivers for Senior Executive**

	Driver	Description
1.	Transforming the business	By changing the way people learn through properly implemented e-learning has the power to bring staff to a state of readiness to meet any competition and cost effectively
2.	Support Strategic change	Can deliver clear, consistent messages about strategic change across time zones and continents immediately without delay. Has the flexibility to convey this information to specific audiences based on learner profiles
3.	Smooth transitions during mergers and acquisitions	Helps in harmonization through synchronous and asynchronous learning procedures to convey clear consistent information across time and distance Helps in distributing knowledge about shared products and services, new catalogues and products and about internal systems and applications
4.	Help in constant innovation	Constant innovation in sectors like financial services and pharmaceuticals which roll out new products continuously is now possible due rapid content development and publishing and knowledge sharing with partners, suppliers, sales team, and customers E-learning enables learning to take place in parallel with the development cycle rather than at the end of the development cycle
5.	Support new enterprise solutions	Can help reduce cycle and time to perform for the delivery of key enterprise solutions Two questions about a new enterprise solution – why the change can be answered through live web casts and discussion forums etc. and the second question how it affects me can be answered by delivering local virtual classes by direct superiors.

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6	Support new enterprise solutions	Can help reduce cycle and time to perform for the delivery of key enterprise solutions Two questions about a new enterprise solution – why the change can be answered through live web casts and discussion forums etc. and the second question how does it affect me can be answered by delivering local virtual classes by direct superiors.
7	Help to meet certification and compliance regulations	Helps employees to meet certification and compliance requirements by educating them about it.
8	Helps in hunting Talent	Can help to attract talent by providing continuous learning through e-learning
9	Use of available IT investment	Helps leverage the already available IT capital for learning purposes
10	Educating customers	Can be important part of customer relationship management Engaging consumers in e-learning can help in creating brand loyalty Can help in B2B relationships
11	Reduce time of learning curve of new employees	Opportunity cost (cost due to wage, benefit, overhead and learning without generating income) of new employees can be reduced through appropriate use of customized self-paced learning
12	Saving in cost of learning	Long term costs are reduced

### 1.12 BUSINESS DRIVERS

An important feature is that drivers change as corporate strategy changes. When first building a case for e-learning you need to stress that these are the initial drivers pertinent to that period and caters to priority business requirements for which e-learning can deliver a solution. Since e-learning is designed to tackle issues that pertain to specific and changing business requirements, there is no methodology that fits all scenarios.

From one perspective, a general view on the drivers for e-learning is as given in Table

The drivers in the implementation of e-learning can be looked at from the viewpoints of the different stakeholders:

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- Senior Executives
- Middle Level Executives
- Learners and HR personnel

**NOTES****1.12.1 Drivers for Senior Executives**

The drivers for senior executives are summarized in Table 1.8

**1.12.2 Drivers for Middle level Executives**

The drivers for middle management are summarized in Table 1.9

**Table 1.9 Drivers for middle level executives**

S.No	Driver	Description
1.	Meeting Targets	The competency and performance management systems of e-learning help to recruit new talent and identify the best qualified staff Continuous customized learning can ensure peak performance of each staff member
2.	Customer Satisfaction	Proactive behavior - anticipating issues and delivering solutions can improve customer satisfaction. Proactivity can be supported by keeping theetc. team abreast of competitive intelligence, industry intelligence, etc.. This can be achieved through appropriate just-in-time learning

**1.12.3 Drivers for Learning and HR departments**

The drivers for Learning and HR departments are given in Table 1.10

**Have You Understood?**

1. What are the main drivers of e-learning?
2. Who are considered the major stakeholders in the implementation of e-learning?
3. What are the drivers for Learning and HR departments?

**1.13 E-LEARNING STRATEGY**

An enterprise e-learning provides an objective vision and framework for the implementation process. The framework is an analysis which provides some guiding principles for the dimensions of e-learning:

- Business needs – this is the driver of change
- Technology – this is the enabler of change
- Content – this is the agent of change
- Corporate culture – this is the arena of change

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**NOTES****Table 1.10 Drivers for Learning and HR departments**

S.No	Driver	Description
1.	Cost Saving	Saving in delivery costs through scalability Saving for enterprise due to saving in opportunity, travel and accommodation costs Once content developed – minimum cost increase due to scalability
2.	Increasing learning effectiveness	Delivers more learning in less time – learn more in less time or learn the same but in less time Reduction in opportunity costs
3.	Support for self-paced learning	Learning can be self-initiated, self-directed and self-paced. Self-paced learning supports effective learning and removes ties from time schedules
4.	Learning Management Centralized	Learning – decentralized but learning management centralized Control of global and local content, budgets and delivery
5.	Continuous measurement and monitoring	Tools to measure and manage continuously so that learning is customized for specific roles and responsibilities and for different learning paths – resulting in relevant content delivered just in time
6.	Delivery of quality content	Tools to develop and effectively deliver content of high quality that engages and motivates employees to learn
7.	Easy learning	Shallow learning curves due to familiarity with Web and due to specially designed user interface
8.	Automating Housekeeping	E-learning automates the process of learner and course registration, learner progress, results, certification and compliance, course usage levels, number of concurrent users etc.. and hence reduces administrative costs

An e-learning strategy operates at both micro and macro levels. Some of the important questions to be considered include:

- What are the business reasons?
- What is the right way to operate?
- What are the financial implications?

The e-learning implementation must have all stakeholders sharing the same objective and vision so that a coherent strategy evolves which is most likely to obtain funding.

**INTRODUCTION TO E-LEARNING****1.13.1 Iterative process – the strategy**

E-learning strategy is not a static process and can fail the first time. The main reasons for this are:

- Failure to manage Technology - keep abreast developments in e-learning products, services and technology
- Failure to respond to changing business needs – respond quickly to changes in business requirements

To cope up with these changes there is a need to have an iterative process in place that constantly reexamines every aspect of the strategy whenever internal or external changes take place. In certain circumstances where a crisis in the enterprise calls for e-learning as a potential solution, then we know exactly what is required and the well defined problem dictates a rapid e-learning implementation.

**1.13.2 Alignment**

The e-learning strategy enables the enterprise to achieve its objectives within the environment in which it operates. The e-learning strategy needs to be in tune with all other strategies operating in the enterprise to achieve the same objectives. The other strategies most likely to be operating include:

- **Business strategy:** caters to the goals of the enterprise – decides how to compete in the market and plans to increase profit. This strategy drives all other strategies.
- **E-Business Strategy:** This strategy decides on the infrastructure, processes and priorities for connecting every entity to every other entity – e-learning & e-business strategies should be aligned.
- **Human Resources Strategy:** The Human resource strategies determines how the enterprise should invest in human capital so as to achieve the business objective and how best to leverage this capital in order to execute the business strategy. There is a natural alignment between this strategy and learning.
- **Knowledge Management:** Viewed from an abstract perspective, both Knowledge Management and e-learning is about capturing tacit expert knowledge and transforming into an explicit form so that it can be effectively disseminated. Again natural alignment between this and e-learning.
- **IT Strategy:** The technology used for e-learning should be in tune with technology used for other business processes – approved technology vendors and infrastructure evolution.

Finally learning and e-learning are methods of delivery of knowledge and hence the two must be in perfect alignment and must have the same general aim of improving the performance of the enterprise by improving the performance of the individual.

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### 1.13.3 Barriers

- **The e-learning industry:** The availability of large Learning Management System by a reputed vendor may seem to be the perfect solution to meet your e-learning needs. However it is best to have a clear idea of your requirements before looking at readymade solutions. In order to have a clear picture of the kind of e-learning system you need the following questions need to be answered:
  - What is the direction your business is going to take?
  - What is the geographic spread?
  - Are staffing requirements likely to rise significantly?
  - Is staff attrition high?
  - Are product cycles getting shorter?
  - Is competition becoming an issue?
  - Is there increasing emphasis on outsourcing?
  - Is there increasing emphasis on cost reduction?
- **Time:** A perfect excuse to avoid developing a coherent e-learning strategy is lack of time. However this is not true since issues not addressed at the strategy development time gets deferred not solved. Often a good strategy will bring a focus into your thinking process which will help in all later stages of the e-learning implementation. As an example, a request for information (RFI) and a request for purchase (RFP) are required when interacting with vendors, a better RFI and RFP can be obtained if the strategy is in place.

### 1.13.4 The process of deciding a strategy

#### Steps:

1. Formation of e-learning group: Choose from members
  - Interested or have experience in e-learning
  - Are Representatives of the enterprise
  - Not all from learning department ( will narrow the scope)
2. Use formal or informal surveys to gather information about adoption of e-learning. Recruit people with positive experience in e-learning as champions of e-learning. Find out any local e-learning experiences.
3. Involve Stakeholders in harnessing support for the e-learning initiative and develop coherent strategy through a process of discussion, discovery and dialogue. The stakeholders include senior management, e-learning steering group, IT department, Knowledge management department, e-learning team, internal clients, internal and external certification and compliance regulators, subject matter experts, tutors, managers, learners, partners, sales channels, suppliers, customers etc.

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4. Conduct an in depth SWOT. The objective of the analysis is to identify key strategic factors which will help in:

- Building core strengths
- Eliminating weaknesses
- Taking advantage of opportunities
- Mitigate or handle threats

SWOT analysis of learners and senior executives can be performed as shown in Table 1.11.

**Table 1.11 SWOT analysis of Learners and Senior Executives**

<b>Analysis parameter</b>	<b>Learners</b>	<b>Senior Executives</b>
Strengths	<ul style="list-style-type: none"> <li>• Good computer literacy – e-learning not a barrier</li> <li>• Competitive – will see e-learning as a tool to improve personal performance</li> <li>• New employees may have already used e-learning</li> </ul>	<ul style="list-style-type: none"> <li>• Have track record of leveraging technology to meet business requirements</li> <li>• See speed-to-market as critical business driver</li> <li>• Committed to maintaining best staff</li> </ul>
Weaknesses	<ul style="list-style-type: none"> <li>• Previous e-learning initiatives - left learners cynical</li> <li>• Variation in learners desktop variations may result in non-uniform look and feel of e-learning content</li> <li>• Feedback indicates learners not satisfied with volume and freshness of content and put blame on training department</li> </ul>	<ul style="list-style-type: none"> <li>• Traditionally view training as cost centre</li> <li>• Training costs cut whenever cost saving required</li> <li>• Not available to interact with training department</li> <li>• Senior executive do not include members from the training department</li> </ul>
Opportunities	<ul style="list-style-type: none"> <li>• Consistent learning content for learners in the enterprise across the Globe</li> <li>• Creation of global learning community where best practices can be shared</li> <li>• Allows partners, suppliers and customers to be part of learning community</li> </ul>	<ul style="list-style-type: none"> <li>• HR head encourages</li> <li>• e-learning especially if it can support and existing HR systems like competency determination and project recruitment</li> <li>• Competitors use of e-learning lead to dramatic success</li> </ul>

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	<ul style="list-style-type: none"> <li>E-learning even when away from workplace</li> <li>Inhibitions to classroom training can be overcome with self-paced, self-scheduled e-learning</li> </ul>	<ul style="list-style-type: none"> <li>Committed to programme of mergers and acquisitions where e-learning helps to accelerate the programme</li> <li>Committed to cost savings – E-learning can show impressive ROI</li> </ul>
Threats	<ul style="list-style-type: none"> <li>Managers do not support e-learning – consider it as distraction. If managers do not encourage e-learning it will fail</li> <li>Learners hesitant in using e-learning at customers premises because of the belief that it may undermine their authority</li> <li>Learners look at e-learning as a cost saving measure rather than a lifelong learning process</li> <li>Managers do not give it high priority</li> </ul>	<ul style="list-style-type: none"> <li>Different factions supporting different e-learning initiatives</li> <li>Commitment to programme of mergers and acquisitions could disrupt e-learning implementation</li> <li>Impatience with time taken to deliver e-learning benefits</li> </ul>

### Have You Understood?

- What are the main dimensions of e-learning?
- What are the main reasons why the first time implementation of e-learning fails?
- What are the objectives of SWOT analysis of learners and senior executives?

### 1.14 SUMMARY

- E-learning has an important role to play in today's world of IT and Web technologies.
- We have understood that e-learning is very important for updating the knowledge and skills of employees of enterprises
- E-learning provide e-enhancements to models of learning
- Online resources, presentation of realistic case studies, online discussion boards, simulations and animations, chats, shared whiteboards, video conferencing, and computer-aided assessments are all used by e-learning to improve educational technologies.

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- E-learning can be defined as “ *E-learning is the continuous assimilation of knowledge and skills by adults stimulated by synchronous and asynchronous learning events – and sometimes Knowledge Management outputs – which are authored, delivered, engaged with, supported and administrated using Internet technologies.* ”
- The elements of e-learning cover the complete process of imparting education including learner registration process, content creation, facilities for collaborative learning, and administration processes.
- The benefits of e-learning include the fact that it is
  - **Cost effective**
  - **Convenience**
  - **Flexibility**
  - **Efficiency**
  - **Scalability**
  - **Global reach**
  - **Interactivity**
  - **Customization**
  - **Measurable outcomes**
- Some of the challenges and issues faced by learning include use of new technologies for teaching, the shared responsibility of learner, the cost factor and the integration aspects.
- E-learning industry includes opportunities in content development and providing technologies and services associated with e-learning.
- E-learning has the push and pull models of e-learning.
- The ROI of e-learning and its measurement and calculation is very important.
- Learnativity spiral, double loop learning and learner domain cycles are e-learning cycles.
- E-learning drivers can be from the viewpoints of senior executives, middle executives, and learners and HR personnel.
- E-learning strategy is dynamic.
- A good decision regarding strategy can be made only after SWOT analysis of learners and senior executives.

**NOTES****Exercises**

1. What is the concept of e-learning? Explain the context in which e-learning becomes relevant.
2. Discuss the different definitions of e-learning.
3. Explain in detail the elements of e-learning.
4. Discuss in detail, the benefits of e-learning.
5. There are some pitfalls when e-learning is implemented. Discuss.
6. What are the challenges and issues associated with e-learning? Critically discuss.
7. List Kirkpatrick's Implementation guidelines.
8. Take an IT industry and explain the calculation of ROI
9. Discuss in detail the various e-learning cycles.
10. Write in detail all the drivers of the various stakeholders of e-learning.
11. Give a detailed SWOT analysis of learners and senior executives.

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## **NOTES**

**INTRODUCTION TO E-LEARNING****UNIT II****NOTES****DESIGN AND IMPLEMENTATION****2.1 INTRODUCTION**

This unit explains in detail the design and implementation of a e-learning initiative. It distinguishes the role of the instructor in e-learning in comparison to the role of the instructor in traditional learning methodology. Then it explains the different learning theories and discusses how these learning theories form the basis of instructional design. It then goes on to explain Learning Object and its role in instructional design in the context of e-learning. Finally the Unit discusses some issues of e-learning.

**2.2 LEARNING OBJECTIVES**

- To discuss aspects in the design of e-learning content
- To understand the changing role of the instructor in e-learning
- To explain some typical learning theories
- To learn about instructional design
- To define learning objects
- To outline the instructional design principles for e-learning
- To discuss issues associated with e-learning

**2.3 DESIGN OF E-LEARNING CONTENT**

An important component of any e-learning initiative is the design and implementation of the learning content. From the viewpoint of e-learning, learning design incorporates two aspects – the what - that is the actual content to be delivered and how – that is the sequence of learning activities. Another aspect to be considered is the reusability of the learning content and sequences. In other words when designing material for e-learning, the following aspects are involved:

- Create content-based, self-paced learning objects
- Create sequences of learning activities which involve groups of learners interacting within a structured set of collaborative environments
- Create Learning objects and sequences that are reusable

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Important aspects of creation of such learning content, and structuring of the learning activities is the achievement of the final objectives of enabling learners to construct their own knowledge and understanding.

### 2.4 ROLE OF THE TUTOR

The role of the tutor in e-learning is vastly different from the role of the tutor in traditional learning. The activities of the tutor in the e-learning scenario include the following:

- Planning phase
- Continuous Monitoring of the learning activity
- Post-delivery review and quality check
- Organizational responsibilities as e-tutor include
  - Content facilitator
  - Resource provider
  - Overall e-learning activity manager and administrator

The Tutor must also ensure that the complete learning activity caters to all different types and levels of learners that they are likely to encounter.

The planning phase is an important activity of the tutor and the key issues to be considered include:

- Audience
- Resource Needs
- Proposed learning outcomes
- Assessments needs and methods

#### 2.4.1 Audience

- Prior learning related to current learning
- Development Special competencies if required
- Keep tracking on the dynamic needs and characteristics of the learners so that it is always matching the learners requirement

#### 2.4.2 Resource needs

The tutor must be aware of what resources are available and how the students can access them. Access privileges for easily available online resources needs to be acquired. As far as possible it is better to avoid conventional type of resources such as text books, videos, etc. since these resources cannot be accessed easily by the e-learners since they cannot be readily dispatched on request.

**INTRODUCTION TO E-LEARNING****2.4.3 Proposed Learning Needs**

A learning scenario whether traditional or Online must necessarily have a learning outcome. Learning outcomes can be of various types such as:

- Outcomes which are specific in nature for example where students are required to master a particular mathematical concept
- Outcomes can be general in nature such as acquiring high level skills such as understanding a play
- Outcomes can be expressive requiring learners to acquire creative skills such as singing or painting

The tutor must clearly specify the outcomes of the learning process whatever may be nature of the learning outcomes.

**2.4.4 Assessments needs and methods**

An important component of learning is the evaluation or assessment process. Normal procedures of assessment in an e-learning scenario include tests, creating portfolio or submitting assignments. However almost all subjectively assessed work such as essays, assignments, project reports etc. must necessarily again be finally evaluated by the human evaluator. E-learning can help in the interaction between learner and tutor more or less acting as a messenger for submitting assignments, reporting results and collecting feedback. For objective type of evaluation such as multiple choice and structured questions there exist automatic modes of evaluation. There are also evaluations which need to physically access the objects such as paintings, or performance such as dancing, traditional methods of submission are required. Therefore the tutor needs to plan in advance the type of evaluation and the methodology of interaction.

**Have you understood?**

1. What are the organizational responsibilities of the tutor?
2. List the issues key issues in planning of an e-learning course by the tutor or instructor
3. What are the various types of learning outcomes?
4. What are the typical assessment strategies used in e-leaming?

**2.5 INSTRUCTIONAL DESIGN****2.5.1 Introduction**

Instruction design is concerned with research and theory about learning and teaching strategies and the methodologies used in developing and implementing these strategies specifically in the context of e-learning.

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Biggs (1999) describes the task of good pedagogical design as one of ensuring that there are absolutely no inconsistencies between the curriculum we teach, the teaching methods we use, the learning environment we choose, and the assessment procedures we adopt.

- To achieve complete consistency, we need to examine very carefully what assumptions we are making at each stage. We also need to *align* these assumptions.
- We need to start with carefully defined intended learning outcomes, we then need to choose learning and teaching activities that stand a good chance of allowing the students to achieve these learning outcomes.
- We then need to design assessment tasks which will genuinely test whether the outcomes have been reached. This process is easy to state, but very hard to achieve in an informed way.

Instructional design helps the teaching and learning process so that education experiences are optimized for particular learning goals. Each and every teacher is in essence involved with instructional design since they plan their education interventions. All activities in the teaching learning process such as giving lecture to conducting an assignment is an intervention benefit from instructional design.

The traditional role of instructional design is ‘to bridge the distance between the student, the instructor, and the learning organization’ Shearer (2003). There are two types of distances - physical or transactional.

- Physical distance – specifies the actual extent of physical vicinity between the teacher and the learner
- Transactional distance is the ‘communications distance’ between the teaching faculty or ‘the degree to which a distance student perceives the availability of and connectedness with the teacher, other learners and the institution’ in their course (Shin 2002).
- Reducing the transactional distance between the teacher and the learner improves student achievement
- Just physical proximity does not ensure less transactional distance. Even if a course is delivered on-campus and in person by the teacher, the transactional distance between the teacher and the learner may encourage real communications and cognitive engagement beyond the structured lecture.
- Large class numbers and highly structured learning environments increase transactional distance.

One of the major goals of instructional design is to minimize the transactional distance between student and the teacher and the other parties involved in the teaching learning process. In the case of e-learning, the goal of instructional design is to minimize the transactional distance in spite of the physical distance making use of the different mix of

**INTRODUCTION TO E-LEARNING****2.5.2 The Psychological Theory Underpinning Educational Design****NOTES**

- There are distinct traditions in educational theory that are derived from different perspectives about the nature of learning itself.
- Three clusters or broad perspectives which make fundamentally different assumptions about what is crucial for understanding learning, have been identified. These are:
  - The *associationist/empiricist* perspective (**learning as activity**)
  - The *cognitive* perspective (**learning as achieving understanding**)
  - The *situative* perspective (**learning as social practice**)
- We consider how each of these perspectives have contributed differently to the design cycle of specifying learning outcomes, designing learning environments and teaching methods, and deriving appropriate assessment.

**2.5.2.1 The Associationist/Empiricist Perspective**

- In this approach, knowledge is an organized accumulation of associations and skill components.
- Learning is the process of connecting the elementary mental or behavioral units, through sequences of activity.
- This view encompasses the research traditions of associationism, behaviorism and connectionism (neural networks).
- Associationist theory requires subject matter to be analysed as specific associations, expressed as behavioral objectives.
- This kind of analysis was developed by Gagn (1985) into an elaborate system of instructional task analysis of discriminations, classifications and response sequences.
- Learning tasks are arranged in sequences based on their relative complexity according to a task analysis, with simpler components as pre-requisites for more complex tasks.
- The neural network approach views knowledge states as represented by patterns of activation in a network of elementary units. This approach has not yet been applied widely to educational issues, but is potentially significant. It suggests an analysis of knowledge in terms of attunement to regularities in the patterns of activities, rather than in terms of components, as traditional task analysis requires.
- Viewed from this perspective, learning is the formation, strengthening and adjustment of associations, particularly through the reinforcement of particular connections through feedback.
- One implication is the individualizing of instruction, where each student responds actively to questions or problems and receives immediate feedback on their response. This has underpinned the development of programmed instruction and computer programmes that teach routine skills. The shaping of responses through selective reinforcement relates to instruction-by-approximation (in classroom contexts skilled teachers provide encouragement as students achieve better approximation to the required patterns of performance). Analysis of complex tasks

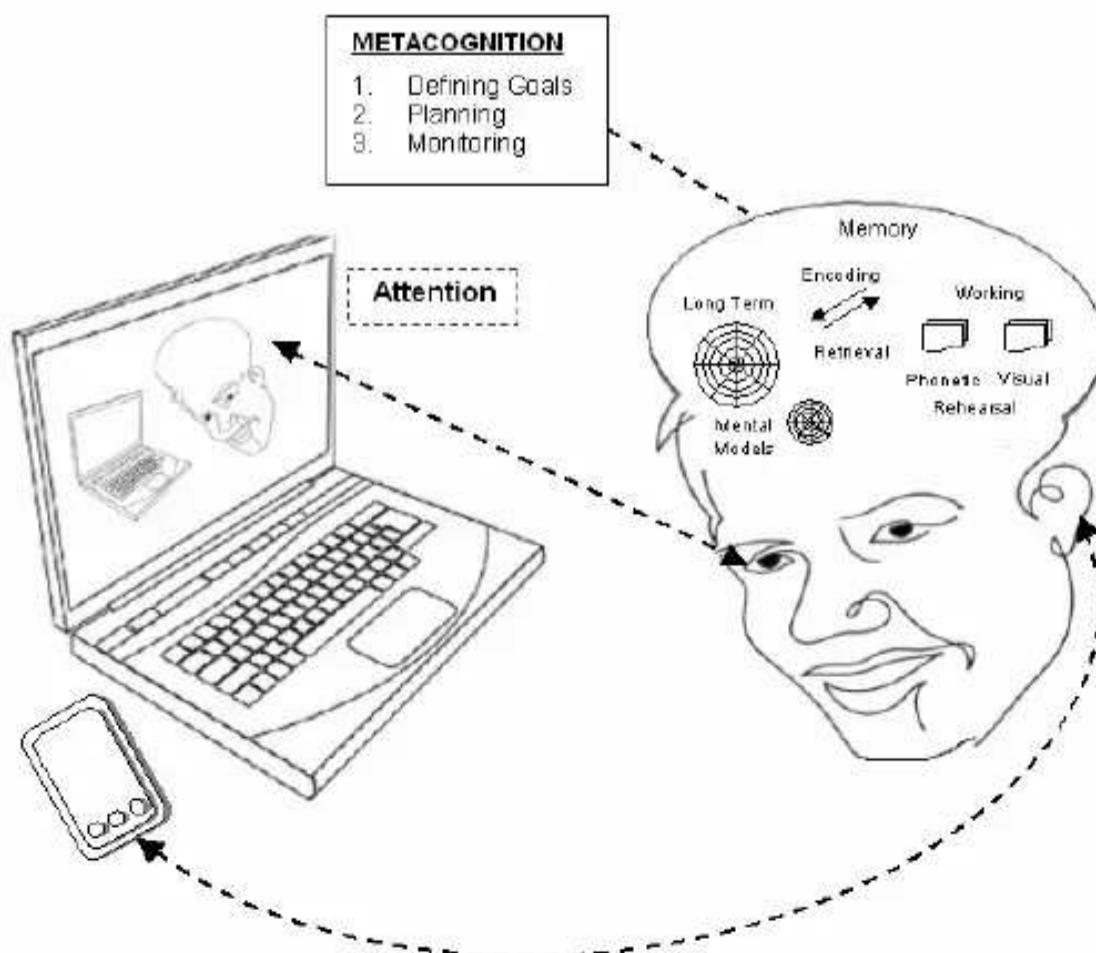
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into learning hierarchies – the decomposition hypothesis – involves the assumption that smaller units need to be mastered as a prerequisite for more complex units. Thus sequences of instruction are designed for students to be able to succeed by learning in small and logically-ordered steps.

### 2.5.2.2 *The Cognitive Perspective*

- As part of a general shift in theoretical positioning in psychology starting in the 1960s, learning, as well as perception, thinking, language and reasoning became seen as the output of an individual's attention, memory and concept formation processes.
- This approach provided a basis for analyzing concepts and procedures of subject matter curricula in terms of information structures, and gave rise to new approaches to pedagogy.
- Within this broad perspective, particular sub-areas of cognitive research can be highlighted as particularly influential, e.g.: schema theory, information processing theories of problem solving and reasoning, levels of processing in memory, general competencies for thinking, mental models, and meta-cognitive processes.
- The underlying theme for learning is to model the processes of interpreting and constructing meaning, and a particular emphasis was placed on the instantiation of models of knowledge acquisition in the form of computer programmes (e.g.: Newell, 1990).



**Fig. 2.1 Cognitive Approach to Learning**

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- Knowledge acquisition was viewed as the outcome of an interaction between new experiences and the structures for understanding that have already been created.
- So building a framework for *understanding* becomes the learner's key cognitive challenge.
- This kind of thinking stood in sharp contrast to the model of learning as the strengthening of associations.
- The cognitive account saw knowledge acquisition as proceeding from a declarative form to a procedural, compiled form.
- A view of cognitive approach is given in Figure 2.1
- As performance becomes more expert-like and fluent, the component skills become automated. Thus, conscious attention is no longer required to monitor the low-level aspects of performance and cognitive resources are available for more strategic levels of processing.
- Increasingly, mainstream cognitive approaches to learning have emphasized the assumptions of *constructivism* that understanding is gained through an active process of creating hypotheses and building new forms of understanding through *activity*.
- Brown *et al* (1989) argued that we should consider concepts as tools, to be understood through use, rather than as self-contained entities to be delivered through instruction. This is the essence of the constructivist approach in which the learners' search for meaning through activity is central. Bloom's Taxonomy is developed based on the cognitive perspective.

**NOTES****2.5.2.3 The Situative Perspective**

- The social perspective on learning has received a major boost from the re-conceptualization of all learning as 'situated'.
- A learner will always be subjected to influences from the social and cultural setting in which the learning occurs, which will also define at least partly the learning outcomes. This view of learning focuses on the way knowledge is distributed socially.
- When knowledge is seen as situated in the practices of communities then the outcomes of learning involve the abilities of individuals to participate in those practices successfully.
- The focus shifts right away from analyses of components of subtasks, and onto the patterns of successful practice.
- Two 'flavors' to situated learning
  - One can be regarded as a socio-psychological view of situativity. This emphasizes the importance of context-dependent learning in informal settings. Here, the main design emphasis is on the relationship between the nature of the learning task in educational or training environments, and its characteristics when situated in real use.

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- The second idea is that with the concept of a community of practice comes an emphasis on the individual's relationship with a *group of people* rather than the relationship of an activity itself to the wider practice, even though it is the practice itself that identifies the community.

### ***2.5.2.4 Aggregation of the different perspectives***

- It is possible to view these differing perspectives as analyzing learning at different levels of aggregation.
  - A behaviorist analysis analyses the overt activities, and the outcomes of these activities, for individual learners.
  - A cognitive analysis attempts a level of analysis which describes the detailed structures and processes that underlie individual performance.
  - The situative perspective aggregates at the level of groups of learners, describing activity systems in which individuals participate as members of communities.
- There will be few current examples of approaches which derive from taking just one level of analysis, and neglecting the others.
- Most implementations of e-learning will include blended elements that emphasize all three levels: learning as behavior, learning as the construction of knowledge and meaning, and learning as social practice.
- In any particular curriculum design it is very unlikely that there would be one-to-one mapping between a single theoretical analysis and a set of objectives that are designed to achieve particular learning outcomes.

### **2.5.3 Pedagogic Design: Defining Learning Outcomes**

- In order to set our analysis of e-learning in the context of curriculum design it is first necessary to consider the nature of the learning outcomes that are sought through educational innovation, including e-learning methods.
- Bloom's (1956) taxonomy was originally developed to classify the complexity of questions asked in assessment, but has become used as a general system for classifying learning outcomes.

#### ***2.5.3.1 Blooms Taxonomy***

Before we go on to explain instructional design for e-learning let us discuss an important *classification of learning actions*.

- The basic cognitive competences to be demonstrated are: *knowledge, comprehension, application, analysis, synthesis and evaluation*.

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SIX LEVELS OF CLASSIFICATION						
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Typical Learning Actions	List	Summarize	Apply	Analyze	Combine	Assess
	Define	Describe	Demonstrate	Separate	Integrate	Decide
	Tell	Interpret	Calculate	Order	Modify	Rank
	Describe	Contrast	Complete	Explain	Rearrange	Grade
	Identify	Predict	Illustrate	Connect	Substitute	Test
	Show	Associate	Show	Classify	Plan	Measure
	Label	Distinguish	Solve	Arrange	Create	Recommend
	Collect	Estimate	Examine	Divide	Design	Convince
	Examine	Differentiate	Modify	Compare	Invent	Select
	Tabulate	Discuss	Relate	Select	Compose	Judge
	Quote	Extend	Change	Infer	Formulate	Explain
	Name		Classify		Prepare	Discriminate
	Who		Experiment		Generalize	Support
	When		Discover		Rewrite	Conclude
	Where					Compare Summarize

Less ← ----- Complexity ----- → More

**Fig.2.2 Bloom's Taxonomy**

- There are also competences for psychomotor and affective learning.
- Practitioners are often encouraged to use verbs from Bloom's taxonomy to define the desired outcomes of a course or learning session.
- Bloom developed taxonomy for classifying cognitive learning objectives in terms of intellectual abilities and skills (Figure 2.2). Blooms taxonomy also has another dimension moving from knowledge, the most simple to the most complex – evaluation. Instruction Designers use this taxonomy as a basis for the following:
  - Choosing the method of presentation
  - Deciding the style of assessment
  - Choosing the kind of delivery channel

**2.5.3.2 Learning Outcomes**

Three kinds of learning are identified - *academic*, *generic competence* and *individual reflexivity*. In order to fully encompass this process to training, it is necessary to extend these concepts to *skills-based outcomes*.

**2.5.3.2.1 Academic understanding**

- Higher Education requires students to acquire competence in academic discourse.
- Biggs (1999) has attempted to clarify the nature of understanding in academic contexts by expressing different levels of understanding as learning outcomes. Biggs' SOLO (*Structure of the Observed Learning Outcome*) taxonomy describes how a learners' performance grows in complexity when mastering academic tasks.
- As students learn, the outcomes of their learning display increasing structural

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qualitatively (the detail becomes integrated into a more complex pattern). In ascending order of complexity, they are: *pre-structural, uni-structural, multi-structural, relational* and *extended abstract*.

- Biggs adopts the view that real understanding is *performative* – the constructivist challenge is to describe what the students can *do* differently as a result of their developing understanding, which then specifies the assessment and allows us to measure the alignment of learning objectives and learning outcomes.
- Laurillard's (1993) influential *conversational model* of learning, which deals directly with e-learning, assumes that academic (mainly declarative) knowledge is the primary learning outcome.

### 2.5.3.2.2 *Generic Competence (transformative potential)*

- There is a growing agenda for a new approach to learning outcomes giving greater emphasis to what are becoming called *employability assets*.
- These outcomes are all generic – not dependent on declarative knowledge – and not only include analytical and flexible learning capabilities, but also emphasize qualities that are much harder to specify as part of a curriculum: confidence, self-discipline, communication, ability to collaborate, reflexivity, questioning attitudes.
- These outcomes start to suggest a crucial role for the community of practice approach, and turn our attention to learning environments that provide maximum opportunity for communication and collaboration, such as networked learning environments.

### 2.5.3.2.3 *Reflection*

- A strong theme in recent educational research has been the crucial role of reflection
- This is not only a necessary pedagogical method, but also a learning outcome - students must learn to be reflective learners.
- The model of learning that has most directly placed the role of reflection in a central position pedagogically is the experiential learning cycle of Kolb (1984).

### 2.5.3.2.4 *Skill*

- Many learning outcomes will refer to mastering a skill.
- Called as ‘functional knowledge’, or ‘working knowledge’, most competences that are relevant for the world of work comprise both conceptual understanding and procedural knowledge

### 2.5.3.3 *Mapping Learning Theory to Learning Outcomes and Learning Environments*

We need to map the underlying assumptions about the nature of learning to learning outcomes and then on to the design of learning environments. This is the crucial stage in the

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### • The associative perspective

- Emphasizes task analysis, defining sequences of component-to-composite skills.
  - Routines of organized activity
  - Clear goals and feedback
  - Individualized pathways and routines – matched to the individual's prior performance
  - Provides a highly focused set of objectives, described as learning competencies.

### • The cognitive perspective

- Emphasizes conceptual development, stressing the importance of achieving understanding of the broad unifying principles of a domain.
  - Interactive environments for construction of understanding
  - Encourage experimentation and the discovery of broad principles
  - Support for reflection
- Encourages us to frame learning outcomes in meta-cognitive terms, with the educational aim of achieving learning through how to learn, and encouraging the development of autonomous learners.

### • The situative perspective

- Encourages the definition of learning objectives in terms of the development of disciplinary practices of discourse and representation.
- Focuses on learning outcomes that are dependent upon the establishment of collaborative learning outcomes, and on learning relationships with peers.
- Environments of participation in social practices of enquiry and learning
  - Support for development of identities as capable and confident learners
  - Dialogue that facilitates the development of learning relationships
- Encourages us to formulate learning outcomes in terms of authentic practices of formulating and solving realistic problems.

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### **2.5.3.4 The Pedagogy Derived from the Associative Perspective: Instructional Systems Design (ISD)**

Much of what is termed e-learning is still based in the training departments of organizations with a traditional training philosophy towards instructional design. The intellectual base for instructional systems design (ISD) consists of principles that are widely accepted within the organizational training culture. This base derives from the behaviorist perspective, but focuses particularly on task analysis.

#### **2.5.3.4.1 Gagne's Events of Instruction**

- Gagne a leader in the area of educational psychology regards instructional design as having emphasis on the learning and performance needs

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- Robert Gagn (1985) set out the psychological principles on which ISD is based and essentially developed an instructional approach based on recursive decomposition of knowledge and skill.
- The basic principle is that competence in advanced and complex tasks is built step by step from simpler units of knowledge or skill, finally adding coordination to the whole structure.

**Table 2.1 Gagne's "Events of Instruction"**

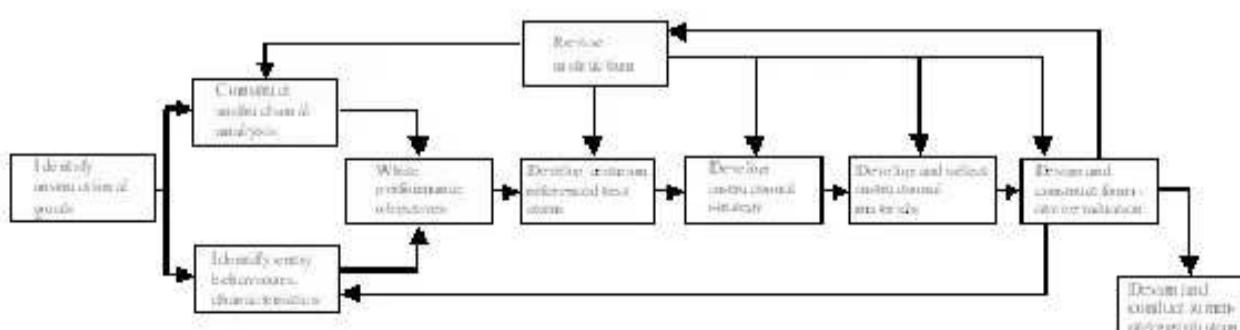
S.No	Step	Information Processing
1	Gaining Attention	Reception
2	Informing learners of the objective	Expectancy
3	Stimulating recall of prior learning	Retrieval
4	Presenting the stimulus	Selective perception
5	Providing learning guidance	Semantic encoding
6	Eliciting performance	Responding
7	Providing feedback	reinforcement
8	Assessing performance	retrieval
9	Enhancing retention and transfer	generalization

- Successful instruction depends on placing constraints on the amount of new structure that must be added at any one stage.
- Gagne's enumerating "events of instruction" can be adopted by e-learning instructional designers. "Events of instruction" is a nine step process which creates ***conditions for learning*** as given in Table 2.1
- Based on Gagne's "Events of Instruction" ISD consists of several steps:
  - Analyze the domain into a hierarchy of small units.
  - Sequence the units so that a combination of units is not taught until its component units are grasped individually.
  - Design an instructional approach for each unit in the sequence.
  - It was demonstrated that successively higher-level skills were more readily learned when their subordinate skills – lower in the hierarchy- were mastered first.
- Gagnë's bottom-up cumulative model could be fully applied only to a particular class of learning outcome – intellectual skills.

**INTRODUCTION TO E-LEARNING****Table 2.2 Dick and Carey 's Instructional Sequence****NOTES**

S.No	Step	Components
1	Pre-instructional activities	<ul style="list-style-type: none"> <li>Motivation</li> <li>Objectives</li> <li>Entry behavior</li> </ul>
2	Information presentation	<ul style="list-style-type: none"> <li>Instructional sequence</li> <li>Size of instructional unit</li> <li>Information</li> <li>Examples</li> </ul>
3	Learner Participation	<ul style="list-style-type: none"> <li>Practice</li> <li>Feedback</li> </ul>
4	Testing	<ul style="list-style-type: none"> <li>Pre-test</li> <li>Embedded tests</li> <li>Post-test</li> </ul>
5	Follow through	<ul style="list-style-type: none"> <li>Remediation</li> <li>Enrichment</li> </ul>

- Additional classes of learning outcomes to which cumulative learning did not apply were: motor skills, attitudes, and higher order thinking skills.
- ISD consisted of guidelines and procedures for the decomposition of complex tasks into learning hierarchies and detailed prescriptions for the design of instructional programs based on such hierarchies.
- Based on the use of taxonomies representing different levels of complexity in learning outcomes. Different levels of intellectual skill were identified: discriminations, concepts, rules and higher order rules.

**Figure 2.3 Dick and Carey 's Model**

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### ***2.5.3.5 The Pedagogy Derived from the Cognitive Perspective: Constructivist Learning Environments and Activity Systems***

#### ***2.5.3.5.1 Dick and Carey's Instructional Sequence***

Dick and Carey are important contributors to work in instructional design. In their work they suggested an *instructional sequence* as given in Table 2.2. The model is given in

Figure 2.3. Gagne's nine-step process and Dick and Carey's instructional sequence provide good guidelines for linear sequencing of e-learning content in the cognitive domain. E-learning in an enterprise needs to focus on affecting attitudes and behaviors

where the last three levels of the Bloom's taxonomy are what should be addressed. In such a context, there is a question whether to follow the linear sequencing guided by the principles of Gagne and Dick & Carey or to evolve new dynamic models when e-learning content addresses awareness, interest, attention, concern, responsibility and responsiveness to interactions

#### ***2.5.3.5.2 ARCS Model of Motivational Design***

As a designer of the learning process, the mental state of the learner is one of the main factors that affect the outcome of the learning process. In order to make an effort during the e-learning process the learner must essentially:

- Value the learning task - For this purpose the learning should be learner-centered and must be relevant and solution centered
- Provide learners with the confidence that they can succeed and for this purpose learners expectations must be met

**Table 2.3 ARCS Model – Part I**

	<b>Category</b>	<b>Strategies</b>	<b>Sub-category</b>
<b>A</b>	Attention	Strategies for arousing and sustaining curiosity and interest	<ul style="list-style-type: none"> <li>• <b>Capture Interest</b> – What can I do to capture their interest ?</li> <li>• <b>Stimulate Inquiry</b> – How can I stimulate</li> <li>• <b>Maintain Attention</b> – How can I use a variety of tactics to maintain their attention?</li> </ul>
<b>R</b>	Relevance	Strategies that link to the learner's needs, interests and motives	<ul style="list-style-type: none"> <li>• <b>Relate to Goals</b> – How can best meet my learners' needs ? Do I know their needs?</li> <li>• <b>Match Interests</b> – How and when can I provide my learners with appropriate choices, responsibilities and influences?</li> <li>• <b>Tie to Experiences</b> – How can I tie</li> </ul>

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C	Confidence	Strategies that help the learner develop a positive expectation for successful achievement	<ul style="list-style-type: none"> <li>• <b>Success Expectations</b> – How can I assist in building positive expectation for success?</li> <li>• <b>Success Opportunities</b> – How will the learning experience support or enhance learners' beliefs in their competence?</li> <li>• <b>Personal Responsibility</b> – How will the learners clearly know their success is based upon their efforts and abilities?</li> </ul>
S	Satisfaction	Strategies that provide extrinsic and intrinsic reinforcement for effort	<ul style="list-style-type: none"> <li>• <b>Intrinsic Satisfaction</b> – How can I provide meaningful opportunities for learners to use their newly acquired skill?</li> <li>• <b>Rewarding Outcomes</b> – What will provide reinforcement to the learners' successes?</li> <li>• <b>Fair Treatment</b> – How can I assist the learner in anchoring a positive feeling about their accomplishments?</li> </ul>

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Taking into consideration these motivational aspects Keller developed the ARCS model of motivational design, the first part is based on four sets of strategies as given in Table 2.3. These strategies are more oriented towards the adaptive domain. The second part of the model outlines a 10-step process for the design of a motivational system as shown in Figure 2.4.

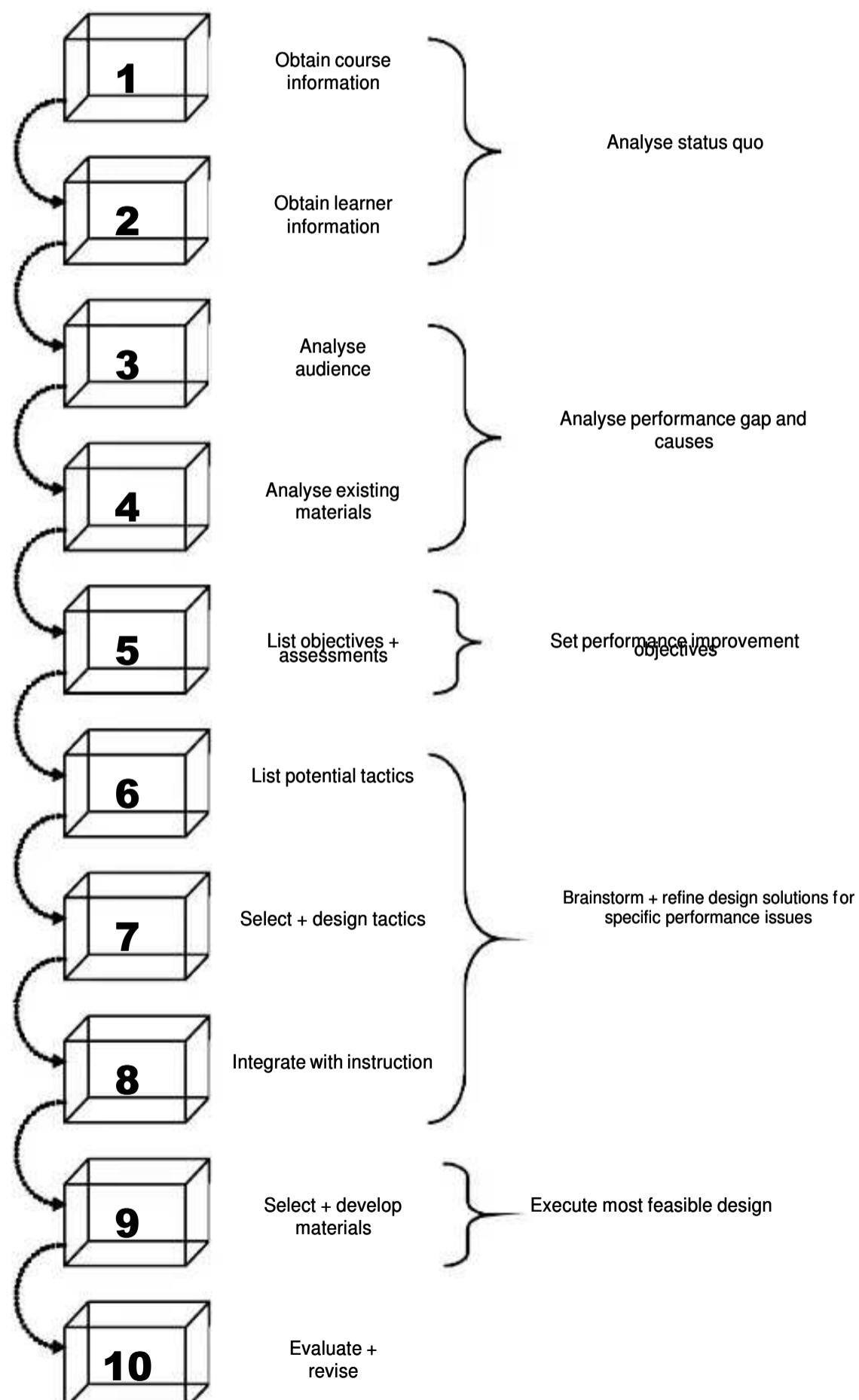
#### 2.5.3.5.3 Constructivist Learning Process

##### 2.5.3.5.3.1 Introduction

- Constructivism has emerged directly from a cognitive perspective.
- In its emphasis on learning-by-doing, and in laying importance on feedback, it leans partly towards the behaviorist tradition
- In its emphasis on authentic tasks it takes much of the situativity position.
- In the context of activity theory, Piaget's constructivist theory of knowledge (1970) was based on the assumption that learners do not copy or absorb ideas from the external world, but must construct their concepts through active and personal experimentation and observation.

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**Fig.2.4 ARCS II**

- There is a crucial point here for e-learning – that good and compelling explanations will lead to better learning: the presentation of subject matter using multimedia is based on the idea – that more vivid and naturalistic representations of knowledge

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- However learning theories also insist the new knowledge must be built on the foundations of already existing frameworks, through problem-solving activity and feedback.

**NOTES*****2.5.3.5.3.2 Murphy's view of the Teaching Learning Process***

- According to Murphy (1997) the teaching learning process should facilitate the setting up of an environment that encourages target learning. These environments are basically constructivist where the learner and the tutor collaboratively engage in the teaching learning process. Murphy explains the following as part of this collaborative process:
  - Goals and objectives jointly decided by the learner and tutor
  - Tutors play multiple roles as guides, monitors, coaches, tutors and facilitators
  - Emphasis is on knowledge creation and construction not on knowledge reproduction
  - Construction of knowledge is a collaborative process taking advantage of the experiences of the individual learners and effectively moderated by the tutor
  - Collaborative and cooperative learning is encouraged to expose learners to different points of view
  - Learners are encouraged to perform beyond the goals of the learning process
  - Assessment is transparent and is an integral, clearly defined component of the teaching process.

***2.5.3.5.3.3 Description of Constructivist Learning Process***

- The Constructivist learning process is enabled by the following:
  - Contextualized learning environment
  - Perspectives of learning from different participants such as student, tutor, facilitator, external expert, and so on
  - Learning activities such as interpretation of primary data or interpretation from primary sources
  - Application of principles learnt in an actual real time scenario
- These aspects and environment of learning encourage learners to develop their own knowledge and understanding and give them the confidence to follow the constructivist learning process. This complex learning environment is also called as cognitive apprenticeship because this environment emphasizes cognitive skills rather than physical skills.
- The constructivist view of learning can be summarized by the following assertions:
  - The learner actively constructs knowledge, through achieving understanding
  - Learning depends on what we already know, or what we can already do

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- Learning is self-regulated
- Learning is goal-oriented
- Learning is cumulative
- Activities of constructing understanding have two main aspects:
  - Interactions with material systems and concepts in the domain.
  - Interactions in which learners discuss their developing understanding and competence.
- There is an increasing focus on the design of student-centered methods and environments: problem-based, project-based, enquiry-oriented pedagogies producing constructivist tasks and environments, placing emphasis on reflection and feedback. The following methods have been extensively researched:
  - Problem-based learning
  - Anchored instruction
  - Cognitive apprenticeships
  - Reciprocal teaching
  - Goal-based scenarios
  - Project-based learning
- Adopting a true learner-centered approach would imply treating each student as an individual case. In a sense this has always been the ultimate goal of educational technology: the achievement of individualized instruction.

### **2.5.3.5.3.4 Activity Systems**

- Attempts have been made to identify how activity theory can influence the design of learning environments (Jonassen 2000).
- It integrates aspects of both the constructivist and situative themes.
- Activity theory focuses not on the individual learner, but with the *activity system*, a larger and more social unit of analysis.
- An activity system consists of a group, of any size, pursuing a specific goal in a purposeful way.
- These activity systems can be analysed into the elements devised by Engestrom (1993).
  - The fundamental connection is between the individual *participant* and the activity system's *purpose*; this relationship is not direct, but is mediated by *tools*.
  - Participants are usually part of communities, a relationship mediated by *rules* for acceptable interactions.
- Activity systems are in constant development, always changing through the actions of new participants, purposes, and tools.

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- Tools both enable and constrain activity through their *affordances*.
- To illustrate the elements in terms of teaching, pedagogical frameworks are tools that afford educators a way of approaching instructional design, thereby shaping associated ways of thinking about learning.
  - An *activity*, then, is when tools are used for a purpose within the activity system.
  - So employing a pedagogical design tool to create an e-learning course would constitute an *action* within the teaching and learning activity system.
  - Actions can be further decomposed into automatic *operations*. In the case of teaching, for example, there are moves performed through pre-planned curriculum procedures (actions) and moves carried out in response to students (operations).
  - However, these three levels (activity, action, operation) are constantly subject to change, as the activity system develops into a community of practice.

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### 2.5.3.5.3.5 Constructivist learning outcomes: the zone of proximal development

- The basis for activity theory is the concept of the *zone of proximal development* (ZPD)
- ZPD is defined as the distance between a learner's current conceptual development (as measured by independent problem solving) and that learner's potential capability, as measured by what can be accomplished "*under..guidance or in collaboration with more capable peers*".
- With personal support, and with practice, novices "*gradually increase their relative responsibility until they can manage on their own*"
- Skills, rules, and knowledge, are internalized, creating the cognitive tools used in self-directed learning.
- The design of web-based learning environments in terms of ZPDs employ the following features:
  - Learning activities that are part of real or simulated activity systems, with close attention to the tools and interactions characteristic of actual situations.
  - Structured interaction among participants.
  - Guidance by an expert.
  - The locus of control passes to the increasingly competent learners.

### 2.5.3.5.3.6 Constructivist Approach: Scaffolding

- The concept of *scaffolding* describes the process of exploiting the *ZPD*.
- The learning and teaching activities will be designed to provide scaffolding –with the instructor having the main responsibility for providing the guidance, but the

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- Scaffolding is a systemic approach to supporting the learner, focusing on the task, the environment, the teacher, and the learner.
- Scaffolding provides temporary frameworks to support learning and student performance beyond their capacities.
- The concept of scaffolding represents any kind of support for cognitive activity that is provided by an adult when the learner and adult are performing the task together.
- To be effective scaffolders, instructors must be sufficiently expert in their domain to judge individual learning needs, and sufficiently skilled as teachers to adjust dynamically, continuously to switch between the novice's and expert's perspectives.
- In the ZPD learning is distributed: thought and intelligence being "stretched across" the larger structures of activity
- Learning and teaching can be viewed at each level of an activity system—activity, action, or operation.
  - The lower the level, the weaker the connection to a specific activity system and the more transferable the skill, since activities are unique to particular systems while operations can be generalized.
- E-learning can be seen as both a tool and as a simulated activity system within which participants are introduced to and learn to perform the actions and operations.
- Purposive, coordinated learning can be organized and led by a instructor, automated by a computer-based tutorial, or created by the learners themselves, depending on the learning objectives
- Instructors will themselves need guidance in the art of scaffolding as they learn to use and monitor e-mail, discussion forums, and synchronous communication tools, to engage students supportively.
- An effective e-learning environment will also include a variety of performance supports and other resources to help learners pick up community practices

### ***2.5.3.6 The Pedagogy Derived from the Situative Perspective: Communities of Practice***

- There are perhaps three levels at which it is useful to think of learning being situated.
  - *At the top level is the social-anthropological or cultural perspective*, need to learn to achieve a desired form of participation in a wider community. The essence of a community of practice is that, through joint engagement in some activity, an aggregation of people comes to develop and share *practices*. This is usually interpreted as a stable and relatively enduring group, scientists for example, whose practices involve the development of a constellation of beliefs, attitudes, values and specific knowledge built up over many years.
- Yet a community of practice can be built around a common endeavor which has a

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the kind of groups described as activity systems. One characteristic of these groups is that they allow a greater scope for interplay between the psychological (or personal) and the social in determining practice than do the long-established communities. The influence of individuals, and of individual relationships, is likely to be greater.

- For long-term stable communities there are two different ways in which the community will influence learning.
  - First, there is the sense most directly addressed— someone aspires to become a legitimate participant of a community defined by expertise or competence in some field of application. The learning in this case is the learning of the practice that defines the community. This is the learning involved in becoming an accredited member of a community by reaching a demonstrated level of expertise, and then the learning involved in continuous professional development. This may be formal, as in medicine, or informal, by being accepted as a wine buff or a political activist.
  - The second sense is that of a community of learners, for whom the practice is learning per se. That is, a very broad community identified by a shared high value placed on the process of continuous intellectual development
    - *At the second level of situatedness is the learning group.*
- Almost all learning is itself embedded in a social context – the classroom, or the tutorial group, or the year group.
- The learner will usually have a strong sense of identifying with such groups, and a strong need to participate as a full member.
- Such groups can have the characteristics of a community of practice but here the practice is the learning itself, in a particular educational or training setting. Or rather it is educational practice, which may or may not be centered on learning.
- Yet every student and every teacher knows that there are characteristics of these groups or communities which are powerful determinants of the nature of the learning that actually occurs in educational institutions.
- Successful students are those who learn how to pass assessments, not necessarily those who have the deepest interest in the subject matter.
- There are, of course, many aspects of student behavior which are determined by social goals and which have little or nothing to do with the curriculum, but much to do with peer esteem.
  - *The third level is the level of individual relationships.*
- Most learning that is motivated by the above two levels will actually be mediated through relationships with individual members of the communities or groups in question.
- The social categorization of these individuals will vary according to the context and nature of particular dialogues

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- Sometimes their membership of a group will be most salient, in other situations their personal characteristics will be perceived as more important.

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- Such relationships will vary according to the characteristics of the groups involved, the context within which they operate, and the strength of the relationships

### **2.5.3.6.1 Networked learning in communities of practice**

- Networked learning can be defined as knowledge-sharing for continuous professional development.
- There is a cycle of learning, moving through phases of externalization (of tacit knowledge), sharing, discussion, refinement and then internalization.
- The design of online learning tasks is central here. “*Neglect of task design tends to have two consequences –either students flounder around unproductively and unhappily, not knowing what is expected of them, or tutors find themselves spending much more time than they can afford trying to animate online discussions*” (Goodyear, 2002).

### **2.5.4 Existing E-Learning approaches and their Pedagogical Origins**

- Let us now study the landscape of e-learning models against the pedagogical background described above.
- The ‘modal pedagogy model’ would describe how to engage the learners in meaningful tasks, give rapid feedback, encourage reflection through dialogue with tutors and peers, align as sessment, and would encourage through discussion the creation of a community of learners.
- A modal *e-learning* model would describe how technology would achieve each of these functional stages.
- We will consider a range of e-learning approaches in relation to the three pedagogical perspectives: instructional systems design, constructivist and communities of practice.
- Few current e-learning examples are pure derivatives of the three pedagogical frameworks described above.
  - Most exhibit features from more than one perspective.
  - It is also unclear exactly what counts as an e-learning model.
  - The candidates range from very broad teaching frameworks, within which e-learning is assigned functional roles, to technically oriented accounts which focus primarily on tools.
  - However, it is possible to consider e-learning models in broad classes, and to map these onto our pedagogical strands.
- Although we have described the development of pedagogical thinking in three broad strands, when mapping onto e-learning models we have found it helpful to classify the cognitive/constructivist into a further subdivision. This distinction is between those approaches which focus on the individual dialogue between a teacher

- and a learner, and those that support group learning
- Thus, for any particular e-learning approach we ask four broad questions:

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1. Is the model characterized by an analysis of the learning outcomes into subject matter units?
  2. Is the model characterized by active ownership of the learning and teaching activities by the learners, producing task outcomes for feedback from tutors or peers?
  3. Is the model characterized by active discussion across groups of learners?
  4. Is the model characterized by a focus on the development of real-world practice?
  5. If it is possible try to judge that an approach is primarily focused
    - a. on the first, then it would map onto the associationist/ISD strand.
    - b. If the second is more characteristic then the individual cognitive/constructivist pedagogy is dominant
    - c. While the third indicates a major influence from the *socio-cognitive* tradition.
    - d. Finally the fourth maps onto the communities of practice approach.
  - Of course, these are very high-level categories and there will be several e-learning models that will be characterized by each of them.
  - Nevertheless, the following four clusters of e-learning models can be regarded as evolving through the three lines of pedagogical thinking:
    1. *Subject matter focus (Associationist/ISD):*  
E-training, CBT, learning objects, some intelligent tutoring models.
    2. *Focus on individual-tasks, formative assessment and dialogue (Cognitive/constructivist):*  
Dialogue models, conversational model, most intelligent tutoring systems, IMS Learning Design.
    3. *Focus on group tasks and discussion (Socially-mediated constructivist)*  
CSILE, Salmon's e-tivities, DialogPlus
    4. *Focus on building communities of practice*  
The CSALT networked learning model

**Have you understood?**

1. What is transactional distance?
2. What is the main goal of instructional design?
3. What are the three perspectives of Learning?
4. What is Constructivist learning process?
5. How is Bloom's taxonomy used for instructional design?
6. What are the four components of Learning Outcomes?

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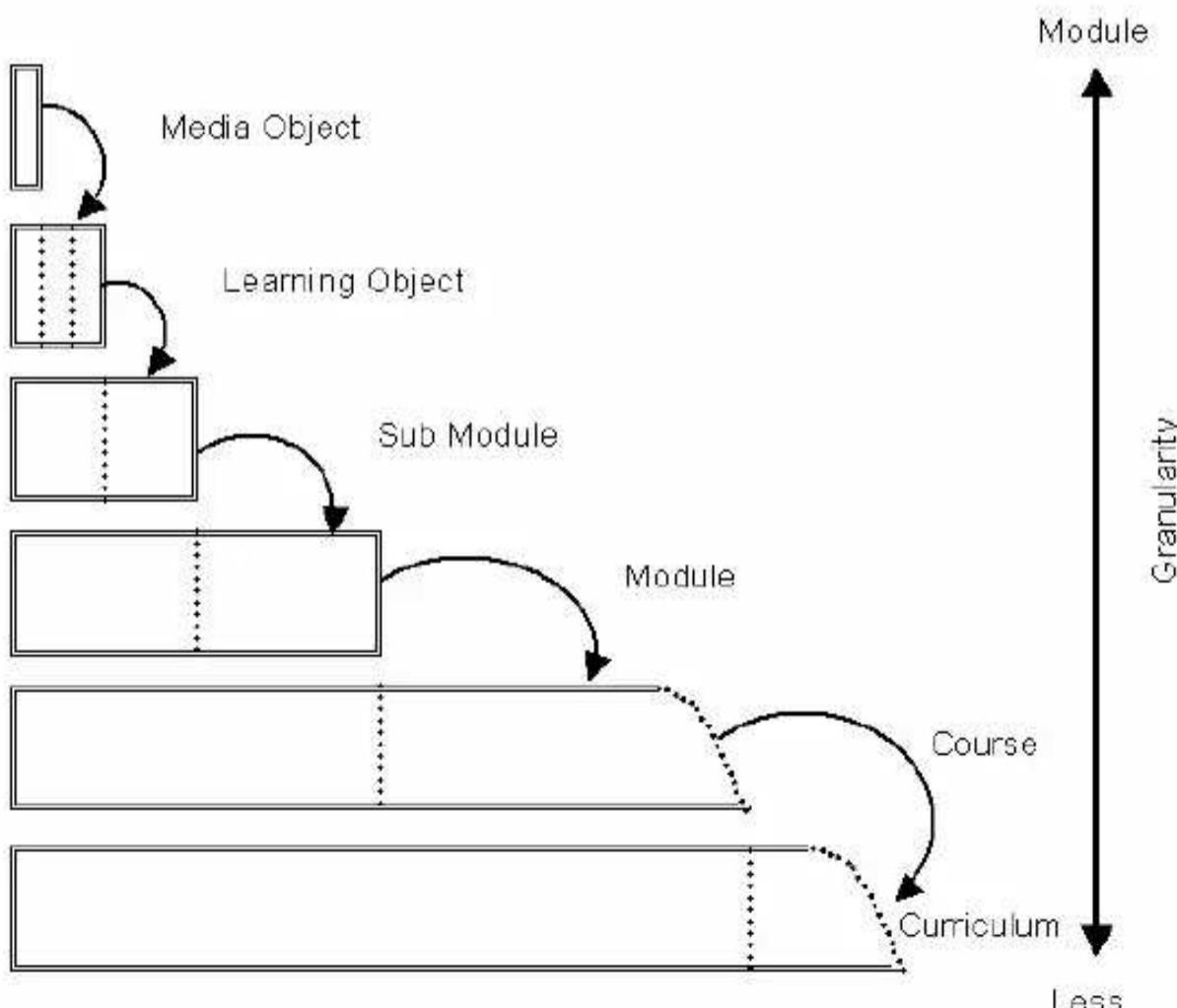
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8. Describe Communities of Practice.
9. Define the zone of proximal development.
10. What are the four clusters into which e-learning models can be classified?

