“The biggest growth in the Internet, and the area that will prove to be one of the biggest agents of change, will be e-Learning....”

John Chambers, CEO, Cisco Systems (Chambers 1999).

1.1 E-learning: Introduction

In the last decade the impact of technology and multimedia on training, learning and education has increased at a rapid pace. The e-learning environment is a multi-faceted area. There are different theoretical views, highlighting different schools of thoughts in the area. E-learning deals with the impact of technologies on learning
and teaching. Within an organization the e-learning environment is utilized to train and educate the employees on their professional roles and organizational strategies and policies. There are numerous perspectives on the impact of an e-learning environment in corporate training.

In modern times, one of the biggest challenges is keeping up with all the latest technological changes that are taking place in the corporate world. In this fast-paced world it is mandatory to acquire the necessary knowledge and skills, be it in the workplace or in the comfort of our own home. The days of routine are over: they have been replaced by rapid technological advances on the Information Superhighway.

Keeping up with the latest technological changes is possible when e-learning is adopted in the organizations for training purposes. E-learning comprises all forms of electronically supported learning and teaching. The information and communication systems utilized in the e-learning environment serve as specific media to implement the learning process. They may be networked or used directly. E-learning is the process of transfer of information, knowledge and skills via an e-learning environment. The transfer of information, knowledge and skills takes place via a computer and network enabled environment.

E-learning processes include Web-based learning, computer-based learning, virtual classroom training and use of multimedia or digital
content. The digital content is delivered via the Internet, audio or video tape, CD-ROM or satellite TV. It includes multimedia or digital content in the form of text, image, animation, video and audio. Abbreviations like CBT (*Computer-Based Training*), IBT (*Internet-Based Training*) or WBT (*Web-Based Training*) are generally used as synonyms to e-learning.

E-learning is naturally suited to distance learning and flexible learning, but can also be used along with face-to-face or traditional teaching, in which case the term Blended learning is commonly used. Sameer (2009) defines Blended Learning as “a fruitful effort in integrating live classroom activities including face-to-face instructions along with online learning and instructions so as to reap the maximum benefits by utilizing the best elements of all through effective planning by an ideal facilitator.”

In his study Dietinger (2003) states that “Web Based Training and its newer and more general synonymous term e-Learning are two of today’s buzz-words in the academic and business worlds. Decision-makers associate with them new ways of learning that are more cost efficient than traditional learning strategies and which allow students to better control the process of learning because they can decide when, where and how fast to learn.” This is the reason why Corporate Managers are adopting e-learning or web based training methods for corporate training.
Information is the lifeblood of all organizations. One of the most important process within an organization is training and learning. Thus, training methods must be of very high standards, whether the classroom is real or virtual.

It is essential for the employees within an organization to acquire a good education and learning. The employees must be provided with the finest and most up-to-date educational resources that are available, in addition to the traditional teaching methods that they receive.

The latest and advanced technology in the form of e-learning is being utilized extensively in corporate houses for imparting training to their employees. In almost all sectors the organizations are spending a good amount of their revenue on implementing an e-learning environment within their organization to provide training and learning to their employees.

The employees or learners benefit greatly from technology based educational resources. The use of a technology based educational medium gives them the opportunity to explore new and fascinating mediums of education and learning.

In today's tight labor market, companies know that in order to remain competitive they must develop a method for training employees more rapidly, more effectively, and less expensively.
Traditional training methods do not fulfill these criteria as effectively as technology-based training. (Byer, 2005)

Byer (2005) further states that traditional training:

- Is more expensive (considering costs for travel, printing, materials, training staff, and facilities)
- Must be done at a certain time and in a specific location (limiting the number of people who can attend at one time)
- Provides little opportunity to transfer knowledge as quickly as business needs may require
- Cannot be updated quickly or easily (it takes time to update paper-based materials, then copy and distribute them).

1.2 Meaning of e-learning

E-learning can be defined in numerous ways. It can be said that e-Learning is the use of technology to deliver and design content to support learning in an Internet-enabled environment. It involves the convergence of technology, the Internet and learning. The components of e-learning comprise of content delivery in different formats, a team of trainers, learners and content developers and managing the learning experience.
The evolution and advancement in the field of computers, web technology and the Internet have led to new innovations and approaches in the field of training and learning which may be termed as e-Learning.

