

# Fundamentals of Virtual Learning Environments (VLE) and its Components

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## Abstract

The merging of robust learning technology with the Internet offers a new breed of learning experiences, in particular the development of Virtual Learning Environments (VLEs). This paper deals with the features, advantages, theoretical backgrounds, various subsystems, components and tools learning and learning content management systems of Virtual Learning Environments. VLE@DLIS, BU is a prototype of virtual learning environments in the Department of Library and Information Science (DLIS), The University of Burdwan (BU) using open source learning management software Moodle.

**Keywords:** Virtual learning environments (VLEs); Social contact theory; Social constructivism; Contact theory; Learning management system (LMS); Content management system (CMS); Learning content management system (LCMS); Learning objects (Los); Learning object metadata.

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## Introduction

The merging of robust learning technology with the Internet offers a new breed of learning experiences, in particular the development of Virtual Learning Environments (VLEs). Virtual learning environments can be described as online teaching-learning-evaluation domains that permit synchronous and collaborative interaction among teachers and students, while also providing asynchronous learning resources for individual use by students at any time. VLEs offer a learning system, made up of many components, with all the advantages of computer-based learning but with the added advantages of access and use over the Internet as platform.

Joint Information Systems Committee's (JISC's) definition seems the most widely accepted:

“A VLE is an electronic system that can provide online interactions of various kinds that can take place between learners and tutors, including online learning”. [1]

Simply, VLE can be defined as the Web-enabled multimedia-driven learning system integrated with synchronous and asynchronous communication tools. While originally created for distance education, VLEs are now most often used to supplement traditional face to face classroom activities, commonly known as Blended Learning.

Such VLE systems are sometimes also recognized by different synonymous terms such as:

Learning Management Systems (LMS), Course Management Systems (CMS), Learning Content Management Systems (LCMS), Managed Learning Systems (MLE), Learning Support Systems (LSS), Learning Platform (LP).

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## Features & Advantages of VLE

The Virtual Learning Environment provides an integrated learning environment based on Virtual library technology. Learning materials are explicitly organized, accessed, and presented in a way that shows objective scientific concepts and their interrelationships.

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In VLE, administrators, teacher as well as users can join, create, use, and re-use learning materials in the universe of subject fields, including classroom, laboratory, and self-guided environments. The main features of VLE are:

- Interactive communication Tools for teaching and learning
- Teaching and learning are in world wide web
- Additional learning system with traditional learning system
- Digital library system and electronic resources are the part of VLE
- One copy of the documents could be viewed by any number of users simultaneously.
- Large number of course can be delivered for a large number of users at a particular point of time at a glance across a globe.

#### *Why VLE*

Most of the VLE researchers identified that why Virtual learning is important in this ICT era due to the following reasons:

- Self-directed learning
- Accommodates multiple learning styles.
- World wide access to the users
- 24 \* 7 support systems
- Fosters greater student interaction and collaboration
- Computer and Internet skills enhancement of next generation users
- greater student-instructor interaction
- Arrays of theoretical support system
- VLE is the future of university learning support system for their on-line course delivery system

#### *Theoretical Foundation of VLE*

*Social contact theory:* Allport's (1954) Social

Contact Theory underneath of Co-operation Ireland's programmes deals with reducing inter-group prejudice or bias is through contact between the groups under optimal conditions. The optimal conditions include: (1) equal status between the groups in the situation; (2) common goals; (3) no competition between the groups; and (4) authority sanction for the contact. According to his point of view, "prejudice will decrease if two groups with equal status have contact. But prejudice will increase or remain high if it occurs under conditions of status inequality, in which one group is dominant and the other subordinate." [2]

#### *Social Constructivism*

Social Constructivism, the Co-operations Ireland's work, emphasises how meanings and understanding grow out of social encounters. The learner is actively engaged in a joint enterprise with the constructing of the meaning. Context is necessary and the learner actively makes the meanings outside of the head first and they are then internalised. Social Constructivism was first laid down by Leon Vygotsky in his theory of Zone of Proximal Development. [3] His work was later further developed by Bruner. [4]