**2.6 LEARNING OBJECTS****2.6.1 Definition of Learning Objects**

- Learning objects can be described as a digital, taggable, shareable, reusable, modular, interoperable element of the learning content.
- It can also be described as the smallest discrete reusable collection of content capable of presenting and supporting a single learning concept.

As learning concepts can vary from simple to complex – learning objects are of variable size. It is desirable that learning objects should be of fixed structure and granularity that is they should fall within the same level in the content hierarchy shown in Figure 2.5.

**Fig. 2.5 Simple content hierarchy****2.6.2 Learning objects and instruction design**

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objects are essentially objects that can be plugged onto any scenario of the learning activity design irrespective of what the learner has just experienced or will experience next.

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Some of questions regarding the use of learning objects in Instructional design include:

- Can a predefined sequence of learning events using Gagne and Dick and Carey's instructional design (ISD) models be sustained using learning objects?
- If we use learning objects based on some ISD models, can we ensure that a course assembled using these objects conform to the same model?

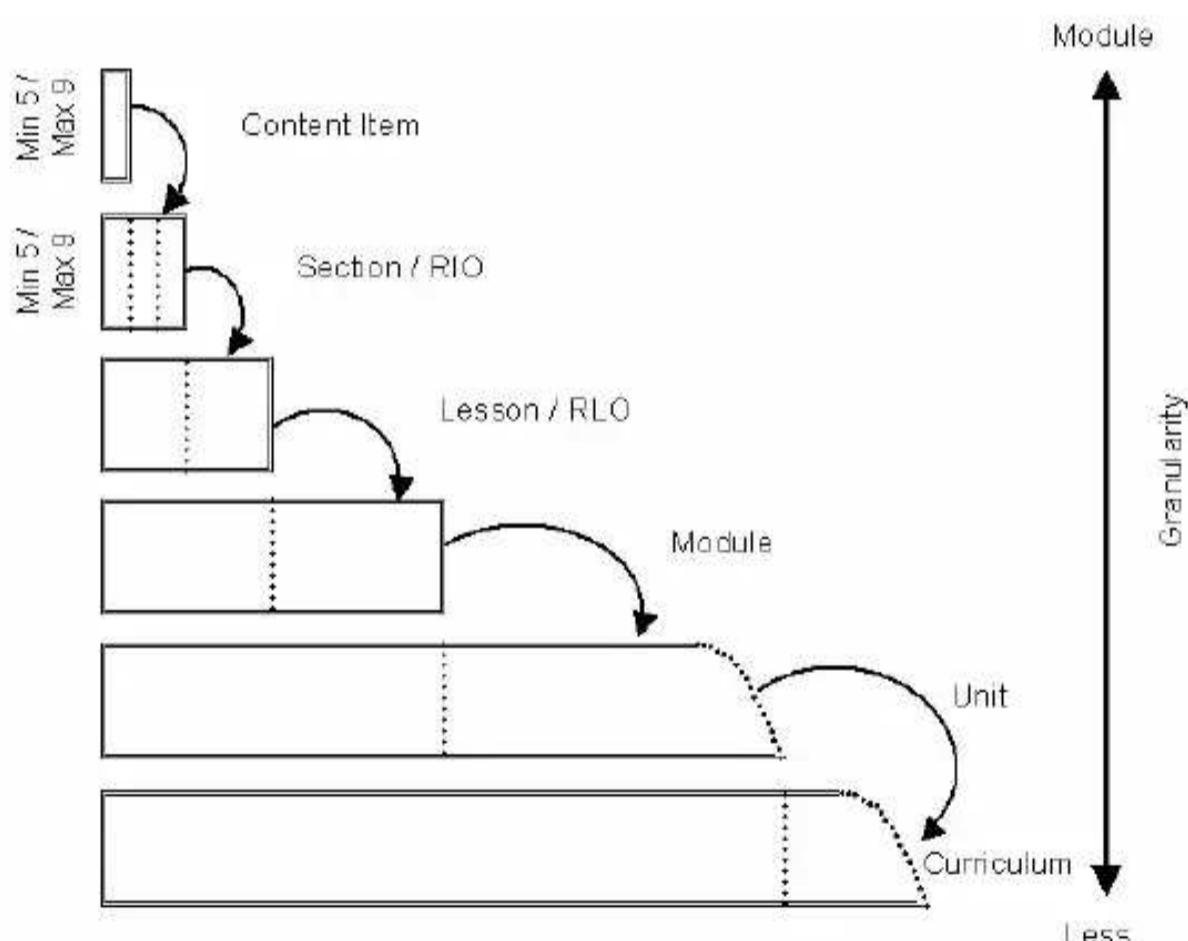


Fig.2.6 Content hierarchy RLO-RID

### 2.6.3 Cisco's approach to ISD with Learning Objects

Cisco wanted

- to convert it's instructor lead training to an updateable e-learning initiative.
- realized that it needed a methodology "to author database-driven objects that can be reused, searched, and modified independent of their delivery media".
- Cisco works with a Two-Tier approach to the design of learning objects.
- RLO – Reusable Learning Object – is based on a single objective derived from a specific task

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### 1.1 Structure of RLO

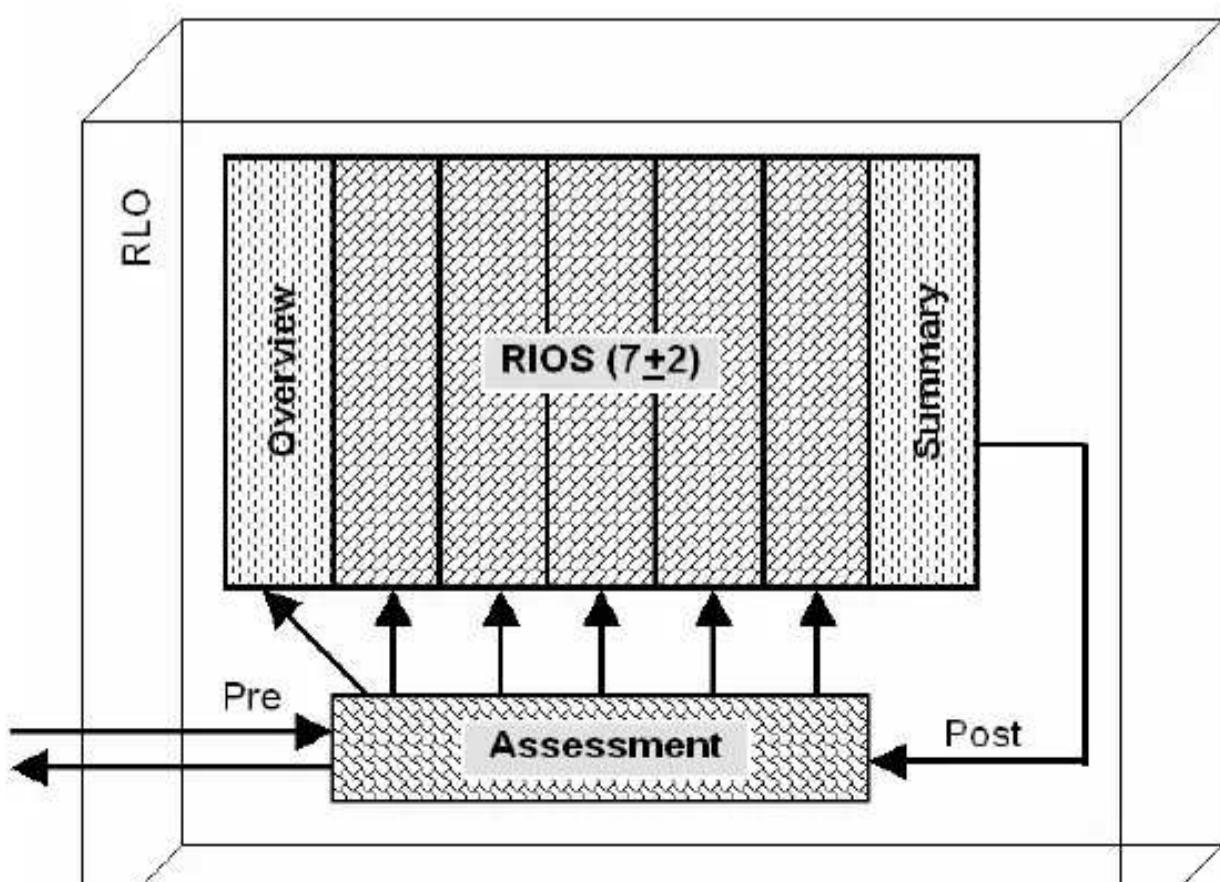
- Assessment
- Overview
- Introduction
- RIOs
- Summary
- RIO – Reusable Information Object – each RIO is built upon an Objective that supports the RLO objective – to aid in content standardization

Examples of RIO classes:

Concept	–	What is a _____?
Fact	–	The network standard is ....
Procedure	–	Check Email using PPP
Principle	–	When to use Layer 3 switching
Process	–	How traffic flows on network?

Cisco learners see RLO as a lesson and RIO as a section. The RLO and RIO together creates a hierarchy of content as shown in Figure 2.6

Cognitive classification forms part of RLO metadata and is based on Bloom and Merrill's work and this content specification is shown in Figure 2.7



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## 2.6.4 Instructional Design Architecture

ISD architecture describes a system for developing and implementing performance-based instruction and at a more detailed level describes specific activities within the system. The architecture is shown in Figure 2.8

### 2.6.4.1 Cognitive Loading Theory

An important part of the ISD architecture is the Cognitive Loading Theory (CLT). CLT consider as an Information processing system which transfers knowledge from our short-term working memory to our long term memory. The third component of memory is the sensory memory which essentially perceives incoming messages. These three components of our memory define the human cognitive architecture.

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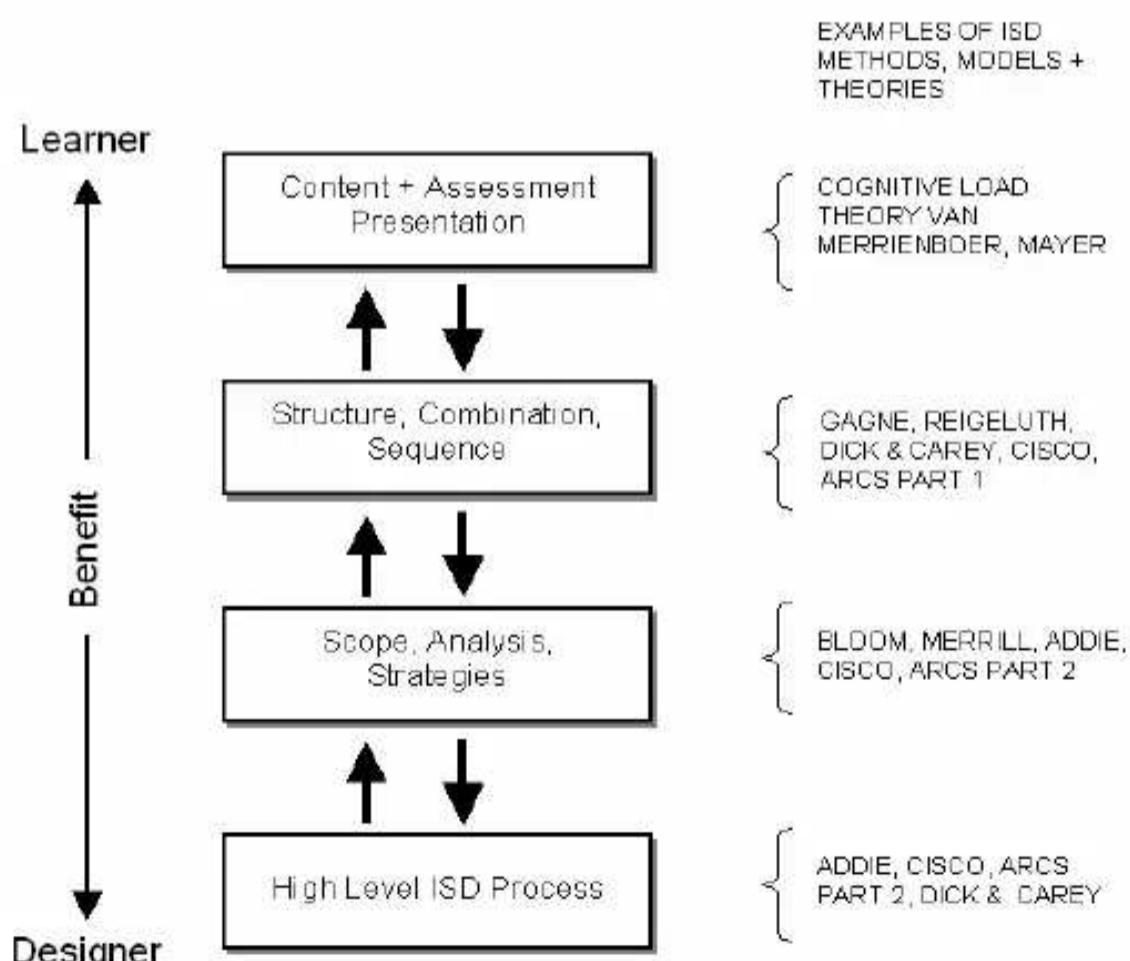


Fig. 2.8 ISD architecture – Examples

## 2.6.5 Instructional Design Principles for e-learning

### 2.6.5.1 Instructional Design is the basis for the teaching learning Process

Whatever the form and method of teaching, all teachers are in some way or other involved in instructional design. However, unlike the traditional method of teaching, during

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for e-learning needs be more structured and thorough and will essentially anticipate the requirements and doubts of the learner. In e-learning, instructional design directs and decides the learning activities and therefore plays a crucial role in the whole teaching learning process.

### ***2.6.5.2 Instructional design is probabilistic***

Instructional design is not considered to be definite and cannot guarantee that all learning objectives will be met. However a properly designed instructional design aims to increase the likelihood of the learning objectives being met. Different course designers will use different instructional techniques and different learning activity sequences, work under different resource constraints and different contexts even when the actual learning objectives remains the same.

### ***2.6.5.3 Instructional design is contextual***

The goal of instructional design is to match educational methods and educational situations to achieve learning objectives. Context plays a very important part in Instructional design. Some of the common contextual factors that affect instructional design include:

- Choice of technologies used
- Availability of an instructor
- Time-frame of design
- Knowledge of pedagogical alternatives
- Institutional systems and policies
- Level of the course
- Profile of expected students

Instructional design needs to take a systems perspective on course design and delivery so that optimization is achieved within the overall context.

### ***2.6.5.4 Instructional design is iterative and dynamic***

Instructional designing is iterative and dynamic and needs constant adjustment during the content development process. It is in fact a cyclic process that dictates that new pedagogical approaches be applied depending on the topic under consideration and also depending on how other related topics have been handled.

### ***2.6.5.5 Instructional design is comprehensive***

Instructional design covers all aspects of course development and strives to provide a holistic learning experience for learners.

It involves the following activities:

- Selecting the instructional sequence
- Creating the content

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- 
- Setting the curriculum or major learning objectives
  - Setting assessment tasks
  - Selecting topics
  - Choosing resources
  - Deciding between media and technologies.

**NOTES****Have you understood?**

1. Define learning objects.
2. Differentiate between RLO and RIO.
3. What is cognitive loading theory?
4. What are the limitations of Working Memory?
5. What is meant by saying that instructional design is probabilistic?

**2.7 INSTRUCTIONAL DESIGN MODELS**

ADDIE is a prominent instructional design model. Models are used to facilitate the decision-making process of course design. Instructional design is usually associated with the ADDIE model, which describes the complete process for course design right down to minute details including individual media objects.

- **Analyze** the context, including the learning objectives and the characteristics of prospective students
- **Design** the learning objectives, assessment, content requirements and media
- **Develop**, or gather the required resources, and link them for instructional purposes. This step includes the production of active activities
- **Implement** or deliver the course
- **Evaluate** the course for effectiveness based on feedback from students. The feedback is then used to improve the course.

ADDIE is often considered to be too systematic with little scope for flexibility. However this basic model is an useful starting point since it allows instructional design to look at the complete system as a whole. ADDIE model does not encourage any particular educational methodology. Instructional design based on behaviourism, constructivism, and social-constructivism can all be designed using the ADDIE model.

The OTARA framework (Hunt) is an useful one to apply when working through the design and develop stages of ADDIE. OTARA focuses on activities, and is immediately

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**Table 2.4 OTARA Framework**

Objectives (or outcomes)	What students are intended to learn from the overall course: what students need to know or do
Topics (for themes)	The subjects or information headings
Activities	The practical tasks students complete to meet the objectives
Resources	The specific sources of information and support services that students will used
Assessment	The means by which students learning will be checked against the objectives

OTARA places considerable emphasis on responsibility of the students in meeting learning objectives. Like ADDIE, it ensures that assessment is lined up with objectives, topics, learning activities and resources. In distance education and e-learning scenario, normally specialist instructional designers who work with teaching faculty and technologists.

### Have you understood?

1. Give the expanded form of ADDIE.
2. What is the OTARA model?

## 2.8 DESIGN ISSUES FOR E-LEARNING

The success of any learning environment is characterized by many factors and essentially relates the learners, learning process and the instructors. In an e-learning environment the learner – technology- instructor interaction triangle is important where the technology component indicates the technical complexity of the e-learning environment. The features that affect the learner – technology- instructor interaction are discussed below.

### 2.8.1 Developing higher-order skills

Higher order skills development includes simple skill of description, collation and transmission of information. These skills are very important in any learning context and include:

- Searching for information based on a given criteria
- Analyzing and synthesizing new information from given data

- Solving problems by a combination of heuristics and analysis
- Creating new knowledge by applying new ideas and information
- Generalizing from specific cases

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- 
- Hypothesizing and Testing
  - Planning and strategizing
  - Evaluating and critically examining available knowledge
  - Inferring and reaching new conclusions

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It is a real challenge to design e-learning to develop all these higher-order skills, however the design should strive to achieve these skills.

### **2.8.2 Developing the capacity for self-assessment and reflection**

It is the aim of every learning initiative to enable learners to become lifelong autonomous learners. This aspect is important because:

- There will be situations where the learner has to find information on their own. This happens when the context is such that the e-learning network does not directly facilitate the gathering of knowledge.
- The ability to seek out and extract necessary information and knowledge without the support network enables sustained continued learning.
- In a similar scenario, the ability to evaluate without external judgment the quality and extent of the learning process is necessary for learners to determine where they stand in their learning roadmap.

In essence, e-learning should facilitate self-assessment and reflection and the planned interaction should be geared towards these goals.

### **2.8.3 Fostering Motivation**

Motivation can be of two types:

- Intrinsic Motivation - based on internal factors
  - pleasure of learning
  - sense of achievement
- Extrinsic Motivation- based on external factors
  - Approval of tutors
  - Esteem obtained from peers
  - Reward such as qualification
  - Penalty such as non-progress to next level of course

Whatever may be the nature of motivation – fostering motivation can be achieved by

- creating attractive and challenging learning environments

- interesting, attractive and challenging e-learning environments
- Meaningful feedback – including interaction and links to tutors and peers who can offer constructive and direct feedback

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### 2.8.4 Encouraging Curiosity

One of the important aspects of learning is the ability to encourage curiosity. Any learner who is curious about some concept will take the trouble to know about it and will be willing to spend time and energy to satisfy that curiosity. On the other hand, if the topic of learning does not interest the learner than the learning activity will get the least priority.

### 2.8.5 Being transparent about learning goals and assessment criteria

For an e-learning activity to be successful, it is very important that the learning goals as well the assessment criteria be made known well in advance before the actual learning commences. These aspects, are important in a traditional learning scenario, but lack of information about learning goals and assessment criteria can be communicated during direct contact between the instructors and learners. However, in an e-learning context, if learning goals are not made clear or not well communicated, the learners switch off from the learning activity and it will be very difficult to bring back the attention of the learners. The lack of transparency in the assessment procedure will demotivate the learners and prevent them from reaching their learning goals.

### 2.8.6 Showing Appreciation

In a traditional learning environment, some learners who do well will get appreciation from their tutors while others who do modestly will get a lower level of appreciation. However it is important to recognize that all learners cannot perform to the high level of expectation, and provide methods to recognize their efforts. The feedback provided should be sensitive and constructive and should encourage learners at all levels of capability. This essentially means that success, however low level should be recognized and encouraged so that learners have motivation to continue learning. It is felt that computer-based environment provides exactly such type of objective feedback without the subjective language and tone of the human tutor. In addition feedback from online tutors or peers may have to be moderated to provide the necessary encouragement.

### 2.8.7 Scaffolding

A central idea of constructivist approaches is the interaction between the learner and either the tutor or a more knowledgeable peer providing the power assistance to achieving a particular level of knowledge, skill or understanding. There are two ways of achieving this:

- The tutor can stage manage the learning process such that the learner is guided through framework which consists of a sequence of progressively complex tasks leading to the ultimate learning goal. This is commonly called Scaffolding.

- Scaffolding

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- the tutor builds a framework in coordination with the learner – in which the learner himself climbs to higher levels with helping hand provided as needed by the tutor.
- This essentially means that the person providing the helping hand should know the likely next steps.
- There is a danger that if the framework is restrictive it may accelerate the learning process of some learners while hindering the progress of others.
- In constructive approaches with tutors, learners and peers working hand in hand judgments on what the next steps are and when the intervention should take place are better focused
- The process can also be ad hoc where a tutor will constantly monitor the progress of the learner and intervene when necessary so that the learner can reach the next step in the learning.

**NOTES****2.8.8 Support for different Learning Styles**

One of the aspects of e-learning is that facilitates individualized or personalized learning experiences. Most educationists are of the opinion that there are varying types of multiple intelligences and this fact plays an important role in tailoring delivery and environment of the learning activity. Felder and Solomon (2005) have presented a learning style inventory based on the Kolb's perspective that learning takes place by receiving and processing information as shown in Table 2.5. However it must be noted no learner actually fits into one type of learning style and normally fits into different dimensions at different levels.

**Table 2.5 Felder and Solomon's Learning Styles**

<b>Learning Style dimension</b>	<b>Description of learning preference poles</b>	
Active / Reflective	ACTIVE learners tend to retain and understand information best by doing something active with it – discussing or applying it or explaining it to others	REFLECTIVE learners prefer to think about it quietly first
Sensing / Intuitive	SENSING learners tend to like learning facts	INTUITIVE learners often prefer discovering possibilities and relationships

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Visual / Verbal	VISUAL learners remember best what they see – pictures, diagrams, flow charts, time lines, films and demonstrations	Verbal learners get more out of words – written and spoken explanations. Everyone learns more when information is presented both visually and verbally
Sequential / Global	SEQUENTIAL learners tend to gain understanding in linear steps, with each step following logically from the previous one	GLOBAL learners tend to learn in large jumps, absorbing material almost randomly without seeing connections and then suddenly understanding it

### 2.8.9 Incorporating Learner Activity

Unlike traditional methods of teaching where transmission mode of teaching is the most prevalent, e-learning at even the lowest level of sophistication guarantees learner engagement at least at the level of practical exercise, or tutorial. More sophisticated learner engagements include:

- Demand for creative responses
- Completion of tasks requiring searching and analyzing information
- Decision making
- Problem solving
- Hypothesis testing
- Interaction with tutors and peers in a social learning context ensuring sharing of ideas and formulation of questions

### 2.8.10 Providing Authentic Learning Environment

In traditional learning contexts, the bridge between meaningfulness and reality and the content is artificial and is usually created through use of simulations and role plays. On the other hand e-learning provides better opportunities through the use of multimedia, animation and advanced communication facilities. In such a context, the learner can be exposed

- to a virtual environment approximating the real scenario

- engage them through webcam, Internet telephony and whiteboard technologies
- Distant laboratories, field trips or events

**INTRODUCTION TO E-LEARNING****2.8.11 Providing Social Learning Environment**

Online e-learning environment almost always incorporates social interaction to support learning through

- E-mail interactions
- Synchronous text, audio and video communication

Social interaction involves support to the learner through access to several tutors, external experts and peers. This type of interaction normally results in success for the e-learning activity.

**2.8.12 Creating Links in Learning Activities**

Traditional learning environment often attempts to widen scope by generalizing specific learning to wider contexts. This is normally achieved through increasing the resource base, or by providing appropriate learning related tasks or assignments. The e-learning context naturally facilitates this process due to the huge resources available on the Internet.

**Have You Understood?**

1. What is meant by learning styles?
2. What is meant by providing authentic and social learning environments?

**2.9 TYPES OF LEARNING ENGAGEMENT**

While considering the design issues in e-learning, the type of learning engagements plays an important role. There are a number of learning engagements possible some of which are applicable in a traditional learning environment, while other types are specific to the e-learning context. The following are the types of learning engagements:

**2.9.1 Virtual case studies, fieldwork and experimental laboratories**

Case studies have been used extensively for business education. The methodology focuses on a virtual boardroom, creating a business decision making where the learners are expected to research their role, the business context and the decisions to be made. In the e-learning context, the decisions can be part of discussions with other students, peers and their implications can be tested online. Such case studies stress active participation in learning. i-Case for example provides a suite of interactive and multimedia case studies covering real cases.

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Virtual fieldwork environments and experimental laboratories also support many of

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- Students control a real situation remotely
  - Example – PEARL project which allow physically challenged students to remotely access actual laboratories at the University. Experiments include remote flame testing, printed circuit testing, cell behavior and digital circuit design
- Students simulate experimental context which enable students to learn by manipulation of real data
  - Example – University of Florida’s virtual field laboratory for environmental studies

### 2.9.2 Online Problem Solving

It is important to enable learners to acquire thinking and enquiry skills as well as information. In this context, learning through problem solving is an important methodology, especially in the online environment. This methodology is characterized by:

- Presentation of problem, puzzle, dilemma
- Students being asked to explore solutions with varying degrees of support from instructors

#### Example

An Example is Classrooms of the Future Project and site (<http://www.cotf.edu/>) hosted by Wheeling Jesuit University and funded by the NASA. This site enables students to identify a problem, such as preserving biodiversity in rainforests. The site uses a problem solving template (at <http://www.cotf.edu/ete/pbl.html>) as given below:

- Read and analyze the problem
- List what is known
- Develop a problem statement
- List what is needed
- List possible actions
- Analyze information
- Present findings

The learning emphasizes that the actions need to be iterative, repetitive or current so that constant reflection enhances the learning process.

### 2.9.3 Online Simulations and Gaming

Simulations and games are often used to bridge the gap between theory and practice

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- **Simulations** are models of real life practice. Simulations attempt to break down problems into discrete and manageable components. This can be utilized to allow learners to interact with a system and go through the problem solving process step by step.
  - Example – Lavamind – is a trading company game with good graphics that simulates the main features of market conditions by allowing role playing
- **Gaming** is similar to simulations but bring in a certain amount of competitiveness that can help provide more motivation for the entire learning process.
  - Example – SimCity – long established strategy and planning game where learners build a virtual city by developing it from scratch with utilities, news media, emergency services, leisure facilities, hospitals, police, residential and commercials and the inhabitants. The learners are required to perform decision making for emergency situations and to plan and manage budget.

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### 2.9.4 WebQuests

Web Quest is a highly constructive teaching method, meaning that learners are given freedom and flexibility to find, synthesize and analyze information in a hands-on fashion, actively constructing their own personal understanding of the learning material. WebQuest also focuses on group work which also makes it a good example of cooperative learning. There is a simple template structure, which is preferred especially by school teachers. The template consists of six sections:

- Introduction – introducing the context
- Task – work that the student must complete
- Process – process to be followed by the learner to complete the task, including the roles they must take
- Evaluation – evaluating or assessing the learner performance
- Conclusion – summarizing the goals of the learning initiative
- Credits – references and credits wherever it is due

### Have You Understood?

1. How are games used in e-learning?
2. What is meant by online problem solving?
3. Describe the Web Quest type of Learning Engagement.

### 2.10 BLENDED LEARNING

However, in order to take advantage of both types of pedagogies any blended course needs to fulfill the following requirements:

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- Learners needs to feel that they are not only consumers of knowledge but also producers of knowledge through the use of simple tools from simple word processing software to sophisticated multimedia authoring tools
- Facilities to collaboratively create and construct knowledge have to be provided.
- Training in various technologies that have been used for the e-learning process needs to be provided especially in areas which involve communication with peers
- Authentic course work needs to be provided
- Presentation of knowledge to peers, and publishing this knowledge for future learners and for a wider audience needs to be an important component of the communication activity
- Group work and project based learning needs to be encouraged
- Appropriate and transparent assessment strategies needs to be planned and implemented
- Course material to be provided well in time to enable learners to come prepared for group discussion and utilize class time in the best possible way.
- To make provisions to allow peer tutoring and mentoring

Provision should be made to make available some of the tools and environments :

- Simple asynchronous discussions on e-mail, bulletin boards, and facility to create their own weblogs
- Engage in synchronous chats which cut across space and time
- Digital audio, video, webcams which can capture and disseminate knowledge
- Databases and statistical & text analysis tools for storage & analysis
- Online tracking, monitoring software and adaptive learning environments for structuring and analysis of learning

### 2.11 THE E-LEARNING DEVELOPMENT TEAM

Methodology for building e-learning teams is to analyze build and develop a collection of processes, and then to determine the nature of skills needed to operate the processes and finally based on the skills needed decide the number of persons needed to meet the workload requirement and deadlines.

# INTRODUCTION TO E-LEARNING

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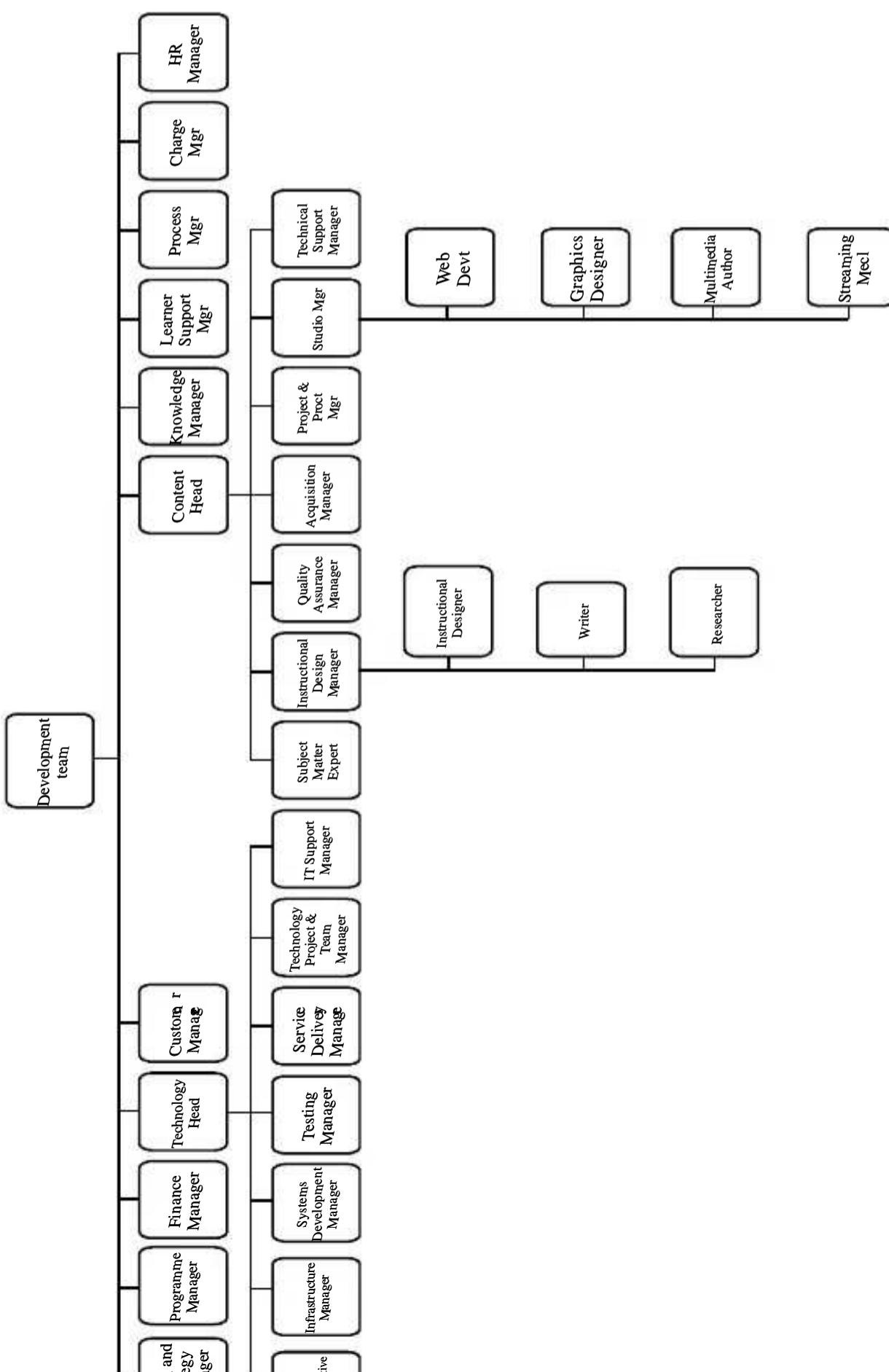
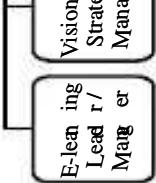


Fig. 2.9 E-learning development tem



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Before recruiting the actual team, an important function is the formation of the Steering Group where at least one person must be from the senior management who will be able to command the respect of others in the senior management and acts as the champion of the e-learning cause. The Steering Group should preferably have members from senior levels from all departments of the enterprise which in any way effect the functioning of the e-learning initiative.

### **2.11.1 Building the team and deciding the roles and responsibilities**

It is not that the e-learning team is built from scratch by recruiting all members of the team. Such a team will not be effective. Therefore the team members will be from both inside and outside the organization. The recruitment process is time consuming so build in that time in your planning and start early.

The overview of the e-learning development team is given in Figure 2.9

#### **Development Team**

##### **Functions of the Team Members**

- **Managing the e-learning development** - i.e. e-learning leader or e-learning Manager
  - Should have leadership skills and experience in large enterprise projects
  - Can be from HR or training background
  - Leader – can be recruited from outside will be possible to utilize his experience of implementing e-learning in other enterprises
  - Must be approved by the Steering Group
  - Leader can shift and become part of the delivery team after the development process
  - In charge of administration
- **Vision and strategy manager**
  - Vision has procedural, technical, political and inspirational components
  - Must take the initiative in adopting even revolutionary ideas and can make it acceptable to both the management and to the learners
  - Needs to be clear and transparent about how e-learning will be demonstrably better than what exists at present
  - The vision and strategy is a team effort but the responsibility rests with this person

- **Programme Manager**
  - Will work with all managers who manage the different components or projects of the development process.
  - Track all progress against the milestones and deadlines

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- Ensure that all projects are utilizing only the resources allotted to them and that the integration between the different projects will proceed as planned
- **Finance Manager**
  - Responsible for the overall budget
  - Tracks spending of each project
  - Manages cash flow
  - Prepares required financial reports for presentation to the Steering Group and to the senior management team
- **Technology Managers**
  - **Head of technology** – in-charge of technology at strategy level, decide on the contracts for vendor, responsible for the outputs of the technology team and responsible for recruitment of technology managers
  - **Representative of IT department** – to collaborate with the e-learning team to enable successful implementation
  - **Infrastructure Manager** - should have previous experience in managing enterprise infrastructures
  - **System Development Manager** – E-learning implementation generally uses at least one technology vendor, and a number of non-technology vendors dealing with generic content but involving technology issues. It is the job of the system development manager to see that the products that use different technologies work in collaboration to ensure successful implementation of the e-learning initiative.
  - **Testing manager** – is responsible for deciding the strategies, resourcing, scheduling, collaborating and reporting all aspects of testing including testing of platforms, application, course, units and user acceptance. In case testing is outsourced – the manager ensures that testing requirements are properly portrayed and has the responsibility of scheduling, interacting and ensuring effectiveness of the testing.
  - **Service Delivery Manager** - Essentially e-learning is a service delivered to customers. This service is often defined by a service level agreement (SLA) between the learning department and its customers. It is the job of the service delivery manager to ensure that the SLA is implemented and operational and the promises of the SLA are delivered. The manager also defines service levels achievable in different parts of the enterprise which may vary depending on the available infrastructure, adopted policies and requirements of the customers.
  - **Technology Project and Team Managers** – Project Manager is responsible for managing interdependencies and ensuring that milestones are met. There

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may be a Team Manager – for very large initiatives – to administer the day-to-day operations.

- **IT Support Manager** – Certain IT needs are specific to e-learning initiatives. These include content development tools, and development servers with non-standard configurations. Testing is another area where non-standard tools and

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- configurations are required. The Central IT department may not be able to meet these specific needs. The manager with this responsibility should have skills to support the e-learning team's desktop applications and administer its servers.
- **Customer Development Managers**
    - Establishment of dialogue between the e-learning team and its customers to learn about customer needs
    - Normally an internal recruit – needs to know about the structure, operations and management of the enterprise
  - **Content Manager**
    - **Head of content** - administrative responsibilities such as planning, recruiting, development schedules and budgets and ownership of acquisition budgets. Works closely with customer development manager to ensure that content delivered meets the enterprise's business needs
    - **Subject Matter Expert (SME)** – This person is required to know exactly what content to deliver, and is required only part-time. May be an internal or external recruit
    - **Instructional Design Manager** – is responsible for the complete instructional design process, decides preferred instruction design approaches, integrates the custom content with the instructional design and sets standards for the design. The instructional design team may consist of:
      - **Instructional Designer**
      - works with the business unit to gain understanding of performance gap or learning need
      - Works with subject matter expert to gain understanding of skill or knowledge that needs to be learned or enhanced
      - Choose appropriate instructional strategy
      - Develop design documents that specify content development
      - **Writer** – normally for large initiatives the design is split and many writers develop the course within the framework of the instructional design
      - **Researcher** – Sometimes the SME is not able to provide required knowledge for a course especially in cutting edge technologies. In such cases the researcher works in close coordination with the SME, instructional designer and the writer
      - **Quality Assurance Manager** – Ensures quality throughout the development process. This includes copy editing, proofreading design documents and ensuring that the Web content and media assets adhere to the design. QA Manager works closely with the Testing Manager and the technology team

- **Acquisition Manager** – is responsible for business relationship with all vendors of generic content especially if the enterprise regularly licenses generic content from third party vendors in order to meet learning needs. The manager needs to know the details about the vendors including new titles offered, instructional

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- design approach used, and needs to understand whether their content is interoperable with the strategies used for the e-learning initiative of the enterprise
- **Project & Production Manager**- Project manager will be in-charge of budgeting, scheduling, tracking milestones and ensuring agreed upon design specifications with regard to content development. The production manager on the other hand will be responsible for the day to day operations and processes and the management of assets.
  - **Studio Manager** – Key tasks include recruitment, resource scheduling, adherence to budgets and schedules, assembling the right teams for each project and implementing e-learning standards and all other tasks connected with managing of the actual content development. The Studio Manager should have previous experience in web development and preferably experience in e-content development. People who work under him include:
  - **Web Developer** – Developers – need programming skills appropriate for web content development such as HTML, DHTML, XML, Java, JavaScript, Visual Basic and Pearl. Some developers specialize in database development and specialize in Oracle, Sequel and InfoMix. Some developers also specialize in graphics and multimedia tools.
  - **Graphics Designer** – responsible for creating screen layouts, user interfaces and graphical elements like illustrations, diagrams, logos, buttons, and icons. Generally work with Adobe's Photoshop and Illustrator. Some also specialize in multimedia authoring.
  - **Multimedia Author** – work with video, audio, and animations. Dedicated multimedia authors makes sense only if there is large volume of media to handle.
  - **Streaming Media Encoder** – Audio & video files needs to be encoded before streaming over the Web. If there is large amount of multimedia content then a dedicated resource for this purpose is called for.
  - **Technical Support Manager** – The members of the content team are responsible for ensuring that all learning content conforms to guidelines for presentation styles and navigation and to ensure that e-learning standards have been adopted. Technical consultancy and a software development kit (SDK) provides developers with approved templates, sample code and documentation.
  - **Knowledge Management In-charge**
    - Increasing need to integrate e-learning content with content from KM databases
    - Responsible for the logical and technological issues in making integration of content a reality
  - **Learner Support Manager**
    - Responsibility for

- Development and delivery of Online help
- Designing, building and manning help desks to accommodate time zone and language variations
- Needs to resolve learners problems by arranging close collaboration between e-learning help desk and enterprise IT support desk

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- **Process Manager**
  - Team builds processes for continuous delivery of e-learning – these processes need to be integrated and documented
  - Responsibility – work with each process owner to establish policy, best practice, workflow, and inter-workings
  - For large e-learning initiatives – may consult process consultants
- **Change Manager**
  - Responsibility of Achieving acceptance of change brought about by the e-learning initiative
  - Work top down, with senior executives to ensure they know their role
  - Communicating vision of e-learning to stakeholders and staff
  - Must have experience in change management – may be external consultant
- **HR Manager**
  - Owns responsibility for recruiting for both building and delivery teams whether from inside or outside.
  - Decide on pay and benefit structure
  - Should understand the roles and responsibilities of Web development and delivery

### Have You Understood?

1. Who are the main players in the e-learning development team?

## 2.12 THE E-LEARNING DELIVERY TEAM

Most of the development team transition into delivery and will remain with the delivery team as long as necessary. However six new processes are required.

- **Service Manager**
  - Responsible for ongoing development of services that overtime may evolve from the original vision
  - Maintains the e-learning strategy and ensures that it is in step with changes in corporate strategy
  - Works closely with customer support and business units to understand the changing need of the enterprise
  - Works with the R&D and technology units to see that e-learning leverages the best available technology
- **Evaluation Manager**
  - Responsible for designing and operating a continuous and consistent evaluation

○ Responsible for designing and operating a continuous and consistent evaluation methodology so as to deliver e-learning that improves enterprise performance and increases its value across the enterprise

- **Asset Manager**

- Many types of assets available in e-learning scenario. They are assets with:

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- Low levels of granularity – files – instructional design documents, graphics in file documents like PSD, GIF, JPG and BMP, multimedia file formats like AVI, WAV and WMF.
- Higher levels of granularity – pages, learning objects, modules and courses
  - These digital assets need to be protected and leveraged through digital asset management
  - The Asset manager needs to:
- Leverage the investment by making assets readily available for reuse or simply through a simple asset library
- Make back-ups readily available in case of hardware or software failures
- When generic third party content is acquired - taking delivery and loading these digital assets is part of asset manager's job
- **Learning Assets Manager**
  - Refreshing and recycling relevant e-learning material including classroom courses, CD-ROMS, Powerpoint Presentations, videos, print material, etc..
  - Assess the value and relevance of existing learning assets once e-learning initiatives are launched
- **R&D Manager**
  - To assess and leverage developments and track new product and service launches including that of Learning Management system and authoring tools
  - To decide whether and when to upgrade
  - To cultivate relationships with vendors to know what developments are in the pipeline
  - To be actively involved in user groups, standards committee to influence the future of e-learning
  - Work in close coordination with technology and content teams

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### Have You Understood?

1. Who are the main players in the e-learning delivery team?

## 2.13 INFRASTRUCTURE

### 2.13.1 The Components of Infrastructure

- **Infrastructure Upgradation:** In most cases, e-learning uses existing infrastructure for implementation. If there is a need for fresh investment in infrastructure then it will affect ROI adversely. In some cases after e-learning has already been

implemented, the increase in the number of users, or in the complexity of content for example real time simulations may result in increase in bandwidth requirements which in turn may demand upgradation of infrastructure.

- **Outsourcing:** Outsourcing some part of the e-learning initiative may decrease the need for additional infrastructure since the need for high end servers for development

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is reduced. IT departments may not be able to accommodate the increased infrastructure fast enough to meet implementation demands. Outsourcing does not solve all the bandwidth requirement issues. Outsourcing may result in application and content residing in third party servers, the actual communication between learner and content still needs to use enterprise servers.

- **Uniform Infrastructure:**

- Most infrastructures is a patchwork built over a period of time where some parts have the latest technology with enough bandwidth while other parts are old.
- Variations may be due to policy differences. Some local IT managers may take a conservative view of security and close firewall to multimedia content or have high security to certain Web browsers. There may be places where the policy allows only restricted access to even e-mail.
- This non uniformity causes problems in enterprise-wide e-learning implementations since only one application can be implemented. It is a question of what type of infrastructure this application should cater to. There are many ways to deal with this:

- Prioritize such that the network catering to the largest number of learners get the best infrastructure
- Depending on the learner profile and requirements, the uneven infrastructure can be accordingly distributed
- **Scalability :**

- In e-learning terms, scalability essentially entails the ability to accommodate 25% increase in number of users or doubling the number of self-paced courses by plugging proportionately more servers in the infrastructure or adding proportionately more processing power to existing servers. However scalability is not limitless. Therefore you need to factor in the number of years you want scalability to work, to cater to x number of learners or add y number of courses.
- Four dimensions of scalability – data size, speed, workload and transaction cost are the parameters and all of them are interconnected. If the number of learners increases, then invariably time for search will increase if infrastructure is not upgraded.
- Scalability essentially involves cost. The e-learning initiative can request for increase in infrastructure only if absolutely necessary.

- **Security:**

- One of the requirements of e-learning is that it should not in any way decrease the security already implemented by the IT department

- Learner login is an important element of security.
- If single network login – least issues
- Where separate login is needed - with what is the learner's login validated with?  
If it is validated with the enterprise register of employees - then there is a need to

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create a secure dialogue between e-learning application and register. The e-learning register needs to be maintained, and as the e-learning requirements change and the learners change the register needs to be maintained accordingly.

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- **Latency and Application**
  - If the e-learning application needs to be accessed globally then the question of latency arises. Latency is the time delay in delivering packets between source and destination
- **Mirror Sites:**
- One of the methods of dealing with latency is replication, copying mirror site is used to improve performance by reducing distance between learner and e-learning content.
- When the leaner logs onto a server it is actually serviced by mirror sites only a short distance away from the learner. The large amount of data – graphics, streaming video and audio, animations is traveling only short distances and this results ion high performance.
- The advantage of keeping application in one place is that learner profiles and tracking data– to be done very often need not be replicated. Only content which changes less often is replicated
- A replication strategy is required- How often to schedule replication once a day or conditional on new data being loaded
- Content is replicated when the least number of learners are likely to be utilizing the mirror sites
- **Content Delivery Networks (CDN)**
  - Formalized and intelligent mirror sites
  - Copies pages of a Web site to a network of servers that are distributed at different geographical locations, caching the contents of page
  - When a web page is requested – request redirected from original server to server in CDN
  - CDN – is layered on top of existing network
  - CDN – can improve the performance of e-learning initiative that is media rich

**2.13.2 The information you need to know****Knowledge about the infrastructure**

- **Infrastructure**

- Is it controlled and maintained centrally?
- Are the regional IT departments in charge? Are there variations?
- Is any part of infrastructure outsourced?
- What Operating systems are supported?

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- **Bandwidth**
  - What are the bandwidth parameters across the infrastructure?
  - What is the connection speed?
  - What is style of dial up?
- **Desktop**
  - What is the standard desktop across the enterprise?
  - What are the operating systems and applications supported?
  - What is the policy about desktop upgrades?
  - What is schedule of upgrades?
- **Resources**
  - Does IT department have the resources to support the application on the infrastructure?
  - If outsourced can the service provider take care of hosting and support?
  - Can CDN be supported by the IT department?
- **Test**
  - E-learning application needs to be tested
  - Need to work with volunteers in all geographical regions where e-learning is to be delivered to test impact of bandwidth, latency and local variations
  - Test the load that the e-learning application puts on the infrastructure
- **Planning**
  - One of the first important component of planning – make sure that the e-learning initiative is scalable – so that after launching is backed with servers that work
  - Initial demand can be controlled by limiting the launch to a region or a business unit
  - Rolling out can also be spread over a period

### Have You understood?

1. What the infrastructure components required for e-learning?

## 2.14 VENDOR RELATIONSHIPS

In order to take the e-learning initiative forward – there is a need to form and maintain partnerships with vendors

### 2.14.1 Single vendor kind of vendor

## 2.14.1 Single or multiple vendors

- Need to buy or license e-learning technology, content and services
- Buy it from one vendor – simple – one contract, one contact point and one specification document
- However – no single end-to-end e-learning vendor available currently

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- Sometimes – need to manage – multiple vendors
- Vendors available to deliver customized e-learning solutions – trading – speed and flexibility
- Group of vendors – deliver faster at lesser cost – but you need to manage the integration of products and services

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### 2.14.2 Market Areas of Vendors

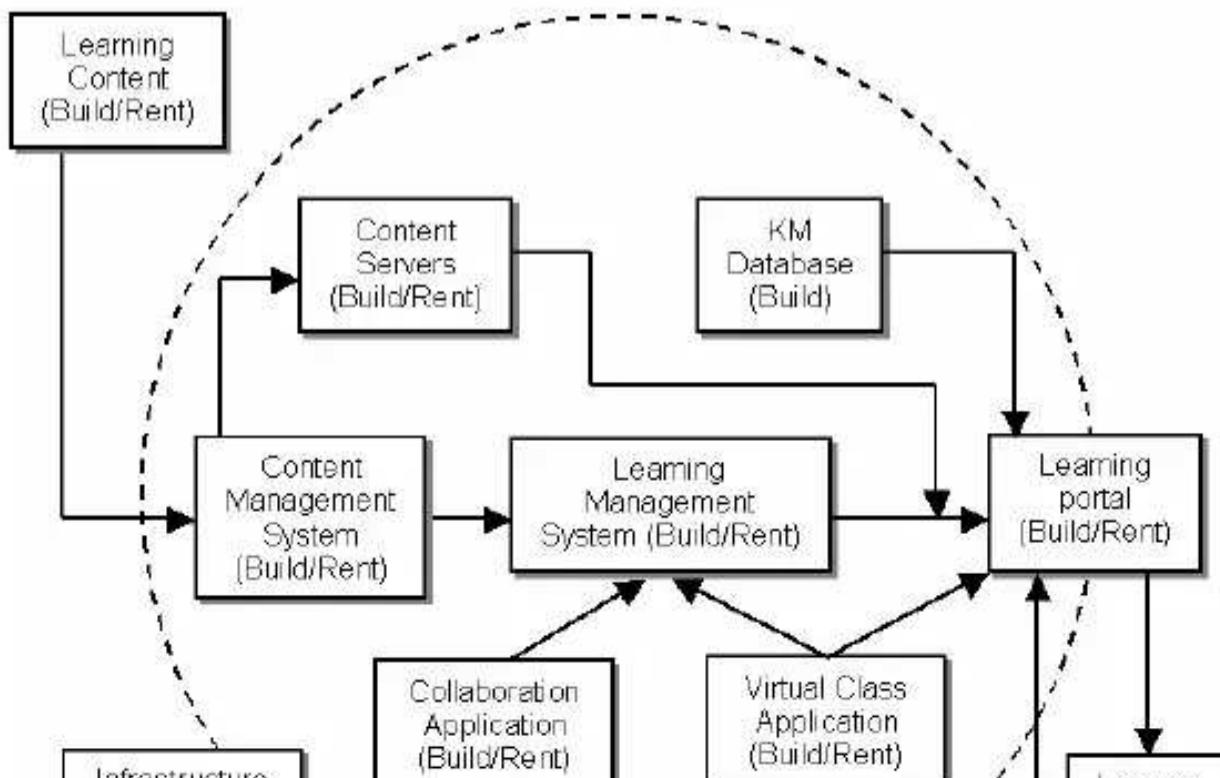
- **Technology**
  - **Learning Management Systems (LMS)** - largest purchase associated with e-learning
- Implementation complex – integration with other e-learning and enterprise applications
- Vendors – Click2Learn, Docent, IBM, Saba and THINQ
  - **Content Management Systems (CMS)** – important role to play
- Especially if adopting object-oriented approach to content
- Vendors – Broadvision, MediaSurface, and Vignette
  - **Learning Content Management Systems (LCMS)** – Learning management system integrated with Content management systems
  - **Virtual Classroom applications**
- Vendors – Centra, EpicLearning, HP, IBM and InterWise
  - **Authoring tools**
- Tools to support content creation as well as functionality to support Web Browsers
  - **Collaboration Tools**
- Business application integrated with e-learning
- Examples – eRoom, IBM Lotus QuickPlace and SameTime and WebEx
  - **Hardware**
- Providing proprietary hardware solutions for development and distribution or desktop solutions for learners
- **Content**
  - **Generic content providers** - author and publish the broad training needs of enterprises – however cover only 5% of e-learning market
  - **Content publishers** with additional services like

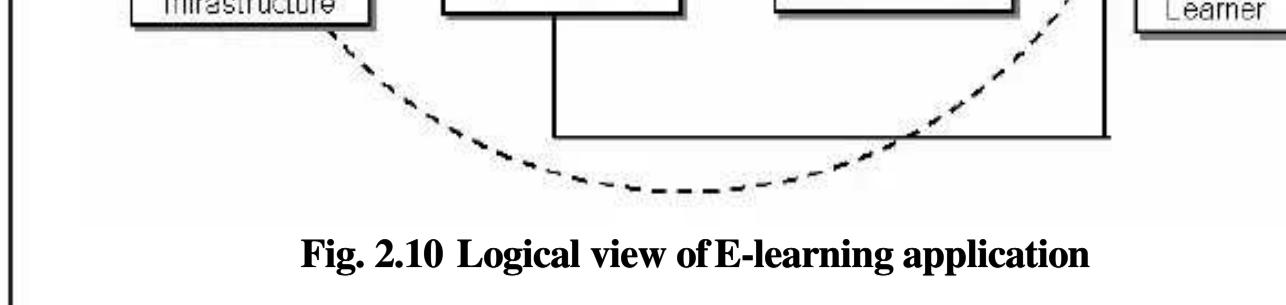
- Customized curriculum design
- Skills assessment and testing
- Strategy and development consulting
- Coaching and mentoring
- Training effectiveness analysis and hosting

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- **Custom content developers** - author content based on IP provided and owned by enterprise customers.
- Tend to concentrate on form of custom content like
  - Self-paced courses
  - Media-rich content
  - Simulations
  - Re-usable learning objects
  - Localization and translation
  - Flash animations
  - Content for hand-held devices
- **Content Aggregators** – aggregates from network of generic publishers
- **Services**
  - **Application Service Providers (ASPs)** – rent space on their proprietary LMSs to enterprises
  - Advantage to use third-party LMS and external hosting – technical, financial and some other aspects to do with speed and ease of implementation will be dealt by the third party vendor.
  - Collaboration and virtual classroom applications – available as ASP model





**Fig. 2.10 Logical view of E-learning application**

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- **System Integrator** – making software components from different vendors work together
- **Specialist Service Providers** – provide learner support and mentoring, encoding of streaming media, hosting of streaming media
- **E-learning Consultant** – help to devise e-learning strategy and the e-learning application, to select vendors and to assess learning needs

An e-learning application has many components and the logical view is given below in Figure 2.10.

#### 2.14.3 Factors for Vendor Selection

- Compatibility of vendor with existing technology
- Quality of programs
- Competency and expertise of staff
- Willingness to understand business
- Scalability of products
- Price not a crucial factor

#### 2.14.4 Events to know Vendors

Workshops, conferences and expos – however time is needed to gain access to specific products of specific vendors and build a relationship with them.

**Some important events are:**

- ASTD – free online searchable Buyer's Guide to e-learning products and services –American flavour
- European eLearning Directory – details of 150 European vendors
- Webinars – Web-based seminars – used for gaining knowledge about vendors

#### 2.14.5 Vendor Selection Process

Selection of appropriate vendors goes a long way in the successful implementation of the e-learning initiative. The management of the vendor selection is a 10 step process.

1. **Nail down Business Requirements:** Decide on the requirements based on your e-learning strategy
2. **Gain knowledge of as many vendors as possible:** Create a vendor selection team.

The team should have knowledge about instructional design, e-learning interoperability standards, and subject expertise. Use the team to gain knowledge about as many vendors as possible. An outside consultant on your team may help to bring in missing

expertise and to evaluate from a new perspective

3. **Develop an RFI ( Request for Information)** - for limited number of selected vendors
  - ask vendors to give information by answering a series of questions

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4. **Examine Vendors by viewing their presentations and demonstrations** – Go to the vendors premises – and view their presentations and demonstrations. Also take into account your gut feeling about them.
5. **Document Requirements** – at this point document the high level product or service requirements which includes:
  - Business requirements
  - Functional requirements – of learners and e-learning managers
  - System requirements – technical and performance requirements
6. **Decide on a shortlist** – based on the RFI submitted by vendors and the requirements
  - make a ranked list with inputs from all team members. Eliminate vendors below a cutoff point.
7. **Develop an RFP (Request for Proposals)** – for short listed vendors. The RFP should have the following properties
  - Make vendor comparison easier
  - Ensures objectivity and level playing field
  - Encourages focused responses
  - Sharpens price competition
  - Reduces risk of both buyers and customers
  - Minimizes complaints from rejected vendors
  - Help justify costs internally
  - Provides clear point of reference in case of any dispute

A typical RFP is composed of the following components:

- Introduction
  - When proposals are required
  - When to submit proposals
  - Point of contact for clarifications
  - Places the e-learning initiative in context
- Directions
  - Describes what to include
  - Evaluation process
  - Specifies format of proposal
- Terms and conditions
  - Provides Standard terms and conditions – including purchase policies, invoicing terms, transaction currency, etc..

- Statement of work
  - Requirements described in detail – in some cases problem given, vendor to provide solution, others complete details available
- Credentials and reference
  - Work done in the past that qualifies the vendor to undertake your job

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- Ask for references
- Outline of best practices
- Culture
  - Ask for business cultures – compatible cultures will give rise to a better working relationship
- Pricing
  - Pricing policy and practices and cost of products and services

**8. Decide on second shortlist**

- Narrow your list of vendors to three or four
- Make time for studying and evaluating the RFPs carefully
- Again come up with a score card
- Price alone need not be the deciding factor since
  - Negotiation is possible
  - Vendor's experience allows him to make a realistic estimate - you may have to make budget adjustments
  - Less important requirements may be eliminated to get reasonable price – align costs with priorities

**9. Make the decision**

- Inform each vendor about the final decision
- Maintain relationships with the rejected vendors – you may need them in future
- Now take presentations from the shortlisted vendors
- Prepare list of questions arising out of RFP - pertaining to each vendor.
- Make use of all channels of communication including face-to-face communication for information gathering
- The complete team should be involved in preparing the final detailed scorecard – taking care of all deciding issues
- Evaluate, discuss and come to a final decision

**10. Negotiate the contract**

- Have the final round of financial negotiations – considering ongoing changes in scope of work, or changing scope to get the right price

- If the decision making process was delayed – start date and delivery dates need to be accordingly adjusted

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### Have You Understood?

1. What are the factors that are to be considered in vendor selection?

### 2.15 LEARNING MANAGEMENT SYSTEMS (LMS)

#### 2.15.1 Functions of LMS

What is a Learning Management System?

- An LMS essentially helps manage an organization's learning activities and competencies.
- Activities managed by the LMS could vary from instructor-led classroom training to educational seminars to Web-based online training.
- From an end-user point of view, an LMS provides an effective way to keep track of individual skills and competencies, and provides a means of easily locating and registering for relevant learning activities to further improve the learner's skill levels and provides access to online courses for which the user registers.
- Administratively, an LMS makes it easy to enter, track, manage, and report on learning activities and competencies in an organization.
- In essence, an LMS primarily focuses on competencies, learning activities, and the logistics of delivering learning activities.
- An LMS does not focus on creation, reusability, management, or improvement of content itself

A Learning Management System is generally Web enabled and centralizes and automates the following aspects of the learning process:

- Register learners
- Maintain learner profiles
- Maintain a catalogue of courses
- Store and deliver self-paced e-learning courses
- Download e-learning modules and tools
- Assess learners
- Track and record progress of learners and assessment results
- Provide reports to management
- Personalize content

- Maintain job-based skills inventory
- Identify skill gaps
- Match staff to jobs
- Manage compliance and certification
- Manage classrooms and classroom resources

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- Track and report learning costs
- Integrate knowledge management
- Integrate live e-learning/virtual classes
- Integrate collaborative tools
- Support the whole learning value chain
- Manage Author content

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It is to be noted that all LMS will not have all the functions listed above. Most systems will concentrate only on some of the functions. Some LMS may be fully web enabled, some partially and some not at all.

When evaluating LMS – the following questions needs to be asked:

- What are the business benefits?
- What LMS functions support the benefit?
- What features are supported by these functions?
- Depending on the group of functions supported they can be categorized as TMS, CMS and LCMS.

### **2.15.2 TMS (Training Management System)**

TMS was a predecessor of LMS. It manages and automates all traditional training activity such as:

- Register and track learners
- Assumes all learning is face-to-face
- Maintain a catalogue of courses and classrooms, classroom resources and classroom events
- Provides Calendar function that allows trainer to book classroom for a specific number of learners on specific dates and book necessary resources ( projector, flip chart etc..)
- Provision for learners to register for courses using specific authorization codes
- Allows instructor to note learner's personal records and record sessions actually attended by each learner
- Uses authorization code to charge for the course to the learner's business unit

For e-learning TMS added a new module – to manage another learning resource – online learning. Vendors thus changed the description of their product from TMS to LMS. Web-based LMS applications were developed taking advantage of Internet. LMS customers wanted facilities to handle classroom courses. They then added a TMS to LMS. Thus there is confusion of whether a particular product is TMS with LMS or LMS with TMS

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## NOTES

### 12.15.3 CMS (Content Management System)

A CMS is used to support LMS. CMS supports effective development and delivery of course content especially for learning objects.

#### 12.15.3.1 Principle of CMS

- Separation of content and presentation
- Content – text, graphics and multimedia files stored centrally in presentation neutral formats – rendering as web optimized JPG files
- Photographs may be stored as BMP files – uncompressed form while video as AVI files another uncompressed format – rendered in streaming file formation WMF
- Series of templates developed to reflect:
  - Consistent visual interface and style
  - Appropriate technical specification
- Templates provide presentation layer
- When user browses to Web page – template is displayed and populated with content in real time
- Supports object-oriented approach to e-learning

#### 2.15.3.2 Classical Application of CMS Technology

- Online newspaper – typical application
- Content updated constantly but presentation layer seldom changed
- Journalists and picture editors – not bother about presentation – just save content
- Web Authoring skills and rules for applying them embedded in the templates
- When user requests page - content – news, sports, weather is automatically poured into the associated template
- CMS can handle real time data like share prices
- CMS can support more than one delivery channel
- Can deliver same raw content to template designed for print, Web, hand-held devices and WAP enabled devices

#### 2.15.3.3 Self-paced course development

- The template approach of CMS can be used for self-paced course development
- Series of templates to reflect
  - Typical course pages
  - Develop content separately
- Stored in channel-neutral formats

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### **2.15.3.4 Benefits of CMS-based Content Development and Publishing**

## NOTES

- Updating and modification of stored content automatically carried out in presentation templates
- E-learning application undergoes changes – to reflect new branding, merger or an acquisition – only templates need to be redesigned however content – larger of the two elements need not be changed
- Supports automatic workflow between instructional designers, subject matter experts, media developers and quality assurance – allows rapid team-based content development
- Local templates can be developed to accommodate local language and culture
- Templates incorporated with learner profiles – allows content to be displayed in local language
- CMS – can automate and accelerate the distribution process while reducing development costs

### **2.15.4 Learning Content Management System (LCMS)**

- In contrast, to a LMS system an LCMS helps create, reuse, locate, deliver, manage, and improve learning content. Content is typically maintained in a centralized content repository in the form of small, self-describing, uniquely identifiable objects, or *learning objects*, each of which satisfies one or more well-defined learning objectives.
- Each learning object may have been created from scratch or by re-purposing existing knowledge documents in other formats.
- An LCMS may locate and deliver a learning object to the end-user as an individual unit to satisfy a job-specific need or deliver the learning object as part of a larger course, curriculum, or learning activity defined in an LMS.
- An advanced LCMS tracks the user's interactions with each learning object and uses this detailed information to deliver highly personalized learning experiences while providing authors with rich reports for analyzing the clarity, relevance, and effectiveness of content, so it can be improved on an ongoing basis.
- Some leading-edge LCMS products go even further to enable powerful collaboration and knowledge-exchange paradigms in the context of learning objects, and empower users to collaborate with each other as well as with subject-matter experts on specific learning objects.