E-learning is the term most commonly used to represent the broader domain of development and research activities on the application of technologies to education. Information and communication technologies (ICT) refers to the broad range of technologies that are used in education.

E-learning provides a learning environment at reduced costs in the long-term and at a rapid pace. It provides a flexibility to the learners to learn at their convenience. It involves a process which ensures accountability for all participants in the process of learning. In today's work environment, the organizations that implement an e-Learning environment for corporate training provide their employees with the ability and advantage to gain a competitive edge in their chosen field.

E-learning has the potential to be the most efficient way for acquiring knowledge, if it is used in the right way. For e-learning to be used in the right way it is important to find out what an ideal learning environment should be.

There are numerous aspects to the technical development of e-learning. They may be categorized into different areas as given below:
• E-learning as an educational tool or process that supports traditional learning and different subjects.

• E-learning as a technological medium that helps in the transfer, communication and development of knowledge and skills.

• E-learning itself as an educational subject; which may be studied as a subject under “Information and Communications Technology” or “Computer Studies”.

• E-learning as an administrative tool such as Education Management Information Systems (EMIS) or Learning Activity Management Systems (LAMS).

E-learning can be of two types – synchronous or asynchronous.

Synchronous learning refers to a learning environment in which everyone takes part at the same time. Here learning is in a face-to-face environment, where learners and teachers are all in the same place at the same time. While in asynchronous learning, learning is focused on the student and uses online learning resources to facilitate information sharing for a network of people. It is self-paced and allows learners to engage in the exchange of ideas or information without their dependency on other learners and at their own convenient time.
Synchronous learning involves the exchange of ideas and information with one or more participants during the same period of time. A face-to-face discussion or lecture is an example of synchronous learning. In e-learning environments, examples of synchronous learning include live teacher instruction and feedback. It may include Skype conversations, or chat rooms or virtual classrooms where everyone is online and working collaboratively at the same time.

In asynchronous learning we use virtual classrooms which may use technologies such as web-supported textbooks, audio video courses, email, blogs, wikis, and discussion boards using web 2.0. Professional training may include online instruction which the learners may avail as per their convenience and availability of time.

Asynchronous learning can be really beneficial for learners who find it difficult to leave home and attend lectures regularly, these may be learners with health issues, learners with child care responsibilities etc. In asynchronous training the learners have the opportunity to complete their work at their own pace in a stress free environment and within a flexible timeframe. If they want to watch any video again or listen to a lecture again they can easily go online and watch it again. This helps them to gather knowledge and skills better and at a faster pace. This proves to be very beneficial for the corporate training of employees within organizations. For the synchronous and asynchronous training to be effective self-discipline and self-motivation is essential.
Collaborative Learning

According to Gerry et al. (2006), Computer-supported collaborative learning (CSCL) is an emerging branch of the learning sciences concerned with studying how people can learn together with the help of computers.

Computer-supported collaborative learning (CSCL) uses methods and instructions that are designed to encourage students to learn and work together on assignments. The terminology, "e-learning 2.0" and "networked collaborative learning" (NCL) may also be used for Computer-supported collaborative learning (CSCL).

Collaborative learning is different from the traditional methods of instruction in which the teacher or trainer is the facilitator in the process of transfer of knowledge and skills. The term "e-learning 1.0" refers to the direct delivery or transfer of content in computer-based learning and training systems (CBL). It differs from the delivery of content, often directly from the teacher's or trainer’s material. Computer-supported collaborative learning (CSCL) uses communities, blogs, wikis, and cloud-based document portals.
Web 2.0 and Social Networks

The rapid technological advancements and Web 2.0 has made the sharing of information between multiple people in a network much easier. The use of Web 2.0 social tools in the classroom allows the learners and teachers or trainers to work collaboratively, share information and ideas. It makes the transfer of knowledge and skills from the teacher or trainer to the learner simpler.