#### *Contact Theory and the Internet*

Brown (2000) explained the contact hypothesis as a very significant idea in the history of Psychology. [5] Strong empirical support has shown that contact, under the prescribed conditions, leads to a positive change in attitude, which can be consistently achieved. Pettigrew and Tropp (2000) found that it was not necessary for all 4 conditions to be met for prejudice to be reduced and mere contact can be sufficient conditions for reduction of bias. [6] However, it is agreed that the greater number of conditions present, the greater the degree of prejudice reduction. It has been suggested that there are significant barriers to the 'Contact Theory' which include: (1) practicality [7] (2) anxiety [8] and (3) generalisation. [9]

The pedagogy is a mixture of many Face to Face activities blended in with On-line Learning Tasks in an innovative and creative programme environment which is a mixture of structured, semi-structured. Marsh (2001) describes blended learning as “Essentially, blended learning combines eLearning tools (everything from video streaming over the web to email) with traditional classroom training to ensure maximum effectiveness.”[10]

#### *Learning Management System (LMS) or Content Management System (CMS)*

Learning Management Systems (LMS) (Learning Management System, 2004) or Content Management System (CMS) provide a means to manage the delivery of e-learning courses. LMS' are learner and organizational focused. They are concerned with handling the logistics of learners that are in a training system. LMS' manage the learning activities, their sequence, and the competency mapping of courses.

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

Learning content management system (LCMS) is a related technology to the learning management system (e.g., WebCT, Moodle), focused on the development, management and publishing of the content that will typically be delivered via an LMS. An LCMS is a multi-user environment where developers may create, store, reuse, manage, and deliver digital learning content from a central object repository. The LMS cannot create and manipulate courses; it cannot reuse the content of one course to build another. The LCMS, however, can create, manage and deliver not only training modules but also manage and edit all the individual pieces that make up a catalog of training. LCMS applications allow users to create, import, manage, search for and reuse small units or “chunks” of digital learning content and assets, commonly referred to as learning objects. These assets may include media files developed in other authoring tools, assessment items, simulations, text, graphics or any other object that makes

up the content within the course being created. An LCMS manages the process of creating, editing, storing and delivering e-learning content, ILT materials and other training support deliverables such as job aids.

#### *Learning Management Systems (LMS) vs Learning Content Management Systems (LCMS)*

Some systems have tools to deliver and manage instructor-led synchronous and asynchronous online training based on learning object methodology. These systems are called Learning Content Management Systems or LCMSs. LCMSs provide tools for authoring and reusing or re-purposing content called mutated learning objects (MLO) as well as virtual spaces for student interaction (such as discussion forums, live chat rooms and live web-conferences). In spite of this distinction, the term LMS is often used to refer to both an LMS and an LCMS, although the LCMS is a further development of the LMS. Computer Learning Content Information Management System (Clcims) is used to create a uniform phonetic way of referencing any learning system software based on advanced learning technology methodology.

In real meaning, LMS is software for planning, delivering, and managing learning events within an organization, including online, virtual classroom, and instructor-led courses. LMS can simplify global certification efforts, enable entities to align learning initiatives with strategic goals, and provide a means of enterprise-level skills management. The focus of an LMS is to manage students, keeping track of their progress and performance across all types of training activities. It performs administrative tasks, such as reporting to instructors, HR and other ERP systems but isn't used to create course content.

There are so many open source software available in the web. Some applications are as follows:

A Tutor (Open Source Web-based Learning Content Management System), Claroline (free LMS),

Dokeos (e-learning and course management

web application), ILIAS (Open Source Learning

Management System), Moodle (Open Source Course Management System). Some closed systems are Blackboard, Desire2Learn, WebCT, etc.