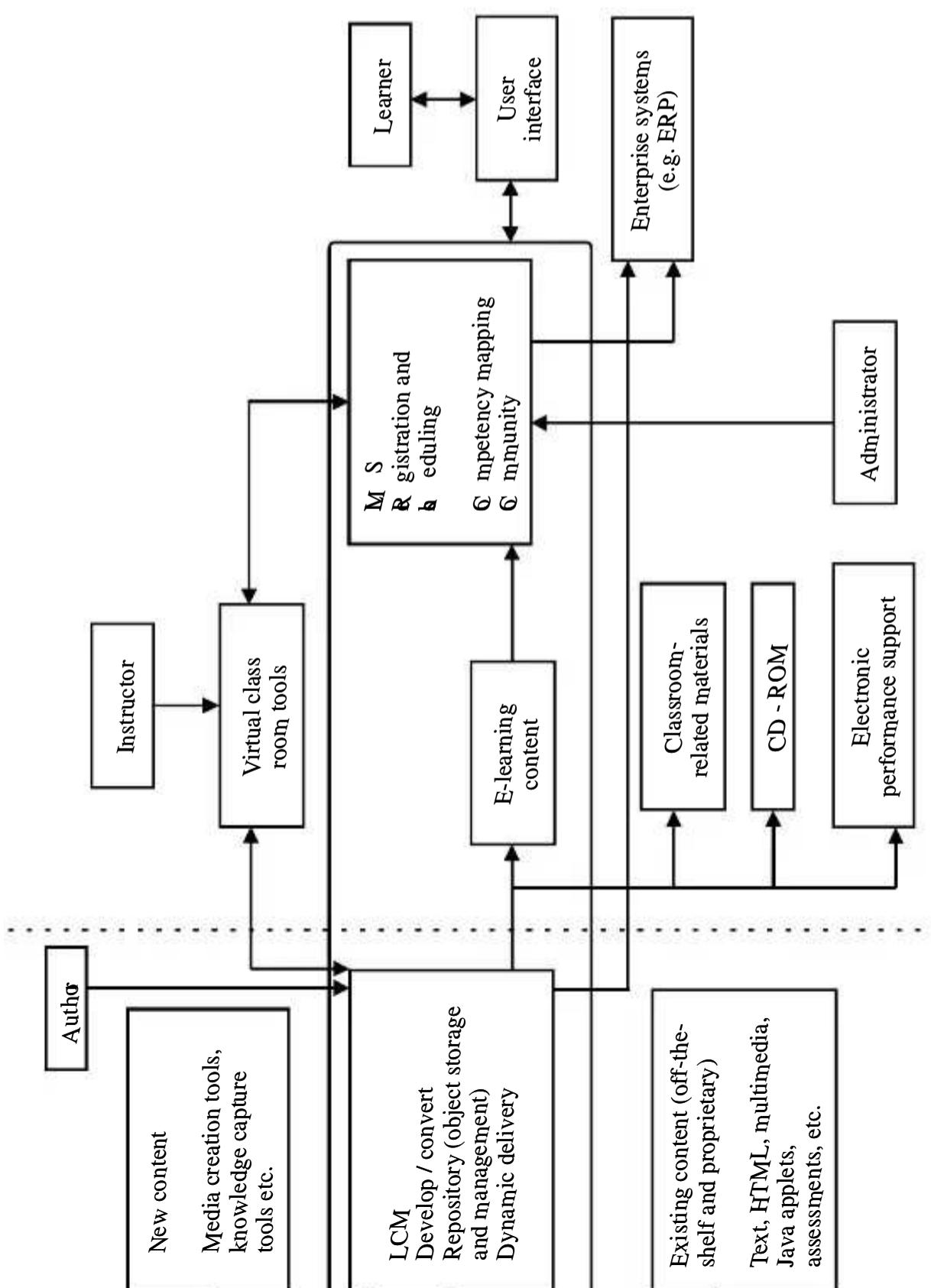
- These knowledge exchanges are also captured, archived, and made easily available to future users to expand and supplement the knowledge encapsulated by that learning object.
- In certain cases, the focus also extends to fostering knowledge communities and capturing the unstructured knowledge around the learning object in a tangible form.

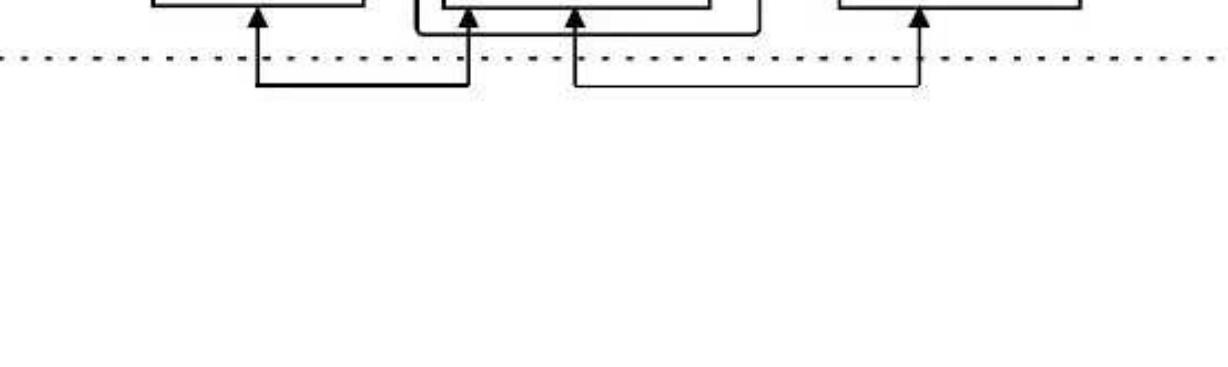
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## NOTES

- But an LCMS does not deal with competency management, the extensive administrative functionalities of managing learning activities, or the logistics of these activities.
- LCMS is defined as a system that enables creation, storage, management and deployment of learning content in the form of learning objects. Vendors of e-learning products and services formed the LCMS vendor council to help define the various components of an LCMS.
- Modules of an LCMS include:
  - Content authoring module
    - should simplify and accelerate the content authoring process
    - allows subject matter experts with appropriate access rights to self-publish
    - Self-publish function – potential to act as knowledge sharing and knowledge management tool
    - Can link to content in knowledge databases inside and outside
  - Assessment authoring module
  - Publishing module
  - Server engine
  - Data Repository
  - Personalized adaptive customized workspace for the learner

LMS and LCMS supplement each other. LMS manages communities of users while the content is stored and managed by the LCMS. In delivering the content – LCMS bookmarks learner progress, records individual scores and passes them back to the LMS for purposes of recording as shown in Figure 2.11.

**INTRODUCTION TO E-LEARNING****NOTES****Fig. 2.11 LMS and LCMS integration**



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## NOTES

Functionality between TMS, LMS and LCMS is not clearly defined in products available in the market.

- Most LCMS vendors claim interoperability with some LMSs.
- Similarly most LMS vendors offer some LCMS functionality – like support for personalized home page, learner profiling, reusable learning objects and adaptive learning based on skills – just as in LCMS

### 2.15.5 Where Do LMS and LCMS Meet?

Though Learning Management Systems and Learning Content Management Systems fundamentally differ in focus, they address complementary aspects of the same high-level goal: *to accelerate knowledge transfer*. In achieving this goal, they share common ground in three key areas:

#### 2.15.5.1 Content

- Content is a key ingredient handled by both LMS and LCMS. The LMS manages, prescribes, delivers, and tracks online courses, which are typically composed of learning objects that were created and defined in the LCMS.
- The LMS and LCMS both monitor the delivery of content but at different levels of granularity.
  - An LMS concentrates on course-level tracking, particularly completion status and rolled-up scores.
  - In contrast, an LCMS employs detailed tracking at the learning-object level not only to trace user performance and interactions at a finer granularity, but also to provide the metrics that help authors analyze the learning object's clarity, relevance, and effectiveness.

#### 2.15.5.2 Users

- Users play a central role in both LMS and LCMS. Independent of whether the resource is a learning object, an online course, an expert, or some other form of learning activity, an important common goal of products in both categories is delivering the learning resource to the user in the most effective way possible.
- A typical LMS maintains a rich profile of each user including organizational affiliation, job role, preferences, competencies, skill levels, participation in past learning activities, and so forth.
- Users typically go to the LMS to manage their current competency status, analyze their skill gaps, and register for learning activities that will help them reduce their skill gaps against an aspired career path.

- An LCMS focuses on delivering a personalized experience to the user that provides just enough content to address the person's individual needs, just in time.
- An LCMS may also enhance this experience by customizing the content based on a user's profile or by offering rich collaborative and knowledge-exchange capabilities around the content.

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- The key difference is that the LCMS takes advantage of all the information available about the user to offer a personalized experience when delivering a learning object, while an LMS typically maintains the user profile information and makes it available to the LCMS to deliver the personalized experience.

## NOTES

### **2.15.5.3 Administration**

- An LMS and LCMS share varying degrees of administrative interests in content as well as users.
- An LMS typically offers detailed user administration including user profiles, competencies, roles, and organizational properties, but only high-level content administration and tracking.
- In contrast, an LCMS offers extensive content administration and tracking at finer levels of granularity.
- However, the LCMS pays more attention to the interactions between user and content than the actual administration of users themselves.
- Irrespective of the administration's sophistication and focus, products from both categories have built-in administrative features to manage users and content.
- Customers have the substantial practical challenge of sharing these administrative interests across an LMS and LCMS, and ensuring the administrative process flows consistently and smoothly between the two systems.

### **2.15.6 LMS – the long term plan**

LMS implementation is not just a question of getting an LMS to be up and running. In other words most LMS implementations are work in progress. This essentially means that there needs to be a long term relationship between the vendor and your enterprise. This relationship impacts the following:

- **Strategic Vision:** There should be a match between yours and the vendor's vision of e-learning. The vision has to be realized within the boundaries of the LMS. If the visions do not match - you may have to choose between compromising your vision or building customized modules to integrate with your LMS.
- **Future Plans:** Need to be aware of your vendor's future plans. Gather information about future focus and see whether it is in tune with the focus of your enterprise. If LMS vendor looking for merger - you may land up with a company – which does not share the vision. On the other hand if the vision of your enterprise changes in a way that affects learning then will the vendor be able to cope up with the changes that follow. If the enterprise is planning mergers and acquisitions will the LMS be able to scale to meet increased number of users?

- **Working Relationship with Vendor:** For this a number of questions separate from the quality of the LMS needs to be answered:
  - Is it okay to work with these people for a long duration?
  - Are they focused on your needs?
  - Are they proactive, responsive, empathetic, reliable?
  - Is there a good cultural fit?
  - Do they have depth of resources to look after long term needs?

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- Do they provide technology resources and information you need?
- Do they deliver what is promised?
- Are communications reliable?
- **User Communities:** Better to participate in a self help group if it exists or to start one. This will enable you to influence future developments, provide preview of upgrades and new products and support dialogue with other customers.

### **2.15.7 Integration, Configuration and Customization:**

#### ***2.15.7.1 Integration***

- The learning chain describes the channels available for content delivery. More number of others' vendor applications that your LMS can talk to, the better will be.
- LMS may need to integrate with other enterprise application
- Correct versions need to be checked before integration
- If the vendor claims development of integrated suite and partnerships with other vendors – check if these claims are valid

#### ***2.15.7.2 Configuration***

- Every LMS has a long list of variables – some of which must be configured as part of the implementation process – you have to configure system roles and rights to match your business or department structure
- Some variables are optional – for example during the initial phase of implementation – you may want to turn off
  - skills assessments
  - some fields in the employee's profile
  - some features from drop-down menus
- Configuration options are built into the application or sometimes may need input
- Configuration is a normal and necessary part of the implementation process – not at extra cost

#### ***2.15.7.3 Customization***

- Customization happens external to the application – was not anticipated by the application's developers

- Requires fresh code to be written – in most cases to integrate with other applications
- Customization is expensive and high risk – sometimes may cost more than LMS
- It is high risk because
  - It may not work
  - Vendors cannot guarantee upward path for the customized LMS implementation

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- Custom code creates - hard-wired link between specific versions – existing code may not work with new versions
- Generally customization is not recommended – however it is suggested that you discuss your needs with LMS vendors
- If your needs is a major generic requirement – vendor may want to include the functionality in future releases – vendor may be willing to share customization costs or absorb the costs

#### **NOTES**

#### **2.15.8 Time and Cost**

- Costs are bound to change over time as LMS implementations become more widespread. The cost and schedule of implementation depends on specific requirements, geographic spread and number of licenses.
- Normally LCMS cost more than LMS
- Internal costs have also to be taken into consideration – example costs associated with data migration, process reengineering, and housekeeping.
- The realistic timeframe including installing, migration of staff records, loading of courses and testing will be a year.
- Launching of pilot programmes with limited functionality and in limited geographic areas – may be completed in 6 months
- Slow rate of progress may be due to:
  - Issues associated with infrastructure, security, hosting and desktop
  - Preoccupation of the Steering committee with some other agenda – may result in the e-learning initiative not getting the needed attention
  - Inability of e-learning team to develop and prepare proper strategy
  - Inability of e-learning team to find vendors and to answer questions from vendors

#### **2.15.9 LMS Market**

Some of the well known LMS vendors are given below:

Click2Learn, Docent, Hyperware, IBM Lotus, Intellinex, KnowledgeNet, KnowledgePlanet, Learnframe, Oracle, Pathlore, Plateau Systems, Saba Software, SAP, Sun Microsystems, TEDS, THINQ, WBT Systems.

#### **2.15.10 Evaluating LMS**

##### **2.15.10.1 Meeting E-learning Standards**

- Make sure how much of the e-learning standards the LMS adheres to. The following issues needs to be looked into:

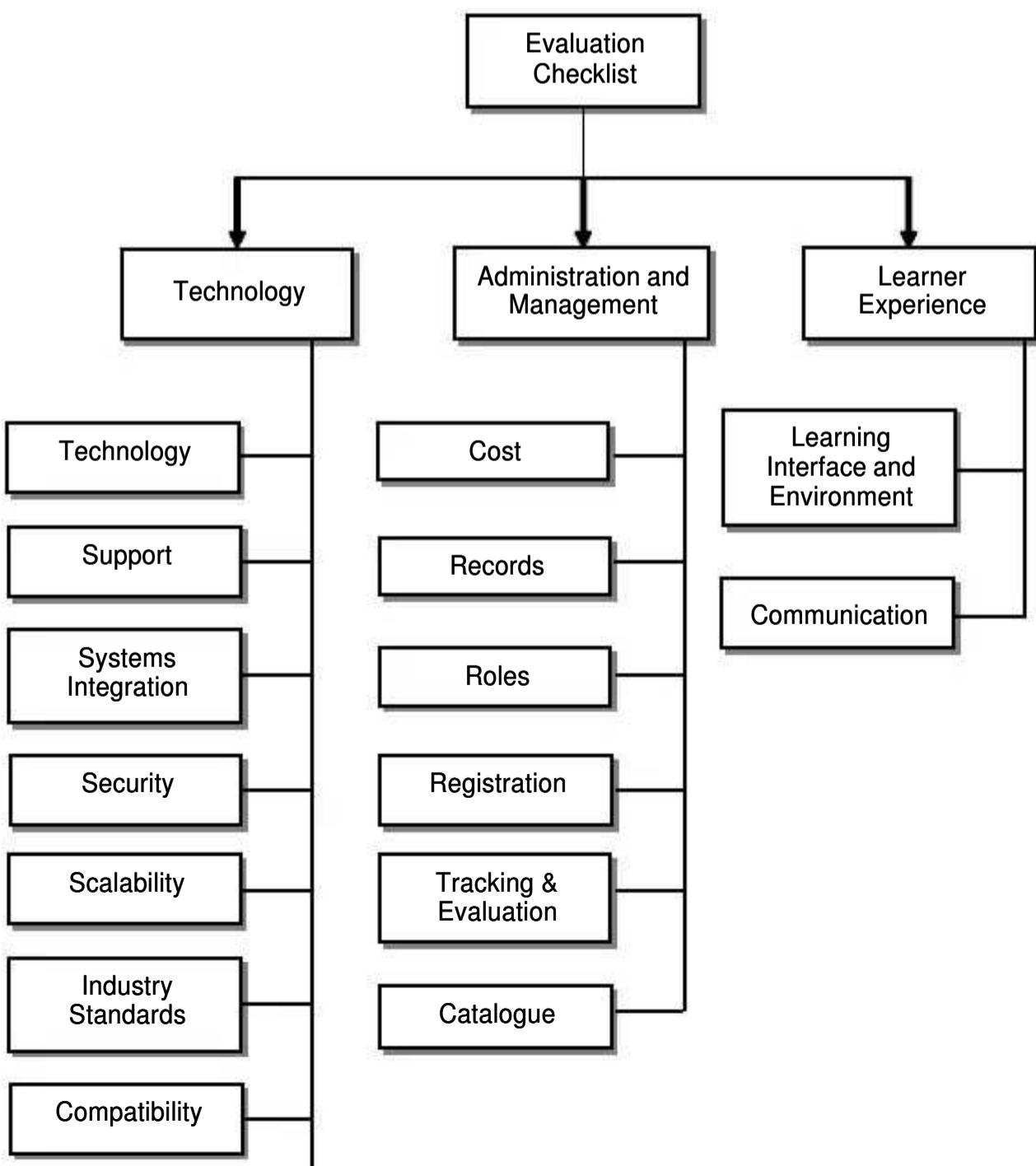
following issues needs to be looked into.

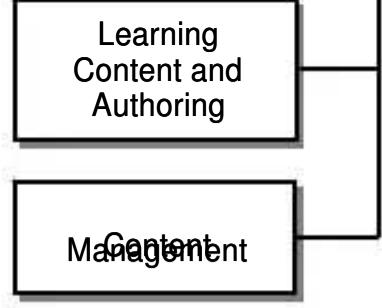
- The standards the product conforms to
- Parts of the standards they implement
- Their strategy for integrating full standards as they get published
- The involvement of the vendors in the standards development process
- The nature of contributions of the vendors to the standards development process
- The area of special interest of the vendor. The areas could include:

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- Content metadata
- Content packaging
- Content sequencing
- Question and test interoperability
- Learner profiles
- Runtime interactions





**Fig. 2.12 Evaluation Checklist**

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#### **2.15.10.2 Evaluation Process and Tools**

#### **NOTES**

The following tools can be used to evaluate an LMS:

i. RFP – the vendor's response to your RFP is the first deliverable that can be used by you to evaluate the vendor. Some of the issues to be considered include:

- Response delivered on time?
- Did the response deliver all details requested in the format requested?
- Did the response over-deliver?
- Was the response prepared according to predefined template – or prepared specifically according to your specific business requirements?

ii. Evaluation Checklist – A generic checklist of the issues to be considered are given below and in Figure 2.12. However you may want to add some specific enterprise related questions to the list.

- Technology
- Server requirements
  - ❖ What backend platforms, databases does it support?
  - ❖ Does the LMS support the back-end specified by your IT department?
  - ❖ Do you want your vendor to provide servers and backend operating system
  - ❖ Does the vendor offer outsourced LMS and hosting? If so details regarding the hosting server, and distributed network to facilitate global reach? Does the vendor host both custom and generic content?
  - ❖ What is the minimum, average and maximum bandwidth required? How much bandwidth does – for 10, 100, 1000 or 10000 learners? How does bandwidth increase with number of users?
- Support
  - ❖ Does the LMS offer other related services such as project analysis and project planning?
  - ❖ How long is the warranty ? What about after warranty period?
  - ❖ Is integration and configuration in-house or outsourced?
  - ❖ What are the monitoring and optimizing tools?

- ❖ What support is included in License agreement and what at extra cost?
- ❖ What is covered by the Service Level Agreement? – availability, customer support response times, LMS and database repairs, bug fixes, help desk availability, training for your e-learning live managing personnel?
- ❖ Does the vendor provide round the clock helpdesk? What languages are accommodated?

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- ❖ Does the LMS support international time-date formats, understand time zones and handle currencies?
- ❖ Is offline learning also supported? Is the learning experience the same Online and Offline?
- ❖ Are hand-held or WAP-enabled devices supported?
- Systems Integration
  - ❖ Is LMS built on an “Open Architecture” to support integration with other enterprise and e-learning applications?
  - ❖ Is Integration based on batch process updates or real-time updates?
  - ❖ Does integration result in a common database of learner records for all applications and content integrated with LMS ?
  - ❖ Can LMS use the enterprise e-mail application to communicate with learners?
  - ❖ Can LMS use templates to customize automated e-mail notices?
  - ❖ Can LMS integrate Knowledge Management sources – to deliver information as well as content to users?
- Security
  - ❖ What security protocols are used to protect enterprise and learner data?
  - ❖ Can LMS security be integrated seamlessly with enterprise network – such that multiple logins can be avoided?
  - ❖ Can Learners access content, third party content developers load content from outside corporate firewall such as from home or a hotel?
  - ❖ Can LMS use corporate extranet to deliver content to customers and suppliers?
- Scalability
  - ❖ Can LMS be scaled smoothly and quickly to meet growing number of learners?
  - ❖ How many concurrent learners can be supported at a time?
- Industry Standards
  - ❖ What draft standards does the LMS support? Can it provide references from customers to that effect?
  - ❖ Is the LMS standards-complaint or standards-certified?

- Compatibility
  - ❖ Does LMS require propriety browser or thin client?
  - ❖ Does the LMS require propriety client side software?
  - ❖ What versions of standard browsers does LMS support?
  - ❖ Does the LMS support all industry standard plug-ins – Flash, Shockwave, Realplayer? Can LMS automatically find missing plug-ins and install the same?

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- Learning Content and Authoring Tools
  - ❖ What publishers' generic e-learning content does the LMS support?
  - ❖ Does the LMS support Standards-complaint or standards-certified content?
  - ❖ Can the vendors provide appropriate API's to integrate non- standard third-party content?
  - ❖ What publishers' generic e-learning content does the LMS support?
  - ❖ Does the LMS support content developed with all authoring tools?
  - ❖ Does LMS provide a suite for integrating authoring tools?
  - ❖ Does LMS support meta-tags?
- Content Management
  - ❖ How is content management handled by LMS?
  - ❖ How many different types of files are stored?
  - ❖ Does the LMS support reusable learning objects?
  - ❖ How does the LMS handle multiple languages?
  - ❖ Administration and Management
- Cost
  - ❖ What is the LMS cost per user? These costs can be grouped under
    - ❖ Installation
    - ❖ Usage
    - ❖ Licensing
    - ❖ Maintenance
    - ❖ Support
    - ❖ Configuration
    - ❖ Consulting
- Records
  - ❖ What is the process of populating learner records?
  - ❖ Is there a common record? How are these records maintained?
  - ❖ How many learner records can LMS support?
  - ❖ What are the details in Learner records?

**NOTES**

- ❖ What are the details in Learner records?

- Roles
  - ❖ How does LMS handle rights for administrators and managers?
  - ❖ Are access levels pre-defined or can they be configured?
- Registration
  - ❖ How are new learners, new e-learning courses registered?

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- ❖ What are the features supported for classroom course registration?
- ❖ Does the LMS provide different kinds of constraint checking during registration?  
Examples of constraints include number of courses, prerequisite course requirement, overbooking etc.
- ❖ How does LMS handle group booking?
- ❖ How does the LMS handle Instruction-led Classroom courses?
- ❖ How are the scheduling and other procedural constraints taken care of?
- Tracking, Assessment, Reporting and Evaluation of Learning
  - ❖ Can LMS launch and track self-paced courses and track learners' progress?  
At what level of granularity – modules, sub-modules, screens?
  - ❖ What type of information is tracked? - Dates of starting & completion, progress, produce reports, etc..
  - ❖ What types of assessments are supported? – fill in the blanks, multiple choice, drag and drop, etc. Can feedback be given dynamically? Is randomized sequence of questions possible?
  - ❖ Can the LMS based on evaluation suggest alternate or remedial study plan?
  - ❖ Does LMS support accreditation and certification assessment?
  - ❖ Does LMS provide features for evaluating skills and competencies and match them with job requirements?
  - ❖ Can it track levels and pace of learning?
  - ❖ Can usage of resources be tracked?
  - ❖ What type of reporting does the LMS support?
- Active & Inactive courses
- Number of registered learners
- Number of concurrent learners
- Number of study hours?
- Confirmation of details of classroom event?
  - ❖ Can customized reports be provided? Can reports be associated with different levels of security?
  - ❖ Can LMS schedule automate the running and distribution of reports?
  - ❖ Can evaluation of learning activity be determined?

- Can evaluation or learning activity be determined?
- Catalogue
  - ❖ Will LMS provide a common catalogue covering all details about the e-learning initiative?
  - ❖ What type of search and query facilities for the catalogue does the LMS provide?
  - ❖ How is the catalogue maintained?
- Learner Experience

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- 
- Learning Interface and Environment
    - ❖ Does access facility have an impact on the performance?
    - ❖ Is the Learning Interface configurable? Is the configuration by in-house staff (is training needed?) or by vendor (is extra cost needed?)?
    - ❖ Is there a provision for learner home page? What are the features provided?
  - Communication
    - ❖ Does LMS support collaboration and knowledge communities? Does it support interaction between learner and instructor?
    - ❖ Does the LMS automatically provide the learner with evaluation and completion information?
  - Vendor References

**NOTES**

The customer referred to you by the vendor has to be questioned in detail. He may be asked the most significant factor that led him to choose this particular LMS and any lesson in general he learned from the implementation. He may be questioned on the following lines.

- Benefits, Features and functions
  - ❖ What are the business drivers and has the vendor understood the business requirements?
  - ❖ Did the LMS customize to fulfill the business requirements?
  - ❖ Did LMS have any negative impact on the business processes?
  - ❖ What is the vendors cost-value offer?
- Implementation
  - ❖ What is the version of LMS actually implemented?
  - ❖ What percentage of the complete range of functionality of LMS was implemented?
  - ❖ Was the project management done by the vendor or outsourced?
  - ❖ Were you happy with the implementation ? Were there any person in the vendor's team who went out of the way to satisfy your business constraints? Was it pilot, phased or full implementation?
  - ❖ Does the LMS deliver e-learning to employees, suppliers, or customers?
  - ❖ Does the LMS support the complete learning-value chain?

- ❖ Does the LMS support the complete learning value chain?
- ❖ Was the implementation clearly scoped, promises delivered, delivered on time? Delivered within budget?
- ❖ Was the vendor proactive and responsive to your needs?
- ❖ Would the same vendor be used for a fresh LMS implementation?
- Integration
  - ❖ Did the LMS integrate with e-mail application, HR system, Financial System, Security system, Knowledge system – If so which one?

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- ❖ What is the opinion about the integration performance?
- Post-Implementation
  - ❖ Does the Service Level Agreement exist? Are the terms clear?
  - ❖ Is the support 24/7 or only business hours?
  - ❖ How is up-gradation tackled?
  - ❖ Is there an user support group?
- Content Integration Test
  - If there is any custom or generic content that you need your LMS to support, provide it to the vendor for testing purposes. The following aspects may be tested:
    - ❖ Content loading
    - ❖ Course launching
    - ❖ Activity Tracking
  - The results of these tests will allow the vendor to better understand how to prepare the RFP.
- SWOT Analysis
  - The SWOT analysis will help you to evaluate the vendor based on strengths, opportunities which will work in his favour and weaknesses and threats which will work against him. Some typical issues for a Vendor SWOT is as follows (Table 2.6):

**Table 2.6 LMS Vendor SWOT analysis**

	S	W	O	T
<b>Ability to execute</b> – issues such as speed, experience, resources, technology expertise and project management skills				
<b>Features and Functions</b> – evolving or static				
<b>Market Position</b> – Is it a leader or follower? What is its reputation?				
<b>Vision</b> –What is its vision regarding e-learning in general and its own business?				

- Gap Analysis – this helps you to make comparisons between the LMS vendors' offering and your requirement. Do a gap analysis by listing all functions and using a simple rating system such as Yes – No or High-Medium-Low. After the analysis – some vendors may be eliminated since the gap is too large.

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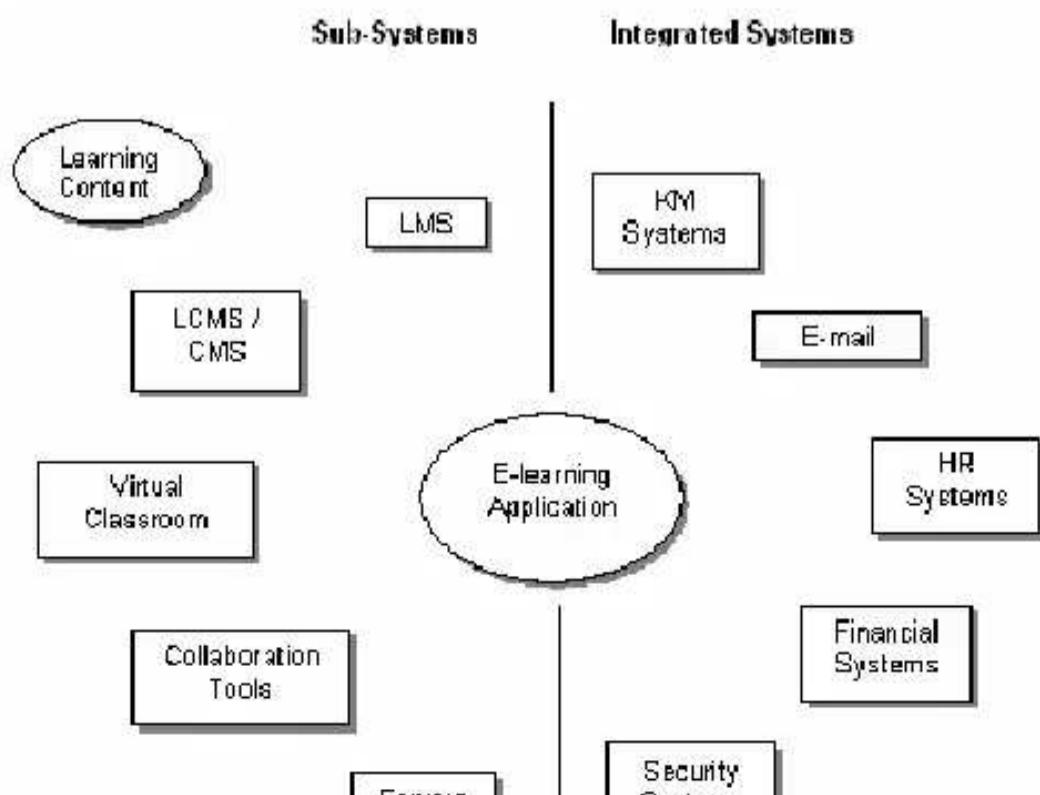
- Scorecard – the same parameters you used in SWOT analysis can be utilized but now you can assign weighting to each parameter. You may want to go more in detail with each heading outlined in SWOT analysis.
- Final selection – after you have completed all the steps of evaluation – you can make the final decision.

**NOTES****Have You Understood?**

1. What is an LMS?
2. What is the difference between LMS, LCMS and TMS?

**2.16 TESTING**

An E-learning system can be complex and often consists of a large number of interconnected components. Figure 2.13. This viewpoint does not show the databases that form an integral part of the e-learning application. Figure 2.14 shows the system hardware and software layers of the application. Therefore testing the e-learning system is highly technical and needs to be carried out in a particular sequence. Moreover the environment in which the testing is carried out is also very important.



**Fig. 2.13 E-learning application components**

Since there are many interconnected parts – it is necessary that testing not only needs to tell you that something is wrong but also the *where and why*. This is important that only when a problem is isolated can it be solved.

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Taking an example, if testing reveals that learner activity tracking data is not being saved to the learner's record in the LMS the problem may lie with

- Code embedded in the content
- The frame in the Web browser that handles tracking data at the learner's end
- With the server that hosts the LMS and its associated database

Another issue associated with testing that there may be many releases especially in the e-learning system. This means as long as the previous release is the Production Environment, the Development Environment corresponding to this release needs to be maintained.

Client Screen, Keyboard, Peripherals

Client Browser

Client Application Components

Client Middleware

Client Operating System

Network Operating System

Server Application

Server Middleware

**Fig. 2.14 System hardware and software layers****2.16.1 Testing Strategy**

The key goals of testing strategy can be classified under three categories:

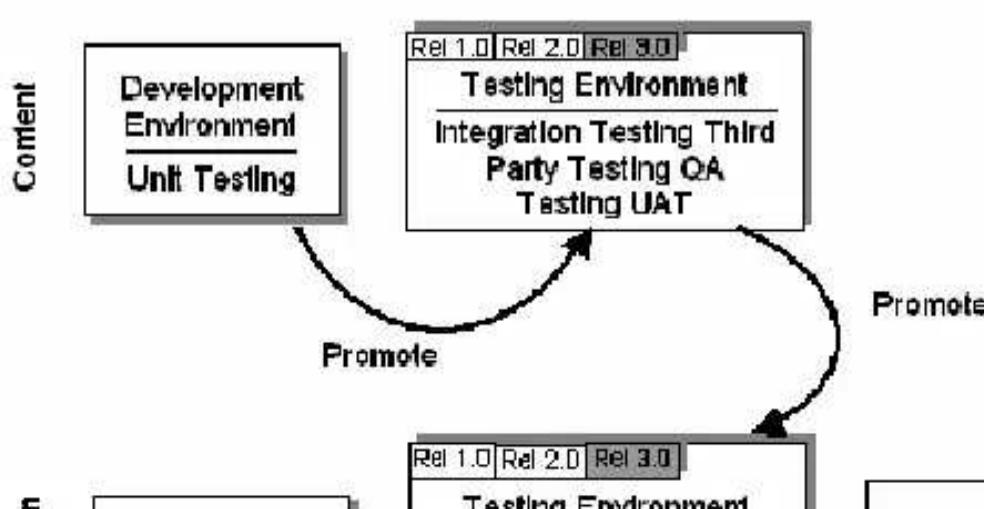
- Non-Functional Testing – generally tests whether requirements – business, system and technical – have been properly implemented

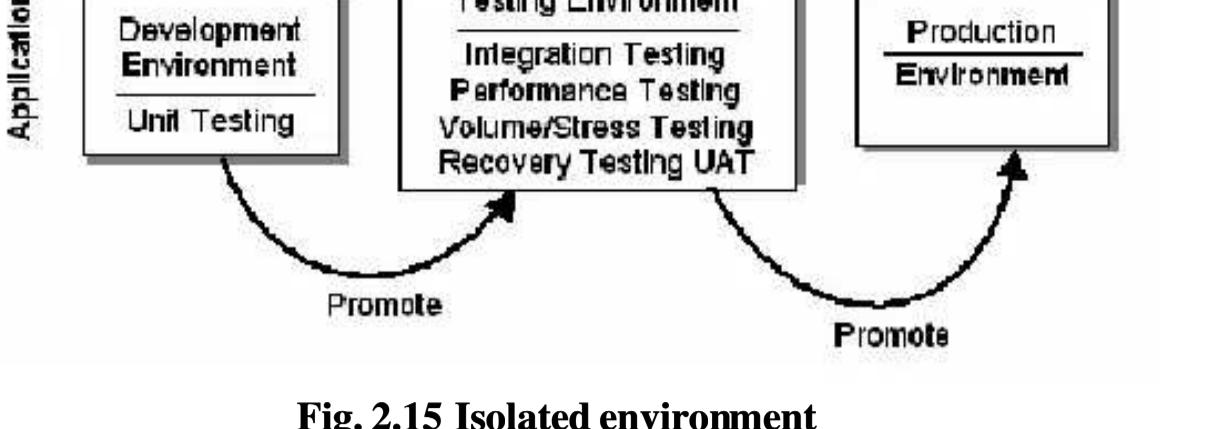
**INTRODUCTION TO E-LEARNING**

- Functional Testing
- Validate that the complete integrated application works well together
- Identify issues and defects and make sure these are addressed before the e-learning initiative goes live
- Validate that the processes supporting the operation of the application
- Validate the security of the application
- Service Level Testing – determine that the system performance and availability requirements have been met

**NOTES****2.16.2 Isolated Environments**

- During implementation – there will be at least three environments – development, testing and production. Since we are talking of an e-learning application environment, we can divide development and testing environment – each into two – one application and the other content Figure 2.15.
- Working with testing in isolated environments will help to isolate problems. When testing indicates something wrong, the problem lies in the area which differentiates the previous and current environments.
- The Production Environment is used for testing only before the system goes live since after this any test in the Production Environment will involve all the learners.
- The Production Environment is used for testing only before the system goes live since after this any test in the Production Environment will involve all the learners.
- The Testing Environment is essentially supposed to be an exact replica of the Production Environment – but in practice only the functionality of the Production Environment is replicated





**Fig. 2.15 Isolated environment**

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## NOTES

- The Application Testing Environment – integrates all components of the application including content. This is where you see your application running for the first time.
- Content and Application Testing Environment need to include and test all desktop configurations across the enterprise.
- Development Environment is designed to meet the specific needs of developers. Authoring tools often have more demanding system requirements. Developers systems often need to have massive amounts of memory and large displays set at maximum resolution. The only testing carried out in this Environment is Unit Testing.

### 2.16.3 Types of Testing

#### 2.16.3.1 Content and Application Development Environments: Unit Testing

- Unit Testing takes place in the Development Environment and is usually conducted by the developer. It tells you that the unit is free of defects.
- Unit Testing operates in a standalone mode – without considering other subsystems.
- Unit testing will bring consistency and efficiency but however does not tell you how the application will operate in the real world
- In case of outsourcing – the contract should specify that all components are unit tested before delivery
- For Example Unit Testing will indicate that
  - Screen layout accurately matches the design template
  - Graphic is legible
  - Flash Animations play straight from beginning to end at a speed that facilitates the assimilation of content
- Unit Testing also applies to sub-systems

#### 2.16.3.2 Content Testing Environment: Integration Testing

- Content integration testing is about loading all course elements in your LMS and check whether they interact as expected with the LMS and with each other
- However in the early stages LMS may not be available – in which case you can use a custom-built application that simulates the LMS for testing purposes
- If LCMS is used – this integration testing id performed within LCMS

- If CMS is used – this can be used for initial integration testing but the input-output of LMS needs to be simulated

### ***2.16.3.3 Content Testing Environment: Third Party Testing***

- Third-party testing is not carried out by the developer – but takes place outside the development environment.
- Third-party testing is a top-down approach and is called *black-box testing*. In this type of testing no attempt is made to find out why something is not working

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### **INTRODUCTION TO E-LEARNING**

- The behavior of the application is tested from the learner perspective to check that each function is fully operational and works as designed
- If there are different configurations – each content needs to be tested as many times. To avoid duplicating effort – the same team is often responsible so that common issues need not be reported
- Third-party testing should be scripted. This ensures consistency of testing. If the same defect occurs across all configurations it means that the defect lies in the content not in the system
- Scripts provide testers the sequence of interactions that reveal a bug
- Scripts are developed by people with knowledge about course design and feature-function set.
- Testers also need to know when scripts cannot work and find out issues not covered by the script

### **NOTES**

#### ***2.16.3.4 Content Testing Environment: Quality Assurance Testing***

- QA testing usually carried out by third-party testers.
- Errors arise due to discrepancies between Detailed Design Document and what appears on the screen
- Find problems at the presentation layer – Objective Defects such typographical errors, spelling errors which are easy to detect and Subjective errors like poor copy editing which are difficult to diagnose and resolve.
- Template driven content development and good workflow practices go a long way to minimizing defects at this level.

#### ***2.16.3.5 Content Testing Environment: User Acceptance Testing***

- In the e-learning scenario Learners are the consumers. You should deliver what content they need in the form they need it.
- UAT should have participants who are representatives of the target audience.
- The test needs to be carefully designed so that it is clear what the testers are responding to.
- When learner rejects objectives of a course there is some doubt – when they reject a graphic or animation they are invariably right
- It is better to perform UAT as early as possible because sometimes the problems

that the testing can reveal can be complex.

- To run UAT early, you may have to use a controlled environment

#### ***2.16.3.6 Application Testing Environment: Integration Testing***

- Integration testing is about running integrated sub-systems to check whether they operate and interact as required in other words does the application work as a whole
- Integration Testing is a bottom-up approach – and called *white-box or glass box testing*.

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## **NOTES**

#### ***2.16.3.7 Additive Testing***

- Integration testing is to be carried as soon as each sub-system becomes available
- Additive Integration – helps isolate sub-systems that impact negatively on the performance of an application
- Example – if you have five sub-systems – security, LMS, virtual classroom, moderated forms and Instant Messaging. If integration testing is performed after all sub-systems become available it becomes difficult to isolate the faulty sub-system

#### ***2.16.3.8 Regression Testing***

- To be effective additive testing needs to be followed by regression testing
- When a new sub-system is tested, it is also necessary to re-test the whole system that has been integrated so far.
- This is to ensure that the addition of this new sub-system has not broken previously integrated features and functions

#### ***2.16.3.9 Application Environment: Performance Testing***

- Determines whether performance specifications are met
- Performance testing has to be conducted under real world conditions
- Example - You have specified that logon should take a maximum of 5 seconds – from client to server and back, irrespective of connection type and geographic location -Testing will be needed from different locations and different locations
- You will have to organize a network of testers representing all system types and configurations and all geographic areas applicable to you

#### ***2.16.3.10 Application Testing Environment: Volume and Stress Testing***

- Before the application goes live it is very important to test the system when a large number of concurrent users are actually using the system in a real world setting
- Test whether the application performs as expected when the maximum number of concurrent learners defined by you are logged on
- Volume testing uses software scripts to simulate the specified level of learner activity
- There are companies which provide volume testing services

- Therefore companies which provide volume testing services
- Sometimes the application shows graceful performance after a certain level or sometimes the application crashes
- When graceful degradation occurs all errors are reported to the learner, all data is saved, all files are closed and no data is overwritten.
- Volume testing should not reveal performance degradation when the specific number of concurrent users is simulated. If it does – the defect needs to be corrected
- Failure to perform under normal loads may be due to failure of server architecture or specification or the way the content has been constructed

#### **INTRODUCTION TO E-LEARNING**

- Stress testing gives information about performance beyond the specified number of users
- The aim is to find the extent to which the application can perform and the point when it fails
- Stress testing can act as a planning tool - performed if there is a possibility your learner base may double because of the possibility of an acquisition
- Stress testing can act as a risk management tool – helps to understand the probability and impact of a system crash due to overloading

#### **NOTES**

##### ***2.16.3.11 Application Testing Environment: Disaster Recovery Testing***

- All systems experience failures – you need a contingency plan in case of such failures
- The plan should
  - Identify vulnerabilities and potential threats
  - Set out containment strategies
  - Identify internal and external redundancy and backup systems
  - Prioritize recovery procedures
- The contingency plan should be published in a disaster recovery manual
- The worst case scenario is to operate a disaster plan after a disaster has actually occurred and find critical gaps or errors in the process
- Disaster recovery testing is to develop failure scenarios, simulating them and implementing the recovery plan under controlled conditions
- You should schedule a Disaster recovery testing before your e-learning application goes live.

##### ***2.16.3.12 Application Testing Environment: UAT Testing***

- UAT in the application testing environment differs from UAT testing in content testing environment in the following ways
  - Takes place within a full e-learning application
  - Works with not only learners but the entire user community including system administrators and managers

- Tests processes as well as hardware and software
- Requires a network of testers representing all geographic areas under consideration, all system types and configurations used by learners

#### 2.16.4 Scheduling Testing

- It is important not to sacrifice the time allotted to testing just because it happens late in the development process
- Going live without enough testing puts the credibility of e-learning at risk

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## NOTES

- When testing - don't do a hurried job, don't procrastinate and expect the unexpected
- Do not schedule the testing close to launching so that you are left with no time to diagnose and rectify the problem

#### 2.16.5 Rating Testing Issues

- After third-party testing and application integration is completed it is recommended that the various issues are rated by the tester according to severity and priority. IEEE Standard 1044 provides such a rating. Some examples of rating are:
  - Severity Rated as
    - Catastrophic
    - Severe
    - Major
    - Minor
    - No Effect
  - Priority Rating as
    - High
    - Medium
    - Low

#### Have You Understood?

1. What are the different levels of testing?

#### 2.17 SUMMARY

- Design is an important aspect of the entire e-learning process.
- When designing material for e-learning, the following aspects are involved:
  - Create content-based, self-paced learning objects
  - Create sequences of learning activities which involve groups of learners interacting within a structured set of collaborative environments
  - Creating Learning objects and sequences that are reusable

- The activities of the tutor in the e-learning scenario include the following:
  - Planning phase
  - Continuous Monitoring of the learning activity
  - Post-delivery review and quality check
  - 
  - Organizational responsibilities as e-tutor
- Learning outcomes can be of various types such as:
  - Outcomes which are specific in nature for example where students are required to master a particular mathematical concept

#### INTRODUCTION TO E-LEARNING

- Outcomes can be general in nature such as acquiring high level skills such as understanding a play
- Outcomes can be expressive requiring learners to acquire creative skills such as singing or painting
- Instruction design is concerned with research and theory about learning and teaching strategies and the methodologies used in developing and implementing these strategies specifically in the context of e-learning
- One of the major goals of instructional design is to minimize the transactional distance between student and the teacher and the other parties involved in the teaching learning process
- There are three perspectives of learning:
  - The *associationist/empiricist* perspective (**learning as activity**)
  - The *cognitive* perspective (**learning as achieving understanding**)
  - The *situative* perspective (**learning as social practice**)
- Bloom developed taxonomy for classifying cognitive learning objectives in terms of intellectual abilities and skills
- Constructivist Learning Process has emerged directly from a cognitive perspective. In its emphasis on learning-by-doing, and in laying importance on feedback, it leans partly towards the behaviorist tradition
- Learning objects can be described as a digital, taggable, shareable, reusable, modular, interoperable element of the learning content.
- Instructional design for e-learning needs be more structured and thorough and will essentially anticipate the requirements and doubts of the learner. In e-learning, instructional design directs and decides the learning activities and therefore plays a crucial role in the whole teaching learning process.
- ADDIE is a prominent instructional design model. Instructional design is usually associated with the ADDIE model, which describes the complete process for course design right down to minute details including individual media objects.
- Virtual case studies, online problem solving, Online Simulations and Gaming and Web casts are important types of learning engagements.
- Blended Learning – is a combination of e-learning pedagogies and traditional pedagogies.

#### NOTES

- Methodology for building e-learning teams is to analyze build and develop a collection of processes, and then to determine the nature of skills needed to operate the processes and finally based on the skills needed decide the number of persons needed to meet the workload requirement and deadlines.
- Most of the development team transition into delivery and will remain with the delivery team as long as necessary.
- In order to take the e-learning initiative forward – there is a need to form and maintain partnerships with vendors

## NOTES

- An LMS essentially helps manage an organization's learning activities and competencies. Activities managed by the LMS could vary from instructor-led classroom training to educational seminars to Web-based online training.

### Exercise

1. Explain the role of the tutor in e-learning
2. Discuss clearly the importance of instructional design in e-learning.
3. Explain in detail the psychological theory underlying learning theories.
4. Discuss the role of Bloom's taxonomy in instructional design.
5. Explain in detail the different types of learning outcomes.
6. How is learning theory mapped to learning outcomes and learning environments?
7. Explain the derivation of pedagogy from associative, cognitive and situative perspectives.
8. Give a detailed description about the constructive approach to learning.
9. Discuss the instructional design principles for e-learning.
10. Describe the ADDIE and OTARA frameworks used as instructional design models.
11. What are the design issues in e-learning? Explain.
12. Describe the various types of learning engagements.
13. Give the basic structure of e-learning development team.
14. Describe the team involved in content management.
15. What is the role of R&D Manager in e-learning? Discuss.
16. How is the e-learning delivery team different from e-learning development team ? Discuss
17. What are the infrastructural requirements of e-learning?
18. Why is important vendors and what are the criteria used for vendor selection?
19. What is a RFP? Discuss its composition.
20. How many short listing procedures are normally performed when selecting the vendor? What are the criteria for short listing?
21. What are the functions of a LMS?
22. What aspects of the learning process are centralized and automated?
23. Explain some classical applications of CMS.

24. Compare and contrast LMS and LCMS.
25. How is a LMS evaluated?
26. What are the main components that need to be tested in an e-learning process?  
Explain.

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**INTRODUCTION TO E-LEARNING****NOTES****UNIT III****DELIVERY****3.1 INTRODUCTION**

This Unit describes one of the most important components of the E-learning Process

-Delivery. In this unit we talk about the different issues associated with channel selection. Then we go on to discuss the different levels of learner support systems. We next describe the development of curricula and the emergence of Learning Objects and the importance and evolution e-learning standards. We then go on to talk about the content management process and list the steps in the development of content. We also consider two case studies and finally discuss future directions.

**3.2 LEARNING OBJECTIVES**

- To discuss the different types of delivery channels
- To consider the issues associated with channel selection
- To discuss the different levels of Learner Support
- To develop curricula for e-learning
- To understand the different evolving E-learning Standards
- To consider the role of Learning Objects in the content development process
- To understand the obstacles in the path to content development
- To list the steps in content development
- To consider two case studies – PwC & BP industries

- To discuss some future directions for E-learning

### 3.3 LEARNING VALUE CHAIN

All enterprises have a learning value chain and already use delivery channels like such as:

- Classroom
- E-mails
- Distributed presentations

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## NOTES

- Print based material
- CD-ROMs
- Knowledge Management
- Communities of practice
- Audio & video conferences

E-learning essentially adds to this value chain through additional channels;

- Self paced courses
- Virtual classrooms
- E-mentoring
- Downloadable tools
- Downloadable content for offline study

### 3.4 CHANNEL STRATEGY

The fact that there is more than one channel to deliver learning – also brings with it the issue of developing strategies for multi-channel delivery.

#### 3.4.1 Multi-channel delivery methodologies

- Delivering of all content in all channels
  - aim of matching delivery to individual learning and working styles.
  - feasible – especially with object oriented approach to content development and a well implemented CMS or LMS
  - However all content in all channels is impracticable in terms of time, cost and resources
- Delivering of all content in all learning styles
  - Delivering content personalized to each learner's preferred style of learning
  - In e-learning, the use of conversational style is encouraged. This style of presentation encourages learners to have a more personal attitude to the largely impersonal nature of the teaching process. Given below is an example to illustrate on how one can write both formal and informal versions of the same

**Introductory Portion of Text about a Botany Computer Game****Formal Version**

*"This program is about what type of plants survives on different planets. For each planet, a plant will be designed. The goal is to learn what type of roots, stem and leaves allow the plant to survive in each environment. Some hints are provided throughout the program."*

**INTRODUCTION TO E-LEARNING****Informal Version****NOTES**

*"You are about to start a journey where you will be visiting different planets. For each planet, you will need to design a plant. Your mission is to learn what type of roots, stem and leaves will allow your plant to survive in each environment. I will be guiding you through by giving out some hints"*

- Effort involved in delivering all content in all learning styles – enormous – so cannot be justified
- Further certain assumptions are made:
  - ↖ Preferred learning styles can be determined through online evaluations – may or may not be true
  - ↖ All learning content can be expressed in all styles – again probably not true
  - ↖ All learners do not adopt same learning style throughout the learning cycle
- While learning styles can effect a learners learning capacity, as Howard Gardner is guarded about the direct application of Multiple Intelligences theory to learning practice. By categorizing students based on their strengths and weaknesses - this categorization is at best fuzzy and also basically dynamic. In effect there is no scientific evidence that confirms the fact that treating learners with different personality attributes differently in the classroom or via technology- will necessarily result in significant different outcomes in their learning.
  - Delivering content through most effective delivery channels
- With the current generation of e-learning technology and instructional design we should design multi channel delivery so that the learning value chain can be leveraged by ensuring that learning messages are delivered through the most effective channels

**Have You Understood?**

1. What are the different types of delivery channels available?
2. Do we have to use Multi-channel delivery channels?

**3.5 DYNAMIC APPROACH TO DELIVERY CHANNELS**

The next issue is the determination of the most effective delivery channel. The factors

to be considered:

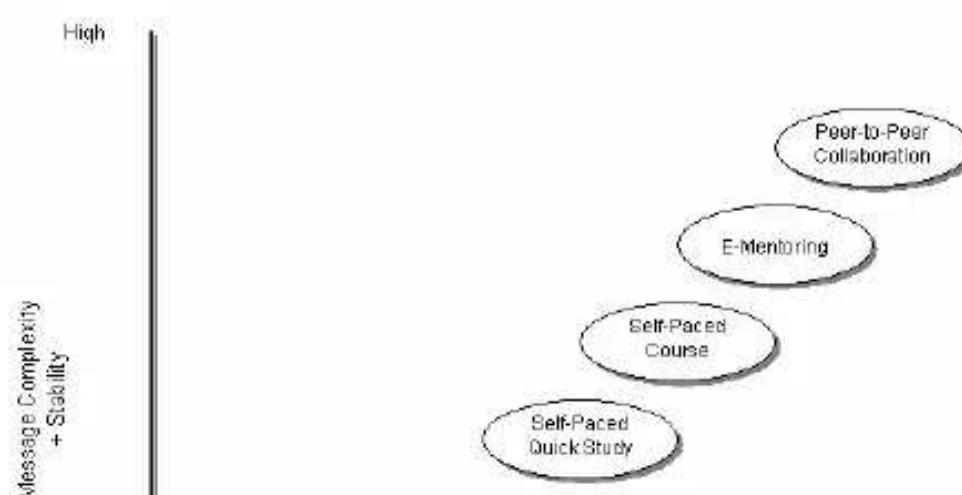
- Business driver for learning
  - Change in business strategy – needs to be communicated to as many staff as possible in least amount of time – series of large virtual classes might be the solution
  - Developing content for virtual class takes less time than for self paced courses –minimum delay in roll out
  - Virtual classes recorded for employees unable to attend

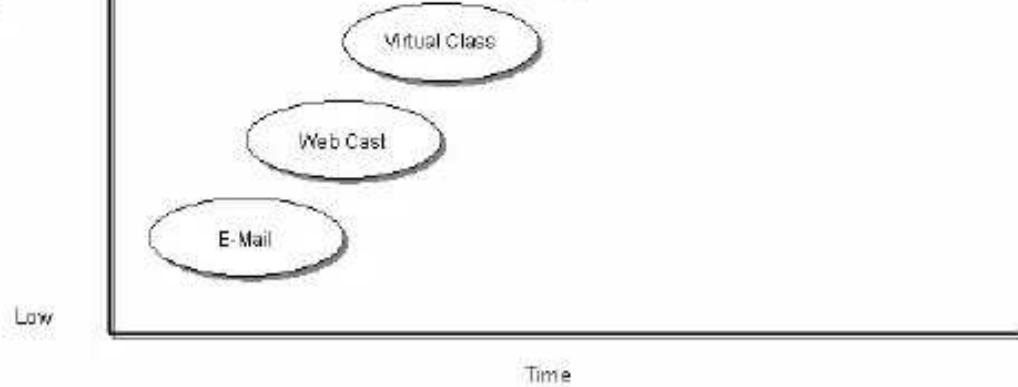
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## NOTES

- Change in strategy – medium to long time
  - Content of virtual classrooms redeveloped to suit self paced courses
  - The new courses
    - ↳ Reflect developments
    - ↳ Deliver higher level of complexity
    - ↳ Draw on range of media to deliver
    - ↳ Be available to all new joiners as well as existing staff
- Learning value chain – needs to respond to changes in the enterprise
  - Changes are basically an evolving phenomena
  - Learning strategy - must use different channels in sequence to deliver indication of change to start with and complete the learning process as soon as the change has completely evolved.
    - ↳ E-mail – to start with – indicating change is imminent
    - ↳ Web cast or virtual classrooms for middle of the change
    - ↳ Self paced course after the change is completed
    - ↳ Finally e-mentoring, online collaboration and face-to-face learning after the change is established

Matching learning requirements to different stages in learning about changes in strategy is given in Figure 3.1





**Fig. 3.1 Matching Delivery Channels against requirements**

## INTRODUCTION TO E-LEARNING

### Have You Understood?

### NOTES

1. What is meant by learning value chain?
2. What is the need for Dynamic approach to delivery channels?

### 3.6 CHALLENGING ASSUMPTIONS ABOUT DELIVERY CHANNEL

Attitudinal skills → psychomotor skills → cognitive skills  
 Learning of heart      Learning of the hands      Learning of the mind

Face-to-face → virtual → e-mentoring → EPSS → ..... → self paced e-learning

#### Figure 3.2 Learning Skills and Delivery Channels

There is a very strongly believed assumption about delivery channels – only face-to-face learning can change attitudes – distributed learning is good only for conveying information. This view places learning skills and their corresponding delivery channels on a continuum as given in figure 3.2

It is always believed that only looking at someone in the eye can you change their attitudes. This assumption is not correct for the following reasons.

#### 3.6.1 False Distinctions

The difference between learning that changes attitudes and that which does not has no meaning in an enterprise scenario since if learning does not change attitude – no effective learning takes place as performance can be improved only if attitude is changed. Therefore all learning needs to be attitudinal.

#### Example – Security

- Employees have learned about security and know its importance
- Lacking – is a sense of personal responsibility for security within the enterprise
- To be effective – learning about security
  - Needs to engage learners minds, hands and hearts

- Knowing is not enough – learning needs to be realized through doing

In an enterprise there is no component of learning such as pure cognitive learning that can be assigned to distributed learning.

### 3.6.2 Ignoring Precedents

- Physical or virtual presence of the instructor is one way of engaging learners' hearts and changing their attitudes but not necessarily the only way. We have to remember that the delivery channel that had the greatest impact on the way people think has always been the printed book – the ultimate, asynchronous, distributed, self paced

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## NOTES

and self-directed learning channel. Remember there is nothing face to face about a book but it does engage the readers' mind and heart

- **Page turning** – in a book is considered to be the author's effectiveness in engaging us so deeply that the reader is forced to turn the page. In self-paced e-learning course the same page turning is considered as a criticism of the author for his inability to hold the reader's attention. This is because of contrasting expectations from the e-learning experience. Users of e-learning expect e-learning content to be interactive – but also expect it to be fresh, just-in-time, authentic, solution centered, relevant, integrated with their work etc.. a noticeably long list of contrasting expectations.
- In spite of a long list of effective presentation tools we assume only face-to-face has the ability to deliver meaningfully. The reasons are many:
  - Lack the vision and imagination to exploit e-learning potential- is not something that can be taught
  - Lack of skills and budgets to support the vision
  - Reject the vision because technology driven change makes them uncomfortable
- Instructional design itself is evolving and trying to effectively incorporate Internet Technologies.
- However, it is necessary to embrace the different types of delivery channels to impart all types of learning skills effectively and to raise the quality of e-learning content and delivery to transform learning.
- **Two hemispheres of the brain** - Not easy to develop e-learning content with power to change attitudes and behaviors. In order to engage both right and left side of the brain we need to design content that involves both cognitive and attitudinal skills. According to Betty Edwards
  - left hemisphere – analyses, abstracts, counts, marks time, plans step-by-step procedures, verbalizes, makes rational statements based on logic
  - right hemisphere – see how things exist in space and how parts go together to make a whole, we understand metaphors, dream, create new combination of ideas. We use this part of the brain when we feel everything falls into place without really understanding it.

- You have fully engaged the learner only when you facilitate the use of both these hemispheres. It is not necessarily true that traditional learning than e-learning is better at designing and delivering content effectively. However the one thing that traditional learning does better is that facilitates face-to-face interaction between learners.

### Have You Understood?

1. List some important assumptions about delivery channels?
2. Why do think some of these assumptions are challenging?

## INTRODUCTION TO E-LEARNING

### 3.7 CHANNEL SELECTION

### NOTES

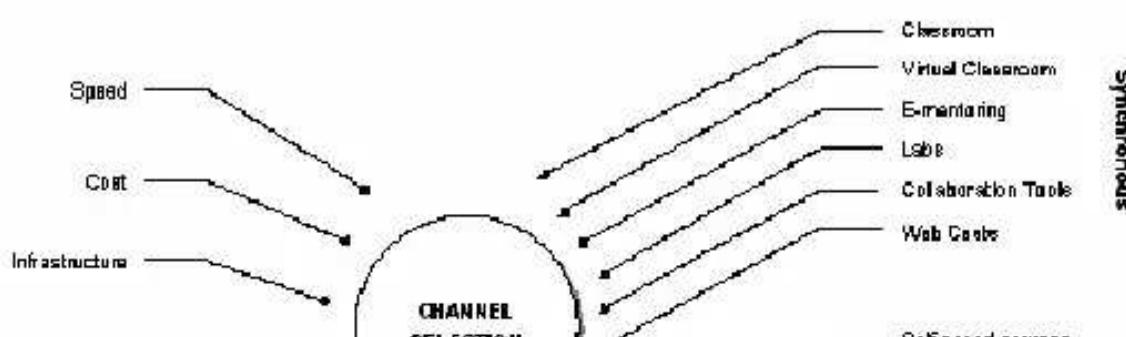
The goal is designing a learning solution that makes use of the learning value chain. The interrelation between business drivers and the choice of delivery channel is an important one and depends on the enterprise.