Web 2.0 tries to tap the power of humans connected electronically through its new ways at looking at social collaboration. (IBM developerWorks, 2009) The main agenda of Web 2.0 is to connect people in numerous new ways and utilize their collective strengths. In this regard, many new concepts have been created such as: Techniques (Blogging, Social Networking, Communities, Mashups, and Tagging). The power of Web 2.0 is the creation of new relationships between collaborators and information. The components of Web 2.0 help to create and sustain Social Networks. Web 2.0 provides an ideal platform for implementing and helping Social Networks to grow. In today's environment, computer literacy is at its peak and tools that are aided through the computerization age are most effective in keeping alive a concept as complicated as Social Networks.

As discussed in "Building Smart Communities with IBM Social Collaboration Tool Suite" (IBM developerWorks, 2009), the major concepts that have been considered in Web 2.0 are:
• **Communities:** Communities are an online space formed by a group of individuals to share their thoughts, ideas and have a variety of tools to promote Social Networking. These are very cost efficient as well as easy to use.

• **Blogging:** Blogs give the users of a Social Network the freedom to express their thoughts in a free form basis and help in generation and discussion of topics.

• **Wikis:** A Wiki is a set of co-related pages on a particular subject and allow users to share content.

• **Folksonomy:** Web 2.0 being a people-centric technology has introduced the feature of Folksonomy where users can tag their content online and this enables others to easily find and view other content.

• **File sharing/Podcasting:** This is the facility which helps users to send their media files and related content online for other people of the network to see and contribute more on.

• **Mashups:** This is the facility via which people on the internet can congregate services from multiple vendors to create a completely new service.
While wikis and communities help to create an online space for the networks, blogging, folksonomy and file sharing help the information to flow across the virtual world of the social networking community.

In his study Sendall (2008) observed that blogs, wikis, and social networking skills are found to be significantly useful in the classroom. After initial instruction on using the tools, students also reported an increase in knowledge and comfort level for using Web 2.0 tools. The collaborative tools also prepare students with the technology skills necessary in today's workforce.

1.3 Essential Requirements for e-learning

There are some essential conditions for e-learning to take place. They may be summarized as:

- At least one or more learners who have a specific goal to achieve from the e-learning training.

- E-learning multimedia or digital content which represents the knowledge and skills which are to be learnt and describes the subject, the learning objectives and guidelines on how to achieve them. The e-learning content can be interactive and include videos and animations.
• An e-learning trainer or teacher. E-learning also involves preferably one or more e-learning teachers or trainers who assist and guide the learners in trying to achieve their learning goal.

• An e-learning environment which can be accessed using a web browser over the internet or intranet. It works as an interface between the learners and their learning goals and objectives. E-learning environments generally also include administrative and management tools.

Some other terms which are often used as synonyms for e-learning environments may be summarized as:

- Computer Managed Instruction System (CMI-System) – The CMI system diagnoses the learning needs of learners and prescribes instructional activities best suited and most appropriate for the assessed needs of the learners.

- Learning Management System (LMS) – The LMS is a software application which is used for the delivery, documentation, administration and tracking of e-learning content for training programs. LMS may be a system for managing the training and the documentation process for the training or a software for distributing the content online over the Internet. Colleges and universities use LMSs to deliver online courses and augment on-campus courses. Corporate training departments use LMSs to
deliver online training, as well as automate record-keeping and employee registration.

- Learning Content Management System (LCMS) – The LCMS provides a more complex platform meant for developing content used in e-learning programs. The emphasis in the LCMS is on the ability for developers to create new material or content.

- Learning Management Platform (LMP) – The LMP helps in resource management and is a useful support for multimedia or learning content.

- Virtual Learning Environment (VLE) – It is an e-learning education system which provides virtual access to the training content to the learners via the web or internet. The learner can access the content of training course or classes, tests, assessments, and other external resources such as academic or website links via a Virtual Learning Environment (VLE). It is also a social space where the learners and trainers or teachers can interact, chat and have discussions.

- Web Based Training System (WBT-System) - It is anywhere, any-time instruction delivered over the Internet or a Corporate Intranet to learners who are linked online.
It is important to focus on and examine the technological, pedagogical, functional and non-functional requirements for e-Learning environments.