### *Components of VLE*

#### *Learning Objects*

As per Higgs (2003) point of view, the essential characteristics of learning objects are as follows:

- *Independent:* Learning objects are discrete and coherent chunks of information, activities or assessment, which are self-contained in that they can contain a complete learning sequence, and don't rely on other material in order to make sense.
- *Shareable/ Reusable:* Learning objects are small stand alone, reusable components that can be assembled to provide resources in various learning environments, i.e., content developed in one context being transferable to another context. It is this notion of share ability, which is fundamental to leveraging any advantage in using learning objects.
- *Interoperable:* Objects must be interoperable that is: content from multiple sources must work with different learning systems. In order to do this they must be designed to conform to world standards.
- *Instructional Value:* In order to be defined as a learning object, there must be some intrinsic instructional value. A learning object is not just a knowledge or information object. It should result in a complete learning sequence, objective, skill or competency.
- *Discoverable:* Objects must be able to be found. This usually entails tagging them with appropriate descriptive metadata that will focus on linguistic semantics.
- *Context:* In order to maximize their

reusability, learning objects are required to minimize the amount of information specific to a given context. However this is often difficult; again we need to accept that some latitude in that learning object can include context-related information either within the object or by some external association to it.[11]

#### *Virtual Communication tools*

In VLE, there are various tools to fulfill the needs of the e-students. The communication tools are divided into two categories. First one is asynchronous and the other is synchronous tools. The asynchronous tools consist e-mail, Discussion Forum, etc. And in synchronous tools consist Internet Audio Conferencing, Video Conferencing, Multimedia Conferencing System, Instant Messaging, etc.

#### *Learning Object Metadata*

Metadata is data about data. Metadata is information that describes content. Metadata are of three types. These are as:-

Descriptive metadata is stored in a database. Information such as the title, author, producer, date of production, and a description of the content are just a few examples of metadata that is normally stored in the database.

Objective Metadata are factual data, most of which can be generated automatically – things such as physical attributes, date, author, operational requirements, costs, identification numbers, and ownership.

Subjective Metadata are the more varied and valuable attributes of a learning object determined by the person or group who creates the metadata, such as subject, category, and description.

More over, metadata is needed for implementation of the semantic web. Metadata can either be embedded in the resource it describes, or be located separately from it. Metadata can be generated either manually or automatically, but is most often structured according to semantically

understood elements – access points such as author, title and location.

Learning Object Metadata is a data model, usually encoded in XML, used to describe a learning object and similar digital resources used to support learning. Learning Object Metadata standards focus on the minimal set of attributes needed to allow these Learning Objects to be managed, located, and evaluated. The purpose of learning object metadata is to support the reusability of learning objects, to aid discoverability, and to facilitate their interoperability, usually in the context of online learning management systems (LMS) as well as learning object digital repository/library. However, there is more than one approved standard used to describe the properties of learning objects. Different Learning Object Repositories try to address different needs.

The standards of Learning Object Metadata are Instructional Management Systems Project (IMS), Advanced Distributed Learning Initiative (ADL) and SCORM, Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE), Dublin Core Metadata Initiative, IEEE Learning Technology Standards Committee (LTSC) Learning Object Metadata-IEEE 1484, Canadian Core Learning Object Metadata (CanCore), World Wide Web Consortium (W3C), METADATA. The available LO metadata standards application profiles are ADL SCORM, ARIADNE, SingCore, UK Curriculum online, Australian Learning Federation, Standard (IEEE/ISO) and others.

#### *Subsystems of VLE*

In, VLE there are three subsystems consist. These are

- *e-Administrator*: Administrator is the super user of VLE @ DLIS, BU. Administrator structured and developed DLIS courses in BU. It is very difficult to create various courses in VLE by the administrator in university like distributed system. So privilege of course creation is given to e-teacher and also

choice based global users. The ultimate roles of administrator are course management, users management, activity settings, appearance tinkering, system and security settings, etc.