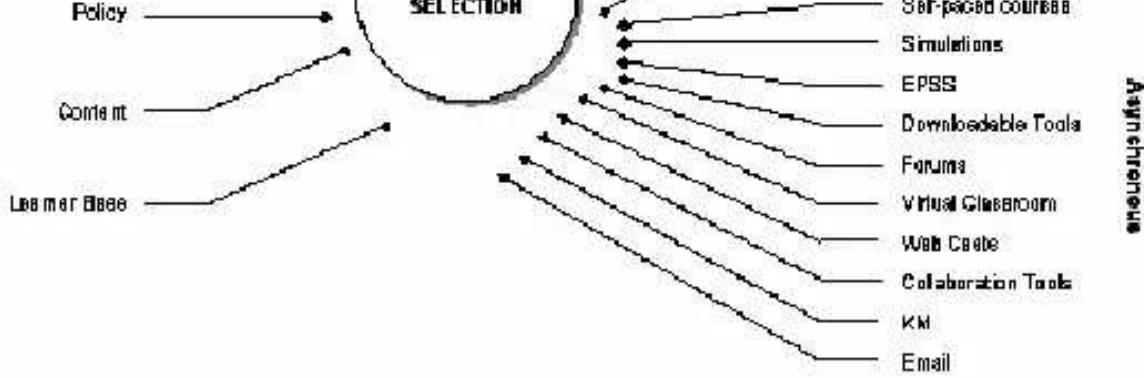
#### 3.7.1 Speed to Market

- The speed of delivery is as critical for e-learning as it is for product development, manufacture and marketing.
- The factors that decide the speed to market include – learning process is related to a merger or acquisition, a new product line, emergence of new competitor, etc..
- The fastest way – simple message to reach a larger base through a series of live Web casts or live virtual classes – both can be made ready in 24/7 hours
- The speed is because of live delivery as well as speed of content development relative to self-paced courses

#### 3.7.2 Cost

- The cost of e-learning is due to two basic factors:
  - Content development
  - Content Delivery
- Content that is cheap to develop (instruction-led classroom courses) – is expensive to deliver while content that is expensive to develop (self-paced e-learning) – is cheap to deliver





**Fig. 3.3 Channel Selection**

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## NOTES

- Virtual classrooms – content delivery & content development are both relatively inexpensive
- Size of learner base is an important factor that has an impact on the cost per learner and cost of delivery channel – below a certain number of users it is not possible to justify the high cost of developing self-paced e-learning content.
- Channel selection and its associated costs should form an important part of the business plan.

### 3.7.3 Infrastructure

- The effectiveness of e-learning depends on the reach and robustness of the enterprise infrastructure that supports the delivery channel.
- Web casts and virtual classes will be effective only if the infrastructure can support the delivery of multimedia content to all learners and to substantially large number of concurrent learners
- However – if the learners are in a region where bandwidth is limited – we have to find an alternate delivery channel
- The IT department may not appreciate that a large number of users are using the Web cast concurrently
- Using third-party web cast service can reduce the burden on the enterprise servers but does not solve the problem of bandwidth
- Sometimes you may need to deliver learning messages as attachments through e-mail which may however cause traffic to almost come to a halt

### 3.7.4 Policies

- Learning policies and targets can influence your selection of delivery channels.
- Example – the policy of using e-learning channels to deliver to a majority of learners – means that face-to-face classroom learning is not an option
- Availability of high investment may result in selection of high cost high impact delivery

### 3.7.5 Content: Lifecycle

- Content has a lifecycle. All aspects – strategies, processes, tools, techniques and legislation all have a lifecycle which start as a notion, develop over time, may fall out, may be disproved or superseded.
- Lifecycle should be considered when selecting a delivery channels.

## INTRODUCTION TO E-LEARNING

- Investment in a long self-paced course is not advisable when the content is still in its beginning stage, or is about to be superseded – instead a fast cost effective content development is advisable
- When the content is stable and lifecycle is long, self-paced and instructor led courses are advisable

## NOTES

### 3.7.6 Content: Refresh Cycle

- Related to content lifecycle but is not the same.
- Describes how frequently content needs updation during its lifecycle
- Courses dealing with project management will have a long refresh cycle – justifies investment in large self-paced e-learning course
- Many courses – about fast changing business processes – best dealt with by using virtual classes – inexpensive development

### 3.7.7 Learner base: Size

- For small number of learners – face-to-face or virtual classes is recommended
- For large number of learners – Web casts, large virtual classes & self-paced e-learning is recommended
- Very large number of learners – may also necessitate focused learning channels like e-mentoring catering to different groups
- Generally – learner base is directly proportional to content lifestyle – larger the learner base – longer the content lifecycle

### 3.7.8 Learner base: Geographic Spread

- If the geographic spread of the learner base is restricted to the same region or same city - then the most appropriate learning channel is the instruction-led classroom – since travel and accommodation expenses are negligible
- If the learners are spread throughout the world – virtual class supported by e-mentoring and peer collaboration is the appropriate solution.
  - When learner base is diverse and dispersed – then e-learning that takes care of localization is required. Localization issues include translation and cultural

localization is required. Localization issues include translation and cultural adjustments.

- When all content for large virtual classes are developed in English then localization issues such as local language translation and local issues such as different names for job titles and equipment or religious practice etc. is costly. Therefore cost of localization needs to be taken into account when the business plan is decided.
- However in certain situations where crucial e-learning is to be imparted to senior executives then the cost incurred for face-to-face session is justified

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## NOTES

### 3.7.9 Learner Base: E-learning Experience and Access

- Issues such as previous experience of learners with e-learning and ease of access to network are important issues
  - Lack of experience – indicates that you should introduce the learner slowly to new types of learning channels such as
    - ❖ Supporting e-learning channels with instructor-led classes
    - ❖ Introducing self-paced e-learning as part of face-to-face classes
  - Intranet access cannot be taken for granted –especially for offsite workers for example. In such cases – use of e-learning channels can in fact prove to be a deterrent to learning
    - ❖ Access not likely to be improved just for the purpose of e-learning
    - ❖ A critical e-learning initiative can push the need for good network access for all workers
    - ❖ The working schedule –especially for shift workers and sales staff - may make it difficult to attend virtual and face-to-face classes. For this group of learners – self-paced courses with 24/7 access is most effective

#### Have You Understood?

1. What are the costs associated with delivery channels?
2. What is meant by Content Lifecycle and Content Refresh Lifecycle?
3. What are the various issues regarding Learner Base?

### 3.8 LEARNER SUPPORT

A well designed e-learning initiative needs to be completely learner centric. It is the aim of the e-learning course that each and every component is designed to support learning and to support the learner. However in some cases, the interactions between the learner and the system does not proceed in the way the designers expected, and the role of learner support is to catch such exceptions in the learning process. Exceptions occur due to imperfections in the learning system and it is our responsibility to help and support learners

Learner difficulties are of different types, and the learner support must cater to all types of difficulties irrespective of their size and seriousness. Learner support is basically of two broad types – self-help and help desk. There are generally five levels of support which deal with any exception that may come up.

- **Self-help** is in the form of online-help files. This is Level 1 support
- **Help desk**
  - There are four other levels of support that make access possible through a help desk.

#### **INTRODUCTION TO E-LEARNING**

- Will be dedicated to e-learning – in some rare cases e-learning may share an existing help desk with IT, Human Resources or Knowledge Management.
- Outsourcing help desk is a viable solution since this eliminates need for dedicated infrastructure and will make it easier to provide full-time support
- If e-learning is delivered across time zones or have staff who work flexible hours – decision is to be made when support will be available.
- Global organizations – need to decide whether to have a single help desk working 24/7 or have separate help desks dedicated to each geographic region of operation
- Another option is to have limited number of help desks which with a little planning can be made to cater to different time zones
- Normally, in order to ensure that the help desk is always accessible it is advisable to have two robust communication options – telephone and e-mail.
- Learners should be able to always access help desk with same telephone number or same e-mail address irrespective of which help desk is currently active – this means employing *intelligent call processing* – help connecting learners to active help desk in a transparent manner.
- Messaging or intranet for voice communication (VoIP) are other alternatives for communication with help desk. The biggest advantage of VoIP is user friendliness and the convenience of having a button on each page labeled “Click me to talk to the help desk”. However the weaknesses of VoIP include quality limited by bandwidth availability, requirement of microphone at learner’s end. When learning portal goes down, together with it VoIP also goes down.
- It is a good idea to have a pre-addressed e-mail which on a single click displays a form which is designed such that the learner can communicate all the details of the problem
- It would be very useful if the help desk is able to access the learning record of learners to know:
  - ↖ The experience of the e-learner
  - ↖ Details of courses undertaken by the e-learner

#### **NOTES**

- Target response times for each help level should be published and actual response time tracked to monitor whether targets are met.
- Every learner who accesses the help desk should be informed about the estimate of when their question will be answered or their problem resolved.

Now let us look at the five levels of Learner Support in detail.

## I. Level 1 : Online Help Files

- E-learning supported by integrated online help files. Generally these include:
  - Getting started

## NOTES

- How To ..... ( common tasks)
- Alphabetical listing of Help Content
- System Status
- FAQ ( Frequently Asked Questions)
- Help Desk details
- Should cover all standard features and functions of both courses and the e-learning application including all sub-systems like virtual classrooms and collaboration tools
- In case of courses with non standard features and functions – must be supported by integrated course help files
- FAQ – should be updated as frequently as possible
  - Initial FAQ – built from data collected during User Acceptance Testing
  - Details can also be collected – by help desk agents and application designers “ walking through” likely problem scenarios
- System Status page displays up-to-the-minute system information
  - If there is a server or hardware failure - more effective for help desk agents to post this information once on the Systems Status page along with an estimate of when normal service will be restored rather than dealing with hundreds of duplicate queries
- Full details of help desk – operating hours, e-mail address, telephone number, response times, etc. – are to be made available

## II..Level 2 : Technology Support

- An important job of the e-learning help desk is to distinguish between a technology problem and other types of issues which will make it impossible for the e-learner to access the e-learning application
  - Example 1 – learner’s computer has crashed – and so operating system, browser and plug-ins may have been corrupted. This may seem like the e-learning application has crashed while actually the problem lies with the learner’s individual system

- Example 2 – there may be an unexpected shortage of bandwidth across the enterprise making the e-learning application unusable. When such enterprise wide Technology issue arises – it is better to make this fact known through the Systems Status page.
- Technology issues should be communicated to the IT help desk where expertise and resources are available to tackle these issues. It is important for the two help desks to cooperate to solve problems
- Technology issues may be with the actual e-learning application. It is important for the e-learning and IT help desks to work together to develop a *triage process* – a series of questions designed to determine whether the problem lies with the learner's system, the infrastructure or with the e-learning application

#### INTRODUCTION TO E-LEARNING

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- Depending on where the problem lies, the IT department may be responsible for learner's system, the infrastructure or with the e-learning application or e-learning vendors or third parties may be responsible for the maintenance of the e-learning application

#### NOTES

### **III. Level 3 : Application Support**

- This support assumes that the problem lies basically with the use of the e-learning application by the learner
- Learner may not be able to register for a self-paced course or may not know how to ask a question in a virtual classroom
- All issues associated with this level must be resolved by help desk at this level
- The issues encountered at this level must be logged and communicated to help desk CRM system since they may indicate defects in the application interface.
- Level 3 issues may also indicate defects in the online help files

### **IV. Level 4 : Content Support**

- Content support deals with helping a learner understand some aspect of content in a self-paced e-learning course.
- Support may be delivered by the help desk agents themselves or in collaboration with instructional designers
- Support is limited to content in the course and does not attempt to add content or deal with project-specific issues.
- Issues need to be specifically logged since they can reveal defects in instructional design or content presentation.
- In order to provide support at this level, help desk agents need to understand each new course and ask their own queries to the course designers and developers – one way is to include help desk agents in the User Acceptance Testing.

### **V. Level 5 : Content Support**

- At this level, the help desk agents transfer the learner's query to the Subject Matter

- A Service Level Agreement (SLA) can be established between the learning department and every business unit that sponsors a course.
  - SLA places an obligation on the business unit to provide subject matter experts for supporting this level.
- Subject matter experts – reluctant to become involved – because of possibility of becoming unnecessarily locked into extended dialogues with a learner - who is looking for a mentor rather than a SME
- The Help desk can function as a go-between – eliminating direct communication between learner and SME

## NOTES

- All e-mails from SME are sent through help desk – helps in capturing knowledge
- The input from SME can be incorporated as part of course-specific FAQ associated with Level 4 help desk and built into subsequent versions of the course

### Have You Understood?

1. Differentiate between self-help files and help desks.
2. Differentiate between Technology Support and Application Support?
3. What is an SLA?
4. Who are SMEs?

### 3.9 DEVELOPMENT OF CURRICULA

A course catalogue simply presents what is available. It should also support learner-defined searches. Curricula are subsets of catalogue organized to deliver value as well as information to the learner.

- Curricula enable defining paths to performance improvement
- Can be defined as sets of courses, learning objects and learning events designed to meet competency and performance requirements within an enterprise.
- From the traditional learning perspective, learning is about knowledge retention and curricula were organized around this aspect.
- From e-learning in the workplace perspective, learning is about competency – the key components of which are performance, measurement and improvement.
- Therefore in the e-learning context, curricula should ideally match the roles and responsibilities of the learner. This is why learner-centred learning concentrates on personalization, authenticity, relevancy and integration with work related activities.
- However it is also advocated that curricula catering to “Personal Learning Path” or personal curricula is the most effective curricula

Learning paths can be personalized from the perspective of different criteria and to different degrees. The different criteria are as given in Table 3.1. The different

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**Table 3.1 Criteria for Learning Paths**

Job type – for example	<ul style="list-style-type: none"><li>• Executive</li><li>• Manager</li><li>• Performer</li></ul>
User Profile – for example	<ul style="list-style-type: none"><li>• Role</li><li>• Theatre of work</li><li>• Business unit</li><li>• Language</li><li>• Clients</li><li>• Products</li><li>• Technologies</li><li>• Career ladder</li></ul>
Status – for example	<ul style="list-style-type: none"><li>• Entry level</li><li>• Experienced</li><li>• Top performer</li></ul>
Competency modeling	
Competency assessments results	
Evaluation – for example by	<ul style="list-style-type: none"><li>• Line manager</li><li>• Coach or mentor</li><li>• Peers</li></ul>

**NOTES**

- Some of the criteria are core – for example curricula covering corporate vision and values, new joiner orientation
- Others are local – for example curricula covering legislation governing commercial practice, employment, health and safety, and personal data protection.

Some LMS have optional modules that help you to model and manage competencies and later to map content to competencies to create personal learning paths.

### **3.9.1 Role of Learning Objects**

- For companies that use e-learning delivery channels, course completions are the most popular measure of learning success.

○ This is the easiest to track. The LMS or LCMS automatically records

- This is the easiest to track. The LMS or LCMS automatically records completions and dumps the resulting data into a report
- However – the relationship between course completion and impact on performance is not easy to understand and course completion metric is considered useless in determining the value of the learning process.
- If the lowest level of content granularity is a course, then it is possible that we may land up delivering content to individual learners that they neither need nor use – i.e. it is inevitable that there is over-delivery.
  - Course designers do not know the needs of individual learners – therefore they create knowledge based courses that match the needs of novice learners – thus over-delivering to all others

## NOTES

- Sophisticated course designs can utilize the outcome of pre-assessments to provide learners with customized path through the course content
- Another question to be answered in this context, is whether we need to design and develop courses at all?
  - The traditional model of publishing – a team is responsible for the content and format of a document & releases the same to the public and no change is allowed except by the publisher
  - Web publishing generally ignores this traditional model – resulting in a loose federation of documents – and treats tightly bound ideas as a collection of ideas – which the reader can consult in the order he or she wants, regardless of author's original intentions
  - These small pieces are what are called loosely as learning objects in the e-learning context.
    - One important reason for adopting an object-oriented approach to content development – is the ability to build a course dynamically that exactly meets learners' needs.
    - The course may not have been built before until the learner's need required it and may never be built again
    - The learning objects used to build the course are however available in a central repository
    - Designing learning objects poses many challenges in technology, instructional design, content management and Return On Investment (ROI).
  - Defining Learning Objects – is itself a challenge.
    - According to David Wiley considered the Guru of Learning Objects – Learning Objects can be defined as “any digital resource that can be reused to support learning”. This essentially means that anything large or small that can be delivered across the network on demand. Examples include:
      - Small reusable digital resources
        - images and photos
        - live data feeds

- live data feeds
- live or prerecorded video or audio snippets
- small bits of text
- animations
- small web-delivered applications – Java calculator
- Large reusable digital resources
- Entire web pages that include text, images and other media
- Applications to deliver complete experiences such as a complete instructional event

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- Cisco has a two-tier approach to Learning Objects
  - There is a shift from large inflexible courses to reusable granular objects that can be written independent of the delivery media and accessed dynamically through a database
  - The Reusable Information Object (RIO) strategy at Cisco is built based on Reusable Information Object (RIO)
    - RIO is granular reusable chunk of information that is media independent
    - Can be developed once and delivered using multiple delivery channels
    - Each RIO can be accessed alone as a content item, practice item and assessment item and can be combined to achieve a single learning objective.
    - Individual RIOs are combined to form a larger structure called Reusable Learning Object (RLO)
    - The use of Learning Objects in designing personalized competency driven courses allows learners to learn only what they need, not what is decided by the course designers. Courses and learning paths can now be designed to address specific performance gaps.

**NOTES****3.9.2 Competency Model**

- One of the most important steps to be undertaken before actually commencing content development is a complete analysis procedure. This analysis is of three types as shown in Table 3.2

**Table 3.2 Three Types of Analysis**

<b>Types of Analysis</b>	<b>Definition</b>	<b>Example</b>
Informal Studies	Conclusions based on feedback from and observations of students	E-lesson revisions are based on evaluation sheets completed during pilot test
Controlled Studies	Conclusions to based on learning from two	

Studies	outcome comparisons of randomly assigned participants to groups with different treatments	identical lessons – one with and one without music – is compared in a laboratory setting
Clinical Trials	Conclusions based on outcomes of lessons taken in actual learning settings	A particular e-learning program is selected based on outcomes from two hundred supervisors

- Before beginning the development of content for a learning system, it is necessary to develop a competency model – definition of competency is based on the way that the competency supports each role in the enterprise.

## NOTES

- If the e-learning initiative is intended to cover the entire value chain then the competency model should include partners, suppliers, sales channels and customers.
- Approaches to creating competency models include:
  - Consulting professional publications
    - Publications by Third party HR vendors and professional bodies who publish competency models for executives, managers and performers in all businesses – can be useful starting point – but need to be validated by your Performers and subject matter experts
  - Live observations of Top Performers
    - You may land up with an unwieldy large set of competencies associated with each role. Test your top performers in each role to determine the shared competencies that differentiate them from others – the subset that is obtained form the curriculum for that role
    - Test your top performers once every six months to ensure that the competencies are mapped to performance
  - Interviews with subject matter experts
- Pfizer Inc was considered as the best learning organization by Training Magazine. Pfizer's Competency model was considered one of the important factors that lead to its success.
  - Pfizer uses historical data – to assess the sales result of each individual based on their area, region and nation
  - This allows the measurement that answers two questions:
    - **Formative Evaluation**- Are the behaviors that training is attempting to improve getting better?
    - **Summative Evaluation** – Are the improved behaviors making a difference in sales results?
  - This measurement allows Pfizer to identify performance issues as well as identify the real benefit of training programmes.

### **3.9.3 Courses and Curricula**

- With competency model developed – now start designing and developing content to deliver the knowledge that supports the competencies
- Develop Learning Objects instead of courses for the e-learning delivery channels using the whole value chain of your enterprise
- Use of Learning Objects allows reuse of content. This is important because elements of competencies may arise in many roles creating opportunities for reuse.
- It is sometimes possible to license off-the-shelf e-learning courses to support IT skill competencies.
- When content is in place – the curriculum for each role can be developed

### **INTRODUCTION TO E-LEARNING**

- |  |              |
|--|--------------|
| <ul style="list-style-type: none"><li>• You can prioritize the development of curricula for roles based on<ul style="list-style-type: none"><li>◦ Largest requirement for performance improvement</li><li>◦ Highest value clients</li><li>◦ Most lucrative market</li></ul></li><li>• The role-driven curricula allows each learner to have a learning path to guide them to improve performance</li></ul> | <b>NOTES</b> |
|--|--------------|

### **3.9.4 Personal Learning Paths**

- Role-based curricula do not consider the actual learners' or employees' interests and aspirations – only a personal learning path can achieve this.
- LMS should allow the learner and the concerned immediate manager to design a personal learning path by adding learning content that reflects the personal and long term career interests in addition to essential role competencies.
- The employees personal mix of essential and interest driven content can be decided by the employee and the manager at regular review meetings
- Some enterprises may want access rights to be set so that only managers can set personal learning paths while other enterprises allow employees to set the personal learning paths
- A learner's personal learning path should be accessible from their learning home page and should also display the learner's progress

### **3.9.5 Evaluation**

- Having well developed competency models and curricula does not necessarily ensure success. Competency based curricula does not guarantee that competency will translate into performance.
- The curricula need to be supported by ongoing evaluation that focuses on evaluating the relationship between competency and performance.
- When competency does not result in improved performance – this may be because of:

- Decided on wrong competencies for the role
- Disconnect lies in learner behavior – little effort to turn competencies into performance

## Have You Understood?

1. Discuss some of the criteria used to define personal Learning Paths?
2. Discuss the role of Learning Objects in the development of curricula?
3. What is CISCO's approach to Learning Objects?
4. What are various approaches to creating Competency Models?

## NOTES

### 3.10 E-LEARNING STANDARDS

- Before purchasing LMS or beginning to develop e-learning content – you need to know about e-learning standards. Some of the issues regarding e-learning standards are:
  - There are no existing comprehensive e-learning standards.
  - The existing e-learning standards – AICC, IMS, IEEE, LRN and SCROM are all largely complementary
  - SCROM is by itself not a standard – it is a reference model – for a suite of standards developed by other bodies
  - E-learning standards by itself – will not determine the success, quality or effectiveness of e-learning products – it is decided by how vendors and developers implement standards
- One of the reasons why e-learning standards are required can be explained by the scenario given below:
  - During self-paced e-learning there is a dialogue between:
    - Content loaded in the learner's Web browser (client side)
    - LMS resident on remote server (server side)
  - This enables generation of learner's learner record and also allows managers to track progress at individual and enterprise level.
  - This also determines what content is presented and in what order
  - Unless the content and LMS are using the same language that is the same syntax and vocabulary – they will not be able to talk to each other.
- Standards also give assurances to buyers about interoperability – that is the ability of a system or product to work with each other without extra effort on the part of the customer
- All content that conforms to an e-learning standard will operate equally well with all other LMSs that conform to the same standard

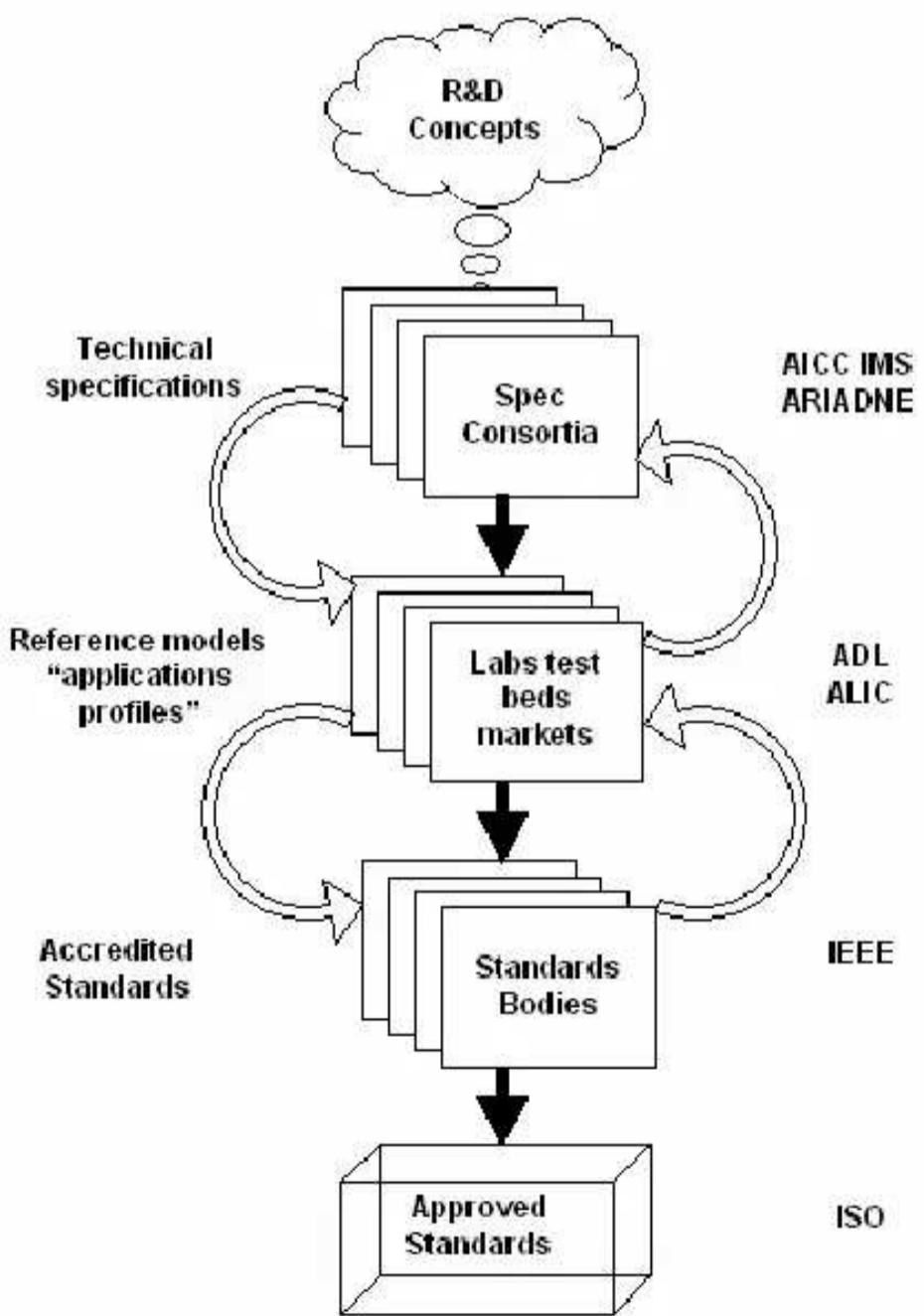
### 3.10.1 The Standards Lifecycle

- All Standards follow a development lifecycle which is made up of a series of highly iterative and time consuming processes as given in Figure 3.4.
- The cycle begins with a perceived need and some R&D concepts
  - By exposing these ideas to an interested consortia – draft specifications can be developed
  - When a consensus on the specifications is arrived at they are exposed
    - To test beds to see whether the theory proposed works in practice
    - To the market to see whether they make sense commercially

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## NOTES



**Fig. 3.4 E-learning standards lifecycle**

- Once it is established that the agreed specification works – the test results in the

form of a reference model is sent for third-party validation and then accreditation.

- Once the standard has been accredited it is sent to a global standards body like ISO so that it can be promoted to an approved international standard – the process can take a few years.
- An approved standard is also called de jure standard – that is standard according to law.
- A defacto standard can also be commonly used – a standard in fact but not by law
- If an LMS or content vendor independently develops a set of proprietary e-learning standards – and these standards dominate the market and attain a critical mass – these standards developed without consultation, third-party validation or formal approval become defacto standards.

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## NOTES

- A defacto standard may evolve for e-learning - though no vendor has been able to dominate the market to such an extent.
- Defacto standards normally evolve when one vendor achieves a breakthrough in technology that makes all work done earlier on standards obsolete.
- When vendors claim that their LMS conforms to standards – they are in fact saying that their product complies with some aspects of draft specifications that is enhanced with proprietary features. These proprietary features sometimes anticipate future standards – but if the guess is wrong – the features will result in non standard features

### 3.10.2 Benefits of E-learning Standards

- **Interoperability** – this ensures that:
  - All features and functions of content that conforms to a standard can be used on any LMS that conforms to same standard
  - Content authored – by different vendors and publishers using different authoring tools – should be capable of running on the same LMS and be able to exploit all its features and functions
  - LMS should be able to import data without intervention to other enterprise systems like HR or financial system and vice versa
- **Reusability** – ensure the ability to author, store and manage learning content as small compatible Learning Objects that can be reused as elements across many different courses
  - **Manageability** – the ability to track a learner's use of and interaction with content and to store this data in LMS or LCMS and make it accessible to earners and to the management.
  - **Accessibility**
    - Ability of LMS or LCMS to access courses and to access and sequence Learning Objects through the use of metadata and packaging standards
    - Allowing many learners to access learning content available remotely
  - **Durability** – the ability of content to support successive releases of LMS

and database applications without need for recoding or redesign

- **Affordability** – ability to leverage standardized technologies to increase development productivity and learning effectiveness while reducing costs

These benefits will allow protection and leverage the investment in content development, prevent locking up in proprietary technology and give control over to the learning value chain.

### 3.10.3 Areas Covered by Current Draft Standards

A learning manager need not be a standards expert. However the learning manager needs to know the areas covered by current draft standards. The areas covered include:

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- **Content Metadata**
  - Metadata is data about data.
  - The relevant attributes of Learning Objects that need to be described include type of object, author, owner, terms of distribution, and format.
  - It may sometimes include pedagogical attributes such as teaching or interaction style, grade level, mastery level and prerequisites.
- **Content Packaging**
  - Learning Objects need to be assembled into an usable learnable form
  - Content packaging describes a uniform method of organizing Learning Objects into courses and collection of courses that are themselves interoperable and portable
  - In addition to physical files, a content package also includes information about
    - Contents of the package
    - Order in which learning objects are to be assembled
    - Their physical location
- **Content Sequencing**
  - It is a standard for defining the order in which the learner encounters the Learning Objects
  - Draft specification for linear and branched sequencing based on outcome of pre-course evaluation emerged
  - Only sequences defined in advance by course designers were supported by the specification – not sequences determined by artificial intelligence based systems
- **Question and Test Interoperability (QTI)**
  - Standard format to support interoperability of questions and tests across different computer systems
  - QTI – does not define working of assessments, question presentation to learners or analysis of answers.
  - QTI – defines only the format in which questions and test data are held.

#### NOTES

- QTI helps instructional designers and developers to create large question banks and for development of a market for Questions and Tests
- **Learner Profiles**
  - Standard way to package information about learners.
  - Standard provides 11 broad heading under which information can be stored – most of the headings are optional
  - Interoperability is not part of the specification
  - This standard structure allows learning experience to be customized according to learner profile taking into account factors such as location, language, age and personal preferences

## NOTES

- **Run Time Environment**
  - Standards to ensure every conformant LMS can launch every conformant content
  - Standards prescribe the method in which LMS initiates and closes its dialogue (data interchange) with content and collects and stores data during the session

### **3.10.4 Bodies who are involved in E-learning Standards**

There are a number of bodies who develop e-learning standards each having their own areas of expertise but are working in collaboration. The bodies are given below:

#### **3.10.4.1 AICC <http://www.aicc.org>**

- Formed in 1998
- Name stands for Aviation Industry CBT Committee
- Aviation – first industry to realize the need to leverage technology for training, and the need for global standards.
- One of the first bodies to publish **specifications for tracking and interoperability**
- For years – AICC specifications was the defacto standard
- When vendors claim that their products are AICC compliant - it means that they have implemented some of the nine AICC guidelines – different vendors can implement different guidelines – therefore there is assurance of interoperability
- When products are AICC certified – it means that the products have been tested by an AICC-authorized independent test lab and have been certified to meet the specification
- AICC works with other standards bodies.
- Contributions to **launching content and tracking learner activity**.

#### **3.10.4.2 IMS Global Learning Consortium <http://www.imsprojects.org>**

- Began in 1997 within EDUCAUSE a non profit group dedicated to advancing

- Name stands for **Instructional Management System**
- Later on IMS became an independent membership and subscriber funded consortium with members drawn from Education, commerce and government organizations
- IMS has two key goals:
  - “Defining the technical specifications for **interoperability of applications and services in distributed learning**”
  - “Supporting the incorporation of IMS specifications into products and services all over the world – that is it **promotes the widespread adoption of specifications** that will allow distributed learning environments and content from multiple authors to work together”

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- IMS – a pioneer in e-learning standards and an important player in standards process
  - Contributions in areas of **metadata and content packaging**

**NOTES*****3.10.4.3 IEEE <http://ltsc.ieee.org>***

- Involved in e-learning through its Learning Technology Standards Committee (LTSC).
- Mandate to develop accredited technical standards, recommended practices and guides for learning technology
- 20 working groups – creating separate but related e-learning standards
- In the standards lifecycle - IEEE – body with a recognized charter to create standards
- Provides independent evaluation of draft specifications developed by other bodies with the ultimate aim of certifying and publishing a new standard

***3.10.4.4 ADL <http://www.adlnet.org>***

- In 1997 – Advanced Distributed Learning initiative launched by US Department of Defense, White House Office of Science and Technology and Department of Labour.
- ADL wanted a faster pace in the adoption of advanced distributed learning technologies for the following reasons:
  - Leveraging technology for faster learning at lesser cost
  - Leveraging standardization to enable interoperability
  - Leveraging Learning Objects – to enable searchable, reusable content
- ADL strategy – provide a focus for other standard bodies by harmonizing their work through **a reference model called SCROM – Small Content Object Reference Model**.
  - Effort to connect different standards
  - Provides a forum and technology test bed for integration of specifications
  - Kind of bookshelf – treats each separate draft specification as a separate book
  - Figure 3.5 shows the contributions of different standards groups to the reference model

- By 2002 – three books
  - Book 1 - **the SCROM overview** – contains overview of ADL initiative, rationale of SCROM, and summary of technical specifications and guidelines contained in other sections
  - Book 2 – **the SCROM Content Aggregation Model** – contains guidance for identifying and aggregating resources into structured learning content
  - Book 3 – **the SCROM Run-Time Environment** – includes guidelines for launching, communicating with, and tracking content in a web based environment
- SCROM basically developed for vendors and toolmakers
- In 2002 - ADL published draft version of *SCROM Best Practices Guide for Content Developers*

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## NOTES

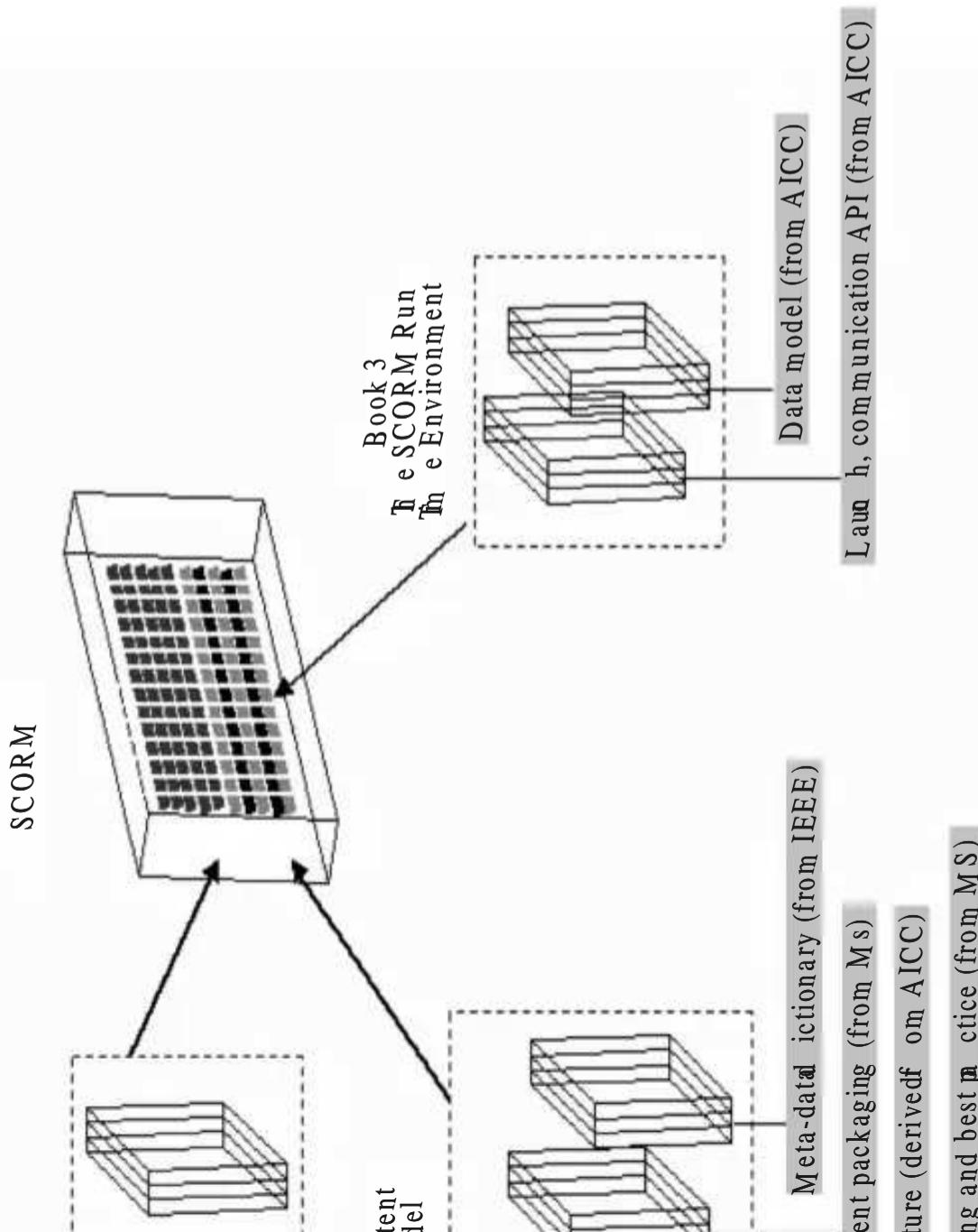
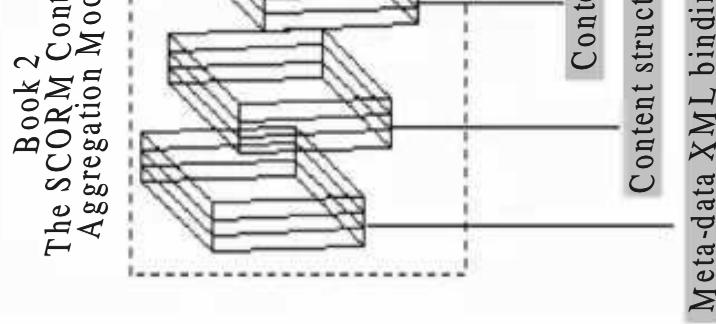


Fig. 3.5 SCORM Bookcase



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**INTRODUCTION TO E-LEARNING****3.10.4.5 ARIADNE <http://www.ariadne-edu.org>**

- Name stands for **Alliance of Remote Instructional Authoring and Distribution Networks for Europe** – non-profit association
- Founded in 1997
- Pioneers in developing **standards for e-learning metadata and reusability**
- Goals described as :
  - “Project focuses on the development of tools and methodologies for producing, managing and reusing computer-based pedagogical elements and telematics supported training curricula
  - Validation of project’s concepts is currently taking place in various academic and corporate sites across Europe”
- Contributed along with other bodies to IEEE Learning Technology Standards Committee’s Learning Object Metadata draft specification

**3.10.4.6 PROMETEUS <http://www.prometeus.org>**

- Name stands for **PROmoting Multimedia access to Education and Training in the EUropean Society.**
- Is a European partnership for common approach to production of e-learning technologies and content
- Membership open to education authorities and institutions, businesses, training organizations, software and hardware vendors, infrastructure providers, publishers, content owners and standardization bodies.
- Its main goals described as:
  - “... improving the effectiveness of co-operation between education and training authorities and establishments, users of learning technologies and content providers and producers within European Community including the Commission of the European Communities....
  - factoring the development of common European and international

**NOTES**

- .....fostering the development of common European and international standards for digital multimedia learning content and services...
- .....giving a global dimension to their co-operation and to having open and effective dialogues on issues relating to learning technologies policy with policy makers in other regions of the world while upholding Europe's cultural interests and specificities”

### **3.10.4.7 DCMI <http://dublincore.org>**

- Established in 1995 in Dublin, Ohio
- Name stands for **Dublin Core Metadata Initiative**
- Organization is

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## **NOTES**

- “....dedicated to promoting widespread adoption of interoperable metadata standards and developing specialized metadata vocabularies for describing resources that enable more intelligent information discovery systems”
- DCMI wants to use metadata to make it easier to find things on the Internet
- Actually does not focus on e-learning
- However – through an MOU with IEEE Learning Objects Metadata – signed in 2000 – platform available for DCMI to participate in developing e-learning standards

### **3.10.4.8 LRN <http://www.microsoft.com/elearn/support.asp>**

- Name stands for **Learning Resource iNterchange**
- Is a commercial implementation by Microsoft of some e-learning specifications
- Specifically supports IMS Content Packaging 1.1 and Metadata 1.2 specifications and also supports the SCROM 1.2 reference model

#### **Have You Understood?**

1. What is the need for E-leaming Standards?
2. What is the Standards Lifecycle.
3. Discuss some important benefits ofE-learning Standards?
4. What is the role of the SCROM model?

## **3.11 CONTENT MANAGEMENT PROCESS**

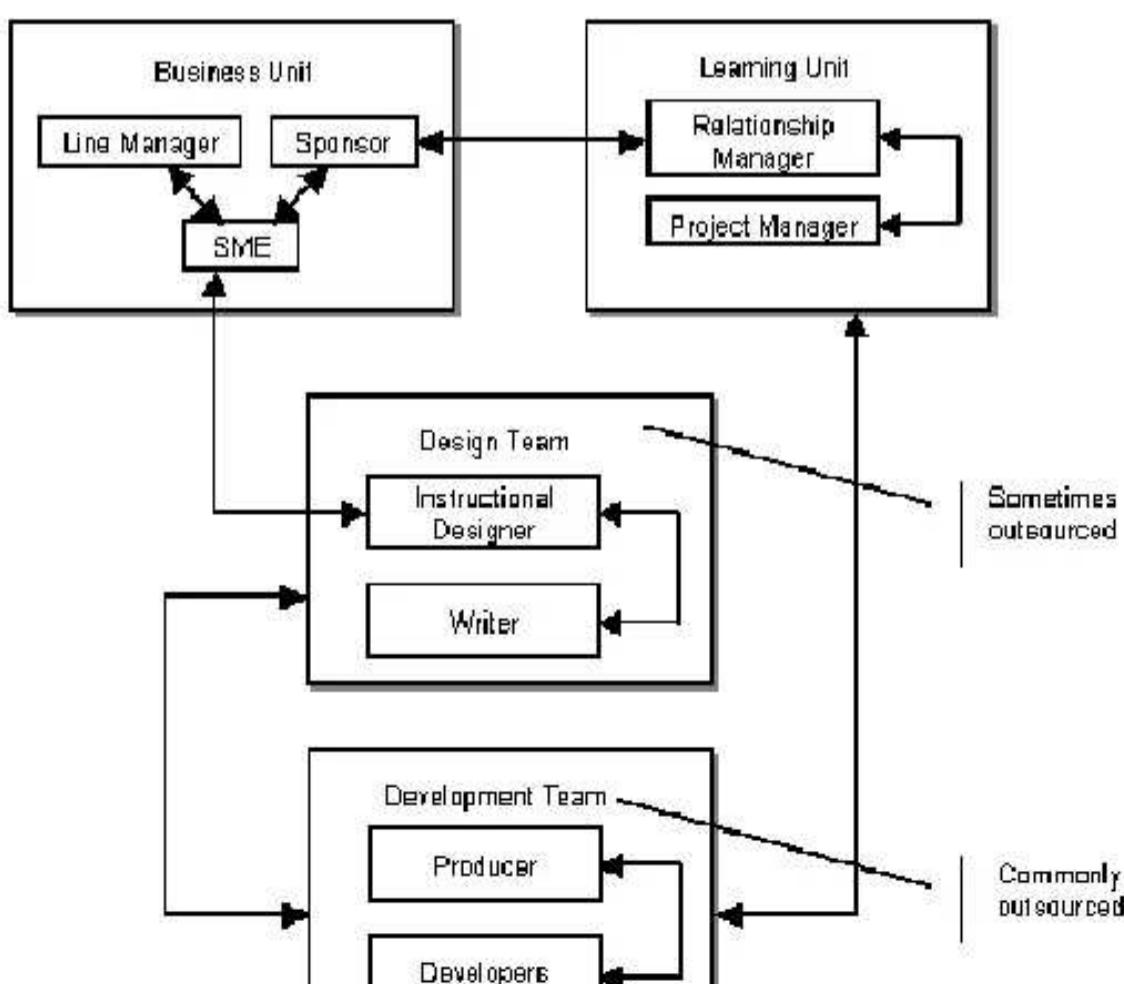
- The instructional design an important part of content management and delivery has already been dealt with in Unit 2.
- E-learning content can be viewed from two perspectives: form and content.
- Form
  - A virtual class and a self-paced course are forms
  - At deeper level, text and animations can be forms

- At deeper level – text and animations can be forms
- Content is what the subject matter expert brings to the development process
  - Content can be raw – a new technology
  - Sometimes can be processed – book, white paper, transcript of a speech, Powerpoint or a course itself in another form. The basic issue is to find the right content first and then decide of the form that expresses this content in the best possible way.
- The main goal of content development is to close the gap that is preventing the enterprise from achieving consistent peak performance.
- To achieve this main objective there is a need to work with the best subject matter experts (SMEs)
  - SMEs are scarce and both managers and customers need them

#### INTRODUCTION TO E-LEARNING

- Managers have to make SMEs available and the businesses have to understand the importance of the contribution of SMEs to the content development process. Figure 3.6 shows the relationships that exist between the different players in the content development team.
- Another aspect is that SMEs should realize the necessity to make contributions.
  - Knowledge sharing is made part of regular staff assessments
- Sometimes – 20% of SME's time in a project is spent on knowledge sharing
- Effective way of achieving this knowledge sharing is to embed it in an e-learning course

#### NOTES



### **Fig. 3.6 Content development relationships**

- Knowledge sharing can be encouraged by
- Rewards both financial and career advancements for being involved in knowledge sharing
- Giving public recognition for the SME's contributions
- Giving credit to SME along with sponsor and development team in each course

## **NOTES**

### **3.11.1 Learning Objects**

#### ***3.11.1.1 Understanding Learning Objects***

Let us consider an every day life example of “baking a pie” to understand Learning Objects.

- Start by analyzing the task
- There are three steps
  1. Prepare the crust
  - 2 Prepare the filling
  3. Bake the pie
- Essentially steps 1 & 3 are the same for every pie – step that changes is step 2
- Let's say you know about – baking an apple pie
- Take the three steps and develop each as a learning object and store in an object repository
- Later there is a performance gap in making cherry and rhubarb pies
- Instead of developing two new courses – you develop two new learning objects – preparing cherry filling and preparing rhubarb filling
- Combine two new learning objects with existing learning objects for steps 1 & 3 and you have two new courses quickly and inexpensively
- You actually have five learning objects & three packaging instructions that assemble the objects according to the instructional designer's instructions

#### ***3.11.1.2 Definitions***

- Let us relook at the definitions of learning objects already discussed in Unit 2.
- Learning objects can be described as a digital, taggable, shareable, reusable, modular, interoperable element of the learning content.

- It can also be described as the smallest discrete reusable collection of content capable of presenting and supporting a single learning concept.

As learning concepts can vary from simple to complex – learning objects are of variable size. It is desirable that learning objects should be of fixed structure and granularity that is they should fall within the same level in the content hierarchy shown in Figure 2.6 in Chapter 2.

- These definitions are supplemented by Warren Longmire, co-author of *Managing Web-based Training*. He outlines the ideal attributes of reusable learning object content as follows:
- “modular, free-standing, and transportable among applications and environments
- Non-sequential

#### INTRODUCTION TO E-LEARNING

- Able to satisfy a single learning objective
- Accessible to broad audiences
- Coherent and unitary within a predetermined schema so that limited number of metatags can capture the main idea or essence of the content
- Not embedded within formatting so that it can be repurposed within a different schema without losing the essential value of meaning of the text, data or images”
- Wayne Hodgins, e-learning visionary and Chairman of IEEE Learning Technology Standards Committee’s Learning Object Metadata Working Group – cites Lego as his inspiration for learning objects. However Hodgins is fully aware that learning objects operate at a higher level of complexity than a Lego.
- Another complex simile – the atom – was considered as the basis of learning object by David Wiley editor of *The Instructional Use of Learning Objects*.

On this basis, he outlined some properties of learning objects that are similar to the following properties of atoms:

- “not every atom is combinable with every other atom.
- Atoms can only be assembled in certain structures prescribed by their own internal structure
- Some training is required to assemble atoms”
- Learning Objects can also be compared to a train.
  - Each learning object is designed to carry different types of content – concepts, principles and processes as examples
  - Despite the differences in payload – each learning object must be able to connect to any other learning object to form a robust whole – form a seamless learning sequence and run on a standardized technology infrastructure
  - Can be disassembled and reassembled to form new seamless wholes
- There are a number of indicators that the future direction of e-learning lies in the use of learning objects

#### NOTES

- Development in 1999 – and implementation by leading Internet Company Cisco Systems – of reusable learning objects strategy
- Emphasis on interoperability, metadata, reusability and sequencing all pointers to learning objects – by e-learning standards development Groups like IMS and SCORM
- Emergence of Learning Content Management System (LCMS) which supports development and publishing of learning objects
- A decision has to be made regarding whether the content development process follows
  - Course oriented approach.
- Disadvantage - if you later want to switch to learning objects – rebuilding all existing content is necessary

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## NOTES

### ○ Object oriented approach

- Advantage - Develop learning objects without full commitment to reusability, metadata and “on the fly” course assembly
- Can be implemented in phases – however some decisions on enabling technology need to be taken at the beginning itself
- Learning objects can be developed without an LCMS or LMS – but it is advisable to implement one of them – especially for a large e-learning initiative
- Reusability is an important benefit – saves time and cost. However without metadata tagging – reuse is slow and expensive because searching for the right reusable object then becomes a manual process
- Tagging is time consuming and expensive and makes sense only if the tagging and searching for reuse process is less expensive than building content from scratch
- Learning objects and standards do not suit all circumstances – given below are some cases where there will be no benefits:
- All content – short shelf life – so no question of reusability
- No requirement for LMS or LCMS and no need for tracking learner activity
- Business requirements can be met by e-learning based on simple static content navigated by simple hyperlinks
- No requirement for using learner’s interaction for content sequencing
- Intent to utilize a single licensed content from a third-party publisher who will also host the content.

**Table 3.3 Learning Objects – pros and cons**

	<b>Pros</b>	<b>Cons</b>
Productivity	<ul style="list-style-type: none"> <li>● Breaking content into learning objects – different parts can be maintained and updated separately</li> </ul>	<ul style="list-style-type: none"> <li>● Changing into learning object approach – from self-contained system approach involves</li> </ul>

	<ul style="list-style-type: none"> <li>Suitable learning object found – new ones need not be created – cost saving</li> </ul>	retooling and retraining costs
Flexibility	<ul style="list-style-type: none"> <li>As the number of standards-based learning objects become available – increased choice – increased flexibility for designers</li> </ul>	<ul style="list-style-type: none"> <li>Using standards-based learning objects restricts scope of learner information – accessibility by content only if total interoperability is maintained</li> </ul>

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Pedagogy	<ul style="list-style-type: none"> <li>Learning objects – fit into many ISD theories</li> <li>Instructional Templates – created with slots for specific types of learning objects</li> <li>Learning objects – encourage designers to operate in a more disciplined way</li> </ul>	<ul style="list-style-type: none"> <li>Restrictions on learner information could restrict pedagogical approaches</li> <li>Approaches using lengthy discussion type of material – may not benefit from use of learning objects</li> </ul>	<b>NOTES</b>
End User Cost	<ul style="list-style-type: none"> <li>Learning object approach – prevents consumers from being locked into specific systems</li> <li>As Standards become more prevalent – content market with lower cost and increased choice will be the order of the day</li> </ul>	<ul style="list-style-type: none"> <li>Cost of converting existing content to a learning object approach may be significant</li> </ul>	
Industry Support	<ul style="list-style-type: none"> <li>All leading system vendors and content producers – support SCORM and other standards – based on learning object approach</li> </ul>	<ul style="list-style-type: none"> <li>12 to 18 months before a vendor adopted approach is actually implemented</li> </ul>	

**3.11.1.3 Pros and Cons of Learning Objects**

Robby Robson of Eduworks Corporation and Chairman of IEEE Learning Technology Standards Committee provides a useful summary of the pros and cons of learning objects and this is provided in Table 3.3.

**3.11.2 Rapid Development**

In e-learning, rapid development is usually based on:

- **Template driven development**
  - Templates ensure standardization across the development process
  - A methodology and template should exist for every sub-process
  - Presentation styles and to a certain extent instructional design can be embedded in templates
  - Templates streamline the process of developing an early prototype – allowing a course to be published in phases
  - Enhancement in features, functions and content can be incorporated into subsequent releases

## NOTES

- **Self-publishing**
  - This essentially means leaving out the instructional design process and allowing the subject matter expert (SME) author the courses
  - Risk is that though SME may be an excellent expert – but has no knowledge about writing and presenting for distributed learning – may end up with great thinking – poorly expressed
  - SMEs – no skills in authoring multimedia content – either all self-published course is text based or SME has to work with Web developers – not effective use of expert's time
- **Standardization and Streamlining Processes**
  - Standardizing an instructional design architecture and presentation style makes way for rapid development
  - Adopting and adhering to a development lifecycle is also crucial
  - Rapid Development reviews that focus on essentials, comment objectively and positively and delivers the reviews in time is also important

### 3.11.3 Development Costs

#### 3.11.3.1 Metrics used

Development costs are largely composed of labour and project management costs. The following metrics are normally followed:

- Cost per learning hour - learning hours can only be estimated – different learners move at different speeds
- Cost per Screen/page – the number of screens in a course can be calculated more accurately by analyzing the Detailed Design
- Complexity also impacts cost – some developers rate a Detailed Design as simple, average or complex and accordingly have a cost scale. This makes sense since the average number of hours for development of a self-paced course of same duration increases as the complexity increases

#### 3.11.3.2 Spectrum of development cost

In an enterprise the spectrum of development cost is fairly broad as given below:

- Simplest – single SME – low overhead branch office developing a Web-enabled Powerpoint Presentation spends 25 hours developing one hour of learning. Cost – SME's salary plus opportunity costs
- Middle - learning department employee using an authoring system and templates – builds a straightforward functional course – spend 80-100 hours
- Complex – large development team based in a high overhead city developing a media rich highly interactive 40-hour course – spending 200 to 600 person hours – will cost hundreds of thousands of rupees

### ***3.11.3.3 Use of low labour cost markets***

Development is based on labour costs so shifting to markets with low labour costs seems a viable option.

## **INTRODUCTION TO E-LEARNING**

- Asia – an obvious solution – development companies in India – creating e-learning content for clients in Europe and USA
  - Savings made this way sometimes offset by additional costs for project management, communications, travel, time difference and importantly cultural differences
  - If – the design process is not frozen or is behind schedule – having a development team in another continent will cause more problems
- Another low cost region where skilled and experienced e-learning development community exists is the Canadian province of New Brunswick

## **NOTES**

### ***3.11.3.4 Factors that Impact Cost***

The factors and variables that have an impact on cost are as follows:

- Quality baseline – the aesthetic standards of your screen design, graphics, animations, audio and video
- Media richness – amount of multimedia in your content
- Interaction richness – quantity and quality of interactions learners have with content
- Template versus craft – if screen content is decided entirely by template, development will be less expensive if there is scope for elaboration
- Stability of content – course is developed in parallel with evolving new process or technology – likely to be lots of changes during course development
- Complexity of content – higher up Bloom's taxonomy the content is – the more expensive the course development is
- Value to the business – sponsors will invest more in content that is critical to business success
- Shelf-life – short shelf-life means low cost that is cost of content development is directly proportional to shelf-life

### ***3.11.4 Obstacles in the way of Content Development***

Some of the obstacles in the path to content development are listed below. There is no way to avoid them – but we need to be aware of them:

### ***3.11.4.1 Turnaround Time for Reviews***

- When the deadlines for delivery of e-learning content are short – the time scheduled for review of content is extremely short. It is extremely important that the estimates of review time is accurate – otherwise the development team has to make up for the shortfall
- Define reasonable review time in the SLA between the business units and the learning departments
- Ensure that the reviewer's time has been cleared with his immediate manager
- The changes in delivery dates of content review must be promptly conveyed to the concerned SME
- As far as possible avoid last minute changes to the review schedule

## **NOTES**

### ***3.11.4.2 Consensus among Experts***

- Getting experts to reach a consensus even they may agree broadly in principle is indeed a challenge
- Sometimes more than one SME may be involved or even if only one SME is involved – they will share their views with other experts or sometimes there is a hierarchy of experts with the real expert delegating the day-to-day reviews to junior experts – in all such cases – you may be caught in a situation where there are conflicts or sometimes one expert claiming the other is wrong
- Often impossible – to bring everyone together to resolve the conflicts – and you are not sure what has been accepted and what has not been accepted
- One way to resolve this problem – ensure that your SLA stipulates single source of feedback
  - There may still be SMEs having conflicts – and you need to be diplomatic but make it clear only the voice from nominated source counts
- If possible – agree to a conflict breaking process in advance – appointing an arbiter (may be the sponsor)

### ***3.11.4.3 Unrealistic Schedules and Budgets***

- Sponsors expect that e-learning is delivered at a rapid speed with unrealistic schedules. They do not realize the complexities and time dependent parameters of the development process.
- If you feel that your schedule is not realistic – you need to make that clear at the outset
- Increasing the size of the development team does not necessarily reduce the time for development
- Unrealistic budgets are another problem – often sponsors look for best value for money – and negotiate the budget but beyond a point the reduction becomes unrealistic.
- Unrealistic schedules and budgets leads to a lose-lose situation

- Shifting the problem by bringing in third-party vendors does not necessarily mean that the unrealistic schedules & budgets can be met

#### ***3.11.4.4 Change of Scope***

The change scope is an important issue you must deal with. You have to protect yourself against major changes in scope.

- The first level of protection is the development of a set of interrelated and highly specific key documents
  - Preliminary Design sets the scope for Detailed Design
  - Detailed Design sets the scope for software development
  - The budget and schedule set the financial and time parameters for the realization of Preliminary and Detailed Designs
- The second level of protection is the implementation of a change control process

#### **INTRODUCTION TO E-LEARNING**

- Any change required by the sponsor or SME after sign-off that will affect the budget and/or schedule needs to be evaluated and documented
- The change of scope should not be implemented until change in budget and schedule is accepted by the sponsor
- On some projects change in scope can have a cumulative effect that results in large changes in budget & schedule and can become a large management overhead
- It is not necessary to accept every change suggested and the cumulative effect can be pointed out especially if the project is already running late and over budget – unless all repercussions are accepted by the sponsor

#### **NOTES**

#### ***3.11.4.5 Review, feedback and Bug Reports***

- A number of people will review content from different perspectives and at different points in the process – examples
  - Sponsor reviews
  - SME reviews
  - Unit testing
  - Integration testing
  - Proof reading
- Managing the output of these different reviews is itself challenging especially when dealing with large courses
- Having a standard form to collate all reviews – so that if there are more reviews about a single sub-module – the developers need to be given a single document listing all the required fixes
- If a CMS which has a Web interface is used - reviewers can input comments and associate them with any component of the content. Later developers can access these files and collate information
- Evaluating detailed design and multimedia content needs some precautions, as SMEs do not work with these components on a regular basis.
  - Better to brief the SME or any reviewer – about content they need to review

- Explain Detailed Design and any technical phrases or abbreviations used
- When reviewing Multimedia content it must be made clear what is the progress of development since preliminary work may seem shoddy to the inexperienced eye.
- If the content development is template driven there may not be many bugs. If bugs turn up they can be easily fixed.
- However the bugs normally occur due to incorrect interpretation of Detailed Design by the development team
  - Does animation reflect the process accurately?
  - Does diagram convey the concept accurately?
  - Is simulation true to real life?
- There are many ways to prevent such interpretive issues
  - Briefings with SMEs are detailed and there are mechanisms to clarify matters

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## NOTES

- Ensure that documents used for such briefings are accurate and current.
- Clarify if there is anything the sponsors and SMEs do not want to see in the content
- Web developers need to understand the business content in order to be able to illustrate better.
- Create an environment where asking for clarifications is encouraged
- Ensure that change of scope is not masqueraded as feedback

### ***3.11.4.6 Delivery***

- Delivering content for review – has its own complications.
  - Third-party development team should be able to FTP software units and courses for review- however enterprise firewalls do not normally allow such FTP
  - Another option is e-mailing – however there may be constraints on size of attachments
  - Content can be delivered in person through CD-ROMs – also an issue due to distance.
- Giving access to sponsor or SMEs for reviewing is another issue.
  - Content can be hosted on a review server accessible on the enterprise extranet –SMEs may not have access to enterprise intranets

### ***3.11.4.7 Copyright and Royalties***

- Costs of photographs, moving pictures and music from library sources needs to be taken into account
- Similarly cost of text data from third-party vendors also needs to be considered

### **Have You Understood?**

1. What is the importance of Knowledge Sharing?
2. Give an everyday example to understand Learning Objects.
3. Give a comprehensive definition of a Learning Object.
4. How can content for review delivered?

5. What is the problem with getting a consensus among experts?
6. How do you deal with change in scope

### **3.12 STEPS IN CONTENT DEVELOPMENT**

#### **3.12.1 Deciding whether to buy or build content**

##### **Availability of Generic Content**

- Many hours of generic e-learning content is available from publishers which costs considerably less than developing custom content
- All performance gaps cannot be closed by utilizing only off-the-shelf readily available content.
- However readymade content are available which is common for many enterprises or enterprises in your domain of operation

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#### **INTRODUCTION TO E-LEARNING**

- Generic content are available in many IT areas such as beginner's courses in office automation, to advanced courses in network administration and programming. Generic content is also available in general areas like quality standards, customer service, finance, human resources and leadership
- Buying content eliminates development time, risk and minimizes cost

#### **NOTES**

##### **Factors to consider when deciding whether to buy or build**

- **Learning Curve**
  - When custom content and generic content from publishers are to be combined staff need to tackle the different interfaces associated with different generic content publishers, as well as deal with different instructional design approaches adopted by different publishers.
  - These differences can impact learning speed and effectiveness
- **Configurations**
  - Publishers allow a certain degree of configurability in the presentation layer – like changing colours, fonts, or inserting company logo.
  - Configuration beyond defined parameters can be impossible or very expensive – the scope of configuration should be understood
- **Common Catalogue**
  - It is necessary to provide a common content catalogue so that learners need not navigate in different locations to find content.
  - If you are mixing custom content and generic content – there is challenge in providing a single catalogue.
  - If most of the content is generic, the publisher can be asked to provide and host the catalogue.
  - The publisher must be made to understand your catalogue requirements.
- **Localization**
  - While the content of the generic courses may suit your needs – the roles, processes, equipment and language requirements may be different

processes, equipment and language requirements may be different.