The distinguishing feature about a learning organization is that it promotes a culture of learning, a community of learners, and it ensures that individual learning enriches and enhances the organization as a whole. There can be no organizational learning without individual learning, but individual learning must be shared and used by the organization (West 1994).

Web-based training is in its nascent stage, but one should know what’s needed to make online learning effective:

- Instructions must be interactive and should include presentations, videos, guided practice for learners, and assessment.

- The e-learning training programs must have clear learning objectives. They should be relevant and help the learners to achieve their learning goals.

- Structure is important. The e-learning training programs should be properly structured.

- Frequent interaction and immediate feedback should be an integral part of the e-learning training programs to ensure good performance.
- All e-learning training programs should provide practice sessions, ranging from simple to complex.

- The multimedia or digital content should be interactive. It should include media in the form of animation, graphics, text, and audiovisuals to enhance the learning process.

  Bailey (2013) states that “to be sure, interactivity can add a level of, creativity and engagement to your e-learning modules. But keep in mind that the interaction needs to be instructionally sound and relevant. If you make a high-budget simulation with no instructional backing, you end up wasting the time and effort of both yourself and your learners. To help determine the best type of interaction, answer a few simple questions:

  - Will it benefit the learner most to reflect, react, or make decisions?
  - What is the most relevant content to the learner’s goals?”

According to Whyte (1989), “Locus of control remains an important consideration in successful engagement of e-learners.” Locus of control refers to the extent to which individuals believe that they can control events that affect them. Locus of control is one of the four dimensions of core self-evaluations – one's fundamental appraisal of oneself.
Whyte (1989) further states that, “the continuing attention to aspects of motivation and success in regard to e-learning should be kept in context with other educational efforts. Information about motivational tendencies can help educators, psychologists, and technologists develop insights to help students perform better academically.”

Skinner (1954) noted that the learning process should be divided into "a very large number of very small steps and reinforcement must be contingent upon the accomplishment of each step." Skinner also stated that by making the steps of learning small, the frequency of reinforcement is increased and the frequency of being wrong is reduced.

Yager (1991) advocated the constructivist learning approach. Constructivist teaching is based on constructivist learning theory.

It is based on the belief that the learners are the makers of meaning and knowledge and that learning occurs as learners are actively involved in a process of meaning and knowledge construction as opposed to passively receiving information.

Constructivist teaching fosters critical thinking, and creates motivated and independent learners. This theoretical framework holds that learning always builds upon the knowledge that the learner already has. According to Yager (1991) the constructivist learning approach leads to the following suggestions on how teachers should proceed in
their lessons. It also provides insights into how this could be supported by Virtual Learning Environments in e-learning courses:

- Encourage students/learners to suggest causes for event and situations and encourage them to predict the consequences.

- Seek out the student/learners ideas before presenting teacher ideas or before studying ideas from textbooks or other sources.

- Encourage students/learners to challenge each other’s conceptualizations and ideas.

- Encourage adequate time for reflection and analysis; respect and use all ideas that students/learners generate.

- Encourage self-analysis, collection of real evidence to support ideas and reformulation of ideas based on the new knowledge.

- Use local resources (human and material) as original sources of information that can be used in problem resolution.

- Involve students/learners in seeking information that can be applied in solving real-life problems.

- Extend learning beyond the class period and classroom.
- Focus on the impact of the learning topic on each individual student/learner.

- Refrain from viewing content as something that merely exists for students/learners to master on tests.

- Emphasize career awareness--especially as related to the learning topic.

In reality this could work like this:

Learning which is integrated in everyday tasks, such as learning by doing, learning from mistakes, learning through networking or learning from interpersonal experiments is also summarized under the term “incidental learning” (Lankard 1995). According to Holzinger et al. (2001) incidental learning is more efficient than intentional learning because learners rather concentrate on the learning goal than on the learning process itself because they are not conscious of the fact that they are learning at the moment. That is also the way children learn, and they do it quite effectively.