- *E-tutor*: E-teaching has changed teacher's role as the owner of the knowledge, E-teacher becomes "a learning facilitator", that is, the one who offers the learner the strategies to fulfill the understanding of the materials on the subject. The e-teacher adopts the following functions: design, manage, moderate, mediate (in a conflict), and assess final results. That means, he/she is not the main character in the activity since this role is transferred to the learners (from teaching to learning). The ultimate role of the teacher is not to present the content of the subject (lecture) but to coordinate the implementation of the activity. Important consideration should be paid on the pedagogical objectives of the activity, as well as, having the act clearly designed.
- *E-student*: The e-student's role is different. It is more active than in a physical learning environment, though s/he is also autonomous and individual. There is a tendency to promote isolate learning environments, which foster neither critical minds nor team work. The latter is essential in the training of any professional in 21<sup>st</sup> century. E-students have to be able to adopt the following functions:
  - To take an active and direct part in the knowledge building;
  - To find their course;
  - To search their learning resources;
  - To answer their assignment;
  - To play quiz;
  - To communicate with the other members using communication tools;
  - To organise the internal roles of VLE, and other.

## Homepage of VLE @ DLIS, BU

The screenshot shows the homepage of VLE@DLIS, BU. The browser window title is 'VLE@DLIS, BU - Mozilla Firefox'. The address bar shows 'https://192.168.36.16/moodle/'. The page header includes 'VLE@DLIS, BU' and a login status 'You are not logged in. (Login)'. The main content area is titled 'Available Courses' and lists two courses:

- Bachelor of Library and Information Science (BLIS):** A professional course offered by The University of Burdwan. Syllabus is approved by the E.C. in its meeting dated 10-06-2008 (Item no. 3) and Departmental Committee in its meeting held on 30-04-2008. Syllabus of BLIS is available. Teachers: Dr. A.K. Bandopadhyay, Dr. S.C. Bhowmik, Dr. Parthasarathi Mukhopadhyay, Dr. C.B. Sain, Dr. Tridib Tripathi.
- Master of Library and Information Science (MLIS):** A professional course offered by The University of Burdwan. Syllabus is approved by E.C. dt. 10.06.2008 Draft Syllabus as approved by the P.G. Board of Studies in its meeting held on 10-03-2008. Syllabus of MLIS is available. Teachers: Dr. A.K. Bandopadhyay, Dr. S.C. Bhowmik, Dr. Parthasarathi Mukhopadhyay, Dr. C.B. Sain, Dr. Tridib Tripathi.

On the right side, there is a 'Welcome to VLE@Department of Library and Information Science, The University of Burdwan' message and a 'Calendar' for November 2008. The calendar shows the date 19th as highlighted.

### *Managing Components for VLE @ DLIS, BU*

VLE @ DLIS, BU is a prototype of virtual learning environments in the Department of Library and Information Science (DLIS), The University of Burdwan (BU) with the help of open source learning management system Moodle. In this project, BLIS & MLIS courses are designed and developed in addition to traditional learning systems. In this way, blended learning will be evolved in the University of Burdwan. M. Phil of LIS course will also be introduced in this system. This is an ongoing project. In this system, VLE acts as a front end layer learning system, and Digital Archiving Software used as back end layer database management system. In Digital archiving software, an open standard learning objects metadata schema is incorporated. Learning objects repository is developed using IDR software with the help of related learning objects from various open courseware

according to the syllabus of BLIS & MLIS of the DLIS, BU. In BLIS & MLIS course, hierarchical course structure is developed according to paper wise. In each paper is divided into unit. In each unit, topics are related with other open courseware and linked with either handle of learning objects or direct location of learning objects in digital archiving software within the VLE system.

### **Conclusion**

One of the basic requirements for education in the 21<sup>st</sup> century will be to prepare students for participation in a knowledge-based economy; knowledge will be the most critical resource for social and economic development. A nice byproduct of online learning is that in addition to knowledge acquisition, students learn about the technology through its use. In

## Course Programme of LIS in VLE @ DLIS, BU

these virtual environments the learning experience can be flexible, more accessible and inclusive. This integrated prototype VLE @ DLIS, BU is developed as a support system for traditional learning environment of the DLIS at the University of Burdwan.

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