- Publishers provide some amount of localization but the associated costs may even deter the use of generic content
- If you need to publish content in local language find out what content is available in what language.
- If required you must request the publisher for translation – however the additional cost must be taken into account
- **Specifications and Standards**
  - You must ensure that both generic content and custom content will interact seamlessly with the Learning Management System – without need for any change
  - If you are mixing generic content from different publishers then they need to also interact with the Learning Management System

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## NOTES

- You need to make sure by testing that the content is interoperable or you understand the scope and cost of making it interoperable
- **Learning Standards**
  - You need to find out what draft standards the publishers propose to implement learning objects and exactly what aspects they actually implement

### 3.12.2 Managing Development

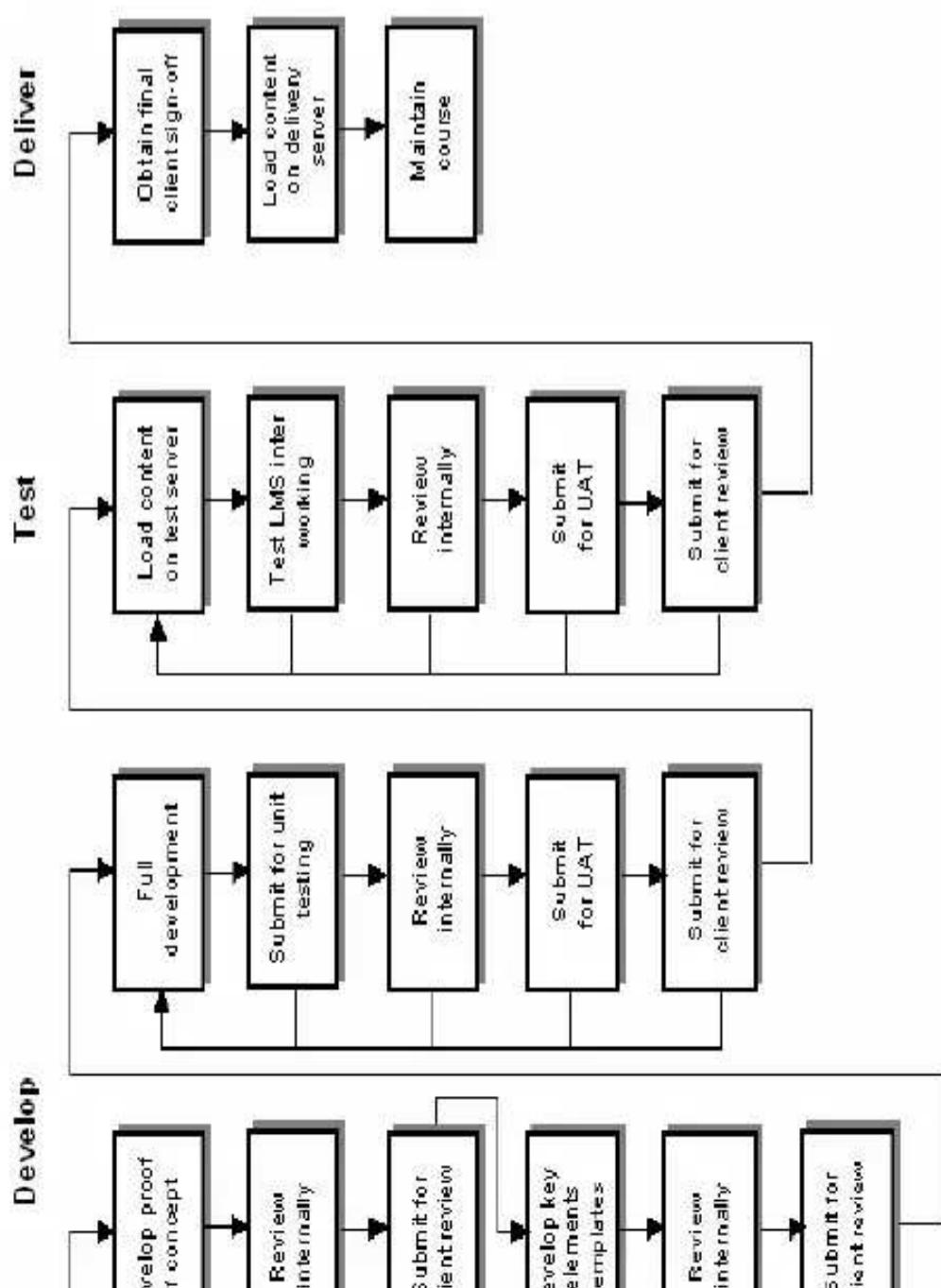
- Self-paced e-learning content development process is made up of a number of interrelated processes
  - Process to hold all sub-processes and associated skills together with effective sequence
  - Key documents – to ensure all members of the team are working towards a common goal
  - Approach to quality that is embedded in the complete process
- Four groups are involved in the development
  - Business unit – it has a performance gap
  - Learning department – requested to close the gap
  - Design team – analyses the performance gap, applies instructional design and writing skills to develop a solution
  - Development team – builds the software
- Learning Department may be an internal resource – or may be outsourced. The design and development activities are increasingly being outsourced
- The pivotal role in content management is the project manager of the learning department
  - Responsible for delivering content according to schedule and within budget.
  - When development is outsourced – responsible for the commercial interaction

- When development is outsourced – responsible for the commercial interaction with the third-party developer
- Has overall responsibility for the vendor selection process – including developing the Request for Quotation (RFQ)
- After selection of vendor – owns contract and is responsible for fixing project schedule, milestones and budget
- The development team consists of a number of Web developers
- The design team normally consists of the designer and a writer or researcher – reports to project manager for scheduling and delivery and to business unit regarding correctness of content

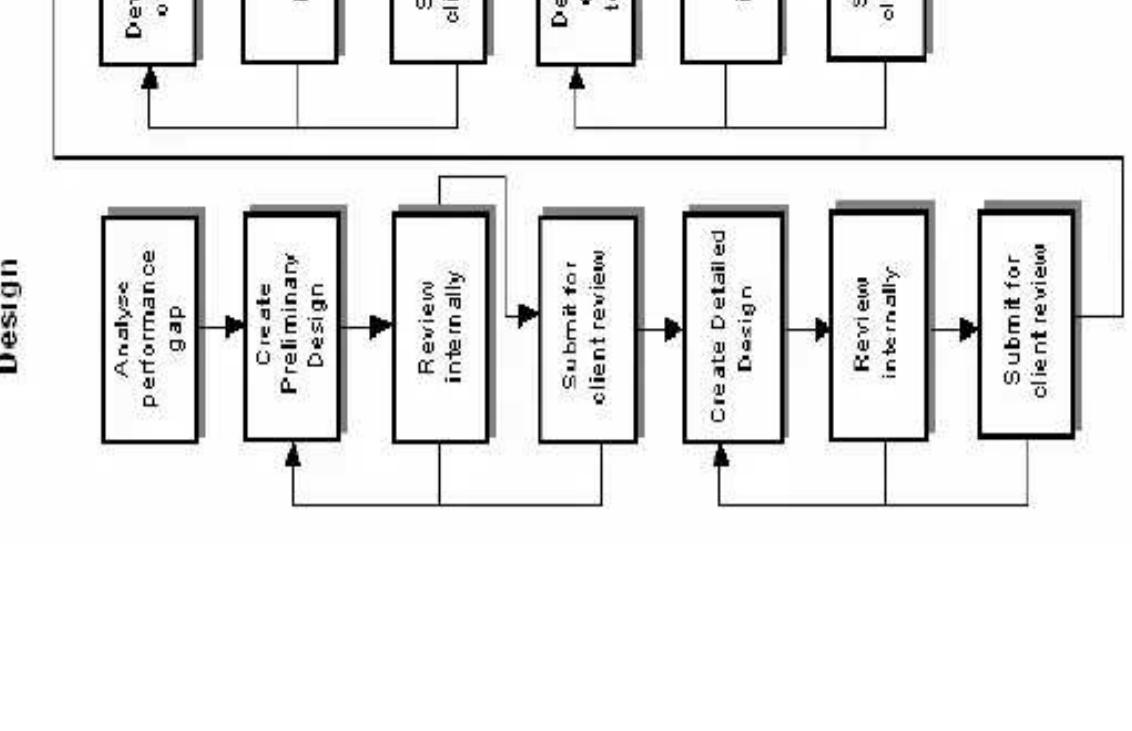
### 3.12.3 The Development Lifecycle

The course development cycle is shown in Figure 3.7

## NOTES



**Fig 3.7** Course development lifecycle



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**NOTES**

Though the figure suggests a linear process, the development cycle is almost always based on parallel processing. At any point in time, content will be in atleast three phases design, development and review processes.

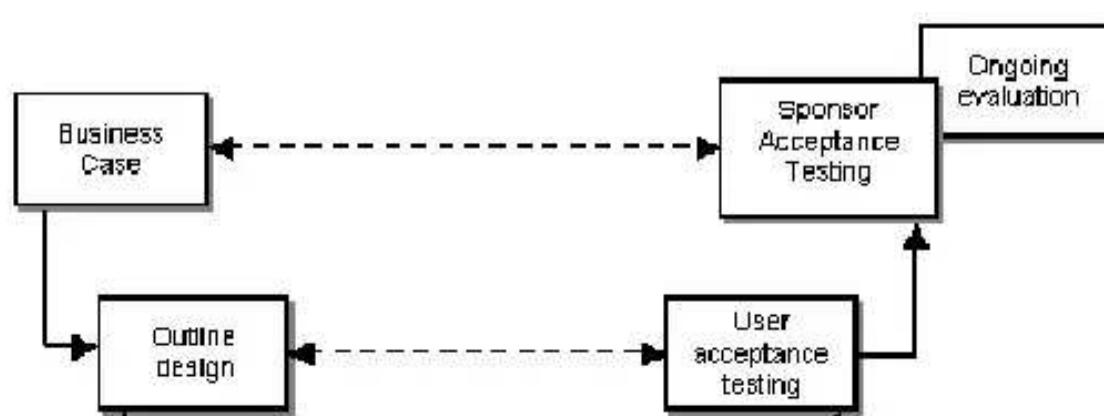
**3.12.4 Key Documents**

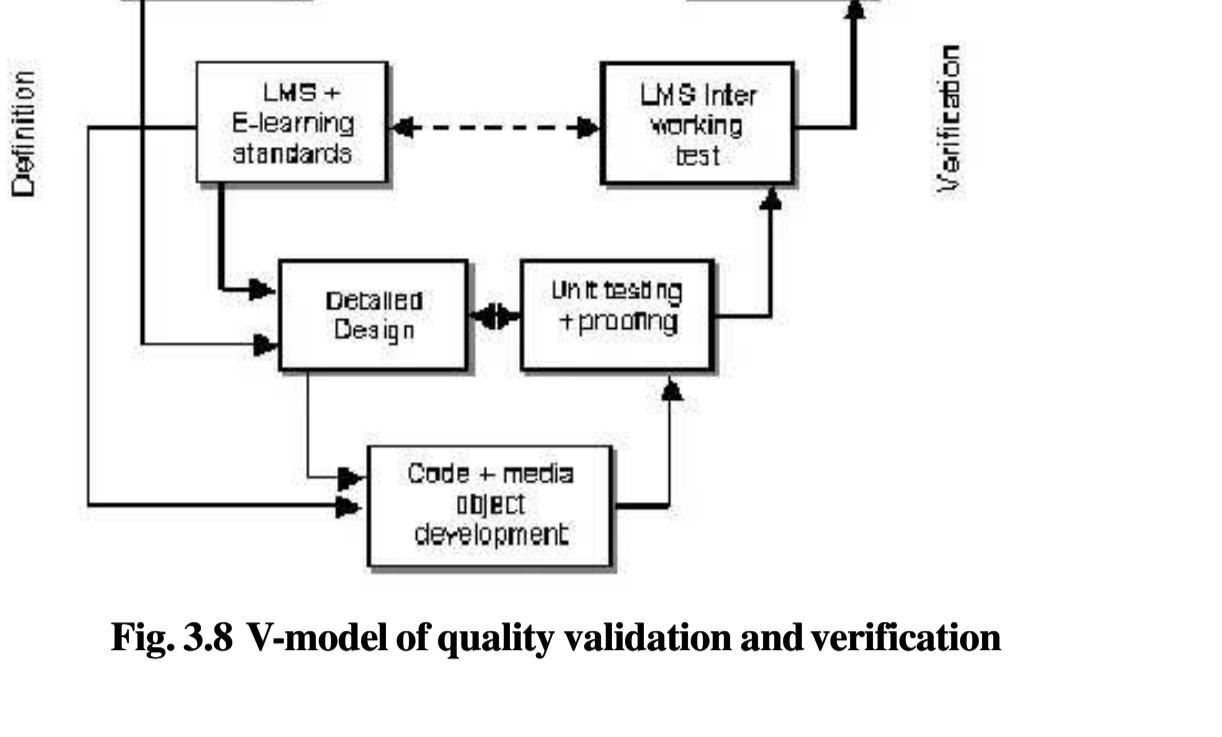
- Key documents support content development by performing the following functions:
  - Enables validation of content development process formatively – by recording the requirements, instructional design strategies and software development requirements
  - Enables the whole development team which may be geographically dispersed to stay aligned with any updates either in scope or requirements
  - Support knowledge sharing within the e-learning community
- There exists five key documents
  - Business case
- Developed jointly by business unit and learning department
- For the sponsor – it ensures development costs are available upfront and ROI is attractive
- From the learning department view – ensures learning is aligned with business and funding has been obtained
  - Preliminary Design
- Prepared by design team with help from the relationship manager, business units and SMEs
- Performance objectives and scope of content are critical elements of this document
- Critical for Preliminary design is the determination of the necessary and appropriate knowledge components for a given instructional goal
- Audience for this document – sponsor, design team and development team

- Signed by sponsor and SME
  - Detailed Design
- Developed by the design team
- Specifies every element of the course
- It is the software developer's so called script
- If any concept or prototype is not included in Preliminary Design it can be included in the Detailed Design
  - Schedule – a detailed schedule of all activities
  - Budget – a detailed budget considering all components both internal and external

**INTRODUCTION TO E-LEARNING****3.12.5 Quality**

- Testing content is a continuous process and cannot be a last minute activity
- Monitoring and maintenance needs to be carried out throughout the development lifecycle.
- Key documents provide reference points for validation and verification- called V&V
- Validation answers:
  - Is it the right content?
  - Does it meet the learner's requirements specified in the key documents?
- Verification answers:
  - Is the content developed in the right way?
  - Does each sub-process meet the specifications described in the key documents developed in the previous sub-processes?
- Validation & Verification is usually described using the V model shown in Figure 3.8. The model describes the relationships between key documents, processes and deliverables. Some documents are from external sources – e-learning standards and LMS requirements

**NOTES**

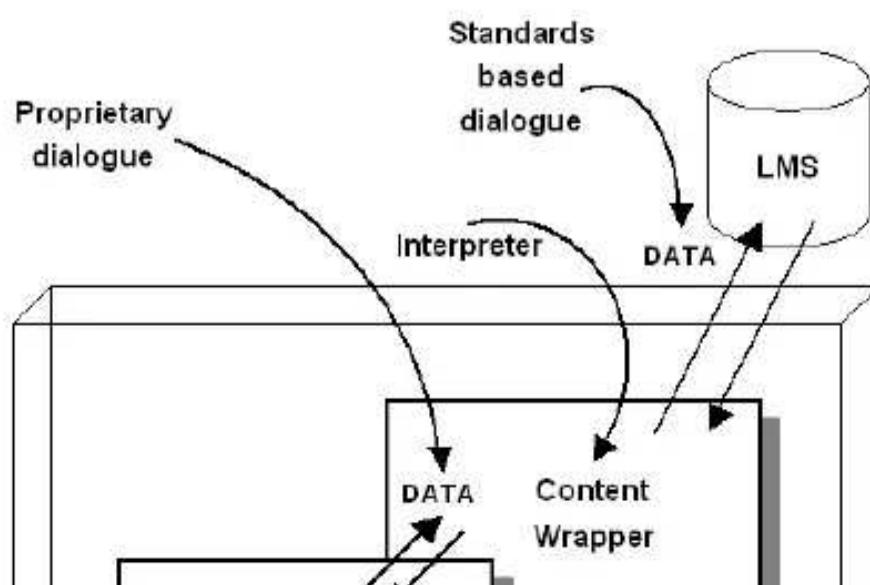


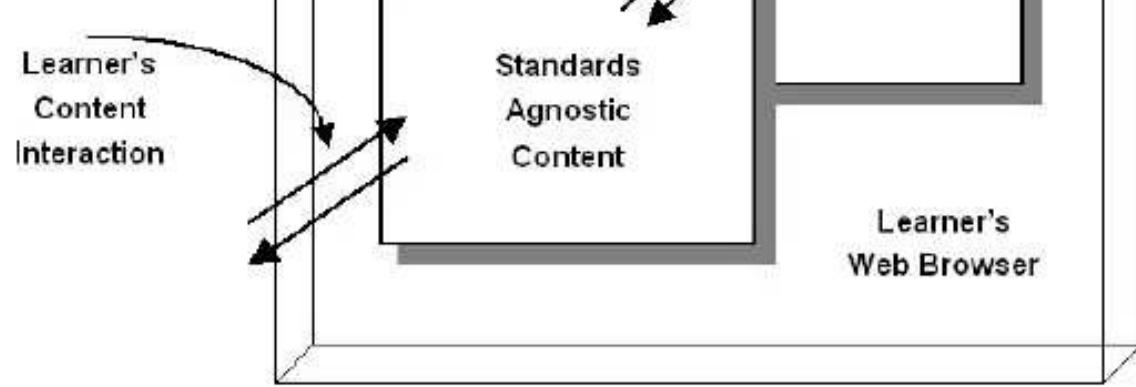
**Fig. 3.8 V-model of quality validation and verification**

## NOTES

### 3.12.6 Content Wrapper

- Before e-learning standards emerge one way to ensure interoperability is to build content that is standards agnostic – then design and build a piece of middle ware called content wrapper
- Content wrapper is positioned between e-learning content and LMS – that is talks the language of both the content and LMS and acts as interpreter for the dialogue between the content and LMS shown in Figure 3.9
- Since content does not include LMS or it is not e-learning standard specific. It can be later made to interoperate with any LMS or standard when it evolves
- The wrapper is loaded to the learner's browser – and its functions are transparent to the learner
- It does not constrain screen design or affect learner interactions
- The data from learner is held in the wrapper until learning session ends when it is uploaded to the LMS in a form the LMS understands





**Fig. 3.9 Content wrapper**

- Building a wrapper is not a trivial project – but is less expensive and time consuming than rebuilding all your content when you want to conform to a different standard or change the LMS

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### 3.12.7 Authoring Tools

- Wide range of authoring tools are available – from Word, PowerPoint, Flash and Dreamweaver
- The authoring tool can be selected based on who will be using it and what kind of content they will be building.
- The users fall into two groups – you may need two sets of tools
  - Professional
- Spent time to acquire skills to use high end Web authoring tools
- Tools provide a comprehensive set of powerful and flexible features and functions with which to build content
  - Non-professional
- Are subject matter experts or learning department staff - expect tools to have shallow learning curves and which will allow them to create content quickly and easily
- Tools are authoring systems providing housekeeping of content development and limited set of pre-defined options

## NOTES

### 3.12.8 Type of Content

- Depending on the kind of content you need to develop the kind of tool differs. From a broader perspective, content can be classified into five broad categories as given in Table 3.4 based on the conceptual category of content.

**Table 3.4 Types of Content based on Concepts**

Content Type	Definition	Example
Fact	Specific and unique data	The company log-on screen; Microsoft Word

	instance	My password is Ram
Concept	A category that includes multiple examples	Web page Password
Process	A flow of events or activities	Performance Appraisal Process
Procedure	Task performed with step-by-step actions	How to log on
Principle	Task performed by adopting guidelines	How to close a sale

The following are categories and types of content based on the delivery characteristics:

- Static content
- Dynamic content

## NOTES

- Content developed and published with or without support of CMS or LCMS
- Learning objects
- Structured courses
- Assessments
- Simulations
- Animations
- Graphics
- Video
- Audio

All authoring tools do not provide features to tackle all types of content. Depending on the type of content you wish to develop the tools have to chosen.

When we talk about content in learning, we know for the learning to be communicated effectively it is necessary to incorporate as much as graphics as possible. We have already seen different conceptual categories of contents and summarized in Table 3.5 is the possible graphics that can be used to teach these content types.

**Table 3.5 Graphics for different types of Content**

Content Type	Instructional Method	Example
Fact	<ul style="list-style-type: none"> <li>● Statement of Facts</li> <li>● Pictures of specific forms, screens or equipment</li> </ul>	Illustration of software screen
Concept	<ul style="list-style-type: none"> <li>● Definitions</li> <li>● Examples</li> </ul>	What is an URL? – Use of Mouse-over to illustrate concept of URL

	<ul style="list-style-type: none"> <li>• Non-examples</li> <li>• Analogies</li> </ul>	concept or URL
Process	<ul style="list-style-type: none"> <li>• Stage Tables</li> <li>• Animated diagrams</li> </ul>	Activities in a computer network – animation to illustrate process lesson
Procedure	<ul style="list-style-type: none"> <li>• Step-action Tables</li> <li>• Demonstrations</li> </ul>	How to use a software application
Principle	<ul style="list-style-type: none"> <li>• Guidelines</li> <li>• Varied context examples</li> </ul>	Guidelines on how to name a link

### Have You Understood?

1. What is meant by generic content and custom content?
2. List some key documents of the content development process
3. What is a content wrapper?
4. Why do we need authoring tools?

## INTRODUCTION TO E-LEARNING

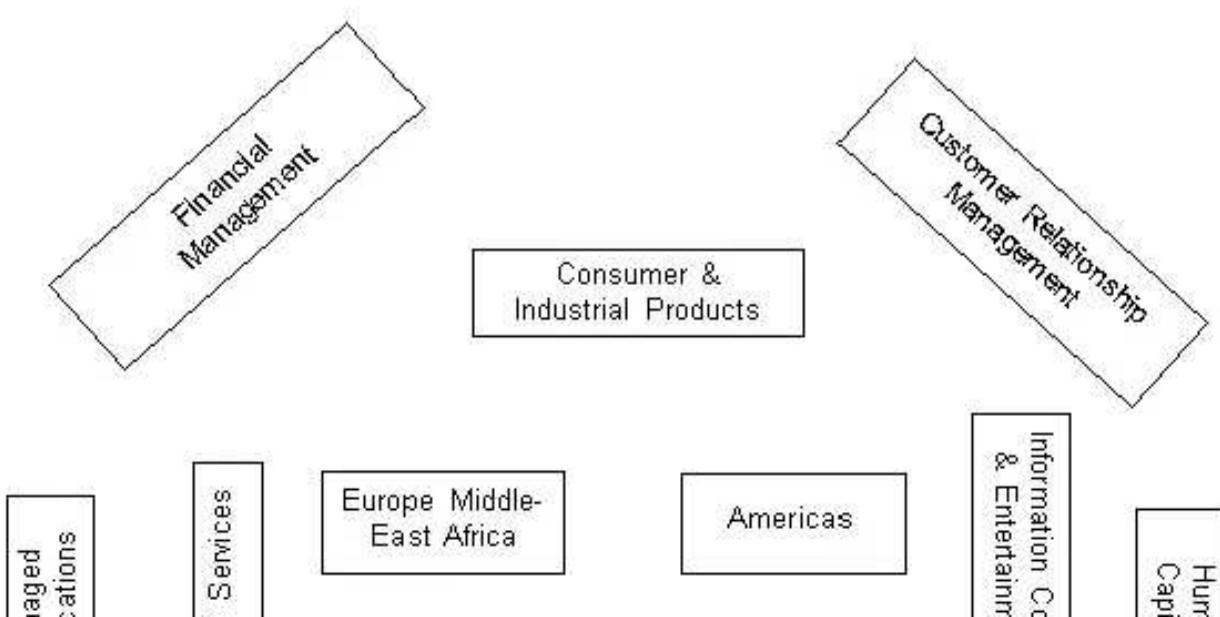
### 3.13 CASE STUDIES

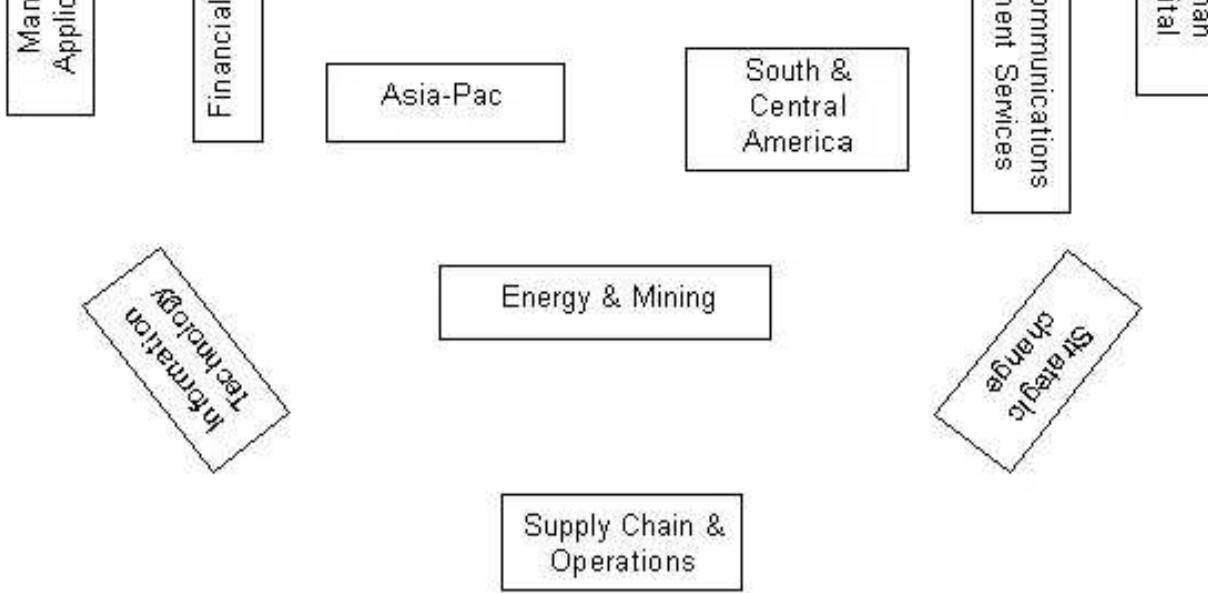
#### 3.13.1 PWC Consulting

##### 3.13.1.1 Introduction

- PwC Consulting provides business consultancy to enterprises in the areas of :
  - Strategic change management
  - Process Improvement
  - Technology solutions
- PwC has worked smart by developing and applying best practices with the goal of delivering projects quickly, consistently and effectively. The Learning and Knowledge Group is the manufacturing arm of PwC consulting. The company has always felt that the way to differentiate your product in a highly competitive market is through the quality of the people who do the thinking.

### NOTES





**Fig. 3.10 PWC consulting structure**

## NOTES

- The way to arrive at best practices is as follows:
  - Study best practices of the most successful businesses in the world
  - Ask your customers exactly what they need
  - From the processes of teams of innovative and successful projects of your enterprise extrapolate best practices. In other words - harvest the tacit knowledge learned by the consultant in the field and embed the shared practices and tools
- The company felt it could obtain the best advantage by integrating:
- Learning—including e-learning
- Knowledge management
- Methods – the best practice group

### 3.13.1.1.1 Structure

- The enterprise has 30000 consultants and 1200 partners in 52 countries across six continents
- Atmost fourteen hours of flying time separate two PwC consultants across different geographic locations
- The PwC Consulting structure across different areas is given in Figure 3.10
- There are two type of consultants who have to be put on new projects:
  - Experienced consultants who are ready to perform after only 10 to 15 days learning of PwC Consulting's methods and practices
  - University Graduates with no consulting experience – their time to perform is 50 days.
- The enterprise invests in 250,000 days of new joiner learning – without any balancing income

- The most important business metric – is Utilization of staff.
- Reducing graduate's time to perform from 50 to 40 days would result in considerable savings
- Presently – 76% is spent on instructor-led learning and 24% on e-learning

### ***3.13.1.1.2 Geographic Diversity***

- Location is normally a barrier to effectively delivering learning and knowledge.
- Most often consultants work directly at the client sites
  - This means generally they have no face-to-face exposure to centralized services
  - Needs learning and knowledge to be delivered at the clients' sites.
  - The nomadic style of working means there are few de-briefing opportunities – knowledge gathered by the consultants are unlikely to be captured, assessed or shared

### ***3.13.1.1.3 Knowledge Sharing***

- Clients now demand the full value of PwC Consulting global knowledge
- Need for a better, faster, cheaper and more consistent way of sharing knowledge and best practices
- Need to engage 30,000 minds in every project across projects but also countries in the knowledge sharing process. This sharing across global dimensions is also critical.

### **NOTES**

### ***3.13.1.1.4 Integration***

- There is no dedicated project team – everyone involved in the project also continues with their normal duties. The new team was called Learning and Knowledge.
- The main driver was the integration of learning, Knowledge Management, methods and activities in order to globalize and upgrade knowledge harvesting, sharing and distribution
- Other drivers for integration include:
  - Increasing awareness about the available learning and knowledge resources
  - Increasing ease with which consultants can access learning and knowledge resources
  - Avoiding the silo type activity of learning and knowledge resources
  - Increasing learning and knowledge efficiencies in response to a softening market
  - Leveraging technology – to share knowledge and build skills
- Though cost was directly not a major driving force for integration – the integration did automatically result in cost savings.

### ***3.13.1.2 The Value Proposition***

- The value proposition of the new integrated took a proactive approach that ensured that Learning and Knowledge had an important position operationally and excellent

support from the board.

- PwC is of the opinion that the head of the Learning and Knowledge Group need not necessarily be headed by a person with training background but rather from a business background as this would catch the attention and earn the respect of senior management.
- PwC feel that Learning and Knowledge should not be support service waiting for to close a performance gap when it happens but should work with business groups to help them achieve their goals.
- The following are the six core services that the integrated group to deliver to the business:
  - **Build Competencies**
    - Develop knowledge, skills, abilities and behaviors for client success
    - Build and provide a personal curriculum
    - Build an environment that promotes learning as a continuous activity

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## NOTES

- **Help to effectively deliver projects**
  - Aid project teams throughout the project lifecycle
  - Develop and enhance methods and tools to help projects work smarter, faster and more competitively
  - Provide an Integrated help desk
- **Harvest and share account and project learnings**
  - Target priority learnings
  - Harvest from all phases of the client service processes
  - Collate the learnings and repackaging for effective knowledge sharing
- **Harvest and share business and client learnings**
  - Build industry, performance and client intelligence learnings and share this knowledge
- **Facilitate Communities**
  - Identify and support communities that do not formally exist in the organization structure
  - Make all employees aware of all learning and knowledge resources
  - Facilitate sharing of information especially strategic priorities within the community.
  - Make joining and contributing to the community attractive
- **Analyze Investment results**
  - Make the understanding of business environment possible
  - Share the knowledge about all the products and services
  - Assist stakeholders in planning and using a new blend of products and services
  - Measure the impact and perform reporting

### **3.13.1.3 Implementing the Learning System**

- The delivering of learning, knowledge and method solutions is through SMARTS. SMARTS is the acronym for Strategic and Managed Accounts: Resources, Tools and Services. Two of the core services of the Learning and Knowledge (L&K) Group—managing investments and helping to effectively deliver projects are handled by SMARTS.
  - The Strategic accounts are identified and made into a SMARTS account
  - The SMARTS accounts manager assigned by L&K works in coordination with the account lead and project partners and draws up a Needs Analysis Report which specifies what L&K can deliver to the project and what can be harvested from it.
  - SMARTS focuses on blended learning comprising e-learning, Web-based collaborative learning which may be synchronous or asynchronous and sometimes instructor-led learning.

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#### **INTRODUCTION TO E-LEARNING**

- SMARTS identifies self-paced e-learning content and develops custom “learning paths” for project team members
- SMARTS facilitates the learning process through e-learning modules or makes arrangements for instructor-led learning
- The L&K funding is determined annually at a global board level.
  - From this global budget, the individual business unit is allocated a number of learning days with cost attached to each learning day.
  - Each business unit divides the budget allocated to it across the six service areas
  - Whatever the delivery channel – content is developed centrally and the cost is met from the central learning budget and is not charged to individual business units. Only when development is exclusive is it charged to the unit.
  - At business unit level – the focus is on client-centric delivery
  - When delivery is global learning needs then the cost is from central learning budget
- L&K calls evaluation Performance Metrics.
  - The driving Metric is the **time to utilization** which defines the time gap between the learning event and the application of what was learned. The maximum acceptability period is six months
  - Long time to utilization may be too long
    - Learning not being effective
    - Learning was not relevant or solution centric which is likely to be a management issue
  - L&K realized the importance of making the business units aware of the financial value of the learning process
- L&K does not treat knowledge management as a separate entity from learning and felt the method of facilitating the exchange – the difference is only how the

#### **NOTES**

and left the method of facilitating the exchange – the difference is only how the knowledge is shared

- L&K found the most effective method of knowledge sharing was the use of informal buddy network
- Another interesting finding was that having a personal relationship with the source of information was as important as the information itself
- Though from L&K viewpoint the learning needs to be aligned with the business needs but however from the consultant's viewpoint the additional acquisition of interesting knowledge and skills having no immediate application is also important – the hierarchy of learning needs in order are
  - Learning to meet business needs
  - Learning to advance career prospects
  - Learning to cater to learner's individual interests
- Delivery Channel selection is another important aspect that L&K had to consider and depends mainly on two factors *time to market* and *shelf life*.

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- L&K favours Web-based Collaboration and content built using L&K's rapid development tool for learning that is time critical and needs to be delivered fast in order to be relevant
- L&K would encourage the development of self-paced e-learning for learning having a long shelf life.

### 3.13.2 BP case study

#### 3.13.2.1 Introduction

- BP is a global company that deals with oil, chemicals and petrochemicals.
- Due to frequent mergers and acquisitions, BP's infrastructure was a patchwork of networks, standards and applications.
- This infrastructure inhibited the easy sharing of data and knowledge.
- An enterprise wide commitment to a Common Operating Environment
  - Simplified the process of data and knowledge exchange on a global basis
  - Simplified support by reducing the range of hardware and software in use
  - Increased reliability due to simplified infrastructure

#### 3.13.2.2 Knowledge sharing and e-learning

- BP has a philosophy that what they do a second time they do it better
- For this philosophy to work there is a need to quickly and effectively transfer knowledge through effective knowledge sharing mechanisms and work comfortably in virtual teams across continents and time zones
- It has 110,000 employees working in 100 countries. About 70,000 of these employees have dedicated desktops or laptops and the employees are guaranteed intranet access.

- These facts led BP to be a natural choice for implementing e-learning
- In 2000, BP had two critical learning initiatives:
  - Global implementation of a standardized desktop
  - Push to increase Web skills and e-literacy
- Part of BP is the Digital Business which has the responsibility for all digital systems, processes and business process transformation. Infrastructure services are provided through outsourcing
- Then BP launched WebLearn – an intranet portal for all e-learning about Digital Business
- This resulted in the recognition of need to embed e-learning capability in all business units.
- The Learning Stages of BP is a four part model:
  - Unconscious incompetence – do not what I need to learn
  - Conscious incompetence – know what to learn

#### **INTRODUCTION TO E-LEARNING**

- Conscious competence – Learned what to do
- Unconscious competence – Do it automatically – this is the meaning of embedding e-learning
- Formation of Digital Learning – to help business units to learn how to develop and distribute e-learning

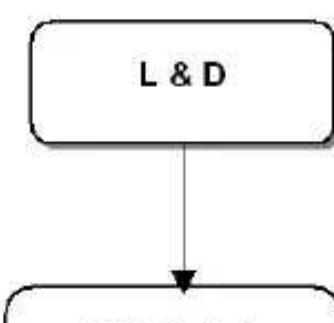
#### **NOTES**

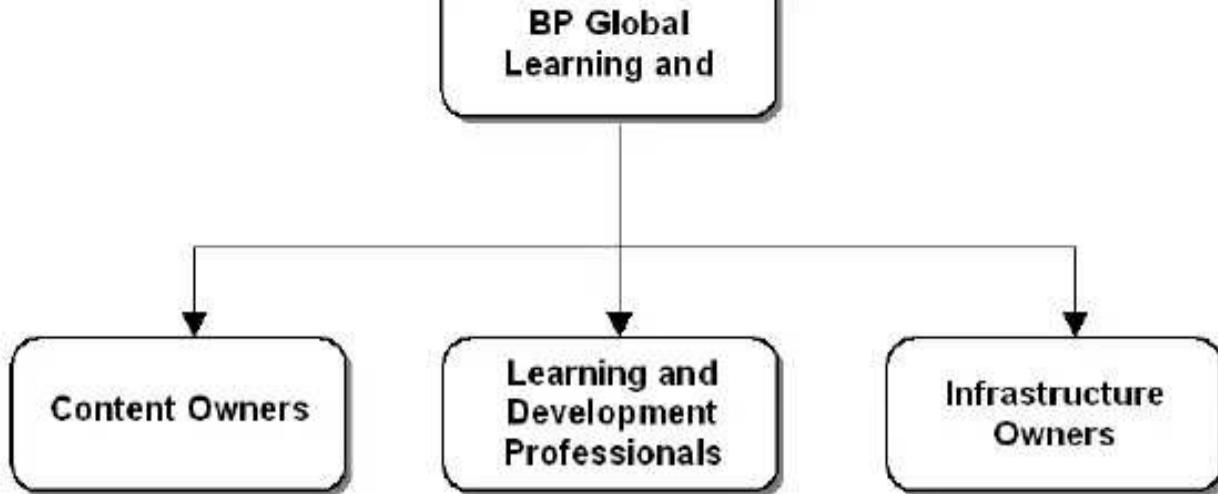
##### ***3.13.2.3 Learning Structure***

- There is a Learning and Development Committee (L&D) – whose members are drawn from Executive Committees of the business streams as shown in Figure 3.11.
- L&D – sets policies, standards and targets
- Figure 3.11 shows the overall structure of L&D.

##### ***3.13.2.4 Drivers for E-learning***

- Key driver is cost saving through effectiveness and efficiency
- The power of e-learning to transform a business by the way people learn
- Blended learning – for leveraging face-to-face learning for aspects suitable for classroom learning and leveraging e-learning for aspects suited for self-paced learning





**Fig. 3.11 Structure of L&D**

- Increasing the value chain—since BP is involved with a lot of outsourcing—vendors are also an important part of the e-learning network. In addition, customers are encouraged to take up e-learning.

## NOTES

- The final driver is the compliance. BP staff are required to comply with training standards in Health Safety Environment, Security and Ethics—E-learning—natural way for delivery.

### *3.13.3.5 The Implementation*

- Within the Digital Learning the initiative is called E-learning Capability which has the following objectives:
  - Support adoption, development and implementation of e-learning initiatives
  - Provide a centre of expertise for the initiative
  - Provide a network to support development of e-learning programmes
- To meet the above objectives, E-learning Capability has developed a set of products and services
  - E-learning Toolkit** – provides guidelines, tools, recommendations and consultancy to business units wanting to develop e-learning projects
  - E-learning Vendor Network** – this network allows vendors to become capable of developing high quality, cost effective e-learning to meet needs of the business needs. Vendors in the network have been vetted and are project ready.
  - Catalyst for E-learning** – markets benefits of e-learning to high value areas within the enterprise – like Health Safety Environment, Security and Ethics
  - E-Learning Delivery** – Hosts and provides the technical infrastructure for e-learning. A single centralized outsourced LMS facilitates the development of an enterprise wide catalogue.

1. What are the six core services that the integrated group of PwC concentrated on?
2. What is the SMARTS system used by PwC?
3. What is “time to utilization” defined by PwC ‘s L&K group?
4. What are the services offered by E-learning Capability of BP?

### 3.14 FUTURE DIRECTIONS

- **Standardization** – most important direction towards which e-learning is moving. All vendors understand its importance and actively support the initiatives. Having Standards will allow the following:
  - All components of e-learning to work together seamlessly right out of the box – enable interoperating with other systems of the enterprise
  - Enabling e-learning systems in different organizations to interoperate
  - Will deliver high value content economically and allow educating the entire value chain of employees, suppliers and customers

### INTRODUCTION TO E-LEARNING

- **Consolidation** – will remove some of the confusion that arises because of the large number of vendors offering similar products.
  - There has been consolidation – LMS vendors having acquired LCMS vendors. ERP and HRIS vendors need to make commitments to move into e-learning.
  - When consolidation of technology sector of e-learning settles then consolidation has to take place in the content component of e-learning.
- **Simulation** – High fidelity simulations is predicted to be e-learning’s “killer application” – with power to build must-have type of demand.
  - With the present generation of employees having experiences with high fidelity animations associated with games – their expectations will not allow them to make do with text only content but will expect realistic simulations.
- **Mobilization** – Finally just-in-time, mobile learning or m-learning will become the order of the day.
  - M-learning in its simplest form – enables learners to download self-paced learning courses to their laptops to allow offline learning.
  - However in future - m-learning can change the face of e-learning. Instructions delivered on PDA for staff working in client sites - the line between working and learning gets blurred.
  - In future, wireless devices will play an important role in bringing learning to the learner and the sophistication of these devices will impact the way content is delivered and presented to the learner.
- **Permeation** - in this vision of the future- the learning value chain of the enterprise simultaneously delivers different forms of learning at many different levels of granularity. This essentially means that the entire workplace is permeated by learning. In this context – there is no differentiation between learning and the employees’ actual work

### NOTES

## Have You Understood?

1. What do you think will be the future of Standardization of e-learning?
2. What do you think will be the effect of advances in mobility to e-learning?

## 3.15 SUMMARY

- E-learning takes place across the entire value chain.
- The delivery channels can be multi-channel or can be dynamic.
- There are some challenging approaches with regard to delivery channel
- Channel selection is decided by many factors such as speed to market, cost, infrastructure, policies, content lifecycles, and learner bases.
- There are basically five levels of learner support for e-learning
- The development of curricula is an important phase of e-learning

## NOTES

- The role of learning objects is very important
- The competency model plays an important role in deciding learning paths
- The importance of e-learning standards need not be overemphasized and some prominent standards are AICC, IEEE and ADL.
- The SCROM model is also an important contribution to the standardization of e-learning
- The use of learning objects has many pros and cons
- Two cases the PwC and BP and their e-learning initiatives are explained
- Future directions in e-learning include standardization, mobilization, consolidation of products and services

### Exercises

1. Page turning is used to judge:
  - a. The effectiveness of self-paced e-learning course
  - b. The effectiveness of interest of reader in a book
  - c. Shows the freshness of a page in e-learning
2. When the speed of delivery is the deciding factor, the delivery channel chosen is:
  - a. Self-paced e-learning course
  - b. Virtual classes
  - c. Instructor led classes
3. How are the two hemispheres associated with different aspects of learning?
4. Explain in detail the different factors that affect the choice of delivery channel.
5. What is Intelligent call processing?

6. What are the different levels of support that can be provided to learners who use e-learning?
7. Discuss the role of learning objects in the process of e-learning.
8. What are the benefits of adopting e-learning standards?
9. Why are defacto standards used?
10. What are the areas that are covered by current draft standards?
11. Differentiate the different e-learning standards with regard to their contributions to the standardization process.
12. Critically discuss the different definitions of Learning Objects.
13. What is a Competence Model? Discuss.
14. Discuss the benefits of E-learning standards.
15. What are the areas covered by current E-learning standards.
16. Give a detailed explanation of the SCROM reference model.

#### **INTRODUCTION TO E-LEARNING**

17. Give a detailed account of Learning Objects from the perspective of content development.
18. What are the advantages and disadvantages of Learning Objects.
19. What is the Rapid development process?
20. How are development costs calculated?
21. Explain in detail the steps involved in content development.
22. Discuss the factors to be considered while deciding whether to buy or build content.
23. Describe the typical contents of Preliminary Design and Detailed Design Documents.
24. How are authoring Tools classified?
25. Discuss in detail the business of a typical enterprise and how it manages its e-learning initiative.

#### **NOTES**

## NOTES

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**INTRODUCTION TO E-LEARNING****UNIT IV****NOTES****WEB BASED TRAINING****4.1 INTRODUCTION**

This unit describes Web based training, an important part of E-learning, where web technologies are used for instructional purposes. Web-Based Training, or WBT, is training delivered over the Internet, specifically over the World Wide Web via the http protocol, and viewed with a browser program such as Internet Explorer. WBT is especially useful in enterprises that anyway use Web as part of their everyday business. The important aspect of Web based training is that it allows smooth synchronous as well as asynchronous communication.

**4.2 LEARNING OBJECTIVES**

- To understand the properties of Web based Training
- To trace the history and birth of Web based Training
- To compare Web Based Training with CBT and classroom training

- To compare Web based Training with CBT and classroom training
- To outline the need for WBT
- To understand the methods of evaluating WBT including its advantages
- To understand the different parameters to be analyzed in choosing an approach towards Web based Training
- To list the four types of Web based Training
- To describe the course framework required for Web based Training

#### **4.3 WHAT IS WEB BASED TRAINING?**

Web Based Training (WBT) makes use of Web technologies for the task of training.

Sometimes WBT is described as what happens within a Web browser without any other associated software or learning resources.

*Definition : Any purposeful, considered application of Web Technologies to the task of educating a fellow human being*

#### **NOTES**

The definition uses the term purposeful and considered – meaning that it is not just a Web based application but however is oriented towards learning, and therefore necessarily needs software and learning resources to achieve this objective. The other point in the definition is to do with the use of the word educating rather than training – to bring in a broader perspective.

Normally Web based Training (WBT) is used when using Web technologies learning takes place within an enterprise. The more general terms Web based education and Web based Instruction is commonly associated with Universities.

#### **4.4 HISTORY OF WBT**

- WBT is the result of the following three social and technical influences:
  - Distance learning
    - Distance learning or the so called corresponding education resulted in a major social innovation
    - It made education accessible to people living in remote areas or who worked during normal working hours and could take up learning only during out of office hours.
    - It allowed the then disadvantaged groups like women and physically challenged to take up education
    - Currently – distance education – is now a large multi-faceted endeavor. Today distance education caters to 100s of thousand of learners and is one of the most important methods of imparting education
    - Distance education has readily adopted new technologies to reach wider audiences and teach more effectively. In this way through the years – radio, television, teleconferencing, satellite television have all been used for distance learning. Along these lines, WBT is the harnessing the latest Web technology for distance learning

- Computer conveyed communication
  - Computer aided and conveyed information in some form or other before WBT.
  - These forms used computers for Computer aided instruction (CAI), Computer based Education, Computerbased Instruction and Computer based Training (CBT) - where computers were used to store and deliver the content.
  - The forerunners of computer based education were audiovisual education – where audiovisual materials were used for effective teaching
  - First attempt - to utilize technology – was by Stanford University in collaboration with IBM to provide computer-aided instruction in elementary school education but early attempts required costly mainframe computers
  - Implemented in 1960s, PLATO which stands for Programmed Logic for Automatic Teaching Operations – allowed sophisticated branching needed for teaching complex subjects

**INTRODUCTION TO E-LEARNING**

- The need for costly mainframe systems and distributed terminals limited the spread of CAI. However with the advent cheaper personal computer enabled the spread of CAI. Again incompatibilities in hardware and software again proved a bottle neck. However the availability of standard platforms for development removed this bottleneck to a certain extent. The advances made training easier and less expensive to develop and deliver.
- Proliferation of Internet Technologies.
  - Though initially the basic network protocols of Internet were meant to send Teletype messages between military bases, the researchers who used the network found other uses for it – like e-mail, file-transfer programs, newsgroups, and repositories of text documents.
  - The system was finally open to the general public.
  - In order to organize Web pages – a simple set of tags – called HTML (HyperText Markup Language). This introduction made it easy for anybody to use it.
  - Now Web – has become a graphical user interface for the resources on the Internet – Training an obvious application

**NOTES****4.5 THE BIRTH OF WBT**

- Probably the first application of WBT was the informal tutorials that was made available on how to use HTML – they were simple and did not conform to any educational theory
- Vendors of CBT tools began offering plug-ins to enable Web Browsers to display modules developed using their CBT tools. However these vendors found that the file formats used for CD-ROMs were unsuitable for the packet-oriented protocols and slower network communication. These vendors updated their file formats to

suit Web based communication.

- The intense competitions between the Netscape and Microsoft browsers – resulted in much advancement such as dynamic HTML, richer scripting languages, and the ability to display XML documents, which encouraged WBT.

#### 4.6 WHAT IS DIFFERENT ABOUT WBT?

- Early attempts at the so called WBT were just dumped classroom materials online and allowed learners to download and play existing CBT modules.
- When new technologies come along, we try to use it in the same way as we used the technology that existed before the new one.
- The question we now need to ask is how can Web technologies actually affect the way we teach and learn?
- What are the changes that WBT brings?
  - The barriers of time and space have been removed – obtain and deliver knowledge anytime, anywhere.
  - From changing the definition of **know** from having information stored in our memory – to meaning the process of having **access to information and knowing how to use it**.

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#### NOTES

- WBT does not change how humans learn but rather changes how we impart knowledge - it essentially changes the economics and capabilities of delivering training and education
- WBT makes it more convenient and less expensive to design and develop certain kinds of learning experiences for learners at a distance
- WBT – allows instructors to create innovative learner experiences such as presentations, simulations, games, field trips, assigned reading, team project, etc..
- In WBT, the creation of learner experiences requires different skills – instructional design, writing, visual design, programming, etc. and the joint role of designer-producer-presenter now shifts from the hand of a single classroom instructor to a development team of experts.

#### 4.7 WBT – JUST IN TIME FOR JUST-IN-TIME TRAINING

- There is the explosive demand for training especially the need for technical knowledge. A lack of trained technical manpower is one of the bottlenecks to enterprise growth. Traditional University style does not meet this need. Fortunately, this technical knowledge is well suited for teaching using WBT.
- It is not employers alone who are recognizing this urgent need for training. Currently workers themselves recognize the importance of learning as essential for career advancement and are willing to return to Universities to continue their education. However, workers strongly preferred informal on-the-job training and self-paced training to formal traditional classroom training.
- Another very important reason for enterprises encouraging WBT is that rapid deployment of just-in-time training to their employees is possible especially in circumstances when the knowledge and training in new technologies is urgent.

1. What are the three influences that affected WBT?
2. How is WBT different?
3. What is meant by Just in time training?

## **4.8 COMPARISON BETWEEN WEB BASED TRAINING (WBT), CBT AND CLASSROOM TRAINING**

### **4.8.1 WBT vs. CBT**

WBT is preferable to CBT because:

- Content is located at a single source location. It can be updated centrally, and all users will see the updated version immediately. Once the WBT product is updated, there are no outdated versions hanging around on disk to confuse learners.
- Delivery is essentially free. There is no cost associated with burning disks, labeling disks, mailing or delivering disks, and going through the process again and again with each new version.
- WBT can be viewed through any commonly available browser, whereas CBT often requires special hardware (CD-ROM drive, graphics card, etc.) and special software viewers.

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### **4.8.2 WBT vs. Classroom Training**

- WBT can seem like the perfect solution to the problem of training a large number of people in a hurry, because:
  - There are no travel costs
  - There are no classroom costs
  - There are no instructor costs
  - There is no upper limit on how many learners can be trained at once.
- These are significant advantages and they are real. However, without the right kind of organizational and infrastructural support, WBT usually fails completely.
- Research shows that the single greatest impediment to the success of WBT is a low completion rate. It is not uncommon for large organizations to see a WBT completion rate less than 10%, and in some cases less than 1%.
- If it is a challenge to get access to a computer in a quiet place for the time it takes to complete a WBT course, people just don't do it.
- Only a small number of employees are willing to pursue e-learning on their home computers on their own time. People are busy at work, and unless they have the kind of organizational support that sets aside dedicated, paid time to complete WBT in a quiet, private location, they just don't do it.
- It takes a lot of skill and experience to build effective WBT. This makes it expensive and time-consuming to build.
- If WBT is boring or hard to follow, people just drop out.
- Learning is a social activity. Many people find solitary learning boring, so they don't do it. Therefore a "solution" that was meant to train large numbers of people at a time often results in less than 10% of the audience being trained.
- The only certain way to make WBT succeed is to bring people into a dedicated

- The only certain way to make WBT succeed is to bring people into a dedicated room during paid working hours for a dedicated period of time, and provide them with a skilled and helpful resource for help, motivation, and feedback.
- In other words WBT works best when it most closely simulates classroom training. So why bother with WBT?
- In fact there are very good reasons for choosing a WBT or partial WBT solution. WBT can be a very powerful tool under the right circumstances, and can save a large organization a lot of money.

#### **4.8.3 What's better - Classroom Training or WBT?**

##### ***4.8.3.1 Classroom training has the following advantages over WBT***

- High interactivity with other learners improves retention.
- Provides a great opportunity to learn from experience of classmates.
- Personalized assistance from the instructor means learners stand a better chance of having their unique needs met.
- Requires less development time since there's a heavy reliance on the skills and experience of the instructor.

## **NOTES**

- It's easy to confirm whether learners have taken the course.
- In a computer lab, it's easy to simulate real-world situations.
- Completion rate is 100%.
- It's easy to use quizzes and tests and other forms of evaluation to confirm that learning has occurred.

##### ***4.8.3.2 Classroom training has the following disadvantages compared to WBT***

- Scheduling can be challenging and costly, particularly if students are geographically dispersed or find it difficult to leave their workplace.
- Class size is limited, especially if computers are required for training.
- Standards are hard to enforce because content can vary from instructor to instructor and class to class.

##### ***4.8.3.3 WBT has the following advantages over classroom training***

- No upper limit on number of students who can be trained at one time.
- No travel costs.
- Most WBT requires no instructor.
- Easy to update from central location.
- Easy to standardize content to entire learner base.

##### ***4.8.3.4 WBT has the following disadvantages compared to classroom training***

- Learners must have access to late-model computers and to the Internet.
- WBT requires more development time due to technical requirements.
- WBT requires special expertise to develop and deliver.
- WBT usually requires a special software package or license to develop.
- It's hard to simulate real-world situations in WBT.

- It's hard to simulate real world situations in WBT.
- If it is necessary to track learner success and learner completion, an expensive Learning Management System (LMS) is required.
- Without incentives, completion rate can be extremely low – less than 10% for unsupervised WBT is common.

### **Have You Understood?**

- What are the advantages of WBT over classroom training?
- What are the disadvantages of WBT over classroom training?
- When is it preferable to use WBT when compared to CBT?

## **4.9 NEED FOR WBT**

### **4.9.1 Need of WBT for your Organization:**

- The business goals need to be first identified and then it has to be decided whether WBT fits into fulfilling these objectives.
- You need to identify what WBT would do for your enterprise and sponsor before you take into consideration, the learner. Some of the questions you may ask include:

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- Does the cost get reduced?
- Can you sell the courses?
- Does it improve the productivity of your enterprise?
- Does it improve the efficiency of the employees?

## **NOTES**

### **4.9.2 Need of WBT for Learners**

- You need to understand what you are teaching and to whom. You need to set teaching objectives which specify what results each learner is expected to accomplish under what conditions and to what degree of success.
- There is need to distinguish between teaching and learning objectives. Teaching objectives are what the instructor wants to teach the learner, while learning objectives are what the learners want to learn. If the WBT is to be successful both these objectives need to match perfectly.
- Clear objectives have to be specified from four perspectives:
  - **The Learner Profile**
    - You need to know the learners whose knowledge, skills and attitudes you are trying to alter. For this purpose you need to know:
      - Current levels of knowledge, biases, skills and attitudes of the learners
      - Learner's expectations and attitude towards learning
      - Learner's motivation for learning
      - Preparedness to use WBT technologies
        - You need to know the group for whom the WBT is being designed.
    - **Accomplishments of the learner**
      - You need to know the accomplishments of the learner after completion of

- The accomplishments of the learner
- The skills they acquire
- The perceptions and attitudes that are altered
- Emotions and attitudes experienced by the learner
- Conceptual knowledge gained

- **Applications of the learning**

- The learners need to apply what they learn not just acquire knowledge
- Learners are expected to apply the knowledge, skills and attitudes in real world environment – which we need to specify
- The training needs to be tailored to suit the environment
- The following factors are relevant to learner's ability to apply learning:
  - Events that trigger the application of learning
  - Resources like books, calculators, access to the Web available to the web
  - Assistance available to the learner like supervisor to guide, peers to discuss problems with

## NOTES

- **Degree of Success achieved by learners**

- Necessary to state in a realistic manner the success achieved by the learner when applying the learning process. Some of the metrics to be considered include:

- Percentage of learners who completely achieve the objectives
- Average error rate
- Time required to perform the task
- Amount performed in a specified period of time
- Reduction in the frequency of problems or increase in the rate of favorable incidents

### 4.9.3 Defining Curricula

- When deciding the scope of a course or a series of courses – you have to determine what among the following resources are available:
  - Defined criteria of knowledge by government bodies or industry associations
  - Certification or Licensing requirements
  - Standard references that cover the area
  - Professional associations that represent an area
- This knowledge can help you in defining the limits and boundaries of your course

**Table 4.1 Interactions for Different Types of Content**

Content Type	Interaction Description	Example: Web Page Creation
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Type		
Fact	Use the fact to complete a task – provide a job aid for memory support	Use the codes on your reference aid to access the application
Concept	Identify a new instance of the concept	Select the Web page that applies effective design features
Process	Solve a problem or make a prediction	Predict the impact of a miscoded page property specification on the final Web page layout
Procedure	Perform a task by following steps	Select the text font from the pull-down menu
Principle	Perform a task by applying guidelines	Design an effective Web Page

**INTRODUCTION TO E-LEARNING****NOTES****4.9.4 Interactions for different types of Content**

Another important aspect of WBT is that it provides different types of interaction for the learning process. Different interactions can be provided for different types of content and this can be summarized in Table 4.1.

**Have You Understood?**

1. What is the need of WBT from the organizer's perspective?
2. Learners need WBT. Why?

**4.10 EVALUATING WBT****4.10.1 Ideal situation for WBT**

There are some situations which is ideally suited for WBT.

***4.10.1.1 The Ideal Learner***

There are some learners who can easily adapt to new technologies and techniques and take advantage of advancements. Ideal learners do not actually exist – but there are some learners who have some of the characteristics given below:

- Learn independently and view learning in a positive way
- Are self-disciplined, manage time well and enjoy working alone
- Express themselves well in writing
- Have good basic computer skills and value the role of technology in the enterprise and in learning

- Understand the need to acquire new knowledge but is unable to attend traditional instructional-led classroom learning – because either they live in remote locations or have to travel frequently
- Can take small technical glitches in their stride and take pride in solving problems
- Have a definite goal such as acquiring a certification, degree or ability to perform a specific task through learning
- Already has some knowledge of the subject and understand the basic concepts in the field

#### ***4.10.1.2 The Ideal Course***

WBT is ideal for courses which consist of precisely defined objective knowledge.

Some of the characteristics of such content:

- Step-by-step Procedures
- Scientific and business concepts
- Syntax and vocabulary of human and computer languages
- Mechanical skills that needs to be taught

## **NOTES**

#### ***4.10.2 Advantages of WBT***

WBT has some distinct advantages over traditional classroom teaching and CBT. WBT has all the advantages of CBT such as constant availability, non-judgmental testing and instant feedback. WBT does encourage the free use of Multimedia. WBT has some other advantages such as:

- Access to Web-based resources
- Centralized storage and maintenance
- Collaboration mechanisms

In other words, WBT combines the collaboration of face-to-face teaching and anywhere-anytime availability of CBT

#### ***4.10.2.1 Cost Advantage***

The main reason for the push towards WBT is the cost factor. Let us now look at the kinds of costs that are saved.

- **Travel costs** – Up to 40% of the cost of corporate training is spent on travel. Travel can include expenses such as airfare, mileage, parking, taxi fares, lodging, meals and phone calls due to constant communication back to the office
- **Facilities and Supplies**
  - WBT reduces infrastructure costs such as costs of classrooms, furniture, whiteboards, and other classroom supplies are reduced.
  - Virtual laboratories and simulations – reduces the cost of setting up expensive

- laboratories and test equipment.
- In addition instructional resources are available on the Web so that there is limited need for libraries, bookstores, copying machines and storerooms.
- This reduction in costs allows enterprises to deliver more learning without adding more facilities.
- **Reduction in Administrative Costs** – many time-consuming administrative activities become simplified. Such activities are:
  - Distributing course catalogue
  - Registering students
  - Distributing course materials and handouts
  - Recording grades and attendance
  - Compiling critiques
- **Salaries** -Employees are normally paid for the time they spend in training. Time spent in learning with WBT may not differ much from traditional methods but the time spent for traveling for the training is less.

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- **Loss opportunity costs** – There is definitely loss in revenue because of what is called lost opportunity costs – costs incurred or revenue not generated because some employee is undergoing training.

#### NOTES

##### **4.10.2.2 Improvement in Learning due to WBT**

The effective instructional design associated with WBT is likely to provide a better learning experience compared to classrooms or disk-based CBT.

- **WBT activates Learners**
  - WBT challenges Learners
  - Learners are required to actively navigate the course
  - Learners are required to select which lessons to take and in what sequence
  - Learners are required to participate in activities and practice sessions during the course
  - In other words learners cannot be passive. They are expected to think and respond
  - WBT can be designed to be passive but it is expected to include meaningful interaction and interactivity
  - Learners feel they are more in control of the learning process – and hence take more responsibility and learn more effectively
- **Exposes Learners to real-world data**
  - Exposes the learner to a world of data and experiences
  - Real world provides a sounding board for ideas
  - Web can expose learners to realistic data for study and analysis. This realistic data has all irregularities, exceptions, and messiness that learners must actually

deal with on the job

- Web is a storehouse of facts – statistical analysis, data collections, and scientific reports on subjects such as economics, medicine, astronomy, crime, geology etc. and for some fields such as weather and finance – real time feeds of the up-to-date data.
- **Provides in-depth Learning Experience**
  - Exposes learners to more aspects of a subject
- **Develop better thinking skills**
  - Web technologies encourage learners to discuss issues, research questions and solve problems and improve critical reasoning and creativity.
  - Learners – asked substantive questions & comment on the writing of peers
    - Learners feel more free to express their reasoning and suggestions more clearly
- **Learners can reflect before responding**
  - Learners take time to think and respond to events by e-mail or in discussion groups
  - Learners learn more when they think for some time before speaking or writing

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## NOTES

- **Promotes Collaborative Learning**
  - By its very nature- Web encourages collaborative learning
  - Learners can discuss, debate and brainstorm with colleagues in the enterprise across the country or even the world
- **Effective Learning Technologies**
  - Technology can improve the learning process
  - Learning improves student attitudes towards learning, enhances student achievement, increasing interaction between learners and instructors and in general boost the self-esteem of students.
- **Helps Learners identify knowledge resources**
  - Traditional learning resources such as Libraries but is not available all the time and at all places.
  - Learning resources on the Web all the time and can be accessed from anywhere.
  - In addition Internet allows book marking a click away.
  - As emphasis of learning shifts from memorizing knowledge but in gaining access to required knowledge, the availability of such resources become very important

### *4.10.2.3 Advantages of WBT for Learners*

- Learners get the best instruction available - Learners can choose the best courses, best instructors and best fellow learners - Enterprises will realize the advantages of providing more choice than is available with local vendors or in-house training departments

- Discussions need not be restricted to classrooms but can go on for days and weeks—after the learners take their own time to compose responses
- With WBT learners can get training just as they need it
- Learners are the ones who set the pace and schedule of their learning process – Learners have the flexibility in learning at their own speed – Learners can repeat or skip lessons depending on their interests
- Learners have better access to instructors through the Web
- Learners are able to showcase what they learn without any inhibitions because of the very nature of the Web
- Training can adapt to individual – that is learners are allowed to learn in the way that best suits them
- WBT accommodates many learning styles:
  - Visual or Verbal
  - Analytical or experimental
- WBT also works with people with different personalities
  - Morning or Evening person

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- Sprinters or plodders
- Extroverts or introverts
- Learners get Instant Feedback – this is a distinct advantage especially when they are practice tests – makes you realize your mistakes
- Learners are treated in an equal manner – provides a sort of anonymity – and the effect of learners' personal characteristics like race, nationality and gender is diminished
- Learners save money – the hidden costs are minimal
- Learners save time – the learners do not have to spend time in traveling.