All these strategies and theories support the conclusion that learner centered knowledge acquisition is an efficient way of learning which has to be supported by a good virtual learning environment.
According to Gulati and Sivakumaran (2002), “Professional development seekers who seek to add value to their work environment are embracing open learning more and more. With different media offering diverse learning paths, the challenge to the trainer is to deliver contemporary content in multimedia-packaged formats and deliver them across different platforms. Web based training is the emerging technology, which promises to deliver a simulated classroom environment, while offering flexibility in terms of time and location. It underscores the need to become more learner focussed and to coordinate activities in real world terms, to ensure success in corporate training context.”

Many of these suggestions are relevant for the e-learning content developer or author and the teachers or trainers who prepare the learning topic and do the coaching, they can be supported by various tools which the learning environment should provide.

Some of the available tools are:

- Authoring tool for the trainer or teacher to package all descriptions, contents, references and supporting tools which cover the topic to be taught to the students/learners. This package goes beyond a typical instructional course material.
• Simple structuring and authoring tools to summarize the knowledge acquired during the training course and to present this knowledge to others.

• Libraries and glossaries which include material such as books, publications and electronic books etc., simulations such as emulations of the real world or a connection to a real remote lab and external material such as rated and reviewed references. All these may be referred to gather information on the topic being taught.

• Rich and powerful search facilities which allow learners to search within the internal and the external information.

• Cognitive tools such as mind maps and semantic networks to structure gained knowledge.

• Personal annotation, rating and linking tools which allow working on the material.

• Collaboration features such as team building with shared workspaces and group annotations.
• Shared calendars and task lists might help to coordinate advanced students and schedule their jobs.

• Rating/voting tools could support sorting out and rating relevant material, and during the presentation phase allow the other students and the teacher to assess the prepared material.

• Synchronous and asynchronous communication features, such as discussion forums, messaging with mailing lists, text, audio, video chat, question/answer dialogues, shared whiteboards and application sharing tools to communicate with other learners, tutors and experts.

According to Meeker (Meeker 1996) students must be able to receive, process, assimilate, store, and use the information that is being presented in order to learn. Most people have a preference for the type of information they can handle most easily. This is a person’s learning style, which also has to be taken into account when creating e-Learning content.

Many learning problems occur because there is a mismatch of learning styles between those offering instruction and those receiving it. Meeker developed a special “Structure of Intellect” (SOI) test. The test not only assesses thinking abilities, but also helps to develop and enhance areas of deficiency.

It also differentiates five ways of thinking which are:
• Cognition: The ability to perceive and understand new information quickly.

• Memory: The ability to retain and retrieve information in any form.

• Evaluation: The ability to make decisions and to judge correctness, suitability, adequacy, or desirability of information.

• Convergent production (sometimes called problem solving): The ability to synthesize new information from given information to arrive at what is normally accepted as the best answer or outcome.

• Divergent production (sometimes referred to as creativity): The ability to generate new information from given information, emphasizing the variety and quality of answers.

An e-learning system also has to provide features that support the overall learning process including administration and organizational issues and an integration into other IT systems and infrastructure apart from the functions that support the learning and training strategy which can be derived from the pedagogical requirements. In addition
to that it might also be useful to support tasks that are closely related to learning such as human capital management, resource management and knowledge management.

E-learning developments, whether small- or large-scale, are complex, having a raft of implicit and explicit consequences across an institution. Many believe that because of this e-learning initiatives need to be undertaken by multi-disciplinary teams, drawn from across the institution (educationalists, technologists, subject specialists and support staff). At the heart of the success of such teams is the adoption and management of a collaborative approach; however, successful collaboration is notoriously difficult.

The complex nature and importance of collaboration are key features of learning technology work that have long been recognized. Introducing yet more complexity in an already complex environment (McNay, 1995) inadvertently sets up problems to be overcome that never feature in bids for funding. In many instances new agglomerations of staff have been created, or the remit of existing centres has been widened (Gosling, 2001), often with a view to operationally focused tasks and little consideration of their strategic importance. Without this higher-level work, as explored by Elton (1999), achievement may be less than planned.
In traditional methodology teachers or trainers are comfortable teaching in a face-to-face context and have a good deal of control over how to do this. In contrast, the rules and norms in an e-learning environment are unfamiliar. Most teachers or trainers do not possess the technical knowledge to be able to introduce learning technologies without at least some support from a competent web-editor or server administrator.

E-learning is more visible and more subject to evaluation than traditional approaches to teaching and learning. Work is at least underway to develop frameworks in relation to e-learning, even if the current policy focus suggests that fair comparisons to conventional techniques are not a high priority (Nicol and Coen, 2003; Bacsich er al., 2001).

The level of learning of the learners can be assessed by summarizing the difference between the pre- and post-test results after successfully finishing a corporate training program.

Constructivism is, perhaps, the most widely recognized social position within e-learning research, having come to dominate the field over the last decades (Thorpe, 2002). However, this ‘position’ might be more accurately described as a cluster of related positions, some advocating learning through active experimentation (e.g.
Papert, 1980), while others emphasize the importance of social interaction (e.g. Vygotsky, 1986; Wenger, 1998) and others focus on the very personal nature of constructed knowledge (e.g. von Glaserfeld, 1993).

It is impossible to talk about e-learning in a research context without reference to methodology, since any claim about e-learning rests on data collected and interpreted in accordance with some methodological position (Conole, 2003).

Jones provides a critique of internet research and the methodological issues that arise (Jones, 1999), emphasizing the danger of misinterpreting online interactions. Using multiple methodologies can be one way of addressing this. For example, De Laat et al. (2005) combine the use of social network analysis with content analysis and critical event recall in a study of an online Masters course in education. Social network analysis is used to visualize the social structures and dynamics of the course, content analysis is used to identify the learning and teaching processes, and critical event recall is used to elicit teachers’ experiences and perceptions.

An aspect that impacts on how successful an e-learning initiative is, or is perceived to be, is the degree to which it is visible and accessible to relevant stakeholders. It is encouraging to note that
funders are more aware now of the importance of ongoing strategically directed dissemination of project outcomes.

1.4 Learning Management Systems

E-Learning systems are usually known as Learning Management Systems (LMS) which mainly focus on content delivery, administrative aspects of learning and the recording or documentation process for the training. LMS have evolved from the Computer Based Training CD-ROMs (CBT), which presented the learning content only but needed some kind of structure for the organized delivery of content and administration and management of the learners to organize who should learn what and when.

LMSs offer the required support for planning, organizing and managing the learning process. They help in administration of course catalogues and registration, event schedules, assessment services, keeping learner records, organizing group and individual learning paths. They also support additional functions for skill and competency management for tracking and controlling the personal development of employees. They assist in resource management by helping in organizing trainers, rooms and other types of resources for instructor-led trainings.
The most important functions and parts of an LMS are:

- **Personalized learner portal**: This module provides personalized entry to the learning system and access to the most important personal information.

- **Course catalogues and registration**: This enables learners to access the course catalogue, register, and enrol in the offerings. It also handles billing issues (which would require integration in e-commerce systems), notifications, schedule changes, waiting lists and drop policies and defines gathered skills when mastering the courses. A curriculum manager tool helps to define and select the courses from the course catalogue and is tightly integrated with the competency management functions. Selected courses can be assigned to trainees individually by the trainers or course managers.

- **Learner-records database**, with user-profile and competency management for tailoring learning experiences to competence frameworks.

Core components of this module are:
• Learner records: which contain stored information about the learner, such as job title, organization, location and skills acquired. These cannot be directly edited by the user. Personal preferences, such as delivery mode and language, may be edited by the user.

Skinner (1958) wrote about "teaching machines", which were mechanical devices designed to present educational material to students at their own pace and to reinforce correct responses to the material while preparing the student to respond correctly to subsequent material. He called this method of teaching (whether it used machines or workbooks) programmed instruction. Programmed instruction is a special type of "interactive training". Skinner described the purpose of a teaching machine as follows:

Creation of learning environments that allow and encourage learners to make connections with previously learnt material. This should support the recall of prerequisite skills, use of relevant examples and analogies.