#### NOTES

#### *4.10.2.4 Advantages of WBT for Instructors*

- Instructors can teach from anywhere – This allows experienced, active experts to become instructors even if they cannot meet the demands of regular classroom teaching.
- Instructors need to travel less – they are now able to spend more time in productive activities rather than travel especially to remote sites
- Instructors can make content dynamic – They can add content to the course from anywhere at any time when an idea strikes them
- Instructors can respond more quickly to changes in the subject matter – revising the course now becomes a routine, continual activity.
- Instructors save time – and is freed from – making arrangements for printing handout and course packs, handing out assignments, notes and other papers, collection and returning of assignments, and making announcements

- Instructors can quickly check the validity and authenticity of the resources used for content development.

#### ***4.10.2.5 Advantages of WBT for Enterprises***

- Delivers consistently high-quality training
- Provides training for employees around the globe without travel
- Gives organization more flexibility
- Integrates Training with work
- Creates valuable learning resources
- Keeps experts on the job – specialists can spend more applying knowledge and less time in sharing this knowledge with others
- Helps recruit workers – since workers seek out employers who provide such training

## **NOTES**

### **4.10.3 Disadvantages of WBT**

WBT has some disadvantages.

- Requires more work – requires more time to design, to deliver and to learn.
- More instructor effort is required – the time and effort to effectively design and deliver the course is more and requires a certain amount of technology expertise.
- More feedback from instructors – learners lacking face-to-face contact, demand more attention and feed back from the instructors
- Conversion efforts take longer than expected – converting existing classroom courses to WBT has proven harder than many designers expected
- More effort required by learners – Online discussions, brainstorming sessions, and problem-solving activities takes longer than their traditional classroom equivalents
- WBT – requires adopting technology – which may be resisted by some learners. Instructional design and production – needs to be good and make use of technology. Because of the absence of the instructor, WBT must be complete, accurate and precise.
- Learners have a fear of losing human contact – they feel WBT is impersonal
- Technical requirements are sometimes stringent – and learners find that these requirements difficult to meet.
- Disrupts established ways of work - Procedures of classroom teaching are well established and well understood while WBT is new, different and currently crude.
- Professionals may feel threatened by WBT – because WBT uses new technologies, employs new strategies and discards many established methods of communication between the instructor and the learner

## **Have You Understood?**

1. What is the kind of costs does WBT help to save?
2. List the advantages provided by WBT to the learning process.

### **4.11 CHOOSING AN APPROACH**

#### **4.11.1 Choosing the Kind of Course**

- WBT allows the creation of different types of courses—each providing learners with different types of learning experience—each suited to different situations
- Instructor led courses
  - Some courses – led by instructor who charts the learning path and sets the pace for the group of learners
  - WBT does not ignore the value of an instructor
- Some courses – learners set their own pace, and interact only with the computer
- WBT provides choices between the two types of courses - The choice is not limited to pure Instructor led courses or Learner led courses – but includes the complete spectrum of possibilities between the two extremes
- As we move from an instructor led course to learner led course, the role of the instructor becomes more of a facilitator.

## **NOTES**

### **4.11.1.1 Advantages of Instructor led training**

- Instructors can answer and solve problems as they arise
- Instructors can urge, cajole, inspire and motivate learners as and when needed
- Instructors can judge the capabilities of the learner group and adjust the course accordingly
- Instructors can evaluate activities and tests that require human intervention

### **4.11.1.2 Advantages of Learner led training**

- Learners develop self-reliance
- Learners are not required to conform to the instructor's schedule
- Reduce costs by limiting the role of instructors
- All learners are assured of same quality of learning experience
- Learners appreciate the anonymity and privacy without constant monitoring by the instructor

### **4.11.2 Choosing whether WBT is Synchronous or Asynchronous**

Actually synchronous and asynchronous are better defined in the context of individual events and activities rather than in the context of complete courses.

- Synchronous
  - The term synchronous means that everyone involved in an activity must perform their part at the same time – usually called real-time or live events

- Examples are chat sessions, screen sharing and whiteboard sessions and video conferences
- Asynchronous
  - The term asynchronous means that activities can be experienced by participants whenever they want
  - Examples are permanently posted Web pages and automatically scored tests
- These definitions – have a problem with what is the meaning of “at the same time” – some may take it to mean minutes or seconds while others may take it to mean a span of hours or days – example is e-mail message answered in two days considered as synchronous or asynchronous
- Courses are not purely synchronous or purely asynchronous – they are made up of a mix of activities that can be either synchronous or asynchronous.
- Synchronous and asynchronous are not mutually exclusive terms and rather indicates the time latitude learners have to complete activities
- Synchronous courses can have activities and events that learners can perform at their own pace. Similarly asynchronous courses can still have deadlines and timed tests.

## NOTES

- Industrial WBT courses are mainly asynchronous while WBT courses of Universities are mainly synchronous.
- Choose Synchronous mode when:
  - Learners need constant discussions with other peer learners
  - Learners need the motivation of scheduled events reinforced by peer pressure
  - Learners often share same needs and have the same questions
- Choose Asynchronous mode when:
  - Learners are from a wide range of time zones and countries
  - Learners have inflexible or unpredictable work schedules
  - Learners cannot wait for a group to form
  - Learners have unique individual needs

### 4.11.3 Size of the Class

- The definition of a WBT class is a group of individuals learning the same material on the same schedule.
- The size of a WBT class is not constrained by physical architecture and can consist of tens of thousands.
- Larger classes are more economical but provide learners with less individual attention
- The class size also affects the possibilities of collaboration
  - Very small classes – most work done by individuals
  - Moderate class sizes (about 30) – class as a whole can participate in activities

- Large classes – learners must be divided into teams
- Size of class affects design of activities and other course materials

#### ***4.11.3.1 Advantages of classes of different sizes***

**Table 4.2 Advantages of different sized classes**

Large classes	Small class	Class of size one
More economical	More individual attention from the instructor	Learner gets a private tutor or mentor
More people taught in less time More classmates to interact with	Whole-class activities are practical Classes start more frequently	No waiting for a class to form Learning is private

#### ***4.11.3.2 Factors to be considered when deciding on class size***

- Budget – How many class sessions have you budget for?
- Frequency of need – How long can the learners wait for a class to form?
- Expectations – What class size is the learner expecting?

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- Critical Mass – What is the minimum number of learners required for collaboration to be effective?
- Individual attention – How much of instructor's time is the learner expecting?
- Instructor load – How many learners can each instructor effectively cater to?

#### **NOTES**

#### **4.11.4 Location of the Courses**

- Success of a course depends on the place where the learners take the course
- The location of where the learner undertakes the course decides the type of computer the learner uses and the kind of network connection the learner has. The type of computer – affects the ability of the course to display multimedia. The network connection – limits the use of media, participation in live events, and use of confidential and secret information

#### ***4.11.4.1 Environments***

##### ***4.11.4.1.1 Learner's office or cubicle***

This means no travel costs – and can sandwich the learning among other tasks whenever time is available. Essentially the network will be fast. The learning takes place at a location where it will eventually be used.

- The characteristics of courses taken in this environment:
  - Short, self-contained modules so that the learner can fit modules in between other tasks
  - Learners to be taught to bookmark their position

- Use large graphics and multimedia if speed of network makes this possible
- Caution learners about leaving their workstations with confidential or proprietary information displayed

#### ***4.11.4.1.2 Learning Centre***

Many enterprises are setting up special rooms where their employees can take WBT courses – these rooms called learning centers. They provide a quiet place where learners can undertake learning without noise or interruptions and without the hassles of having to set their own computer.

- Learning centres – contain desks with computers specially equipped to run the WBT courses – The computers will have the necessary software installed and will have high speed network connections. Some Learning Centres will have specially appointed facilitators to greet and get the learners started.
- The characteristics of courses taken in this environment takes advantage of the strength of the learning centre's facilities and compensates for its weaknesses :
  - Utilize multimedia, advanced browser capabilities and large graphics without any limits

## **NOTES**

- Budget the learning centres that will host your learners
- Train support staff to support the courses, and train them to support and facilitate the learners

#### ***4.11.4.1.3 Home***

Many learners undertake the WBT course at home in the evenings or at weekends. The disadvantage is that there are family distractions just as there are office distractions. Learners at home must access by dialing the enterprise intranet, going through the firewall and logging onto the course. The speed of the network at home is often limited.

- The characteristics of courses taken in this environment
  - Limit the size of pages so that they can be downloaded faster
  - Design the course assuming there will be many interruptions
  - Increase efforts to motivate the learners
  - Limit the number of plug-ins that the learner must load and set up and also limit other sophisticated technical requirements
  - Handle potential security threats
  - Take care of how to access the course from outside the firewall

#### ***4.11.4.1.4 During Travel***

Many learners are mobile – they are away from their offices – and need to have access to WBT courses from their hotel rooms. There are some disadvantages – mainly the network connection and the cost of the phone bill. However the learner is free from

- The characteristics of courses taken in this environment
  - Reduce the technical requirements
  - Allow the learners to download entire courses, or package entire courses on CD-ROM
  - Handle potential security threats
  - Make the live events optional – instead allow learners to download a summary or transcript of the event

#### 4.11.5 Hybrid versions of WBT

There are many ways in which CBT or classroom approaches can be integrated into WBT.

- Mix WBT with classroom approaches:
  - Use WBT for the main presentation in a classroom session
  - Use WBT for preparation and reinforcement

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- |  |                |
|--|----------------|
| <ul style="list-style-type: none"><li>○ Use a facilitator to guide WBT learners</li><li>○ Use WBT materials in the classroom</li></ul> <ul style="list-style-type: none"><li>● Mix WBT with disk-based CBT<ul style="list-style-type: none"><li>○ Use CD-ROM for heavy media</li><li>○ Add dynamic content to a CBT course</li><li>○ Make the course run from CD-ROM</li><li>○ Download the WBT course to local disk</li></ul></li></ul> | <h2>NOTES</h2> |
|--|----------------|

- Use a facilitator to guide WBT learners
  - Use WBT materials in the classroom
- Mix WBT with disk-based CBT
    - Use CD-ROM for heavy media
    - Add dynamic content to a CBT course
    - Make the course run from CD-ROM
    - Download the WBT course to local disk

## NOTES

#### 4.11.6 Set Technology Standards

WBT depends on technology and designers of WBT should specify the technologies to effectively use the courses they design and they should use formats are popular and often used by most number of learners

- Designate target browsers
- Specify file formats for materials
  - Browser native formats
    - HTML, Dynamic HTML, and CSS
    - Text (ASCII and Unicode)
    - JavaScript
    - GIF, JPEG and PNG graphics
    - XML including XSL style sheets

- Platform independent formats
  - Music –MIDI
  - Video-MPEG
  - Virtual Reality – VRML
- Popular Web Formats
  - Sound – Wav, Real Audio, MP3
  - Multimedia – Shockwave Director, Shockwave Flash, Shockwave Authorware, QuickTime, AVI
- Limit File sizes

#### **4.11.7 Use of Metaphors**

Metaphors are often used in online training and can contribute to organizing and imparting learning.

##### **4.11.7.1 Examples of Metaphors used in WBT**

- **Solar Theater** – The Yohkoh Public Outreach Project chose the metaphor of a movie theatre for a collection of tutorials, activities and scientific data on the physics

## **NOTES**

of the sun. The use of something familiar and fun – a movie theater helped to unify, organize and present difficult scientific facts.

- **ASK Internet Camp** – organizes its basic course on the Internet as a summer camp – where the welcome sign is hung from wooden poles. The main menu is a mountainside camp covered with waterfalls, cabins, hiking trails and lots of happy campers.

##### **4.11.7.2 Use proven Metaphors**

Often the physical classroom is used as metaphor to teach the virtual classroom. Map each Web mechanism to an analogous function or object in the physical classroom.

**Table 4.3 Virtual Classroom mapped to a Physical Classroom**

Represent this item	As this
Learner	Student
Instructor	Teacher
Training centre or department	School
Discussion Group	Student Groups, Student Lounge
Real-time events	Class meetings
Tests	Exams or Quizzes
Jump pages for external resources	Library
Reference materials on course site	Handouts
Chat sessions with Instructor	Office hours
Assigned activities	Laboratories

#### **4.11.8 Name the Course Carefully**

It is very important to choose the name of the course very carefully since these names entice learners to click and link to actual descriptions of the courses. Name the course, such that the learners can predict the goals, approach and subject of the course by just looking at the name.

#### **Have You Understood?**

1. Explain the advantages of classes of different sizes.
2. List the various kinds of environments in which WBT takes place.
3. Give an example of a metaphor used in WBT.

### **4.12 FOUR TYPES OF WEB-BASED TRAINING**

There are four main types of Web-Based Training. Each is useful under different circumstances, and most training projects will use a combination of different types of WBT with printed documentation, classroom training, Web sites, and other forms of information delivery.

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##### **4.12.1 Leader-Led or Facilitated Online Learning**

##### **NOTES**

In this type of training, there is an instructor on the other end to provide guidance and support. This approach is very common at the university level, since there's a lot of room for interpretation of essays or open-ended questions by the instructor.

##### **Advantages**

- High interactivity with other learners.
- Personalized assistance from the instructor.
- Requires less development time since there's a heavy reliance on the skills and experience of the instructor.
- A very high completion rate due to personal follow-up by the instructor.

##### **Disadvantages**

- Requires a skilled instructor online during working hours.
- Requires a special software package or license.
- The ratio of students to instructor should not be more than 20-1 per course

##### **4.12.2 Self-Paced, Web-based Learning**

There is no instructor for this type of training, but well-constructed self-paced WBT is still structured around formal lessons, typically bite-sized for easy consumption (perhaps 10-30 min. in length). Lessons contain performance objectives, motivation, learning activities, feedback, and evaluation. The biggest disadvantage to this type of training is a very low

feedback, and evaluation. The biggest disadvantage to this type of training is a very low completion rate.

### Advantages

- Learners can start when they're ready and take as much time as they need to complete.
- No upper limit on number of students that can be trained at one time.
- Many studies have shown that among learners who complete self-paced WBT, there is no significant difference in learning and retention from those who complete training in the classroom on the same subject.

### Disadvantages

- This type of WBT takes the most time and skill to construct. Development time is typically 40 to 60 hours (or more) for each hour of learning time.
- No interactivity or opportunity to learn from the experience of classmates.
- Is better suited to memorization and mental activities and does not lend itself well to hands-on activities.

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- Without a Learning Management System (LMS) there is no way to track whether learners have achieved performance objectives or indeed whether they have completed training or even looked at it.
- A very low completion rate. People are busy and tend to just drop out unless there are organization incentives (both carrots and sticks) to influence learners.

### 4.12.3 Online Tutorials

These are really just online documents meant to be read online or printed. Online tutorials are typically in PDF format.

### Advantages

- Quick to develop and to produce, since they are usually based on existing documentation.
- Do not require an instructor.
- Easy to distribute online or via email.
- Self-paced
- Can be used any time, anywhere.

### Disadvantages

- No interactivity, no feedback, no external motivation.
- It's a challenge to make users aware that online tutorials exist and to motivate them to use them.

- Online tutorials have a very low usage and completion rate. Learners find online tutorials hard to find, hard to print, and difficult to follow.

#### **4.12.4 Web-Based Electronic Performance Support Systems (EPSS)**

An EPSS is intended as a just-in-time online instruction in the accomplishment of a short task (say, 5 min.) EPSS often incorporate visual simulations “showing” rather than “telling”.

##### **Advantages**

- Can be incorporated into a software product and used like online help.
- Just in time and just enough - available any time, anywhere the product is available.
- Short and therefore more usable and user-friendly in a busy workplace.
- Can serve visual or hands-on learners or ESL learners better than a printed manual.
- Can replace other forms of training for simple tasks that are neither critical nor frequently performed.

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##### **Disadvantages**

- No interactivity with other learners, no feedback.
- Low usage and completion rate. Studies show that when people don't have the information they need to complete a task, they will typically
  - ask someone
  - phone someone
  - try to figure it out themselves
  - read the manual.

##### **NOTES**

##### **Have You Understood?**

1. What are the four types of Web based Training?
2. What is EPSS?

#### **4.13 COURSE FRAMEWORK**

A course framework shown in Figure 4.1 consists of all components that does not deal with the actual subject matter but are nevertheless essential for the conduct of any WBT course. The components that perform the following functions:

- Web pages that describe and introduce the course
- Registering learners
- Help administer the course
- Gather feedback

- Gather feedback
- Supply technical and administrative support
- Make individual topics easily accessible and provide access to additional learning resources

In Figure 4.1 we divide the course framework into eight components. In the “About the Course Section” we describe the course, its objectives, terms and conditions for undertaking the course, details regarding staff and sponsoring organization and the technical requirements to undergo the course. There is a separate ‘Registration’ component where the students register and are welcomed. In “Access Mechanisms”, the different access mechanisms available to access the course are defined. The “Running the Course” component contains learner page, course home page, syllabus, student details, and teacher guides. The “Learning Material” component gives details of all resources that make up the course content. The “Feedback” section lists the different types of feedback options available to the student. Another component may contain support pages while the “Course completion” component is activated during course completion. The course framework is not the most creative component of the development of the course. Without the course framework, the course in spite of availability of excellent teaching content may not achieve its business and teaching objectives.

## NOTES

### **4.13.1 Course Information**

#### ***4.13.1.1 Course Announcement Page***

The Course Announcement page is an overview of the course with links to more detailed information. There can be information with several titles: About the Course, Course Catalog Entry, Course Overview, Course Description and Course Identification.

#### ***4.13.1.2 Course Description Page***

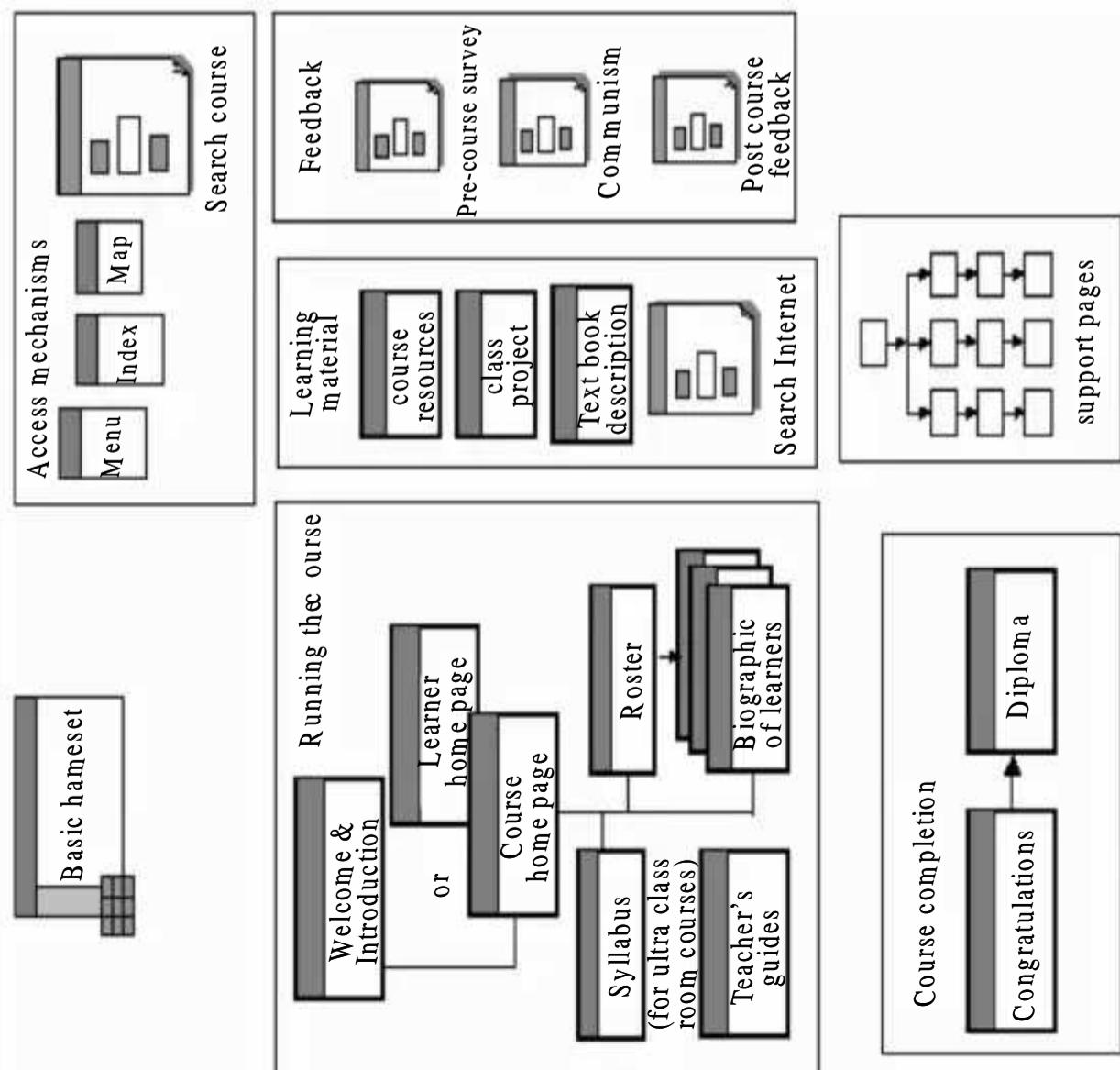
The Course Description is one of the most important pages. It is the most effective marketing and support tools of your course. It should not be too long but at the same time all the necessary information. It is advisable to advise the learner to print out this page and read all information carefully. This page must provide complete details about the course including all information needed by the learner to sign up for the course and prepare for the first activity. The following are some of the details that a typical Course Description page may contain:

- Identification – complete identification of the course: Number, Title, Subtitle, Version and Revision Date.
- Marketing the course – include inviting statement that would entice a learner to choose the course. This statement should not be a direct sales promotion statement but should motivate the potential learner to read on further to find more about the course.
  - Some of these statements are:

- Have you ever wondered.....?
  - Have you ever asked yourself .....
  - Have you ever wanted to .....

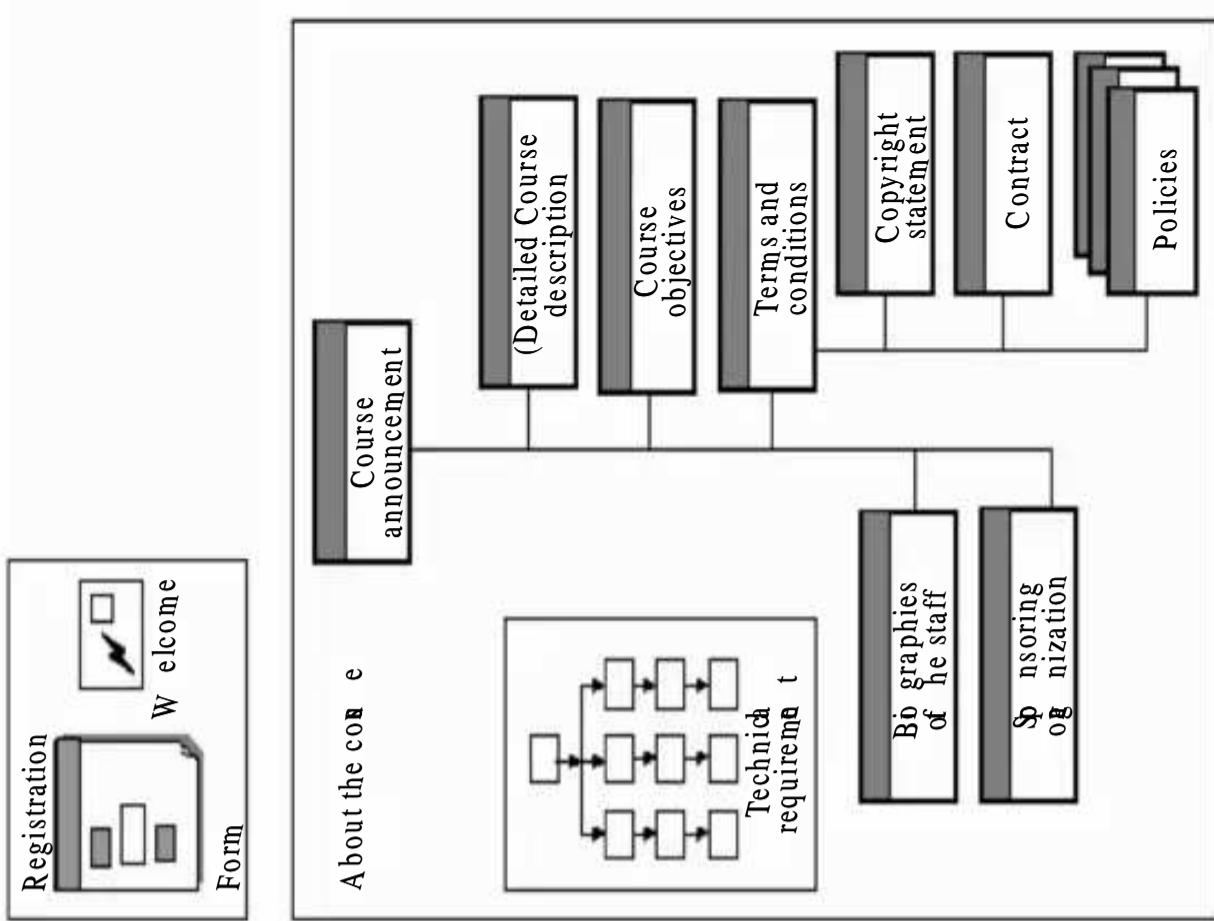
○ These statements are meant to make the reader aware certain problems that exist and how these problems are solved with this course – one example is given below:

# **INTRODUCTION TO E-LEARNING**



## NOTES

Ejerc. 4.1



## NOTES

### *4.13.1.3 Course Specifications*

You now have the reader's attention. Now quickly outline the most important points about the course in a concise manner and can include information about the most important characteristics of the course, such as length, languages in which it is offered and the fee structure.

Length	: 20 Study Hours
Language	: English
Fee	: Rs. 5000

### *4.13.1.4 For More Information*

Give full and disambiguous information to potential learners about how to contact you for more information. Make sure to provide e-mail address and phone number for queries that are not answered in the description

### *4.13.1.5 The audience for the course*

The learners should be informed clearly about the intended audience for the course.

- Is it meant for a particular professional group? – Mechanical engineers? Human resources executives?
- Is it aimed at a particular level? – Basic level? Advanced Level?
- Is it meant for learners who have high level of IT skills?

- Does it solve a problem experienced by large number of potential learners?

#### Who is this course for?

This course is meant for teachers at every level both school and university who want to provide some level of e-learning to their students

#### **4.13.1.6 Credits Awarded**

Specify clearly what credits the course will earn for the learner. State whether the credits lead towards a degree, certification or prize. Clearly state the modules offered and what combination of modules can lead towards a degree.

#### **4.13.1.7 Coverage**

- Clearly state the subject covered by the course.
- Outline the main points covered
- Give a brief statement of objectives

---

#### INTRODUCTION TO E-LEARNING

#### Objective

The e-learning course will inform you about e-learning in general and web based training in particular. The course gives a peep into various aspects of e-learning including instructional design.

#### NOTES

- In case the objective statement is complex, include full set of objectives in a separate page and provide a link to that page
- You can also include a two-level list of objectives with a little more detail by giving a brief outline of the topics
- Focus on the points the learners want to know
- You need to emphasize the real-world benefits of undergoing the course
- You need to be careful and see that the list of topics do not become too long and get boring

#### **4.13.1.8 Special Incentives**

If there are special incentives for learners who undertake your course – outline them clearly.

- Bonuses or prizes

- Highlight the way in which this course is different from other similar courses
- Reduced price
- Discount on additional courses
- Special learning resources available
- Members only entry to areas and events
- Advance notice of courses and first choice of dates

#### ***4.13.1.9 Prerequisites***

This defines the prior knowledge required to obtain the maximum from this course.

To benefit from this course:

- \*You must be involved with the educational field in some way.
- \*You must have basic IT skills and be comfortable with communicating using the computer
- \*You must have a basic idea of instructional design

## **NOTES**

#### ***4.13.1.10 Registering***

The learner must be given the following information necessary for registering for a course:

- Availability of the course
- The starting date of the course
- Approvals required for registering
- Class size
- Deadline for enrolling

#### ***4.13.1.11 Necessity of the course***

The necessity of the course must clearly be stated.

- Is it necessary for all employees?
- Is it needed for certain jobs?
- Is it restricted to particular areas?
- Is it required to renew any license?
- Is it required periodically for renewal?

#### ***4.13.1.12 Style of Instruction***

In this section clearly explain to the learner how the learning will proceed. Explain the

following:

- Whether the course will consist mainly of textual Web pages?
- How will interaction between learner and instructor and between learners take place?
- What the media will be used – text, graphics, multimedia, virtual graphics?
- What collaborative tools will be used – e-mail, discussion groups, chat, video-conferencing, etc.?
- What type of activities will be used to enhance the learning process?
- What will the learners be expected to produce as part of the learning process? – Documents, software, work products, etc..

#### **4.13.1.13 Technical Requirements**

Clearly state the hardware and software requirements to take the course. Specify what the minimum and maximum requirements. You may also provide a link to sources of help for meeting the requirements.

#### **4.13.1.14 Other Information**

- Information regarding the author or instructor of the course must be given. Many experts in a specific field are well known and learners may register for a course based on this fact. If the author is an authority on the subject of the course, highlight this fact.
- Be clear about the grading policy.
  - Explain clearly how grades are assigned, whether the grades will be numerical or letter grades, or be just a pass or a fail.
  - On what basis is the grading decided? - Will there be equal weight for class project, submitted activities, and participation in discussion groups?
  - If the policy is complex – have a separate page giving details.
- Explain the activities to be undertaken before embarking on a course
- At the end of the course description page include a link to the course Registration page.

## **NOTES**

#### **4.13.2 Efficiently Registering Learners**

- Simplify the registration forms – learners must be able to do the registration without too much hassle.
  - Keep it short
  - Label each item clearly
  - Flag required items in a clear manner
  - Give default values wherever possible

- Give default values wherever possible
- Minimize typing – wherever possible - give options to select from a list of options
- Confirm Registration by e-mail - to acknowledge registration and for motivation send them individual welcome e-mails

#### **4.13.3 Conducting the Course smoothly**

- Construct a **Welcome Page** for the learners
- Some courses require learners to post brief **biographies**; some do not and in some cases posting of biographies is optional. It is better to provide a template or a checklist to help the learners post their biographies.
- Create a **Roster Page** for the course. This page provides names and electronic contact information for staff and learners to enable them to communicate with one another
- Create a **Course Home Page** – include upcoming events, activities, tests, changes in schedule, etc..
- Create a **Learner Home Page** – home pages can be customized for individual learners. This page all pertinent details, announcements etc for all courses the learner is undertaking. With this page, the learner is freed from the need of visiting individual home pages for each course the learner is undertaking.

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## **NOTES**

- Create a **Syllabus Page** – this is the core of the instructor-led WBT courses – lays out schedule, links all activities, presentations, readings, staff members, and external resources of the course.
- There may also be a **teachers' guide** in cases where local teachers will be used for leading, participating or just supporting.

#### **4.13.4 Provision of Needed Resources**

Some pages provide information for learners to find learning materials they need throughout the course and may include links to priority resources, searching devices, description of textbooks and details of class projects. Some of the resources may be internal and some may be Web material.

- Course Resources
  - May be internal or external and are needed throughout the course. Some of the resources include
    - Syllabus, agenda, timetable
    - Past exams, projects, discussion group threads
    - Tutorial on the learning system
    - Documentation for the required course software
    - Technical support for the course
    - How to Study guide
  - Provide links to external resources – external sources may be
    - Other Web sites on the same subject matter

- Other Web sites on the same subject matter
- Newsgroup
- FAQs
- Forms used in a process being taught
- Reports, specifications, data sheets and white papers on the subject of the course
- Computer programs for tasks taught in the course
  - Add commentary

For the resources – add value by grouping, labeling and describing what is important about each link

- Web search page – include a page for triggering searches using popular search engines. Allow the users to use both external and internal search engines.
- Text book description – if the course uses a paper textbook – include its description including details such as title, author's name, Edition and date of publication, publisher, price etc..
- Provide complete description including a step-by-step to be followed to complete the project. Some of the topics to be included are goals, list of possible projects, process of defining projects, assignment instructions, and grading policy.

#### **4.13.5 Acknowledging Success**

- It is very important to acknowledge the success of the learner. The following may be included:
  - Congratulations
  - Diploma at the end of the course

#### **4.13.6 Collecting Feedback**

Gathering feedback is very important because this can help in improving the course. Feedback can take three forms:

- Throughout the course – have links or buttons to let learners offer feedback, point out errors, and make suggestions.
- Pre-Course Survey – this can help to learn more about learners and their expectations
- Post-Course Feedback – Questionnaires helps to gather statistics and help learners to express opinions, make suggestions and voice their problems

#### **4.13.7 Access Mechanisms**

Web designers have realized the need to allow learners find their own way through the course by providing a variety of access mechanisms. The following are some of the access mechanisms provided by many Web designers.

**NOTES**

#### **4.13.7.1 Menu and Table of Contents**

- Menu is hierarchical organization of Web pages similar to a table of content in traditional printed books.
  - Menu lets users click and go to any individual page.
  - It gives a preview of course contents
  - Good menus – organize each course into a few levels and each level into a few choices
- Kinds of Menus
  - Menus as layered pages of subtopics- here each layer is a separate Web page and each layer is reached by clicking at the previous level
  - Sidebar of Linked Pages – more sophisticated menu – layered list of subtopics is displayed in one frame of a multi-frame frameset – menu remains visible even when flicking through contents of each layer.
  - Expanding–outline menu – An even more sophisticated approach displays entire list of topics as an expanding outline like the Windows Explorer. Clicking on a menu item displays sub-items indented under it.

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## **NOTES**

- Designing Effective Menus
  - Keep entries short
  - Divide if list is long
  - Pick meaningful categories
  - Fit in one scrolling zone
  - Suggest sequence
  - Display only one or two levels at a time
  - Prompt learners to click
  - Make menus dynamic

#### **4.13.7.2 Index**

- Index is an alphabetical list of terms assigned by humans –user need not any longer remember exact term or correct spelling.
- Can contain synonyms to terms in text
- Some tips in creating indexes
  - Format the index in the familiar form of the printed book. Hyperlink is used – rather than page number\
  - Keep index entries short
  - Test the index

#### **4.13.7.3 Map**

- Organize a clickable map if the organization is not strictly linear
- Maps have the following characteristics:
  - Places a mental model in the learners' mind
  - Shows how – subject can be divided into subtopics
  - Shows which ideas are especially important and how topics are related
  - Is visually attractive

#### **4.13.7.4 Search Mechanism**

- Some courses provide a specially designed Web search engine to the learner for searching of resources – rather than use existing Search engines – which the learner may find too general.

#### **Have You Understood?**

1. What are the components of a WBT framework?
2. What are the titles that should be in a typical Course Announcement Page?
3. How do you define the audience of a course?
4. What are typical special incentives given to learners who undertake your course?

#### **4.14 SUMMARY**

- Web Based Training (WBT) makes use of Web technologies for the task of training
- WBT is the result of the three social and technical influences - distance learning, computer conveyed communication and proliferation of Internet technologies.
- Probably the first application of WBT was the informal tutorials that was made available on how to use HTML – they were simple and did not conform to any educational theory
- With WBT the barriers of time and space have been removed – obtain and deliver knowledge anytime, anywhere
- WBT – allows instructors to create innovative learner experiences such as presentations, simulations, games, field trips, as assigned reading, team project, etc
- WBT is ideal for courses which consist of precisely defined objective knowledge. Some of the characteristics of such content:
  - Step-by-step Procedures
  - Scientific and business concepts
  - Syntax and vocabulary of human and computer languages
  - Mechanical skills that needs to be taught
- The main reason for the push towards WBT is the cost factor.
- The effective instructional design associated with WBT is likely to provide a better learning experience compared to classrooms or disk-based CBT – it activates learners, exposes learners to real-world data, provides in-depth learning experience.

#### **NOTES**

learners, exposes learners to real-world data, provides in-depth learning experience, develops better thinking skills, promotes collaborative learning allows learners to reflect

before responding, provides effective learning technologies and helps learners to identify knowledge resources.

- WBT is ideal for courses which consist of precisely defined objective knowledge.
- Learners get the best instruction available - Learners can choose the best courses, best instructors and best fellow learners - Enterprises will realize the advantages of providing more choice than is available with local vendors or in-house training departments
- Instructors can teach from anywhere – This allows experienced, active experts to become instructors even if they cannot meet the demands of regular classroom teaching.
- WBT allows the creation of different types of courses – each providing learners with different types of learning experience – each suited to different situations
- WBT provides choices between the two types of courses - The choice is not limited to pure Instructor led courses or Learner led courses – but includes the complete spectrum of possibilities between the two extremes
- Courses are not purely synchronous or purely asynchronous – they are made up of a mix of activities that can be either synchronous or asynchronous. Synchronous and asynchronous are not mutually exclusive terms and rather indicates the time latitude learners have to complete activities

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## NOTES

- The definition of a WBT class is a group of individuals learning the same material on the same schedule. The size of a WBT class is not constrained by physical architecture and can consist of tens of thousands.
- There are many ways in which CBT or classroom approaches can be integrated into WBT.
- WBT depends on technology and designers of WBT should specify the technologies to effectively use the courses they design and they should use formats popular and often used by most number of learners
- There are four main types of Web-Based Training. Each is useful under different circumstances, and most training projects will use a combination of different types of WBT with printed documentation, classroom training, Web sites, and other forms of information delivery.
- A course framework consists of all components that does not deal with the actual subject matter but are nevertheless essential for the conduct of any WBT course

### Exercise

1. What is Web based Training? Explain.
2. Trace the history and the birth of WBT.
3. What makes WBT different?
4. Compare and contrast WBT, CBT and classroom based training.
5. Explain in detail why learners need WBT.

6. Give in detail the interactions between the different types of content.
7. How is WBT evaluated?
8. Discuss in detail the ideal situations for WBT.
9. What are the cost advantages of WBT?
10. How is learning improved through WBT?
11. Justify the use of WBT for learners, instructors and enterprises.
12. WBT has some disadvantages. Discuss them.
13. How do you choose the kind of course for WBT?
14. What are the advantages of different sized classes ?
15. Discuss the various environments under which WBT operates.
16. What are the four types of Web-based Training? Discuss.
17. Describe the components of a typical course framework.

## **UNIT V**

## **NOTES**

# **E-LEARNING METHODOLOGY**

### **5.1 INTRODUCTION**

This unit gives a detailed description of organizing learning sequences in the context of WBT. The effectiveness of the different methods of organizing learning sequences depends on the subject matter and to a certain extent on the learner group and the infrastructure available at the learner end. The designing of reusable modules is another important concept of WBT. There is a long list of learning activities that can be used to motivate learners. A correct mix of the various activities can help in conveying the subject matter in a coherent and interesting manner. The challenge lies in the instructor using these activities in an effective manner. Another important component of WBT activity is the testing and evaluation process to be carried out. Since the personal contact between the learner and the instructor is limited, the testing, evaluation and feedback should be designed carefully so that the learners are not discouraged.

## 5.2 LEARNING OBJECTIVES

- To understand the importance of organizing learning sequences
- To design learning sequences
- To understand linear and layered sequences
- To discuss about the various types of learning activities
- To describe testing and exercise generation for e-learning
- To understand the variety of question types
- To discuss the importance of effective feedback
- To discuss how cheating can be prevented

## 5.3 ORGANIZE LEARNING SEQUENCES

A course is just a sequence of learning experiences. Some courses allow only one sequence applicable to all learners while others allow each individual to have an unique learning path. Common Learning structures can be classified into six types.

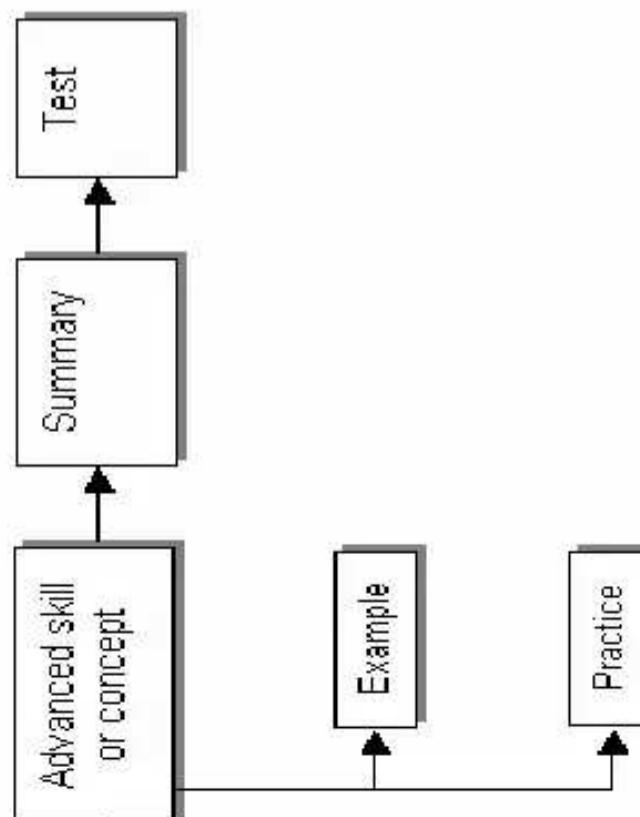
### 5.3.1 Class Tutorials

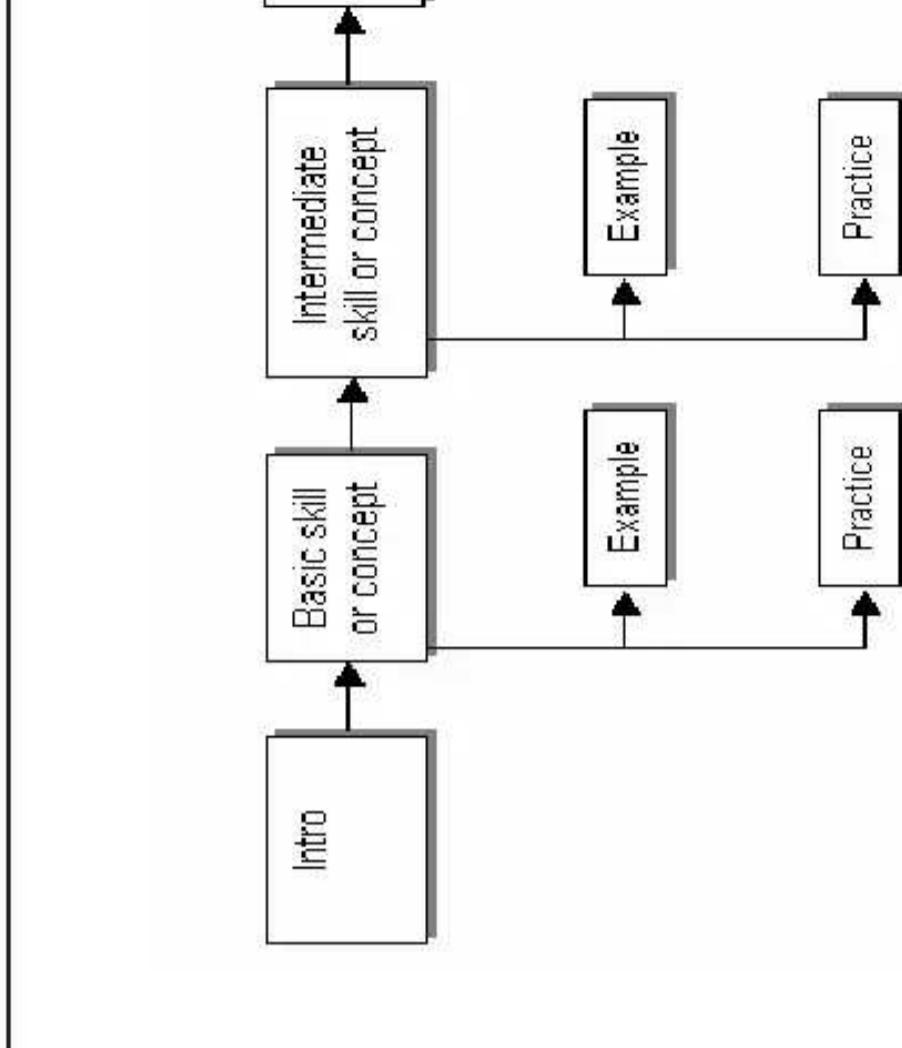
- **Architecture**
  - Architecture of class tutorials is shown in Figure 5.1.
  - After an introduction, learners proceed through a series of pages, each teaching a more difficult concept it skill

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## NOTES

- At the end of the series – is a summary and a test
- Linked to the pages teaching skills and concept are pages providing examples and practice—which is optional
- **When to use**
  - To teach basic knowledge and skills in a safe, reliable but unexciting way



**INTRODUCTION TO E-LEARNING**

- **Advantages**
  - Familiar to learners – learners can easily follow the simple structure
  - Flexing – adapts to suit many purposes – but simple enough to create from templates
  - Fits in with many structured design techniques and instructional design ideas
- **Tips and Guidelines**
  - Do not try to cover too much – limit each sequence to not more than 7 to 10 simple skills or concepts
  - Add as much practice sessions as possible – so that learners apply what they learn immediately – otherwise structure – becomes a unexciting pag-turner

**NOTES****5.3.2 Activity-centered Lessons**

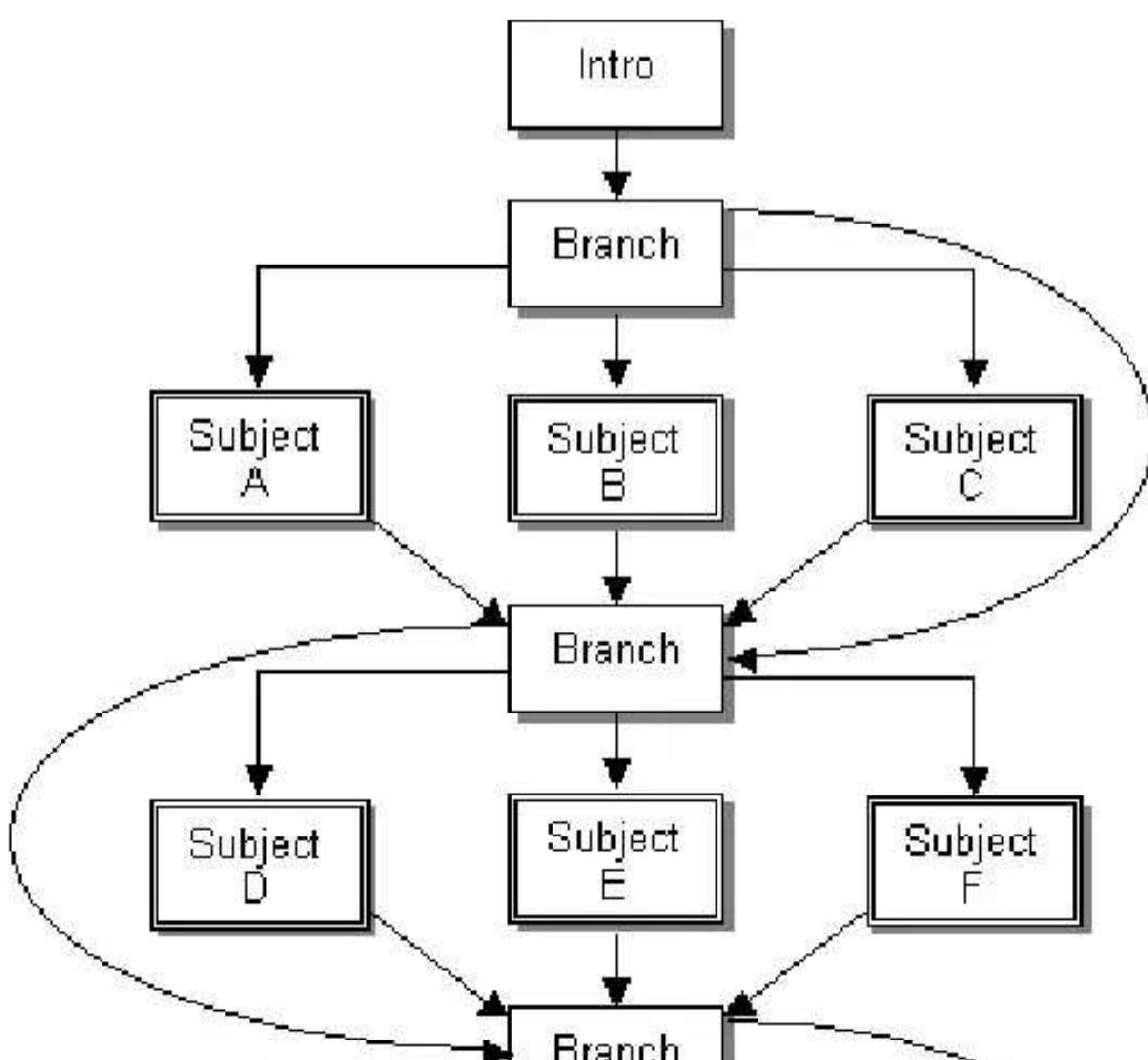
- **Architecture**
  - Architecture of class tutorials is shown in Figure 5.2. Figure 5.2 – page 138
  - Lessons are centered around a major activity
  - After introduction and preparation – learner participates in activity
  - Then – learner reviews summary - of what the learner was able to learn from the activity
  - Finally takes a test to prove his mastery

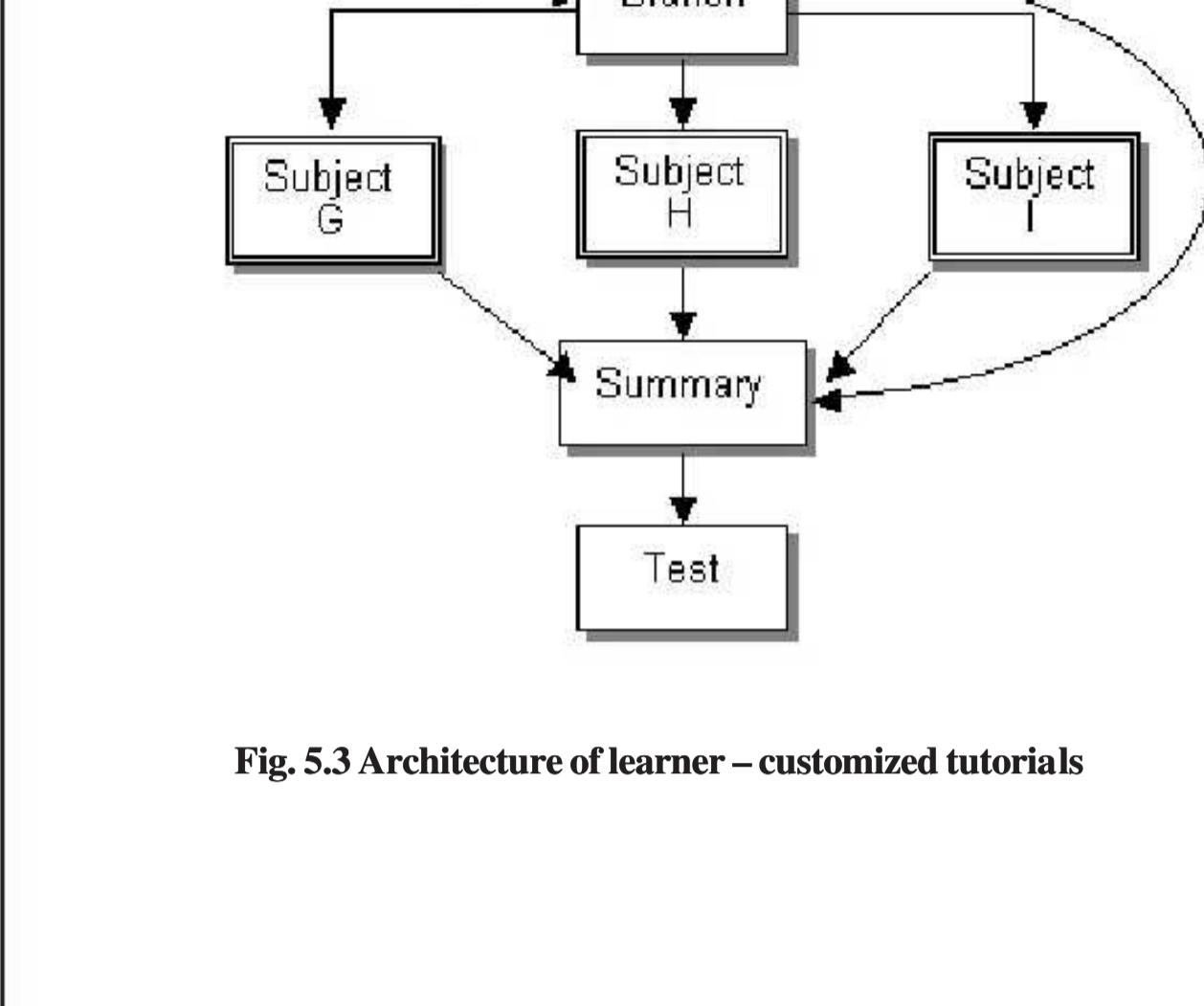


**Fig. 5.2 Architecture of activity – centered lessons**

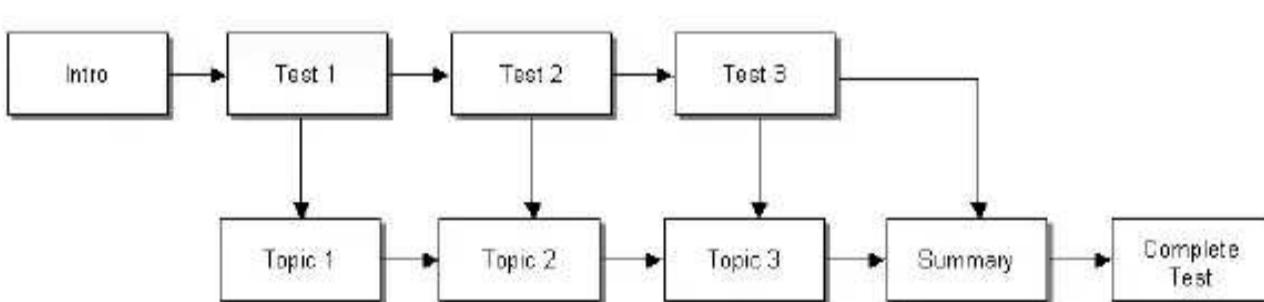
- **When to use**
  - To teach complex concepts, emotional subjects, or subtle knowledge that requires rich interaction with the computer or other peer learners
- **Advantages**
  - This structure can be used when engaging learners in rich activity results in better learning
  - Can be used when the activity is incomplete in itself
- **Tips and Guidelines**
  - Specify clearly the goals of the activity
  - Explain how the activity fits into the course
  - Define the prerequisite knowledge necessary for the activity
  - Give instructions for performing the activity
  - Link effectively – to information, software or other resources

## NOTES





**Fig. 5.3 Architecture of learner – customized tutorials**



## NOTES

**Fig. 5.4 Architecture of knowledge – paced tutorials**

### 5.3.3 Learner-customized Tutorials

- **Architecture**
  - Architecture of class tutorials is shown in Figure 5.3.
  - The lesson branches based on knowledge or choice of learners
  - After a small introduction – lesson branches down a specific path
  - Path may rejoin and branch again before the summary and test – covering all the topics – regardless of topics taken
- **When to use**
  - To let learners customize training to suit their individual needs
- **Advantages**

- Suitable for group of learners with widely varying needs, interests, and levels of knowledge
- Though complex to develop and test - training much more efficient and effective by helping learners to adapt standard materials to suit their immediate needs
- **Tips and Guidelines**
  - Clarify expectation – be clear which portions of the course can be missed by choices and which portions should not be missed
  - Explain the branching scheme – explain clearly how to select choices – through quizzes or questionnaires
  - Test and define – the complexity of this structure makes it complicated to ensure the natural flow of the course in spite of branching. Therefore plan to spend 30% to 40% of the development time for testing and refining prototypes

#### **5.3.4 Knowledge-paced Tutorials**

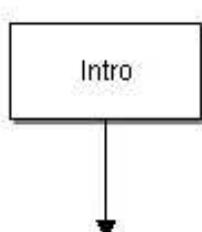
- **Architecture**
  - Architecture of knowledge-paced tutorials is shown in Figure 5.4.
  - After an introduction – learners proceed through a series of tests - until they reach their current limits of knowledge

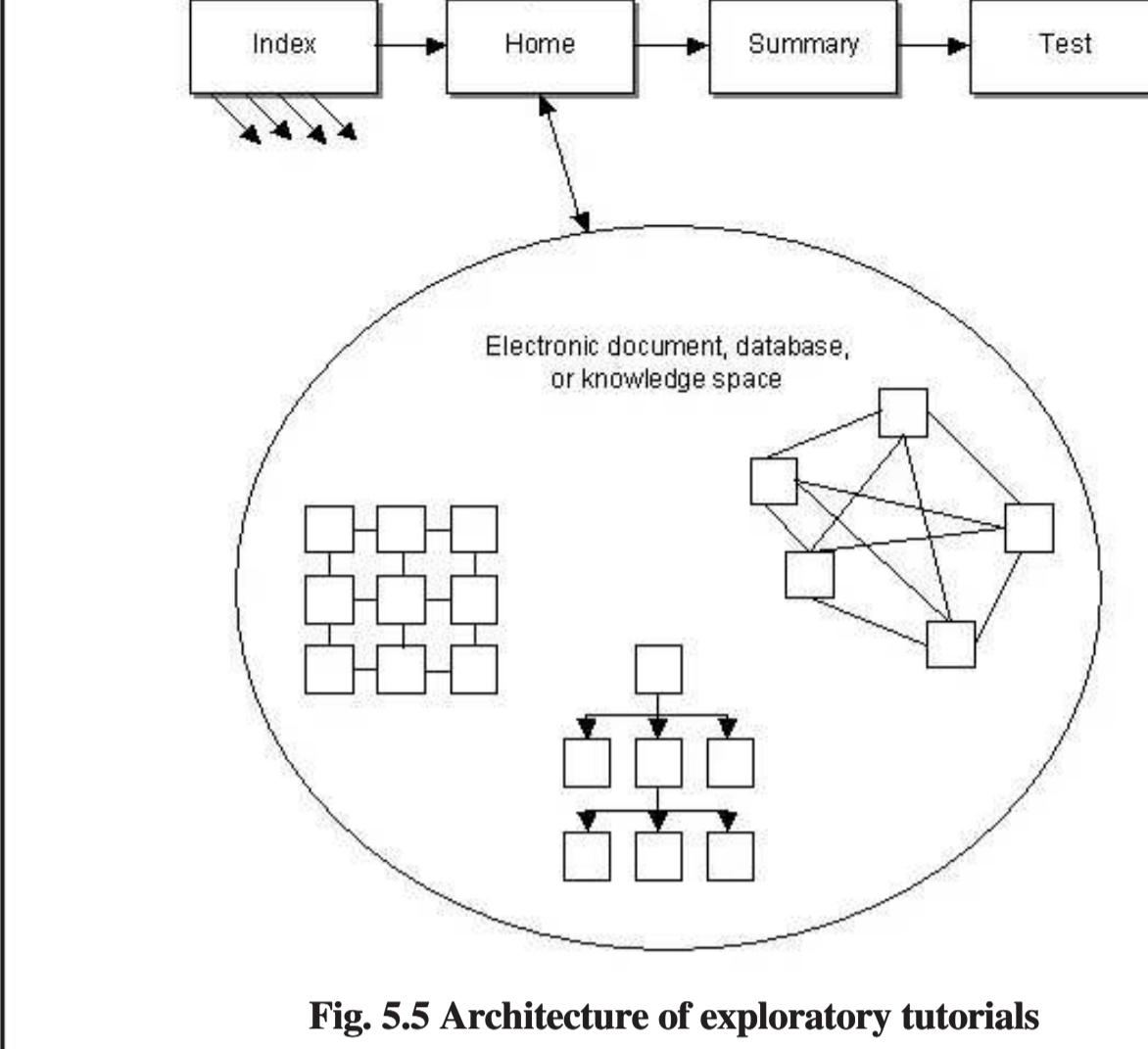
## **NOTES**

- The learners are then transferred into main flow of the traditional tutorial – which ends with a summary and test
- **When to use**
  - To let impatient learners to skip topics they are already familiar with
- **Advantages**
  - Used to hand learners with different levels of skill
  - Best for courses in subjects which have a definition progression in levels of skills and knowledge

#### **5.3.5 Exploratory Tutorials**

- **Architecture**
  - Architecture of class tutorials is shown in Figure 5.5.
  - Learners find knowledge on their own
  - Learners navigate an electronic document, database or Web site in which they accomplish specific learning goals





**Fig. 5.5 Architecture of exploratory tutorials**

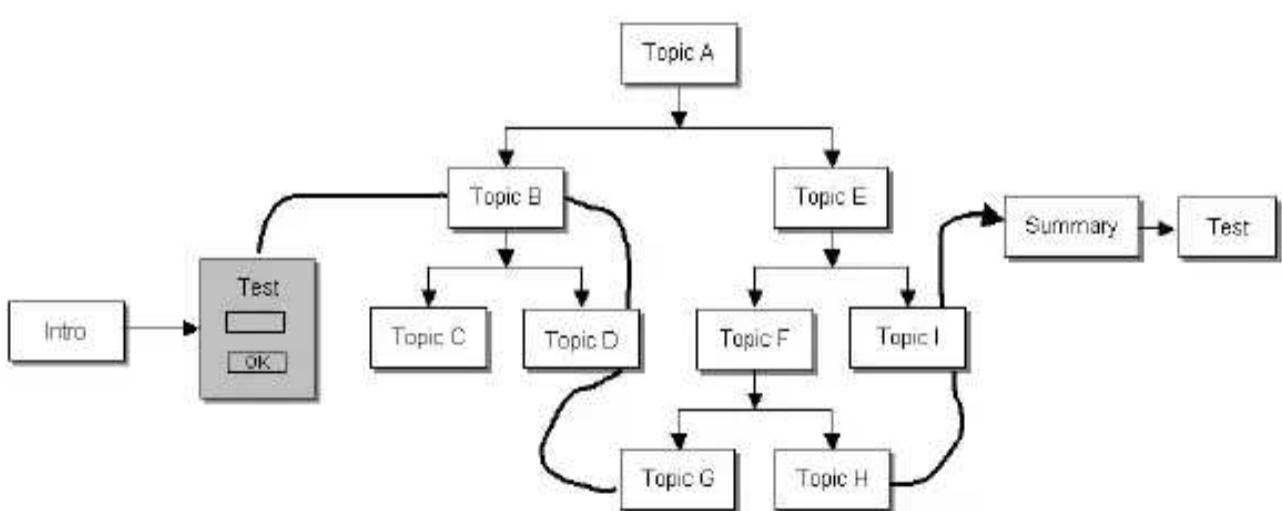
#### INTRODUCTION TO E-LEARNING

- To aid in this task – use special index and navigation mechanisms
- Once learners have accomplished their goal – they view a summary and take a test
- **When to use**
  - To teach learners to learn on their own by developing their skills or navigating complex electronic information sources
- **Advantages**
  - Used to learners to meet their individual learning goals
  - Develop and hone general online navigation skills
  - Look up information – just-in-time training
  - Best for experienced learners
- **Tips and Guidelines**
  - Support the learner by providing a concise summary with links to topics covering individual concepts
  - Provide a well designed index to help learners find specific material
  - Create tests covering essential material - and in the test feedback provide links to the materials learners may have missed

#### NOTES

- **Architecture**
  - Architecture of generated lessons is shown in Figure 5.6.
  - Learner tailors a learning sequence based on learner's answers to questionnaire at the start of the lesson
  - After the custom sequence of topics, learners view a conventional summary and take a test
- **When to use**
  - To customize learning for those who have very specific needs and not much time or patience to complete topics already learned

## NOTES



**Fig. 5.6 Architecture of generated lessons**

- **Advantages**
  - Useful for custom tailoring learning to individual learners.
  - Can be used to train a varied group of impatient people with different needs, varying desires and different levels of experience
  - Can be used to provide a targeted review of skills and knowledge
  - Can save learners time and effort by allowing them to study just what they need to learn
- **Tips and Guidelines**

- **Tips and Guidelines**
  - Pedagogically and technically difficult to construct
  - An experienced instructional designer and a competent programmer are necessities.
  - A good lesson needs to be generated using artificial intelligence techniques
  - Topics from which the lesson is constructed must be written in a completely modular fashion – so that they can be taken independently

### **Have You Understood?**

1. When can activity-centered tutorials be used?
2. Why are Generated types of tutorials difficult to design?
3. What are the advantages of exploratory tutorials?