1.5 Multimedia and Digital Content

Multimedia refers to the digital combination of text, graphic art, sound, animation and video elements. Interactive multimedia is
where the learners or users are able to control the material being presented to them, an example being interactive CD-ROMS (Vaughan, 1998). Alternatively, hypermedia is where a structured set of linked elements is provided through which a learner or user can navigate, for example - web pages.

Hypermedia has various advantages and disadvantages; the non-linear navigation possible with hypermedia is powerful in terms of potentially promoting discover learning. However, it is easy to get lost in ‘hyper-space’ when following hyperlinks (Nielsen, 1990); a learner may tend to become disoriented in terms of the goals of their original query and the relevance to the query of the information they are currently browsing. This problem is often referred to as the ‘navigation problem’ (Levene and Loizou, 2003).

Hypertext supports active learning. Learners who navigate and explore a plethora of information are gathering and gaining more knowledge; this interactivity allows them to create new paths until their understanding of the topic is complete. But perhaps an even more powerful tool for learning is the construction of hypertexts. The earliest users of hypertext in teaching (e.g. Landow, 1992) observed that the people who understood the most about any particular topic were the graduate students they employed to build the learning materials. Nowadays the teachers or trainers are being innovative and using this idea by asking the learners to construct hyperspaces and blogs, sometimes in teams.
Multimedia software is used across a range of subjects to support learning. For example, the creation of a virtual chemistry lab might require the bringing together of images, sound, maps, video and animation, controlled through user interaction. Other examples of where multimedia applications are used to facilitate learning include their use in languages and visually based subjects.

Simulation is a way of using multimedia in a project-based context, engaging learners in solving particular problems. Simulations may take many forms, such as scenario-based simulations, knowledge- or model-based simulations or multiplatform/multi-user synthetic environments enabling cooperative and adaptive immersion learning.

Facer et al. (2003) have pointed out that the use of games can allow learners the opportunity to imaginatively inhabit alternative realities in which they can test out ideas and take control and that this may lead to the development of new cognitive abilities and literacy. An interesting question for learning technology research is: Why are games motivating? Facer et al. (2003) suggest that learners are ‘personally responsible for the outcome. The role of challenge in engaging and motivating games players is already well recognized and has been identified as an experience of a “flow” state’.

However, it is not easy to get tasks at the right level in gaming environments. Games do not offer true interactivity and are in
essence a very structured experience where ‘semiotic links to reality are merged with action without real world consequences that seems to be enjoyed. (Facer et al. 2003). Another factor is that there are no real consequences associated with games (e.g. the frequently reported activity of intentionally opposing the supposed aims of the game, such as refusing to take over any worlds in the game Risk). Thus in games there exists the opportunity to inhabit alternate reality and see what it is like to take control.

Malone and Lepper (1987), in their work on motivation, identified four major factors in relation to motivation – challenge, curiosity, control, and fantasy. Arguing that these are what make a learning environment intrinsically motivating. So to be challenging, activities should be kept continuously at an optimal level of difficulty to keep the learner from being either bored or frustrated. To elicit sensory or cognitive curiosity in activities one can use audiovisual devices or present information that makes the learner believe that their current knowledge structure is incomplete, in consistent or unparsimonious. Activities should also promote a sense of control on the part of the learner, that is, a feeling that learning outcomes are determined by their own actions. Finally, one can engage the learner in make-believe activities (or fantasy contexts) to allow the learner to experience situations not actually present.

Elsom-Cook (2001) points out that we are seeing a shift towards multi-modal communication abilities and literacy. However, Facer et
al. (2003) point out that being ‘literate’ in a digital age is more than information seeking and handling. It operates on three dimensions: operational (use of the computer), cultural (participation in authentic forms of social practice and meaning) and critical (ability to critique resources and use them against the grain, to appropriate or even redesign them). In addition, Rieber (2001) points out that play is an important component of promoting learning. The vision of e-learning in ubiquitous computing environments raises the idea that the environment, and the devices in that environment, can be coordinated to help support the learner’s activities or collaboration.

1.6 E-learning Environment

In an ideal learning situation a very qualified teacher is needed who trains and guides one or just a few students whom he knows quite well (their personal background, their strengths and weaknesses, their personalities, how fast they can understand etc.). If there is more than one student then all students should have about the same level of knowledge and agreeable personal profiles, know each other quite well and love working together and helping each other. Direct face to face communication between teacher and students (and among students) allows to immediately react to requirements of students (questions, speed of teaching etc.). Thus the teacher can individually respond to each of the students and motivate them. Also all necessary illustration material is available that the students can use to understand the teaching subject more quickly and there are
plenty of possibilities to practice and test the already learnt and use knowledge gained to solve problems with it.

This ideal situation will most probably lead to a very efficient learning process, no matter whether the learning goal is just storing some facts, carrying out processes, or whether they are as complex as finding new solutions for difficult problems of a certain category (the learning subject).

However, although it might be the ideal learning environment in reality it is not usable most of the times for at least one or more of the following reasons:

- It is limited to a very small number of similar students (say 1-3).

- Usually the teacher and the students do not know each other well enough.

- It is time and place dependent.

- It is very expensive because of the one to one or one to few relation between teacher and students and the enormous investment in time.
Especially the fact that this scenario and all similar traditional learning strategies cannot deliver new knowledge to a large number of students fast enough is the strongest argument which displaces instructor led training in the way described above. Additionally new requirements such as lifelong learning and just-in-time learning arise out of short development and deployment cycles and continuously changing working profile. That is the reason why present day economy needs a new way of learning to continue to be successful. Therefore, a conducive-learning environment needs to be created for making technology enabled learning effective. An e-learning environment is an artificially created environment comprises of all required components for smooth and successful transmission of knowledge by using e-learning resources.

An e-learning environment which works as an interface between the participants and their learning objectives and provides different means to achieve the learning goal. Usually the e-learning environment can be accessed using a Web browser over the Internet or Intranet and supports several learning strategies and different ways of interaction, communication and collaboration. Additionally e-learning environments often include administration and management utilities and interfaces to other systems to support the organizational part of learning as well. Other terms for e-learning environments, which are often used as synonyms or with slight variations in its feature-set are e.g. (among many others):
- Computer Managed Instruction System (CMI-System)
- Learning Content Management System (LCMS)
- Learning Management Platform (LMP)
- Learning Management System (LMS)
- Virtual Learning Environment (VLE)
- Web Based Training System (WBT-System)

Whether you refer to them as course management systems, virtual learning environments or managed learning environments, they have in reality only been around since the late 1990s (e.g. WebCT was established as a company in 1986 and Blackboard in 1987). Initially they provided tools to allow teachers who were not necessarily IT literate to upload and manage content on the web; they then provided coherent and integrated tools for managing and communicating with and between groups, and more recently they have focused on the interface with enterprise systems such as student information systems. In just a few years such systems have moved from being esoteric tools for early adopters to becoming mainstream; nearly every university supports at least one such environment, and thus a significant majority of HE courses have a web presence of some kind.
In spite of this enormous success there are many criticisms and shortcomings of what, after all, is the first generation of large-scale web-based learning systems. These systems are monolithic, may not use standard representations for their content, may not be open at the service/API (applications program interface) level and are typically commercial rather than open source, so interoperability (the ability of one system to communicate with another) is a serious issue. The SCORM (sharable content object reference model) approach of many learning management systems also tends to support a particular pedagogical viewpoint, which more often aligns with commercial training requirements than academic education (Wirski et al., 2004).

Current thinking is that the next generation of e-learning environments will be modular; they will allow the creation of bespoke systems sewn together from appropriate modules that will interoper ate to create the whole. These systems will be developed by communities (including software vendors) rather than single suppliers and they will be content and communication standards compliant, ensuring interoperability. This technical solution should enable teachers to specify learning tools and environments appropriate to their pedagogical purposes, rather than as dictated by the features provided by a particular technology. At the same time institutions should benefit financially, as not only are they sharing in the cost of development, but also the cost of deployment of new functionality is much reduced, involving maybe only the addition or
replacement of a module rather than waiting for and deploying a full system upgrade.