### **5.4 BUILDING BLOCKS OF LESSONS**

The following are some of the pages that commonly occur in all kinds of lessons.

- Welcome Page
  - Greets learner at start of lesson – describes the lesson, its importance and what the learner will gain by taking the lesson.
  - Should be there for every lesson unless this welcome task is performed by the introduction page.

---

### **INTRODUCTION TO E-LEARNING**

- Introduction Page
  - This establishes the subject and characteristics of the lesson and prepares the learner to participate in the learning process.
  - Should be there when learner needs background information or extra motivation.
- Related Resources Page
  - This gives the learner access to information outside the lesson itself. Provides pointers to information may be needed before, during, and after taking the lesson.
  - It consolidates all references into one organized display.
  - Is added when the subject matter is complex and the lesson cannot contain everything every learner needs on the subject
- Summary Page
  - Recaps all the critical points in the lesson
  - Learners are able to recall all the ideas regardless of the path they take through the lesson
  - Needed for all lessons having more number of pages and activities
- Featured Example Page
  - Presents a single example or case study along with commentary about it.
  - Needed when there are complex, rich, life like examples that require detailed

### **NOTES**

commentary or some special treatment

- Code Sample Page
  - Describes a special type of example – shows a fragment of a computer program or script
  - Needed when teaching computer languages or scripting languages, formatting languages and document structuring languages
- Event Replay Page
  - This page lets learners – play a previously recorded event – such as video lecture, audio conference or a chat session
  - Should be included when all learners are not able to participate in live events or when learners want to review a live event afterwards
- Choice Page
  - Presents alternatives and invited learners to select a choice – Each choice takes the learner down a different path through the course
  - Used whenever – you want learners to decide where to go next – example in a branching structure or a menu system
- Procedure Page
  - Provides clear instructions for learners to “act” in active learning

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- Used to guide learners through a complex procedure by giving clear step-by-step instructions
- Lesson Feedback Form
  - Gathers comments and suggestions about the lesson while it is still fresh in the mind of the learner
  - Used to get immediate fresh feedback on the lesson

### Have You Understood?

1. What is the function of the event replay page?
2. What is the function of the related resources page?
3. What are the advanced features that can be added to related resources page

## 5.5 DESIGNING LEARNING SEQUENCES

The design of courses can be carried out using the common learning structures discussed in Section 5.3. However by understanding the principles of combining, linking and sequencing pages to shape learning experiences that exactly fit the profiles of the learners. This section explains the principles of structuring learning sequences.

### 5.5.1 Design a well Structured Organization

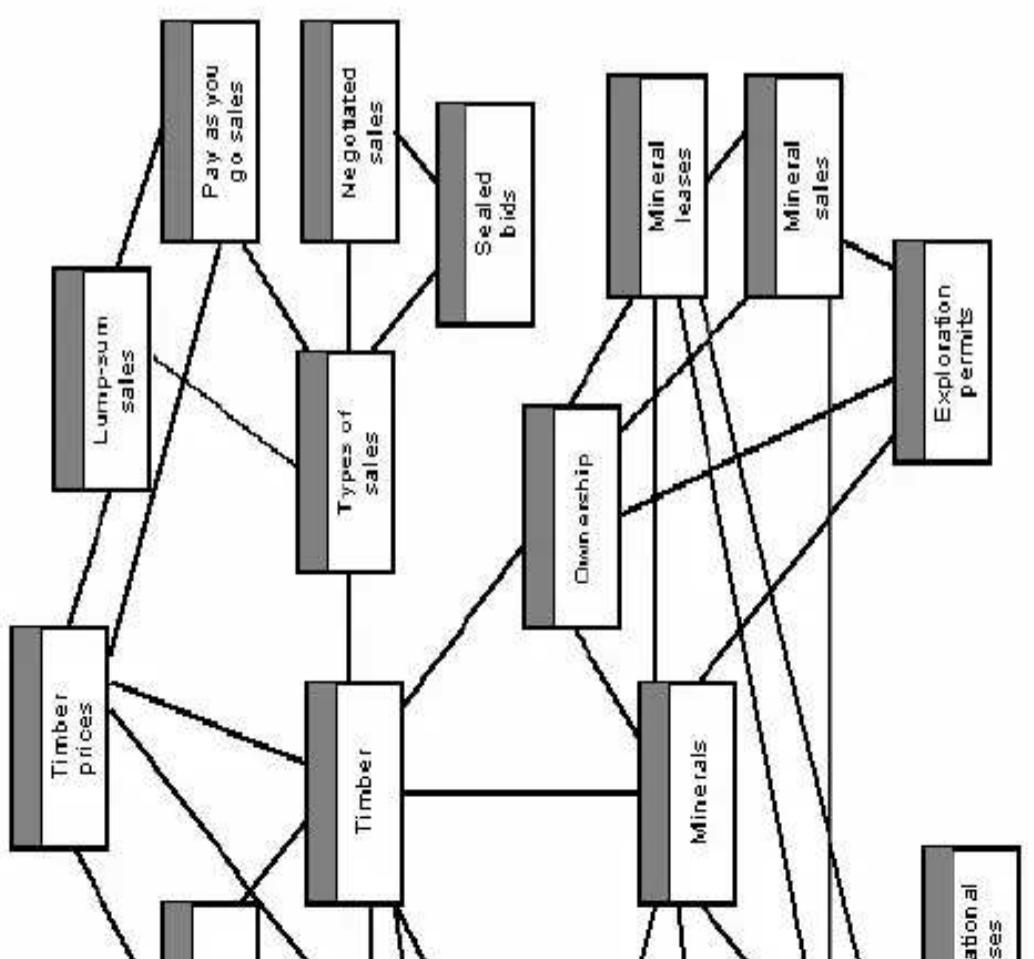
Architectural discipline is necessary in order to design WBT lessons and courses that are well structured otherwise the learners will be confused and disoriented. A course needs

are well structured otherwise the learners will be confused and disoriented. A course needs to be logically organized. Figure 5.7 gives an example of an organization of a lesson which is not clear. It appears disorganized with no clear learning path and no guidance for selecting paths and topics. Figure 5.8 shows another version of the same lesson. Here the organization is simple, regular and predictable. Learners navigate more reliably and comfortably with such a hierarchical structure.

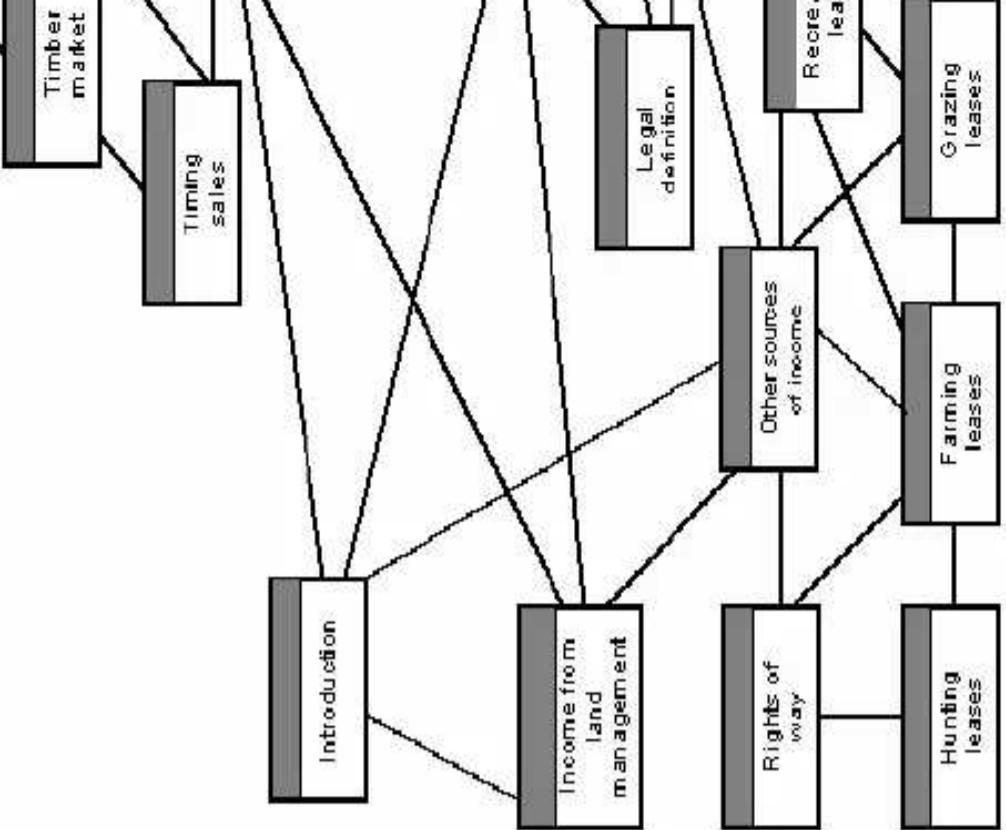
### 5.5.2 Design Reusable Modules

- **Reusable modules**
  - Modularity is one of the most important concepts associated with WBT. Designers, vendors and standards committees promote this concept.
  - Developing training would be much easier and a lot less costly – if it is possible to just assemble courses using off-the-shelf components.
  - The goal of Modularization is to enable designers to assemble a large portion of their courses from modules that have already been designed, developed and tested.
  - Lessons can be assembled by pre-defined topics or Web pages, which in turn can be constructed from a library of standardized animations, video clips, sound recordings, graphics etc.

## NOTES

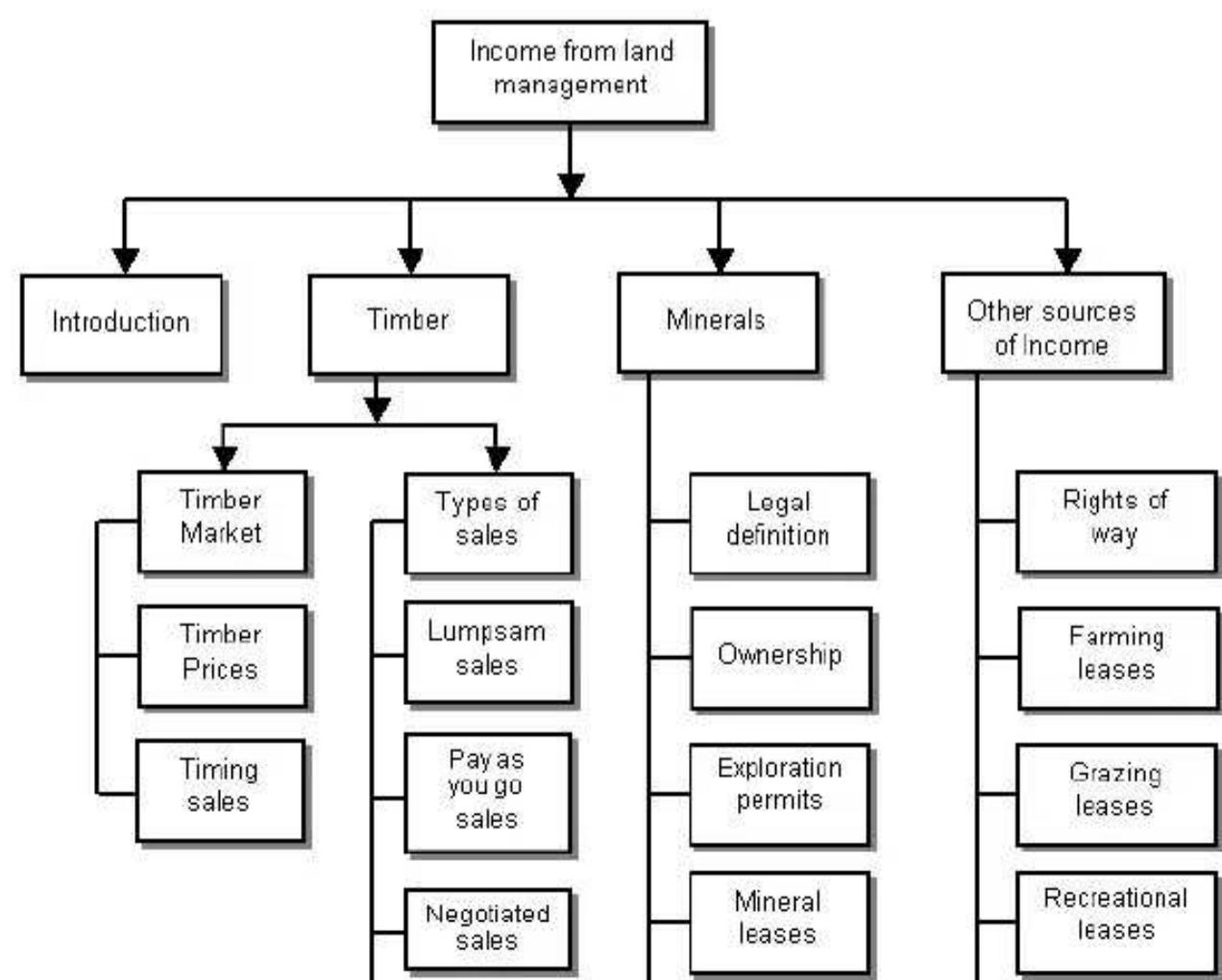


disorganized course on timber management



**Fig. 5.7 Not Clea ly organi**

## NOTES



### Fig. 5.8 Well organized course on timber management

- Challenges in embracing modularity
  - Real-world knowledge is highly interrelated and skills are interdependent and become unwieldy when transformed into modules
  - Technical incompatibilities discourage reuse – though this may not be a problem in future when standards groups are working to define standards and vendors are starting to support them
  - Learners have to deal with a large number of interfaces – on one page buttons may be on top, on the next at the bottom, colours may change abruptly. Unless developers follow common standards for user interface, visual appearance and media usage, learners will not have a smooth ride.
- Approaches to Modularization
  - Follow Standards – follow standards whenever possible. AICC, IMS and IEEE's Learning Technology Standards Committees are some bodies that are working towards developing such standards
  - Design cross-everything modules

### INTRODUCTION TO E-LEARNING

- Design the courses so that they work with many versions of as many browsers on as many operating systems as possible.
- Pick solutions to a problem that will place fewer restrictions on who will be able to take the course.
- Do not use advanced browser features or file formats requiring proprietary plug-ins, if you can avoid them.
- Modularize at all levels
  - Design independent, self contained modules at all levels.
  - Minimize dependence between courses
  - Make each page complete in itself
  - Design multimedia procedures so that they can be dropped on a page without complex integration procedures
- Limit Free-form Linking – we cannot avoid links altogether since they provide valuable navigational pathways. However they make modularization difficult. A partial solution is to reduce the amount of navigation done by handcrafted hard-coded links in the body of the Web pages.

### NOTES

#### Have You Understood?

1. What is meant by saying that learners have to deal with a large number of interfaces?

## 5.6 SEQUENCING MODULES

A course can be viewed as a sequence of experiences encountered by learners where the learning experiences may be class meetings, homework assignments or Web pages. There are basically two approaches to determining sequencing.

- Linear Sequence – decided by course designer
- Layered approach – the selection and order of learning experiences are controlled by individual learners dynamically as they navigate the course

### 5.6.1 Linear Sequence

- Sequential Learning paths are extremely simple. You can either go forward or at the most move backward.
- If the instructor is an experienced expert who already knows the sequence that works best – then use that sequence
- The best sequence for teaching is not always obvious – best order of teaching steps – need not be the exact order in which the steps are performed or even the logical order
- In training some of the thumb rules in deciding the sequence are:
  - Teach simple skills before complex ones

## NOTES

- Introduce concepts that are necessary for understanding other concepts
- Teach skills that the learner can immediately apply
- There are some standard teaching sequences – the sequence goes like this:
  - Motivate the learner
  - Preview the sequence
  - Have the learner recall prior knowledge
  - Present new Ideas
  - Provide Feedback
  - Test Understanding
  - Enrich learning

#### *5.6.1.1 Problems associated with sequential learning paths*

- Long Sequences - can be tedious

#### Solution

- Keep sequences short
- Interleave presentations with activities
- Let the learners know where they are in the sequence, how much progress has been made and how much is remaining

- Learners may know early parts of the sequence
- Solution**
- Let the learners skip through pages
  - Let the learners jump ahead to Summary or test page
- Learners may need only part of the content covered by the sequence

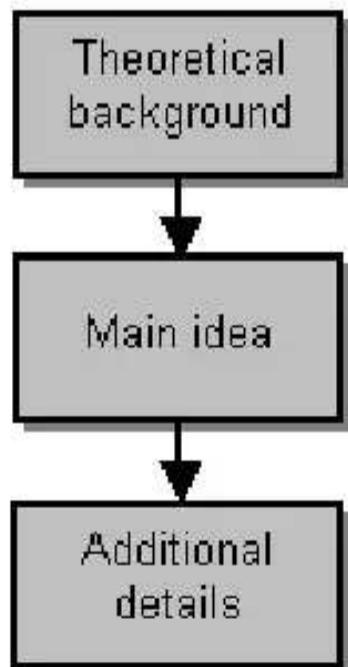
**Solution**

- Allow learners to jump to individual topics within a sequence – list the topics in a lesson menu.

### 5.6.2 Layered Modules

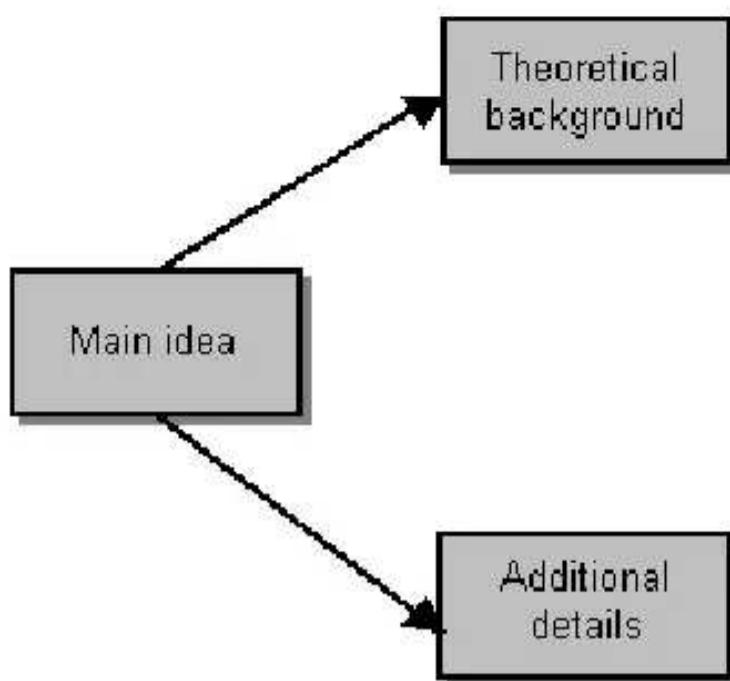
One approach allows the designer or instructor to determine the sequence of learning experiences while in the second approach the learner determines the sequence. However the learner – does not know the material they are studying – how does the learner determine the sequence. In order to help the learner to find the best sequence designers arrange the course in layers so that learners can explore in logical, systematic ways.

## NOTES



**Fig. 5.9 Linear sequential presentation**

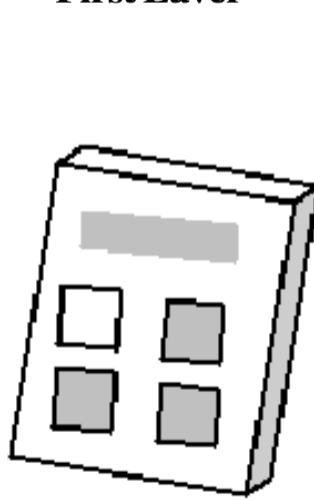
As shown in Figure 5.10, with a layered approach, the learner can start with the main idea – the learner then choose to learn about theoretical background or look up additional details. These are choice sthat the learner can make. The learner may also choose to quit after getting the main idea.



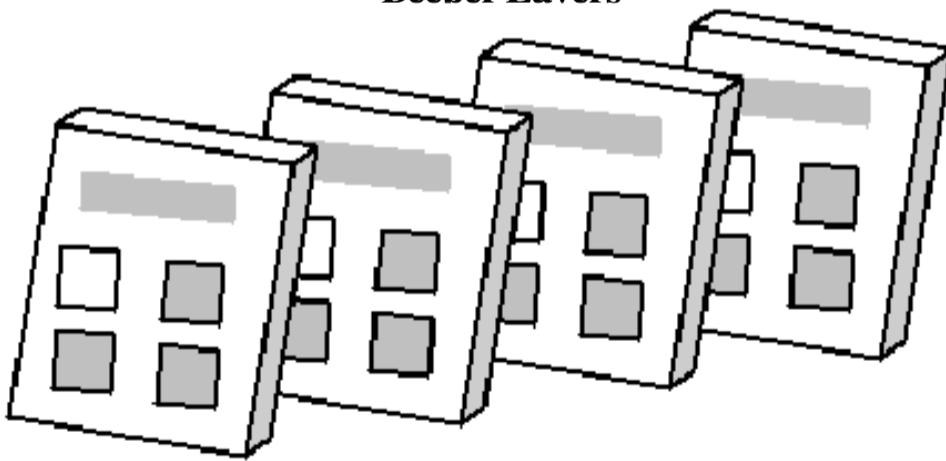
**Fig. 5.10 Layered presentation**

## NOTES

**First Layer**



**Deeper Layers**



**Essential** ----- → **Nice to know**

**Needed by everyone** ----- → **Needed by few**

**Usual case** ----- → **Rare occurrence**

**Immediately useful** ----- → **Background theory**

**Fig. 5.11 Layers of knowledge**

- Layers of Knowledge – learners normally start on the first layer of knowledge and then gradually move to the next layer. ... So far, we have

then select links to progressively deeper layers as necessary. Surface layers deal with skills and knowledge that all learners need to know while deeper layers deal with knowledge that only a few learners occasionally need. (Figure 5.11).

- Learners in Control
  - Layered approach put learners in control but at the same time provides them with navigational aids that help them to find just the training they need.
  - Useful when there is too much material for all learners to learn in time (just-in-case-learning) or when individual needs of the learners vary widely.
- Typical contents of the various layers
  - Top layer – Preview, overview, summary, quick-reference aids
  - Middle layer – Complete developments of main, high priority ideas
  - Bottom Layer – Rarely needed subjects, common reference documents, links to standards, specifications, and external reports

### Have You Understood?

1. How is layering different from sequencing?
2. What are the typical contents of the top, middle and bottom layers?
3. What are the directions you can move in linear sequence?

## INTRODUCTION TO E-LEARNING

### 5.7 LEARNING ACTIVITIES

Learning activities are coordinated actions that exercise basic intellectual skills, thought processes, and analysis techniques.

### NOTES

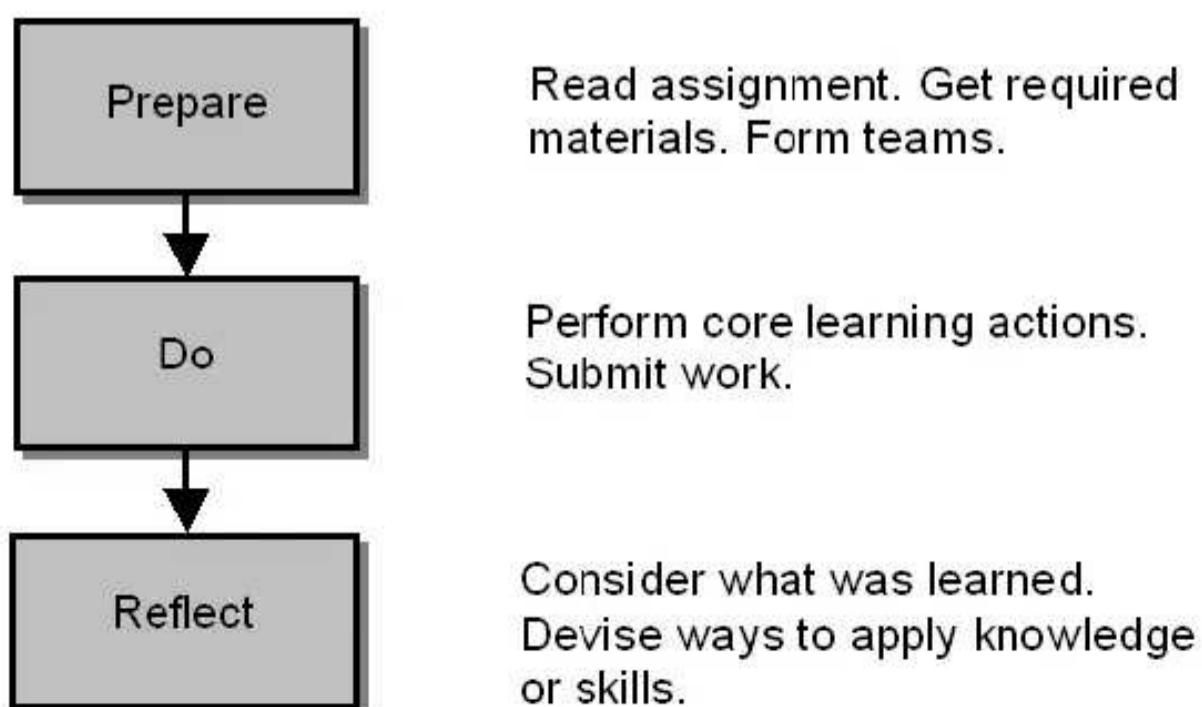


Fig. 5.12 Phases of learning activities

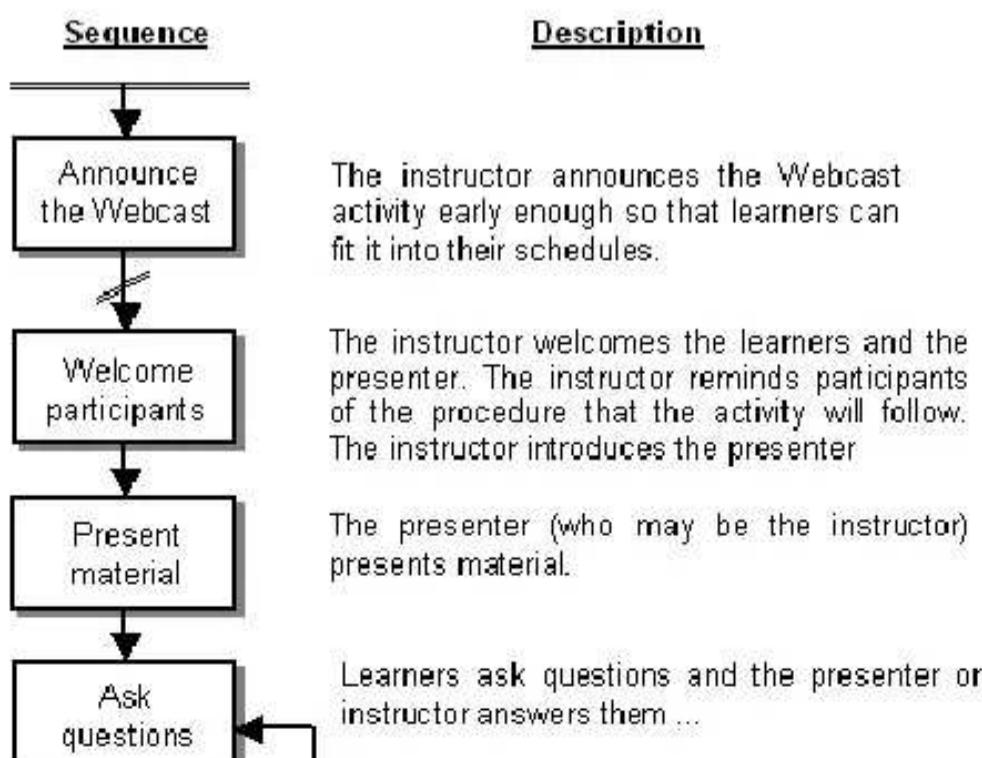
- Mere clicking the mouse or aimless chatting do not result in learning
- People learn by considering, researching, analyzing, evaluating, organizing, synthesizing, discussing, testing, deciding and applying ideas.
- Activities may use clicks and chat sessions but the goal is to provoke the above mentioned mental activities
- Most learning activities has three phases as shown in Figure 5.12.
- Learning activities can be used to teach, to exercise and to test knowledge, skills and beliefs
- **Common Learning Activities** - there are some common formats for learning activities. These techniques are proven and flexible. Well designed and appropriately deployed activities work well with any subject matter. The following are some of the learning activities.

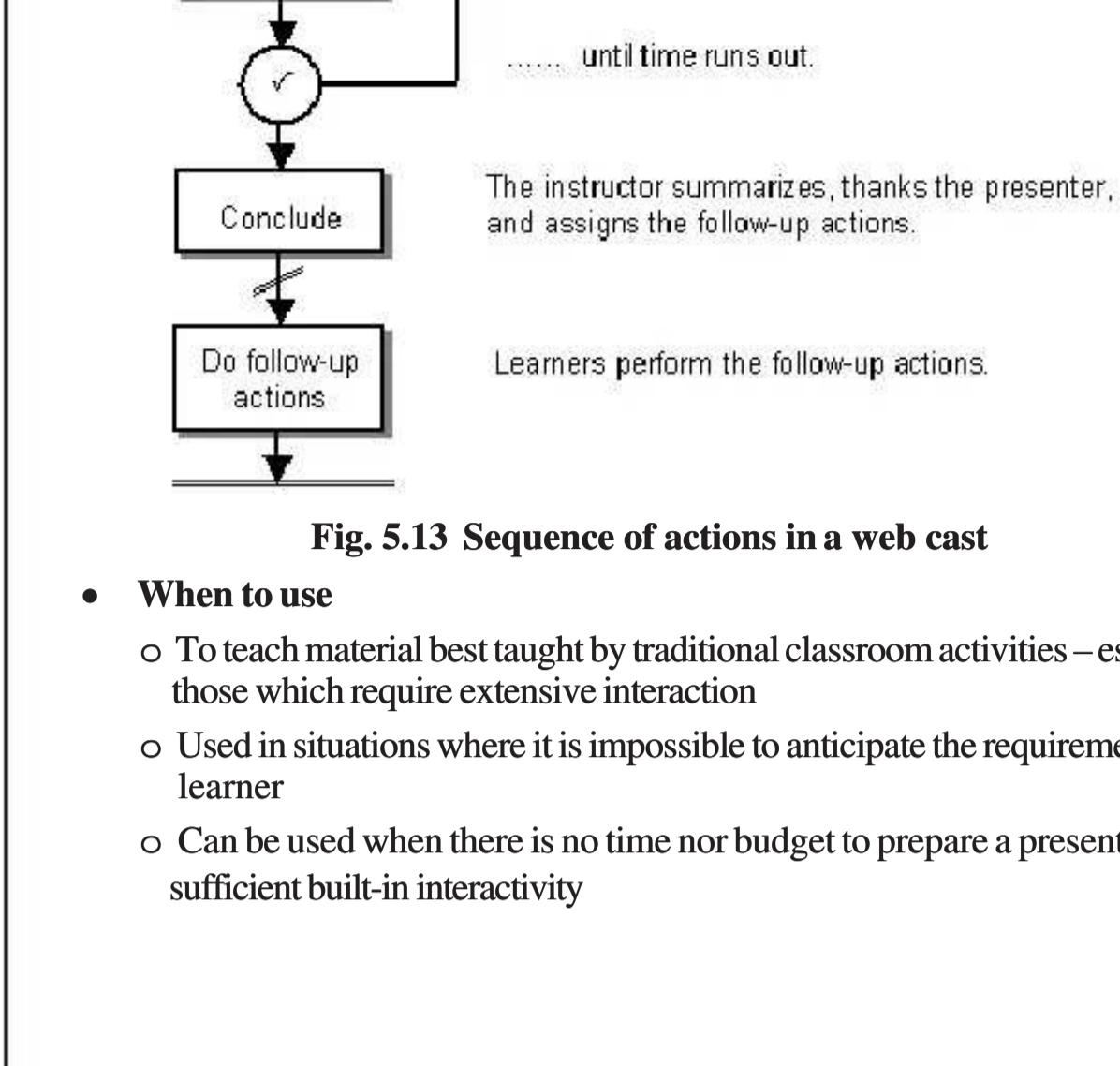
### 5.7.1 Webcast

- **Description**
  - Many distributed learners participate fully in a conventional training event by a network
  - The most common format is a lecture or speech followed by questions from learners
  - The presenters and audience are connected by a chat or conferencing system

## NOTES

- Participants may also use screen sharing and whiteboard tools during the session
- **Sequence of actions**
  - Figure 5.13 shows the sequence of actions in a Webcast and these actions are similar to classroom activity





**Fig. 5.13 Sequence of actions in a web cast**

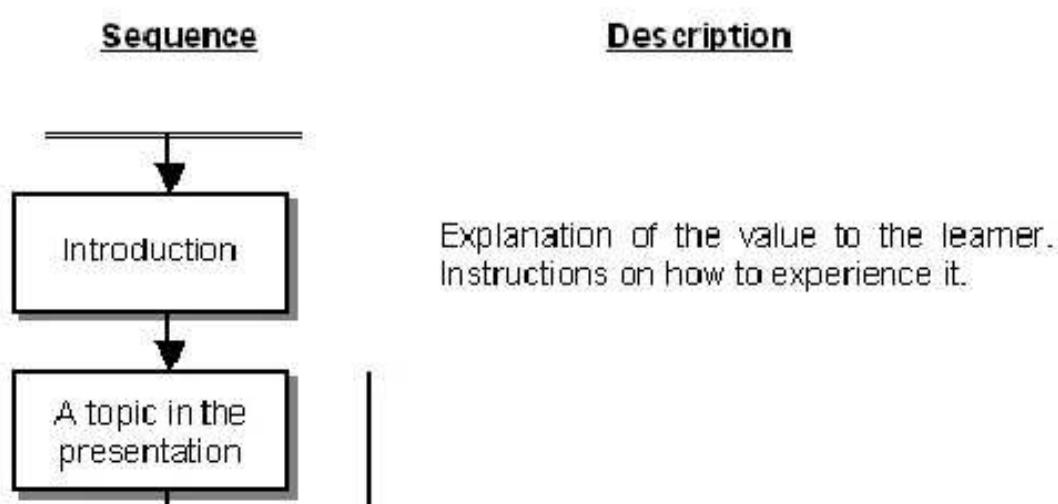
- **When to use**
  - To teach material best taught by traditional classroom activities – especially those which require extensive interaction
  - Used in situations where it is impossible to anticipate the requirements of the learner
  - Can be used when there is no time nor budget to prepare a presentation with sufficient built-in interactivity

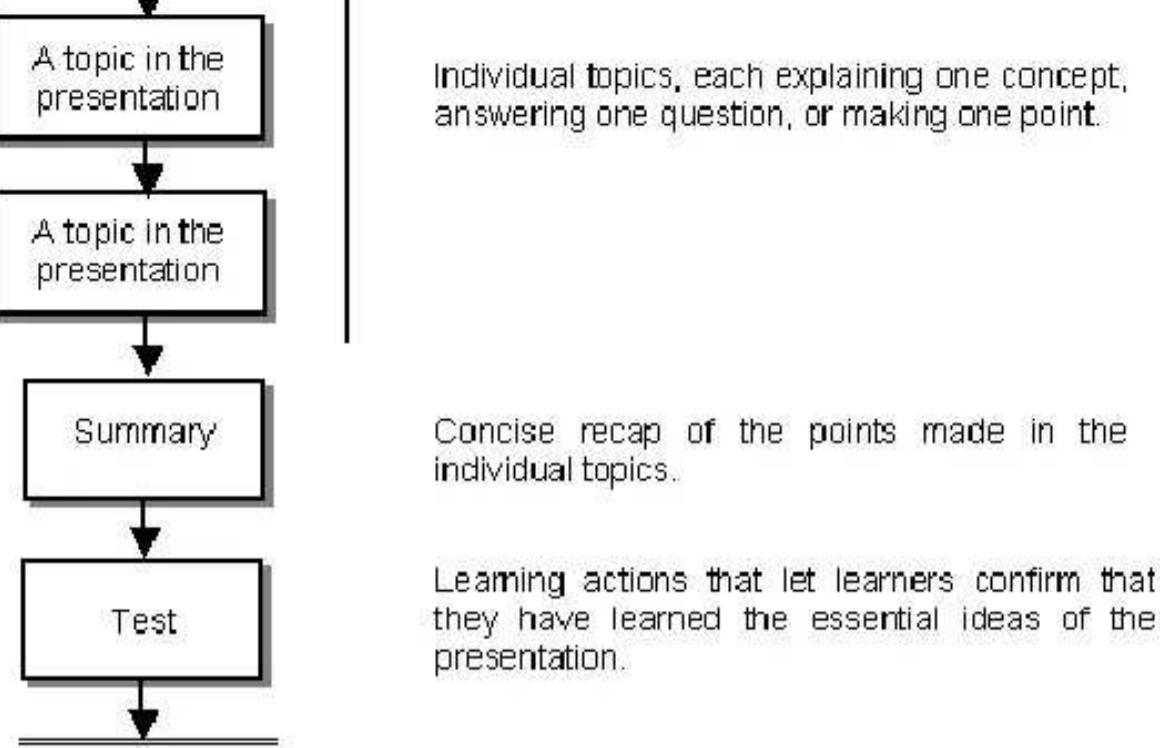
### 5.7.2 Presentation Sequences

- **Description**
  - Learners read, listen to, and watch carefully crafted explanations in a Web browser
  - Presentation sequences rely primarily on text and graphics to tell their stories
  - Primary pathway is linear
- **Sequence of actions**
  - Figure 5.14 shows the presentation sequence.

### NOTES

Figure 5.14 – Page 200



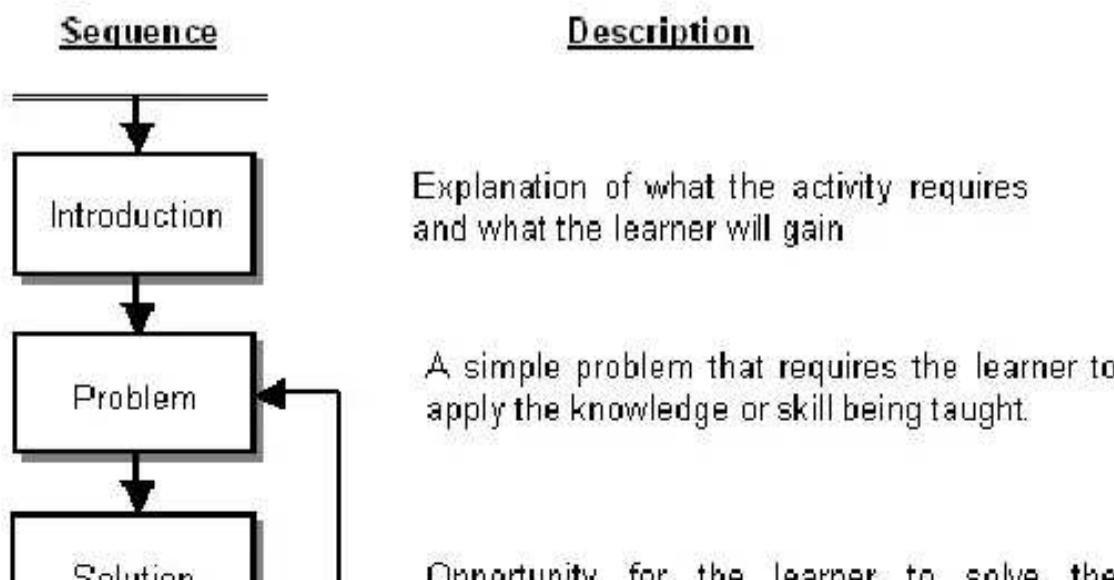


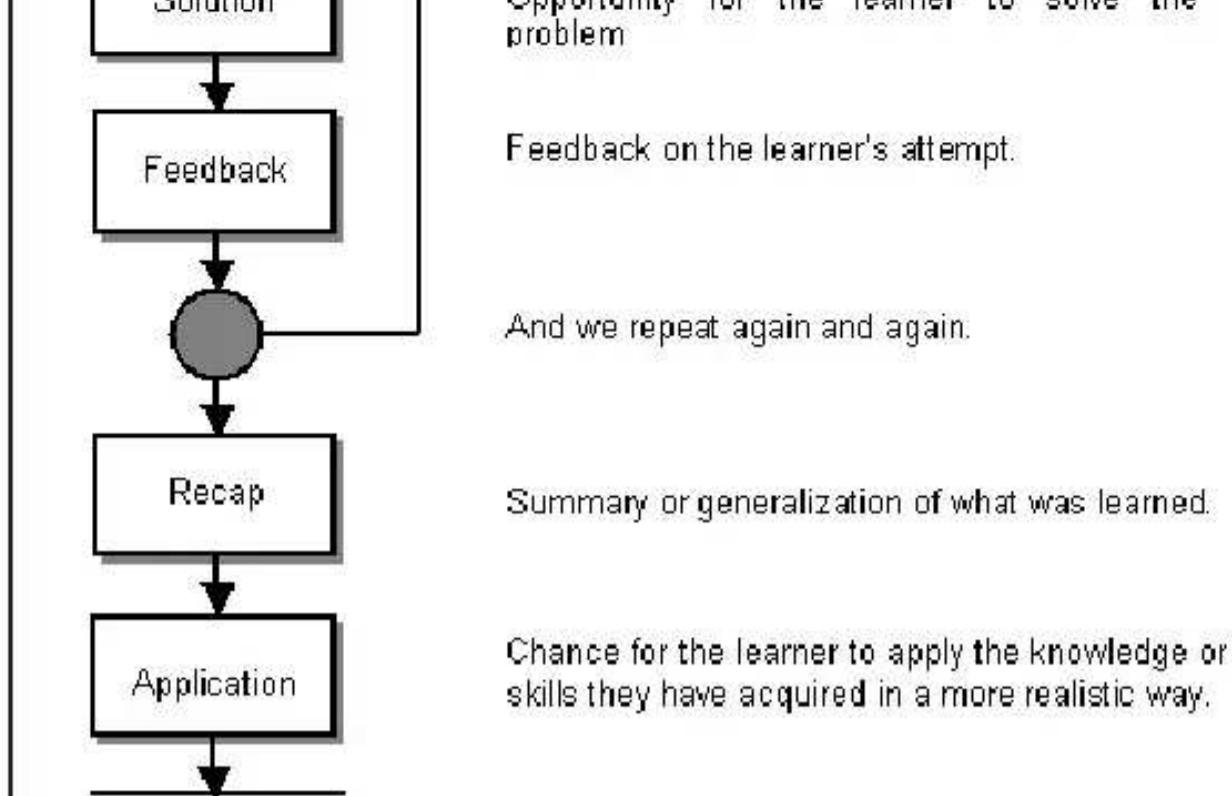
**Fig. 5.14 Working of presentation sequence**

- In the presentation sequence, solo learners interact with the computer to learn about the activity, experience the individual topics of the presentation, get a summary, and then test the extent of their learning

## NOTES

- **When to use**
  - To provide a consistent high-quality explanation to all learners
  - Works well for teaching established information in a highly efficient way to many learners
  - Used when presentation sequence designers really are confident if they know the best way to teach the subject material
  - Useful when the courses that have no class or instructor – because this activity depends on the computer





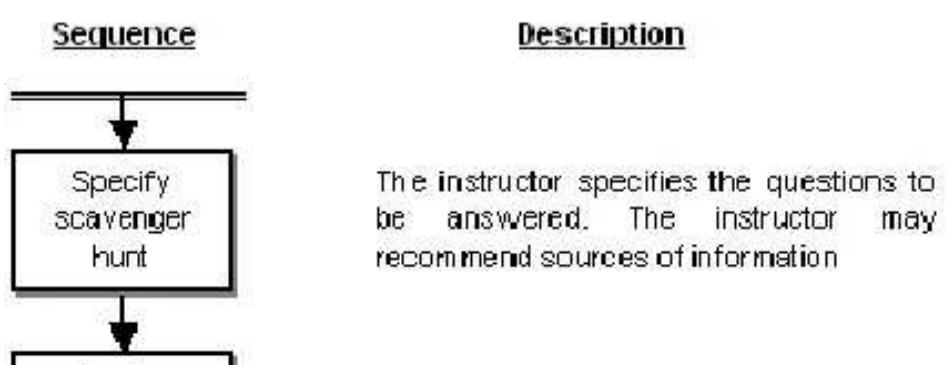
**Fig. 5.15 Working of drill – and – practice activity**

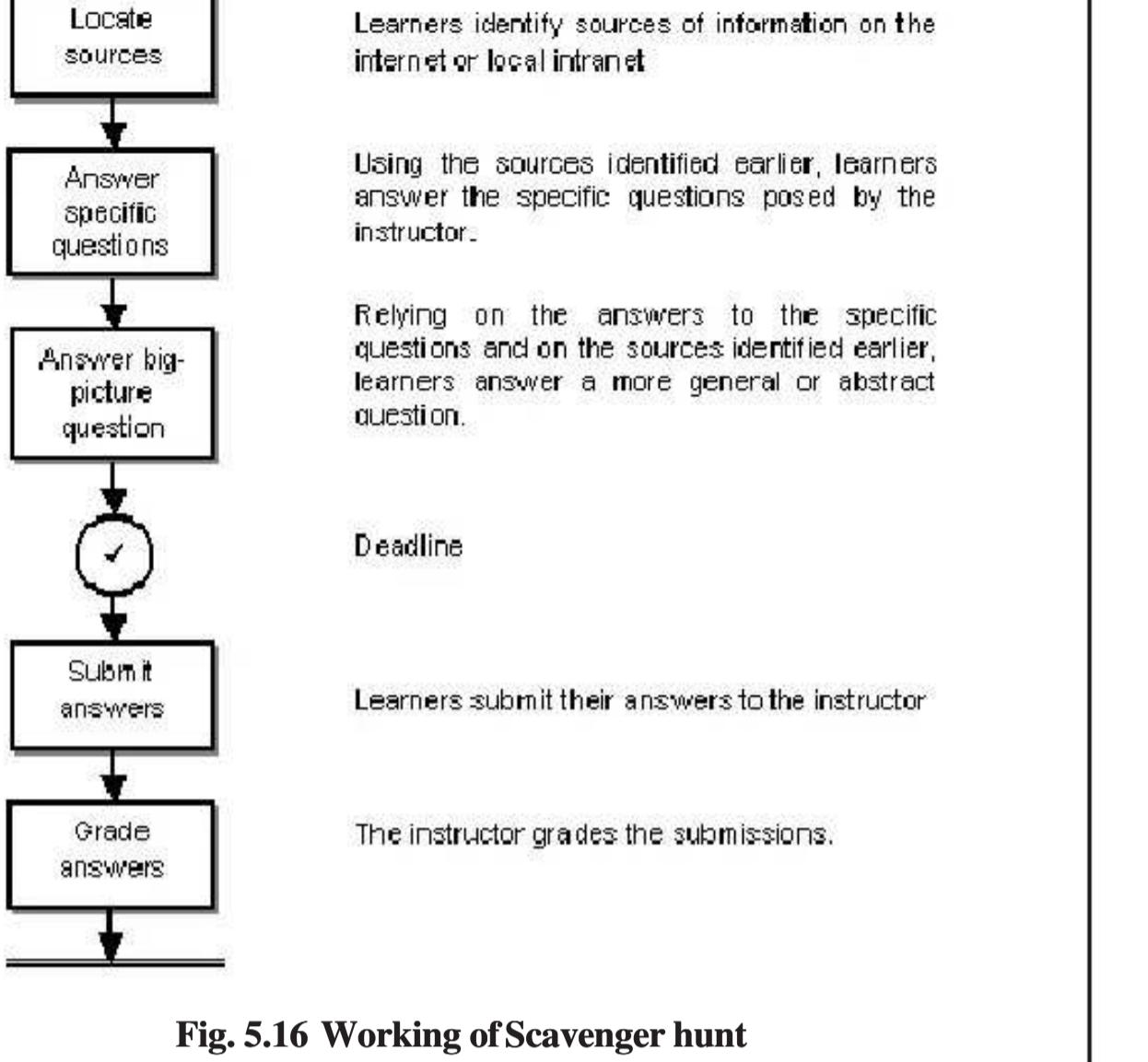
### 5.7.3 Drill and Practice

- **Description**
  - Learners repeatedly practice applying specific knowledge or a well-defined skill

- Build on a simple testing cycle
- System presents a problem, which the learner tries to solve
- Provides feedback on the learner's solution before posing another problem
- **Sequence of actions**
  - Figure 5.15 shows the sequence of actions in the drill-and-practice activity  
Figure 5.15 – Page 203
  - Starts with an introduction that welcomes the learner and explains how the activity works.
  - The learners repeatedly solve problems and receive feedback on their solutions
  - Finally learners try to apply what they have learned to a more realistic situation
- **When to use**
  - To help learners memorize facts that they must be able recall without hesitation

## NOTES



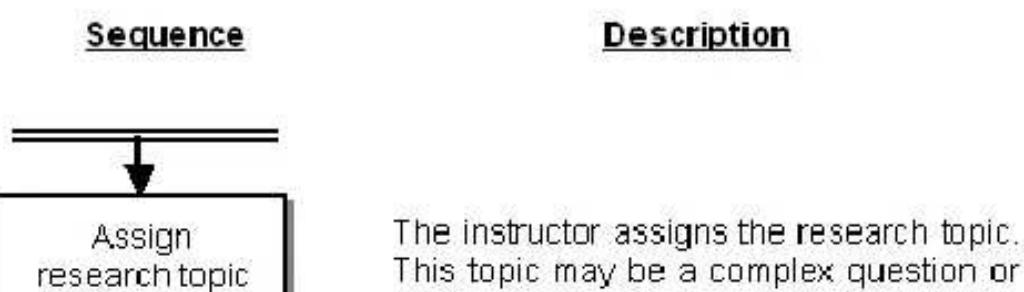


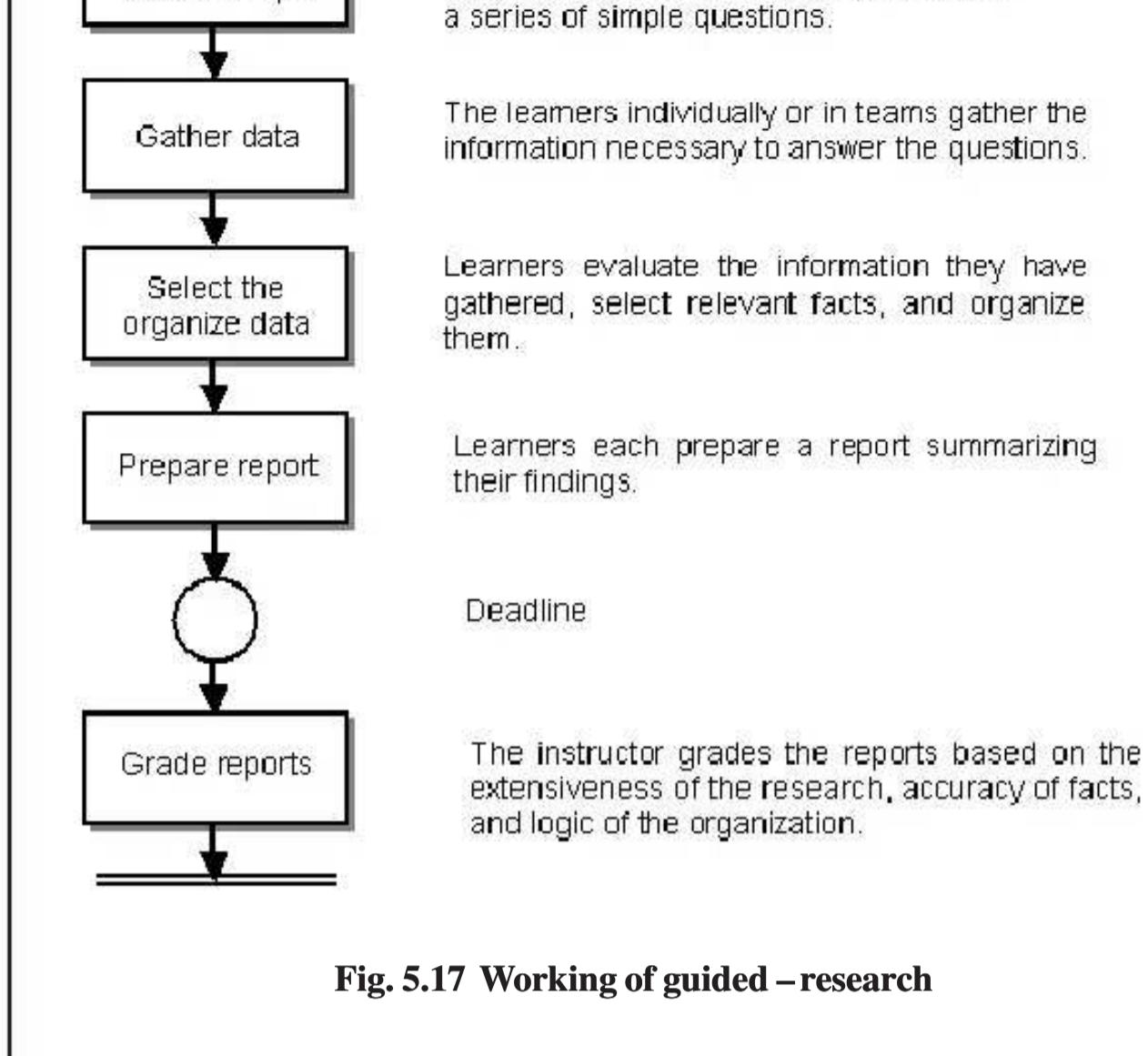
**Fig. 5.16 Working of Scavenger hunt**

## NOTES

### 5.7.4 Scavenger Hunt

- **Description**
  - Learners find reliable sources of information on the Internet or their corporate intranet
  - Challenge learners to find their own resources of information
- **Sequence of actions**
  - Figure 5.16 shows how scavenger hunt works.
- **When to use**
  - To make learners more self reliant by having them locate reliable sources of information on the subject they are studying
  - When learners need to navigate a large reference document, such as a specification or technical manual
  - Used for retrieval of information from the database





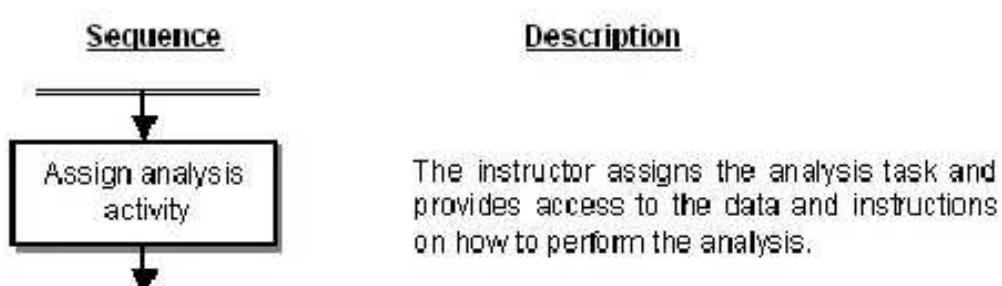
**Fig. 5.17 Working of guided – research**

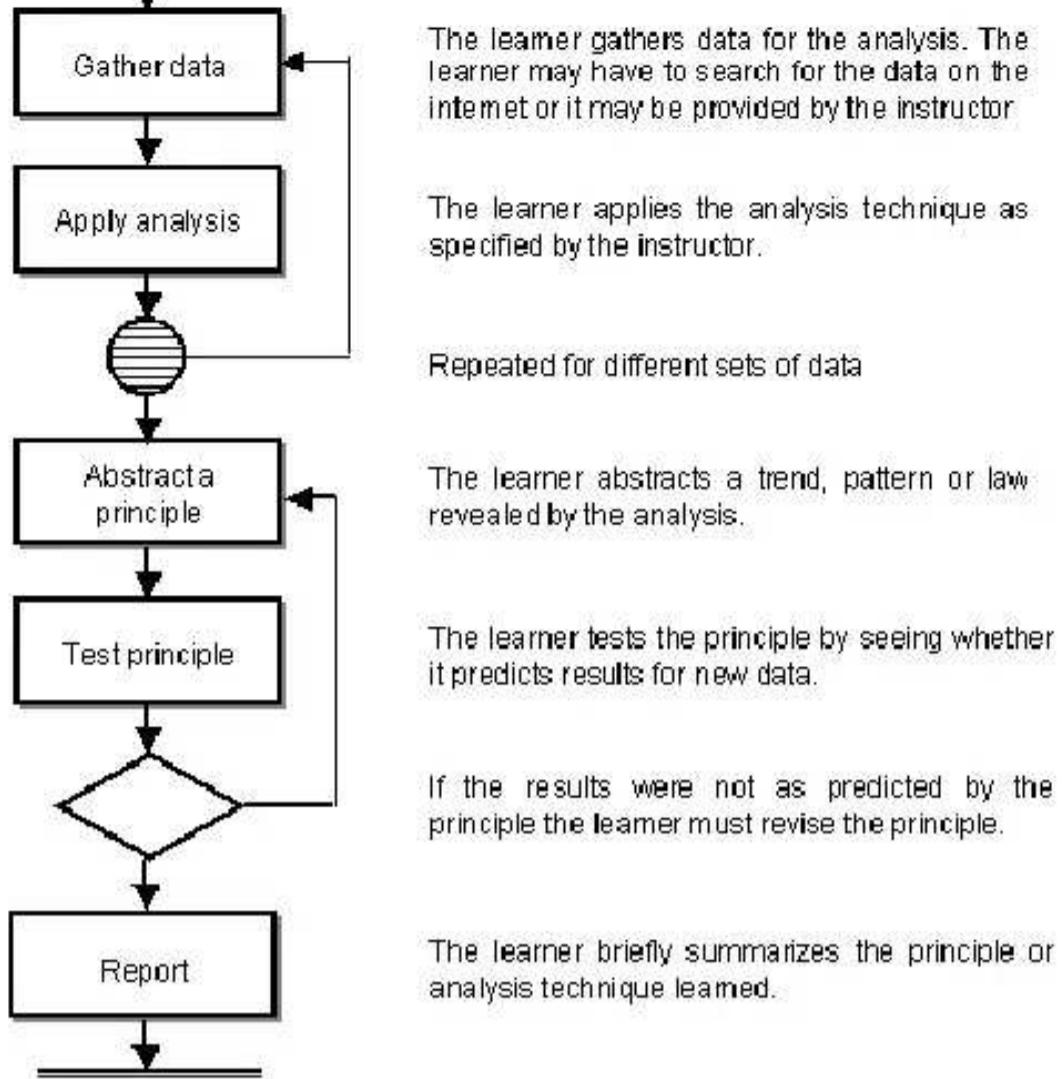
## INTRODUCTION TO E-LEARNING

### 5.7.5 Guided Research

- **Description**
  - Learners gather, analyze, and report on the information
  - Learners consult various sources of information on a topic and then assemble a report, jump page or multimedia scrapbook summarizing the topic
- **Sequence of actions**
  - Figure 5.17 shows how guided research works
- **When to use**
  - To teach learners to conduct informal research on a subject.
  - Valuable to the learner who have to conduct informal research as part of their job
  - Use guided research when you want to teach learners to evaluate, select and organize information

## NOTES



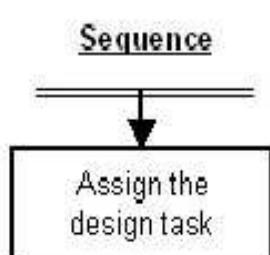


**Fig. 5.18 Working of Guided Analysis**

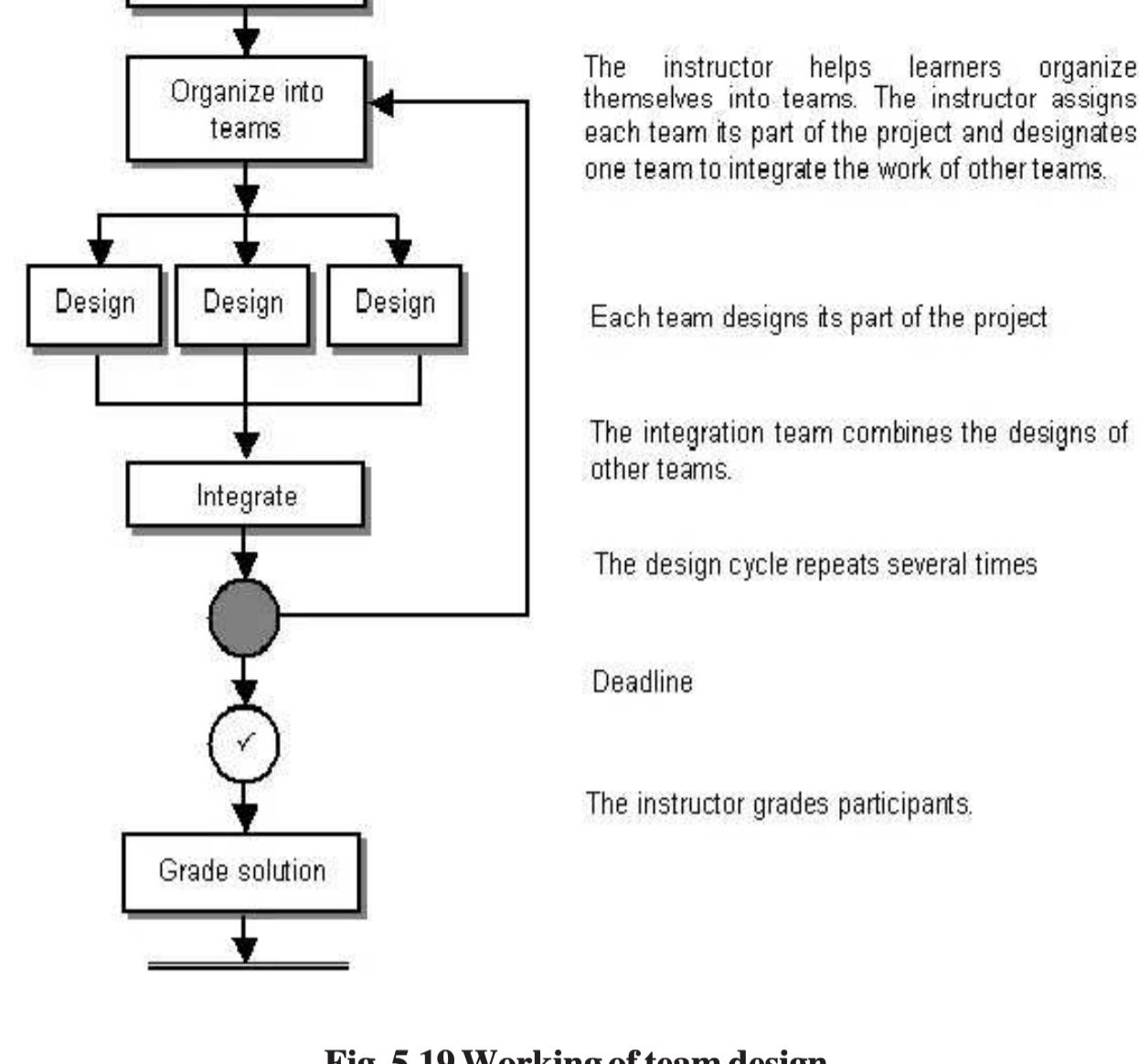
## NOTES

### 5.7.6 Guided Analysis

- **Description**
  - Learners analyze data to evaluate its validity, spot trends, and infer principles.
  - Guided Analysis helps learners to separate useful from useless information
  - Teaches learners how to turn data into information and knowledge
- **Sequence of actions**
  - Figure 5.18 shows how in guided analysis, the learner follows the procedure specified by the instructor to gather data
- **When to use**
  - To teach a formal analysis technique
  - To guide learners to discover trends and principles for themselves
  - To teach involve sorting, classifying, or ranking items according to defined procedures



The instructor specifies the design task.



**Fig. 5.19 Working of team design**

### 5.7.8 Brainstorming

- **Description**

- Distributed learners work together to generate creative solutions to a problem or to accomplish some other goal.
- Is the process of generating lots of new ideas

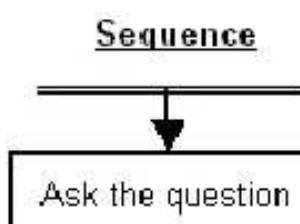
- **Sequence of actions**

- Figure 5.20 shows how brainstorming works

- **When to use**

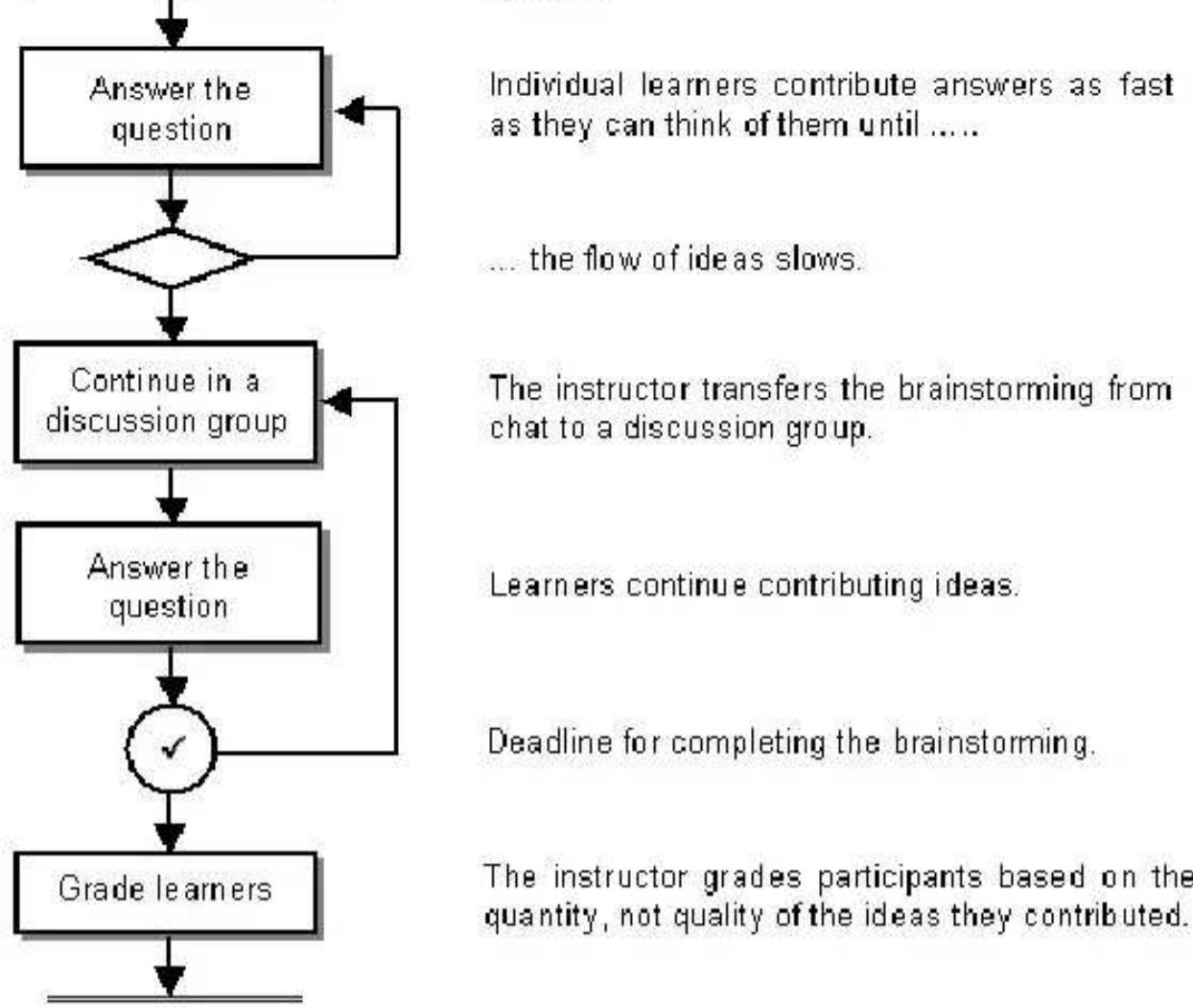
- To teach learners brainstorming in its own right
- To teach as part of a course involving problem solving, creative thinking, or team design
- Can be used in any course that requires learners to solve problems in an original way

### NOTES



### Description

The instructor welcomes participants, explains the procedure to be followed, and poses the question.

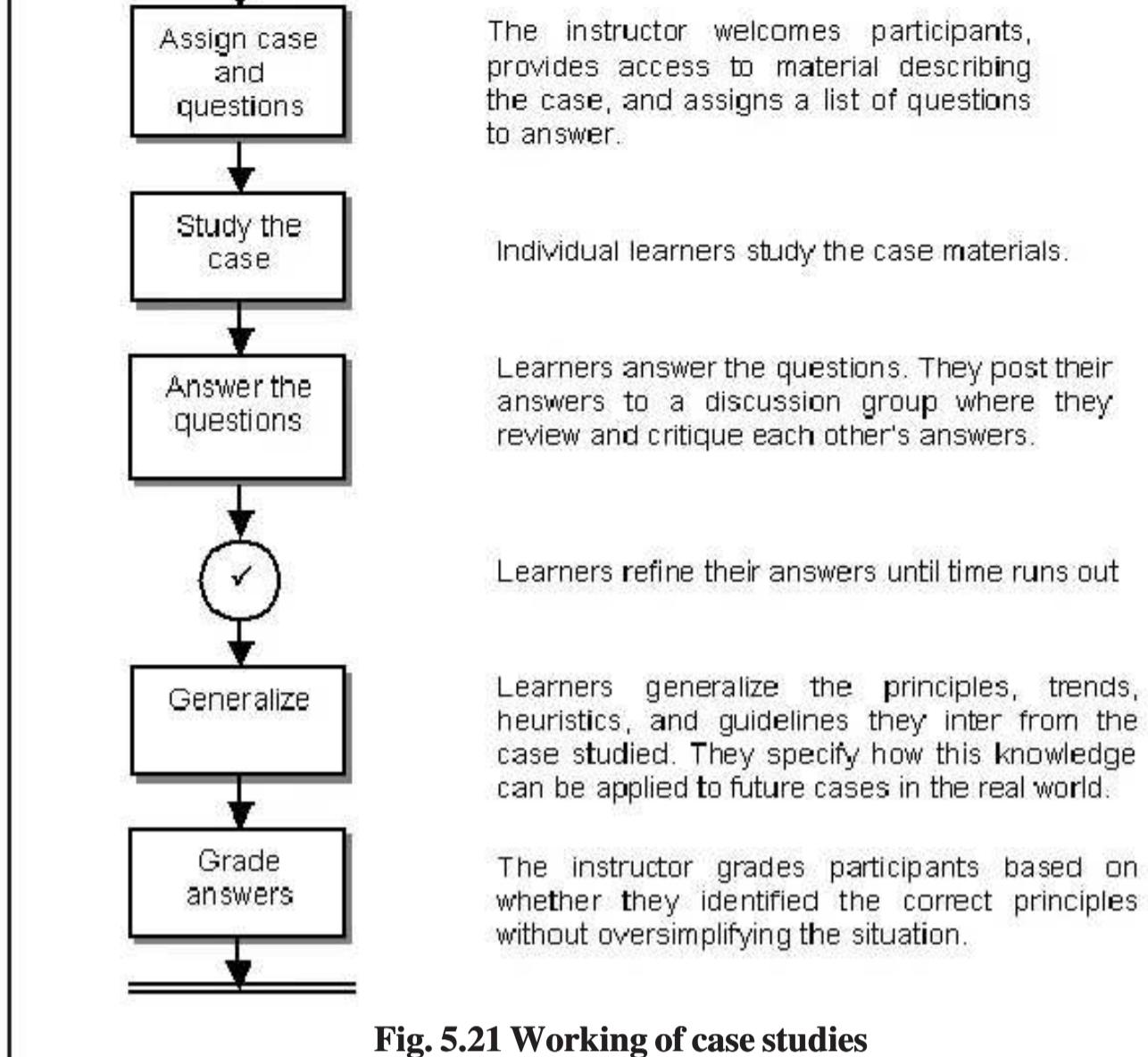


**Fig. 5.20 Working of brainstorming**

## NOTES

### 5.7.9 Case Study

- **Description**
  - Learners study a meaningful detailed example of a real world event, process, or system to abstract useful concepts and principles
  - Learners are given materials that describe or perhaps even simulate the case
  - WBT case studies can include a richer mix of materials for the learner to examine and can more realistically mimic real world cases
- **Sequence of actions**
  - The instructor assigns and explains the case of study. Figure 5.21 shows how case study works
- **When to use**
  - To teach learners complex knowledge that cannot be reduced to a simple formula
  - To use specific, concrete particulars to teach abstract, general principles

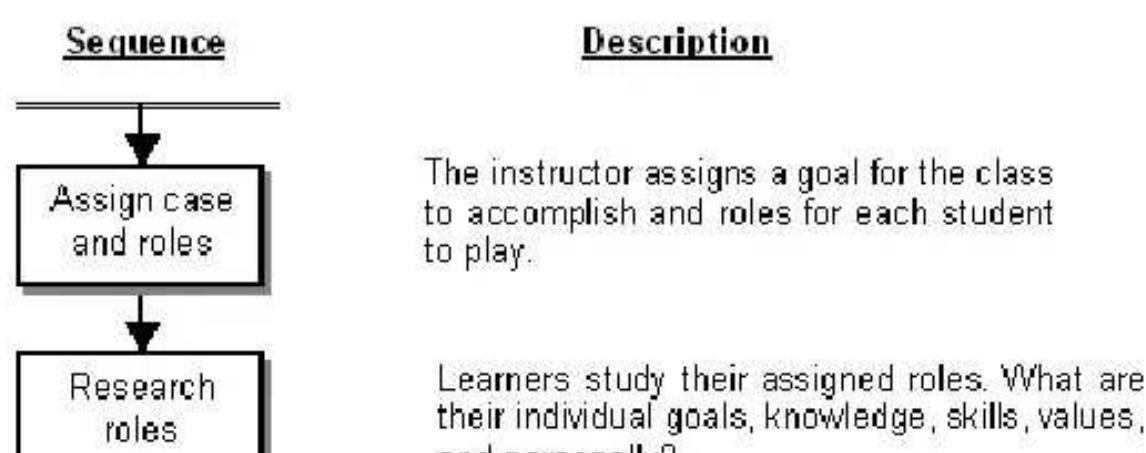


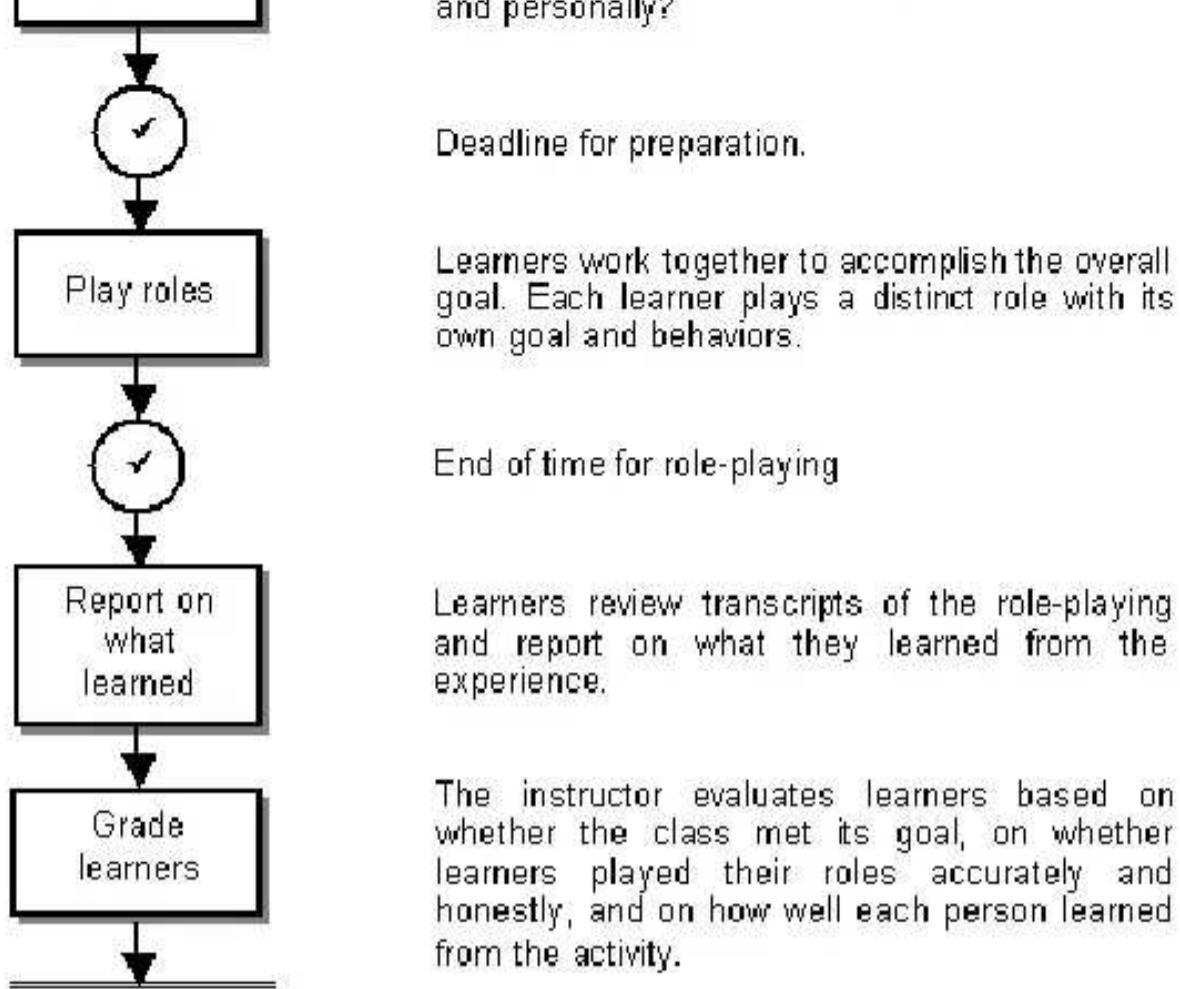
**Fig. 5.21 Working of case studies**

### 5.7.10 Role Playing Scenarios

- **Description**
  - Learners adopt assigned roles in simulations involving complex interpersonal interaction
  - Learners research their roles
  - Learners collaborate via chat, conferencing, discussion, or multi-user domains to play their roles to achieve the goal
- **Sequence of actions**
  - Figure 5.22 shows how role-playing scenarios works

### NOTES





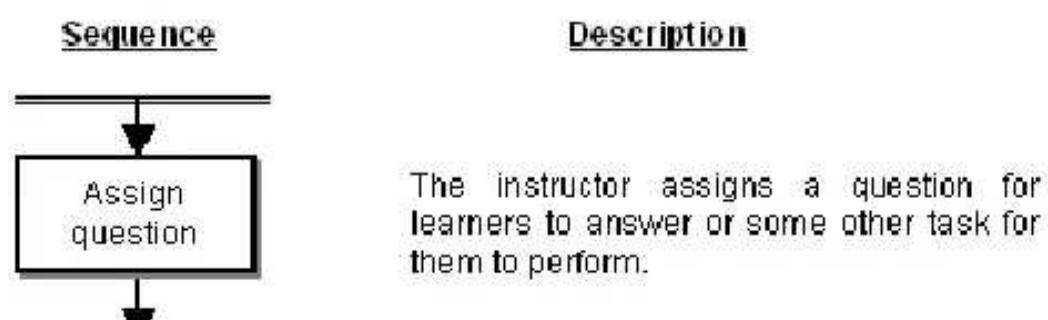
**Fig. 5.22 Working of Role-playing Scenarios**

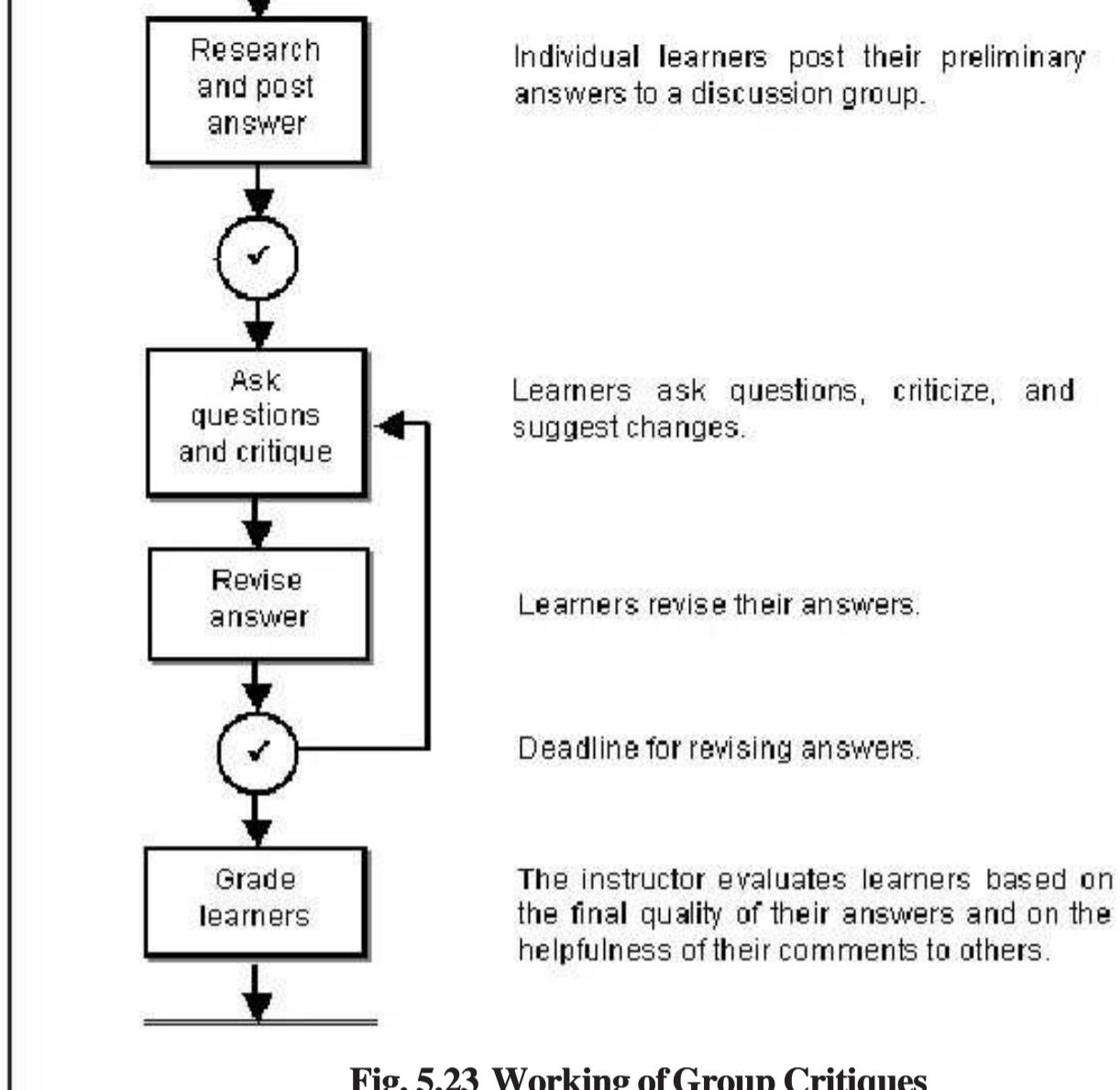
## NOTES

- **When to use**
  - To teach subtle interpersonal skills and to reveal the complexity of many human endeavors
  - Used to demonstrate the many perspectives necessary for complex undertaking
  - Used to force someone to view events from a different perspective

### 5.7.11 Group Critiques

- **Description**
  - Learners receive and react to the criticisms from their peers
  - Learners submit a work that others in the class critique
- **Sequence of actions**
  - Figure 5.23 shows how group critiquing works

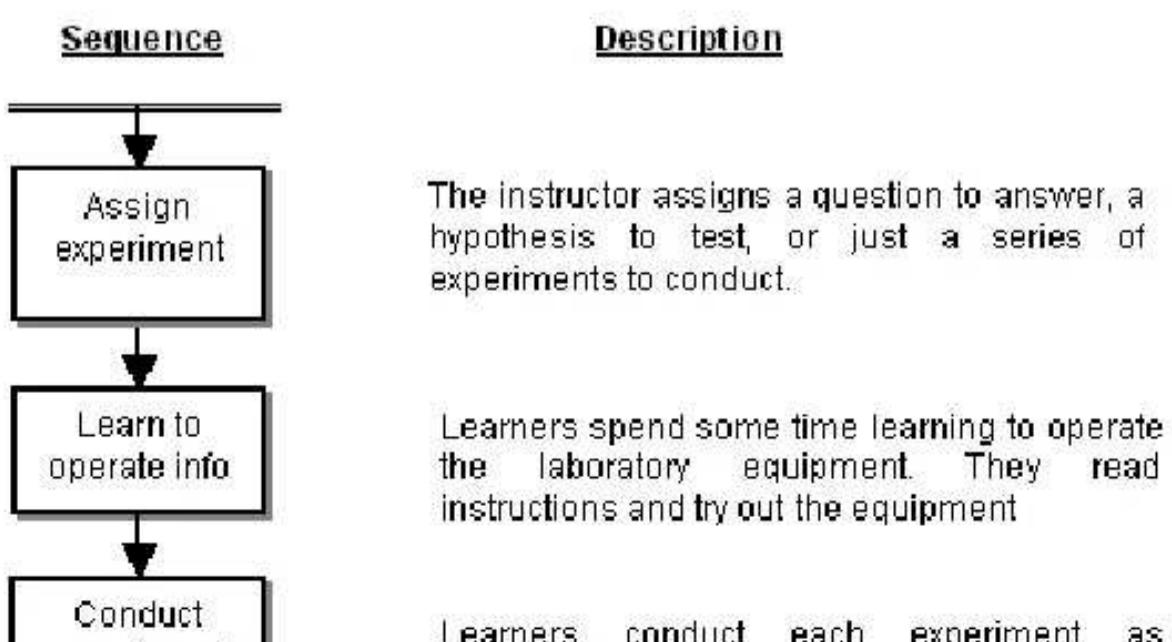


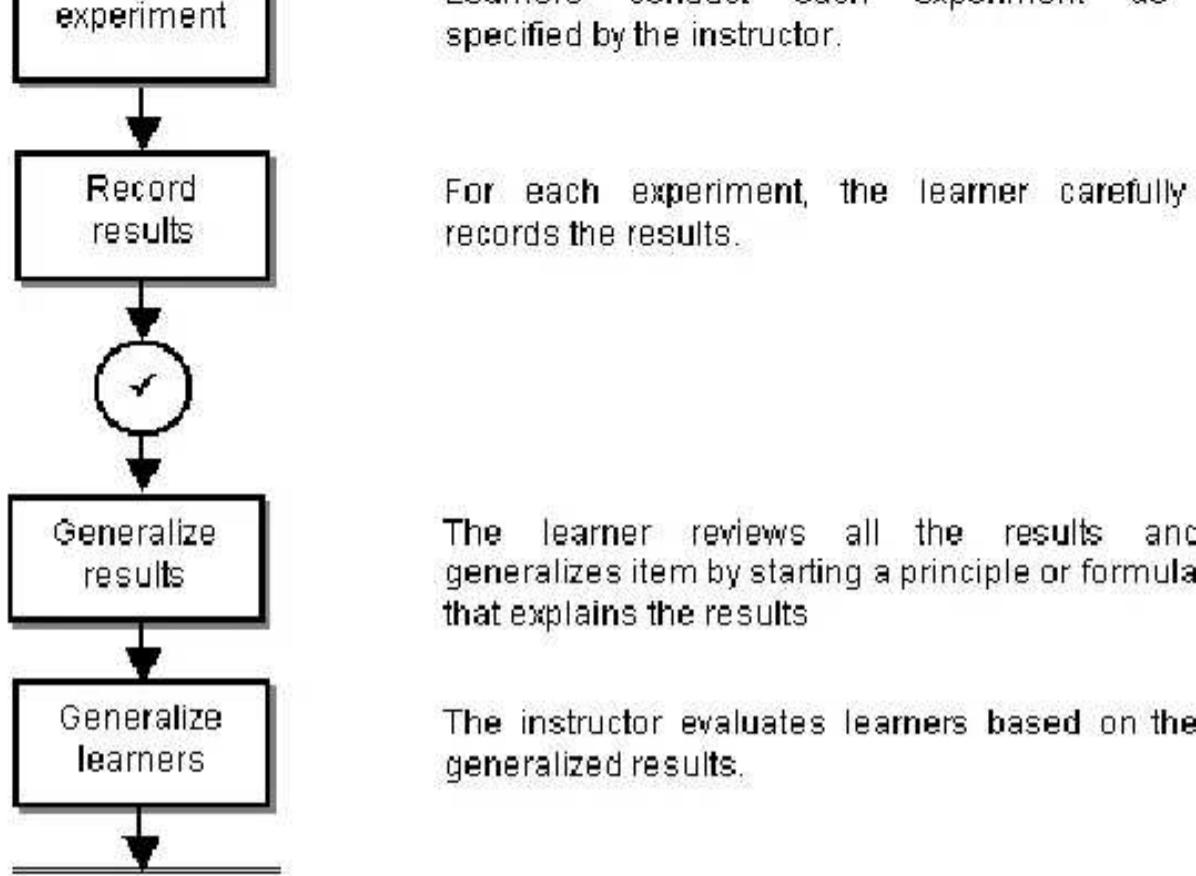


**Fig. 5.23 Working of Group Critiques**

- 
- **When to use**
    - To teach learners how to use critical comments of others to improve their own work and how to offer helpful criticism of the work of others
    - Teach learners to refine their work by incorporating the ideas of others
    - Used to condition learners to accept and filter the criticism of their peers

## NOTES





**Fig. 5.24 Working of Virtual Laboratories**

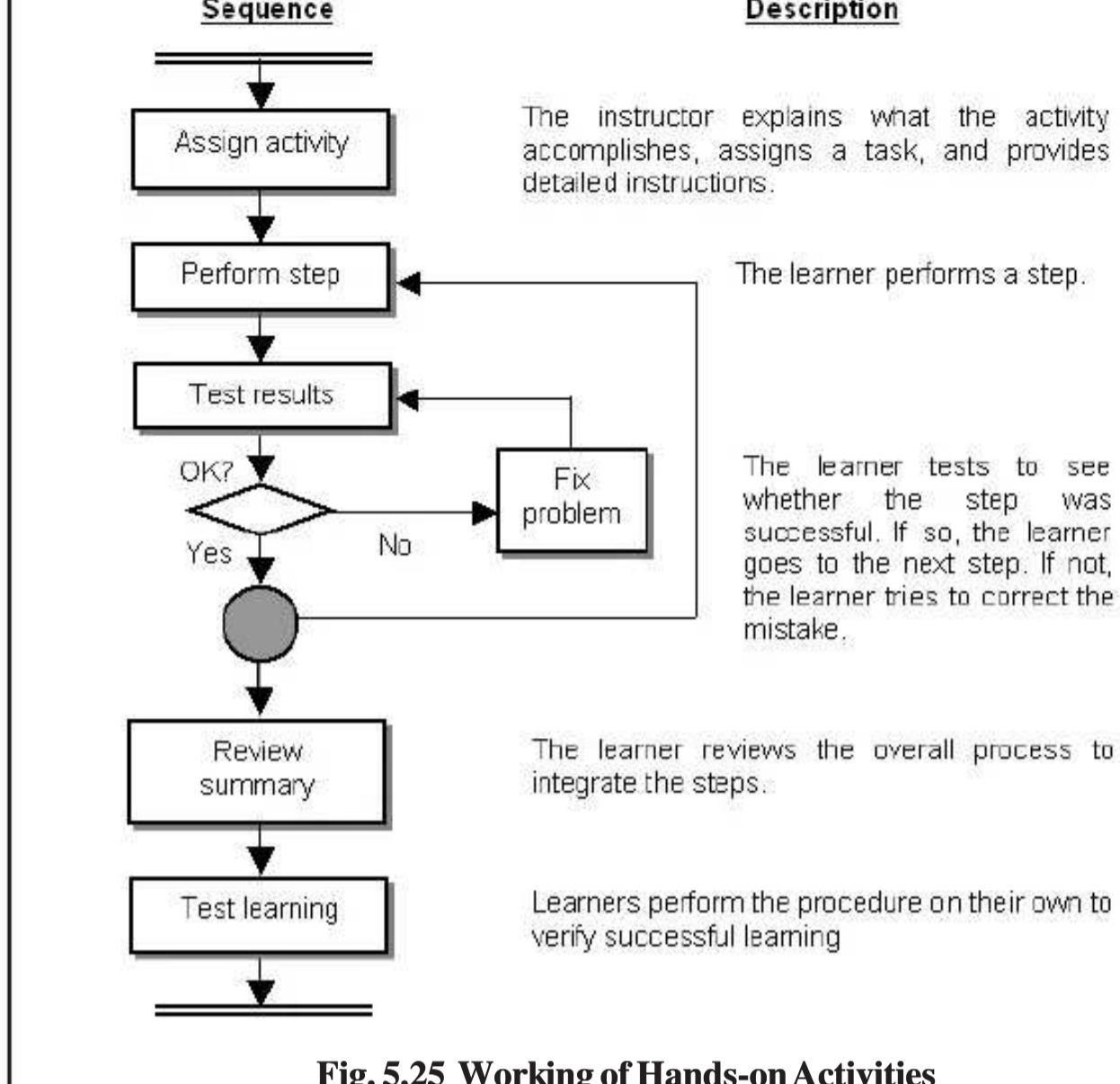
## NOTES

### 5.7.12 Virtual Laboratory

- **Description**
  - Learners conduct experiments with simulated laboratory equipment
  - Learners can test and observe results
- **Sequence of actions**
  - Figure 5.24 shows how virtual laboratory works
- **When to use**
  - To prepare learners to operate real laboratory equipment
  - To guide learners to discover principles and trends on their own

### 5.7.13 Hands-on Activities

- **Description**
  - Learners perform a real task outside the lesson
- **Sequence of actions**
  - Figure 5.25 shows how hands-on activities works
- **When to use**
  - To teach hands-on tasks
  - To show learners how to apply abstract knowledge gained in other activities



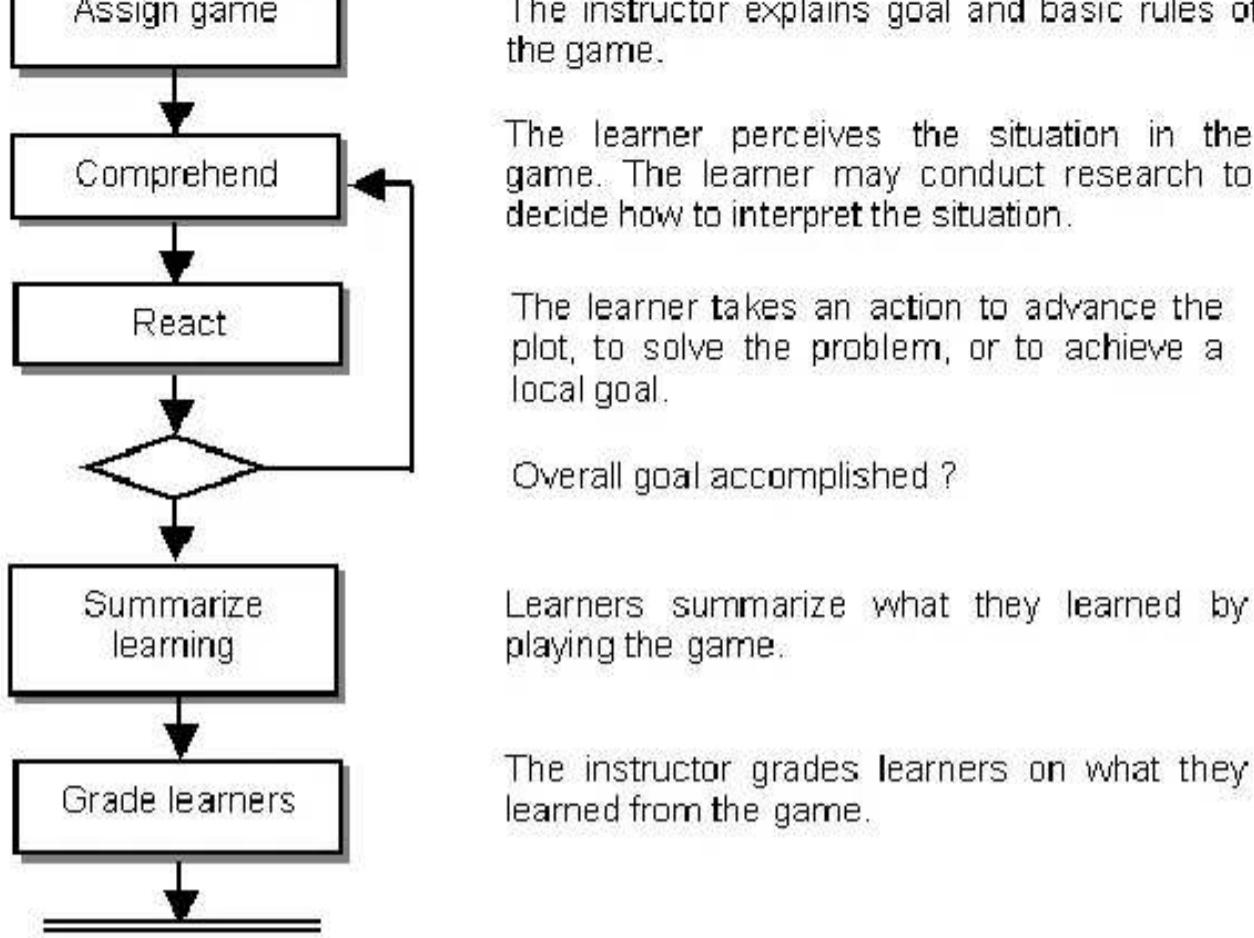
**Fig. 5.25 Working of Hands-on Activities**

### 5.7.14 Learning Games

### NOTES

- **Description**
  - People learn by playing
  - Learning games are computer simulations that let learners practice a highly interactive task
- **Sequence of actions**
  - Figure 5.26 shows how learning games work
- **When to use**
  - To give learners experience performing a task without the risk or cost of the real activity
  - Useful when the failures in a real environment is too costly
  - Used when the subject is dry and boring





**Fig. 5.26 Working of Learning Games**

## NOTES

### 5.8 COLLABORATION FOR LEARNING

Collaboration is defined as the structured exchange between two or more participants designed to achieve of the learning objectives. One way of classifying collaborative tools are as asynchronous and synchronous. They are:

- **Asynchronous**
  - Email
  - Online Discussion Boards
  - Podcasting
  - Wikis
  - Blogs
- **Synchronous**
  - Chat
  - Instant Messaging
  - Virtual Classrooms
  - VOIP - voice over Internet protocols

- Webinars
- Video conference
- Audio conference

The details of some of the collaborative tools and some of the applications are listed in Table 5.1. However not many enterprises nor educational institutions are utilizing these tools for e-learning and are in fact missing an important aspect of e-learning and WBT.

**Table 5.1 Collaborative Facilities**

Facility	Description	Use in WBT
Chats	Two or more participants communicate at the same time by text or audio – moderated by facilitator	<ul style="list-style-type: none"> <li>● Role-play practice</li> <li>● Group project work</li> <li>● Pair collaborative study</li> </ul>
Message Boards	Number of participants communicate at different times by typing comments that remain on the board for others to read and respond to – usually monitored by a moderator	<ul style="list-style-type: none"> <li>● Topic-specific exchanges</li> <li>● Post-class exchanges</li> </ul>

## NOTES

Threaded Discussion Boards - are also referred to as: Web forums, message boards, and bulletin boards.	Message board in which related comments appear in threads. A running discussion is maintained over time	<ul style="list-style-type: none"> <li>● Comments on specific topics</li> <li>● To connect students to discuss concepts and ideas.</li> <li>● Used by tutors to post questions to which they want to collect various feedback</li> <li>● To discuss case studies</li> <li>● used as a tool for online assessment</li> </ul>
Online Conferencing	Number of participants online at once with a moderator. Offer features to hear comments, send messages (text & audio), display visuals, collaboratively work on a project and vote	<ul style="list-style-type: none"> <li>● Guest Speakers</li> <li>● Group Project Work</li> </ul>
Podcast	delivery of digital multimedia content over 1 hour	<ul style="list-style-type: none"> <li>● Used by the tutor to post a master recorded class that</li> </ul>

	the internet for access by computers, mobile devices, and media players - may include audio or video.	students may need to attend
Blogs	website where users can add comments or information on different subjects that are submitted by internet users	<ul style="list-style-type: none"> <li>Post an idea and others can submit additional ideas to build on the subject</li> </ul>
Wikis	A software that allows users to create and edit documents collaboratively.	<ul style="list-style-type: none"> <li>Used to allow students to quickly create and edit documents for submission for course work or for publication</li> </ul>
E-mail	Two or more participants communicating at different times. Comments received and managed at individual mail site.	<ul style="list-style-type: none"> <li>Group Project Work</li> <li>Pair collaborative study</li> <li>Instructor-student exchanges</li> <li>Used to handle inquiries and for tutoring purposes (may cause work overload for tutors)</li> </ul>

## NOTES

Voice over Internet Protocol (VoIP)	Used to transmit voice over the internet	<ul style="list-style-type: none"> <li>Used for learners to collaborate with the tutor or with their peers at no cost</li> </ul>
Webinars	Tools used to deliver synchronous Webbased seminars, also known as online workshops	<ul style="list-style-type: none"> <li>To conduct an online seminar or workshop (particularly useful for large numbers)</li> </ul>
Virtual Classroom	Web-based environment that allows the Instructor and Students to participate in real time lessons and discussions. The VC incorporates a variety of tools such as: ? Display of PowerPoint slides ? Polls/multiple-choice	<ul style="list-style-type: none"> <li>Used to simulate real classroom</li> </ul>

	<p>Surveys</p> <ul style="list-style-type: none"> <li>? Websites (Internet/intranet)</li> <li>? Whiteboard and electronic flip charts</li> <li>? Chat rooms</li> </ul>	
List-Servs	<p>Group e-mail where the individuals comment on a specific topic and comments are sent to everyone on the list.</p> <p>Recipients can choose digest of List-servs receiving periodic consolidated emails</p>	<ul style="list-style-type: none"> <li>• Class Announcements</li> </ul>

### Have You Understood?

1. When can Webcast be used?
2. What is guided research?
3. Give a typical scenario of teaching in which role playing can be used.

### 5.9 TEST AND EXERCISE LEARNING

- An essential element of learning – the evaluation or test elements such as quizzes, drills, examinations, assessments, competence monitors are used for gauging a learner's progress. Tests, along with other kinds of activities, give learners an opportunity to apply the concepts, skills, and attitudes they have learned. Well designed tests provide a reliable way to measure progress objectively.

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#### INTRODUCTION TO E-LEARNING

- In the context of the WBT, Web provides an effective yet inexpensive way to test knowledge, skills and attitudes. Web-based testing eliminates the costs and effort of printing, distributing, and collecting test papers. For many kinds of tests, answers can be scored and results recorded automatically. It is to be noted that the cost savings multiply with the number of distributed test-takers.
- Assessment strategies are designed for several purposes among which are:
  - To provide a way to measure learner's performance and progress and determine whether they have reached the set of pre-defined learning goals.
  - To determine whether a particular learner is sufficiently well-prepared in a subject area to proceed to the next level of instruction.
  - To provide feedback to learners which indicates levels of attainment, and to indicate and diagnose misunderstandings and learning difficulties.
  - To provide feedback to teaching staff to indicate areas in which learners are experiencing difficulties, and to identify and diagnose ineffective teaching.
- Online assessments can be categorized broadly into two types
  - Formative
  - Summative.

### NOTES

These types can be explained as follows (Table 5.2)

**Table 5.2 Assessments types**

	<b>Formative</b>	<b>Summative</b>
<b>Purpose</b>	To monitor and guide an on-going process/product while it is still in progress	To judge the success of a completed process/product at the end
<b>Time of Assessment</b>	During the process or development of the product	At the end of the process or when the product is complete
<b>Types of Assessment Techniques</b>	Informal observation, quizzes, homework, faculty questions, worksheets	Formal observation, tests, projects, term papers, exhibitions
<b>Use of Assessment Information</b>	To improve and change a process/product while it is still going on/being developed	To judge the quality of a process or product then grade, rank, promote

## NOTES

### 5.9.1 Planning of Tests

- Before you decide on the tests, you have to take some high-level design decisions, regarding the type test you want.
- **Reasons for the test** - The first question to be asked is “What is the purpose of the test?” Table 5.3 gives some of the good reasons and some of the bad reasons for testing.

**Table 5.3 Good and Bad Reasons for Testing**

<b>Good Reasons</b>	<b>Bad Reasons</b>
Allows learners gauge progress towards their learning goals	Fulfill stereotypes and expectations – It is a course and therefore it must have tests
Emphasize what is important and thereby motivate learners to focus on it	Gives instructors power over learners
Allow learners to apply what they are learning	Torture learners –

learning – enabling them to learn more deeply	learning is supposed to be a painful process – tests ensure
Monitor success of parts of the course so that the instructor and designers can improve it	Prove to management, clients, and customers that the course works
Certify that learners have mastered certain knowledge or skills	
To meet a legal or licensing requirement	

- **Review the learning objectives** you have set for the segment being tested.
  - What are teaching? – Knowledge, skills or attitudes.
  - What facts, understanding, abilities, and beliefs are the learners required to acquire?
- Do not always assume that the learners will start as expected by you from the beginning of the course and proceed through to the end. Learners probably may jump into the middle of a lesson in the middle of the course. This is to be expected in the WBT context.
- **Issues in Grading tests**
  - You can decide whether to grade the test.

**INTRODUCTION TO E-LEARNING**

- Will the grade be permanently recorded?
- How do these tests affect the final grading?
- These issues may also depend on your assumptions about the motivation of your learners.
- Are grades necessary to motivate professionals who take the course on their own?
- Do you have more effective ways than tests to measure performance?

**NOTES**

Range of questions that are possible is given in Table 5.4.

**Table 5.4 Range of Questions**

<b>Assertion-Reason Questions</b>	<b>Build up images</b>	<b>Crossword puzzles</b>	<b>Case Studies</b>
Completion Questions	Drag and drop	Drawing questions	Essay questions
Field simulation	Graphical hotspot questions	Image identification questions	Justification questions

Labeling and building questions	Matching questions	Matrix questions	Multiple choice questions
Multiple response questions	Ranking questions	Sequencing questions	Short answer questions
Sore finger questions	Text/Numerical questions	True/False questions	Yes/No questions

### 5.9.2 Tests Grading

The table 5.5 outlines the methods used to evaluate the performance of tests, with their advantages and disadvantages.

## NOTES

**Table 5.5 Methods for Evaluation**

Technique	Advantages	Disadvantages
Answers are evaluated by a script or program on the learner's computer	<ul style="list-style-type: none"> <li>Evaluation is immediate</li> <li>No network connection is required</li> <li>Nonjudgmental</li> </ul>	<ul style="list-style-type: none"> <li>Limited to simple forms of evaluation</li> <li>Instructor cannot monitor learner's progress</li> </ul>
Answers analyzed and response generated at a remote computer	<ul style="list-style-type: none"> <li>Instructor can monitor learner's progress</li> <li>Evaluation is quick</li> <li>Nonjudgmental</li> </ul>	<ul style="list-style-type: none"> <li>Requires network connection</li> <li>Limited to simple forms of evaluation</li> </ul>
Answers are emailed to the instructor – who grades them and writes back with an evaluation	<ul style="list-style-type: none"> <li>No limits to the kinds of questions</li> <li>Instructors can spot learner's subtle misconceptions</li> <li>Instructors will have knowledge necessary to evaluate learners</li> </ul>	<ul style="list-style-type: none"> <li>Quality of evaluation depends on knowledge of instructors</li> <li>Learners have to wait for a response</li> <li>Requires extra work by instructors</li> </ul>

		evaluate learners	<ul style="list-style-type: none"> <li>Learners may feel hesitant to expose their ignorance to the critical gaze of the all-powerful instructors</li> </ul>
Learners have a co-worker or on-site advisor examine and comment on their answers	<ul style="list-style-type: none"> <li>Coworkers can show how something applies to the learners' real-world work activities</li> </ul>	<ul style="list-style-type: none"> <li>Coworkers may not be available</li> <li>Coworkers may lack knowledge</li> </ul>	
Learners evaluate their own work using a procedure spelled out by the instructor	<ul style="list-style-type: none"> <li>Having the learners perform the evaluation provides another learning opportunity</li> </ul>	<ul style="list-style-type: none"> <li>Answers may not be easy to find</li> <li>Learners may consider searching for answers a waste of time</li> </ul>	
Peer learners evaluate the work	<ul style="list-style-type: none"> <li>Peer evaluations help learner's develop judgment</li> </ul>	<ul style="list-style-type: none"> <li>Peer learners may lack necessary knowledge</li> <li>Learners not mature to handle evaluation</li> </ul>	

**INTRODUCTION TO E-LEARNING****5.9.3 Delivering Feedback****NOTES**

Another important aspect of the test processing is the delivery of feedback of the evaluation.

- You can deliver immediate feedback automatically after each question
  - Advantage
- Immediate feedback – powerful motivational force
- Fits learner's expectation of computer-based media
- Makes tests feel more like games and less like interrogations
- Corrects misconceptions before they sink in
  - Disadvantage
- Getting feedback in a piecemeal fashion - can make the test longer especially to impatient learners
- Interruptions due to feedback can break continuity of the test
- Deliver feedback after the whole test.
  - Advantage

### ○ Advantage

- Can reduce number of screens the learner must view compared to Immediate feedback
- Learner can navigate back and forth and answer questions in any order
- Feedback can be more targeted since you have answers to all questions
- Sophisticated evaluation procedure – find patterns of mistakes
  - Disadvantage
- Postponing evaluation can frustrate some learners
- Misunderstanding one question can cause them to miss other questions
- Feedback can be delivered only after evaluation by a human being.
  - Give priority for scoring tests
  - Motivate evaluators to respond quickly
  - Schedule tests in coordination with the evaluator

#### 5.9.4 Other Issues

- **Time to be given to learners**
  - Do you need to limit the time taken by the learners to complete the tests? –  
Limiting time can challenge the learners and can prevent cheating a little harder.  
May intimidate some users – and may handicap others
  - Limits can help measure how quickly learners can perform certain tasks and  
how quickly they can recall facts

## NOTES

- Limits can put pressure thus adversely affecting the performance of some learners
- **Is retaking the tests allowed?**
  - Do learners have the chance to take the test more than once?
  - Allowing Learners to retake tests allows them more than one chance to gauge their mastery of the material
  - It is necessary if there is requirement that the learner needs to get a passing grade before learner can proceed to the next segment
  - Retaking tests – means you must have multiple sets of different questions at the same level of complexity
  - When retaking of tests is allowed – grading can be done in the following ways:
    - Only first attempt is considered
      - Only the most recent attempt is considered
      - Only the best attempt is considered
      - An average of all attempts is considered
- **Measure to be taken in case of technical problems**
  - Learners cannot take tests because of technical problems at system level –

- Learners cannot take tests because of technical problems at system level – publish procedure to follow to report problems -Have make-up test ready.
- In case of learner's computer or network connection fails – can the instructor trust the learner – allow one or two such reporting

### **Have You Understood?**

1. Give two reasons why testing should be done.
2. When can feedback of tests be delivered?
3. What are the issues in allowing retaking tests?

### **5.10 QUESTION SELECTION**

There are a variety of question types. Normally the simple type of questions that do not require latest technology, lot of plug-ins or high-speed network connections are used. There are also questions that can be automatically be evaluated by the computer.

#### **5.10.1 True/False Questions**

- Require learners to decide between two alternatives, typically saying whether statement is true or false
- Used when the learner's abilities to make definite judgments are to be tested
- Require learners to make a binary decision:
  - Is statement right or wrong?
  - Will procedure work or not?
  - Is procedure safe or unsafe?

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#### **INTRODUCTION TO E-LEARNING**

- Does example comply with standards?
- True/False are restricted to simple cases
- May encourage guessing. Discourage guessing by
  - Penalize guessing – give negative marks for wrong answers
  - Require higher scores – say 80% correct
- Phrase question in neutral terms - do not imply answer

### **NOTES**

#### **5.10.2 Multiple Choice Questions**

- Multiple choice questions display a list of answers for learners to choose from
- Easy to construct and understand
- Do tempt some learners to guess rather than think
- Two types of multiple choice questions
  - Pick-one questions – learner to pick a single answer
    - Used when there is only one right answer
    - Works well when people required to assign to categories

- Assigning numerical rating
- Learning to recognize members of specific classes
- Recognizing causes for a problem
- Picking superlatives
  - Pick-multiple questions – learner to pick one or answers from a list of possible answers
    - Used when there is more than one right answer
    - More sophisticated questions than with True/false or pick-one type questions
    - Requires making a series of related judgments
- Picking items that meet a criterion
- Deciding where a rule applies
- Picking examples from non-examples
- Radio buttons, selection lists, click-in-picture questions for visual choices are all alternatives of multiple choice questions

### 5.10.3 Text-Input Questions

- Requires learner to type in the answer to a question – typically short answers to very specific questions
- Used to verify whether learners have truly learned the names of things
- Used for testing recall of:
  - Technical or business terms

## NOTES

- Abbreviations
- Vocabulary in a foreign language
- Command and statements in a programming language
- Phrase the question in such a way so that the computer can evaluate the answer

### 5.10.4 Matching List Questions

- Requires learner to specify which items in one list correspond to items in another
- Used to measure knowledge of relationships among concepts, objects and components.
- Use them for matching
- Lists not limited to text can also be graphics

This aspect is given in Table 5.6

**Table 5.6 Topics of Matching Lists**

Use them to match	With
-------------------	------

Terms	Definitions
Pictures	Captions
People	Titles/ accomplishments
Tools	Their uses
Diseases	Symptoms or cures
Items	Opposites
Part of one whole	Another part of same whole

### 5.10.5 Click-in-Picture Questions

- Used to select object or area in a picture using mouse
- Use click-in-picture tests to test visual recognition of objects or parts of a system
- Used when it is important for learners to know what something looks like
- Used to avoid awkward eye and hand movements

### 5.10.6 Drag-and-drop Questions

- Requires learners to move icons or images to specific locations on the screen
- Used to test the ability to assign items to the correct category or to arrange parts of a system into a whole
- Used to test learner's ability to:

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- Name things
- Classify things
- Rank things
- Assemble pieces into a whole

### NOTES

### 5.10.7 Simulation Questions

- Uses simulation to let learners perform a highly interactive task.
- Simulations can be used as tests, as learning activities, and even as core of entire course
- Simulations test the learner's ability to perform complex activities - if they accomplish the task with simulator, then they can most probably perform the real activity.
- Used when
  - Teaching ability to perform a procedure
  - Procedure is complex – requiring learners to make decisions
  - Speed of performance is important

- Training learners to perform a task in the real world
- When designing a good simulation test, it is important to scale down the task to test a single objective. The following points may be considered:
  - Simplify the simulation
  - State the goal clearly
  - Explain the simulation
  - Reveal the limits
  - Spell out scoring rules

#### **5.10.8 Fill-in-the-blanks questions**

- Requires learners to supply missing words in a paragraph of text or missing items in a table.
- Also called Cloze questions
- Measure the learner's ability to "apply knowledge within a contextual matrix" – that is learners use a partial answer to figure out the complete answer.
- Use fill-in-the-blanks when:
  - Testing increment knowledge
  - To measure ability to apply verbal knowledge in context
  - To ask complex questions
  - To provide scaffolding – context provides the support learners need early in learning a subject

## **NOTES**

- When designing fill-in-the-blanks questions the following points may be considered:
  - Introduce the context
  - Explain the goal
  - Use a selection list let learners pick several plausible alternatives
  - Make sure the context provides enough clues.

### **Have You Understood?**

1. List the various types of questions that be used in e-learning.
2. Why is Click-in-picture suitable for WBT?
3. What are the points to be considered when designing a good simulation test?

#### **5.11 EXPLAIN THE TEST**

- Explain tests thoroughly – so that all doubts of the learners are cleared by reading the explanation
- Separate instructions from questions – learners need a lot instructions – however it is better to put the different kinds of instructions in different places

- It is better to put the different kinds of instructions in different places
- Welcoming to the Test page – introduces the test and provides information needed to begin the test
- Clearly specify all rules and conditions that apply to all tests
- Guard against computer malfunctions
- Make sure the test-taker is in control and is comfortable so that concentration is on the content of the test.

## 5.12 DESIGNING EFFECTIVE QUESTIONS

- Phrase questions precisely and clearly
- Keep it simple for students – challenge in taking a test is in answering the questions not in interpreting them
- Phrase the questions so that only one answer is required – do not ask or imply a second question
- Ask job-related questions – phrase the questions – so that they resemble the kinds of decisions learners will make when applying the knowledge - they recreate what will actually occur on the job.
- Avoid obsolescence - avoid questions whose answers change over time
- Make choices parallel – phrase all answers at same level of abstraction, generality and degree of common usage.
- Keep questions challenging
- Do not make questions too easy
- Ask questions that do not strongly imply one answer

## INTRODUCTION TO E-LEARNING

- 
- Keep choices concise
  - Careful monitoring and revision improves the tests

## NOTES

## 5.13 EFFECTIVELY SEQUENCING TEST QUESTIONS

Tests consist of a sequence of questions. There are many ways in which questions can be sequenced and combined for a comprehensive test.

- **Ask multiple questions about one scenario** – for complex subjects – create a series of test questions based on the same situation, scenario or description
- **Vary the difficulty of the questions** so that no one completely fails yet few get full marks. Start with simple questions and progressively increase the complexity
- **Keep the sequence short**
- **Enable navigation** – allow learners skip back and forth among the questions.
- **As far as possible make questions independent**
- **Vary the form of questions and answers**

## 5.14 FEEDBACK

There is a need to provide proper feedback after the learners answer the questions.

- **Provide complete information** – feedback on test questions help learners correct misunderstanding and augment knowledge. For each answer – consider including the following:
  - The question – repeat or redisplay the question
  - Flag the answer as right or wrong – avoid vagueness
  - Give the correct answer
  - Also give the learner's original answer for reference
  - Explain why the correct answer is right
  - Link to the original presentation or a remedial presentation if necessary
- For the Right Answers
  - For the correct answer – be brief - tell the learners they are right and state the main reason why- be enthusiastic
  - Challenge the learner to think about how they got the right answer and to consider other methods
  - Feedback – for a correct answer can teach additional information – you already have the attention of a happy, confident and receptive user – use this
- For the Wrong Answers
  - For an incorrect answer, gently but clearly point out the problem
  - For negative feedback use a neutral term such as “incorrect”. Avoid using terms that may seem patronizing or abrupt. Avoid using flashing headlines or embarrassing noises

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- Acknowledge partial success – give learners credit for questions that they got right - encourage learners to try again – give them choices so they feel they are in control. If it is an almost correct score – suggest alternatives that is likely to lead the learner towards the correct answer
- Give an hint that will challenge the user to try again – provide a hint button to let learners request help
- If Many Right Answers are Possible
  - If a question can have many right answers, state this fact clearly in the feedback. Provide one right answer with comments on why it is right or you can also list all the answers and describe when each is the best answer
- Explain why other Answers are Wrong
  - If many learners give the same wrong answer - consider providing feedback on why the answer is wrong

### Have You Understood?

1. What are the different circumstances when we should give test evaluation feedback?

## 5.15 PREVENT CHEATING

Unfortunately in any testing scenario, there will be some learners who will cheat.

- Why do learners cheat?
  - Low test scores may affect learner's chances of advancement, promotion and pay increases
  - Learners feel embarrassed or angry about low scores
  - Learners find cheating more challenging and fun than writing tests
- Detecting cheating – before you accuse anyone of cheating – check to see if there is any evidence of any widespread cheating. Do a complete analysis of all activities associated with the learning process, other tests etc.
- How to learners cheat?
  - Get others to take the test for them (impersonation)
  - Use resources like books, notes, calculators which are not allowed
  - Ask other learners for the answers
  - Create multiple accounts and take the test more than once
  - Examine the mechanism used to evaluate tests
- Reduce cheating – cannot eliminate cheating – but can minimize cheating. Three methods:
  - Trust Method – aims at reducing incentives for cheating – trusts learners to obey rules.
    - Remind learners that they are responsible for their own learning.

### INTRODUCTION TO E-LEARNING

- Other methods – make tests easier, reduce importance of grades, use tests as only small percentage of overall grading, allow “open-web” tests in which learners can consult all available resources
- Allow users to challenge questions they consider unfair
- Fence Method – tries to make cheating impossible. Remove the biggest security threats
  - Create new test questions for each test
  - Randomly select questions from a list
  - Randomly order multiple choice answers
  - Put the evaluation script in a separate file and evaluate at server end
- Threat Method – threatens learners with punishments if they are caught cheating – usually by the learner’s employer. The policy on cheating can be integrated into the “contract” that the learner must agree to before beginning the test. Use this method only if absolutely necessary
- Validate test-takers – One of the major concerns of testing in WBT is to ensure that the person taking the test being truthful regarding his identity. How do we is

### NOTES

- that the person taking the test using a facility. How do we ensure the learner is alone while taking the test?
- The most common method to authenticate the test-takers is to have the test monitored by a specially designated individual.
  - Gather the details about the background of the learner and use these details to ensure that the same person participates throughout the course
  - Observe the learners using videoconferencing facilities while they are taking tests – learners may object to being spied on and there is a limit on how much can be observed by a video

### **Techniques to Minimize Plagiarism**

- Use a variety of assessment techniques, including tests and quizzes, journals, collaborative assignments, papers and projects
- Be alert to changes in student posting and assignment style
- Modify discussion questions and assignments each semester that the course is offered
- Use process steps in completing assignments
- Minimize the use of individual competitive situations and maximize the use of collaboration and community building
- Check sources cited in student work
- Use proctoring (invigilation) for exams
- Teach about what constitutes plagiarism
- Use a plagiarism detection service

## **NOTES**

### **Have You Understood?**

1. Why do learners cheat?
2. What are the different methods by which learners cheat?
3. Name the three methods used to minimize cheating.

### **5.16 SUMMARY**

- A course is just a sequence of learning experiences. Some courses allow only one sequence applicable to all learners while others allow each individual to have an unique learning path.
- Common learning structures are class tutorials, activity-centered lessons, learner customized tutorials, knowledge-paced tutorials, exploratory tutorials, and generated lessons.
- The design of courses can be carried out using the common learning structures.. However the understanding of the principles of combining, linking and sequencing pages to shape learning experiences that exactly fit the profiles of the learners is necessary to build good learning material

- A course can be viewed as a sequence of experiences encountered by learners where the learning experiences may be class meetings, homework assignments or Web pages. There are basically two approaches to determining sequencing.
  - Linear Sequence – decided by course designer
  - Layered approach – the selection and order of learning experiences are controlled by individual learners dynamically as they navigate the course
- Common Learning Activities - there are some common formats for learning activities. These techniques are proven and flexible. Well designed and appropriately deployed activities work well with any subject matter.
- An essential element of learning – the evaluation or test elements such as quizzes, drills, examinations, assessments, competence monitors are used for gauging a learner's progress. Tests, along with other kinds of activities, give learners an opportunity to apply the concepts, skills, and attitudes they have learned. Well designed tests provide a reliable way to measure progress objectively.
- There are a variety of question types. Normally the simple type of questions that do not require latest technology, lot of plug-ins or high-speed network connections are used in e-learning

### **Exercise**

1. Give the architecture of learner-customized tutorials and explain in detail.
2. Compare and contrast activity-centered and learner-customized tutorials.
3. Describe the architecture of Knowledge-paced tutorials using a diagram
4. Why is exploratory considered to be suitable for the Web context? Give some guidelines while designing this type of tutorial.

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### **INTRODUCTION TO E-LEARNING**

5. Explain the architecture of generated lessons.
6. Explain in detail the various pages of a typical e-learning lesson.
7. How do you design reusable modules? Discuss
8. What are the challenges in embracing Modularity?
9. How are learning sequences designed? Explain.
10. What are the problems associated with sequential learning paths?
11. Describe the various layers of knowledge.
12. Write in detail about the sequence of actions in a Web cast.
13. Give a diagram indicating presentation sequences.
14. Compare and contrast drill-and-practice activity and scavenger hunt.
15. Compare and contrast guided research and guided analysis.
16. Explain in detail role-playing scenarios.
17. Explain the methodology of learning through games.
18. How do you organize team designing? Give an IT application where this activity

### **NOTES**

will effective.

19. Explain how brainstorming works with the help of a diagram.
20. Give a detailed analysis of collaborative facilities available for WBT.
21. Discuss the different types of assessments.
22. What are the different methods used to evaluate tests?
  
23. Critically discuss the various types of questions.
24. How can questions be sequenced?
25. How is cheating prevented? Discuss.

## NOTES

