

Online Education Systems: Discussion and Definition of Terms

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This paper is written in order to establish a common framework of terms for the *Web Education Systems Project* (Web-edu), which is supported by the European Leonardo da Vinci program. The project's web pages are available at www.nettskolen.com/in_english/web_edu.html.

The following main terms are presented, discussed and defined in relation to each other and to the Jigsaw model and the Hub model for integration of online education systems:

- Online Education, E-learning, Online Education Systems, Integrated Online Education Systems, and Standards Specifications
- Content Creation Tools, Authoring Tools, Assessment Tools, Learning Content Management Systems, and Learning Objects
- Learning Management System, Learning Platform, Virtual Learning Environment, and Learning Service Provider
- Student Management System, Enterprise Resource Planning System, Human Resource Information System, Knowledge Management System, and Competency Management System
- Accounting System

Online Education

There are many terms for online education. Some of them are: virtual education, Internet-based education, web-based education, and education via computer-mediated communication. The Web-edu project uses a definition of online education that is based on Desmond Keegan's (1988) definition of distance education. Hence, online education is characterized by:

- the separation of teachers and learners which distinguishes it from face-to-face education
- the influence of an educational organization which distinguishes it from self-study and private tutoring
- the use of a computer network to present or distribute some educational content
- the provision of two-way communication via a computer network so that students may benefit from communication with each other, teachers, and staff

E-learning

E-learning is here defined as interactive learning in which the learning content is available online and provides automatic feedback to the student's learning activities. Online communication with real people may or may not be included, but the focus of e-learning is usually more on the learning content than on communication between learners and tutors.

Unfortunately, the term e-learning is often used as a more generic term and as a synonym for online education. Kaplan-Leiserson has developed an online e-learning glossary, which provides this definition:

E-learning: Covers a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite broadcast, interactive TV, and CD-ROM.

The term e-learning is not very precise, and it should be pointed out that learning is just one element of education. So, the term online education should cover a much broader range of services than the term e-learning. One may also claim that e-learning companies often focus on course content, while online education institutions cover the whole range of educational services.

Online Education Systems and Integration of Them

Online education systems are here defined as all systems that support online education. In the following, this paper discusses two alternative models for online education systems developed in the web-edu project. The models are:

- The Jigsaw model for online education systems
- The Hub model for online education systems

Both models show that several online education systems should be integrated or exchange data and this need for integration increases when online education systems grow from small-scale to large-scale systems. Kaplan-Leiserson touches upon the need for integration in an attempt to define an integrated learning system:

ILS (integrated learning system): A complete software, hardware, and network system used for instruction. In addition to providing curriculum and lessons organized by level, an ILS usually includes a number of tools such as assessments, record keeping, report writing, and user information files that help to identify learning needs, monitor progress, and maintain student records.

To facilitate the increasing need for integration and exchange of data, a number of initiatives have been undertaken to develop standards specifications. Among these initiatives are the IMS project (www.imsproject.org) and SCORM (www.adlnet.org/scorm/downloads.cfm). Much focus has been given to the specifications' attempts to facilitate exchange of learning content, but the attempts to standardize integration between the various online education systems could actually be more important. This could be exemplified by the specifications IMS is developing which address key problems and challenges in integration between online education systems:

- The [IMS Learning Resources Meta-data Specifications](#) create a uniform way for describing learning resources so that they can be more easily found (discovered), using meta-data aware search tools that reflect the unique needs of users in learning situations.

- The [IMS Enterprise Specification](#) is aimed at administrative applications and services that need to share data about learners, courses, performance, etc., across platforms, operating systems, user interfaces, and so on.
 - The [IMS Content & Packaging Specification](#) will make it easier to create reusable content objects that will be useful in a variety of learning systems.
 - The [IMS Question & Test Specification](#) addresses the need to be able to share test items and other assessment tools across different systems.
 - The [IMS Learner Profiles Specification](#) will look at ways to organize learner information so that learning systems can be more responsive to the specific needs of each user.
- (<http://www.imsproject.org/faqs/imsnewpage.cfm?number=6>)

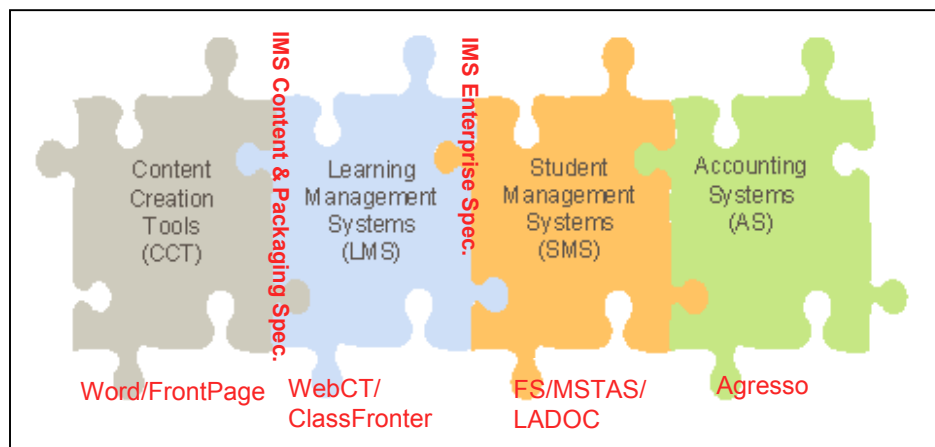
The Jigsaw Model for Online Education Systems

The Jigsaw model is a simplistic model used in the web-edu project. It includes the four main categories of online education systems that are listed below and presented in Figure 1.

- Content Creation Tools (CCT)
- Learning Management System (LMS)
- Student Management System (SMS)
- Accounting System (AS)

It is called the Jigsaw model to indicate that these systems should fit together to exchange data more or less seamlessly. The figure also presents some examples of actual systems and shows how the IMS specifications relate to the systems.

Figure 1. The Jigsaw model for online education systems

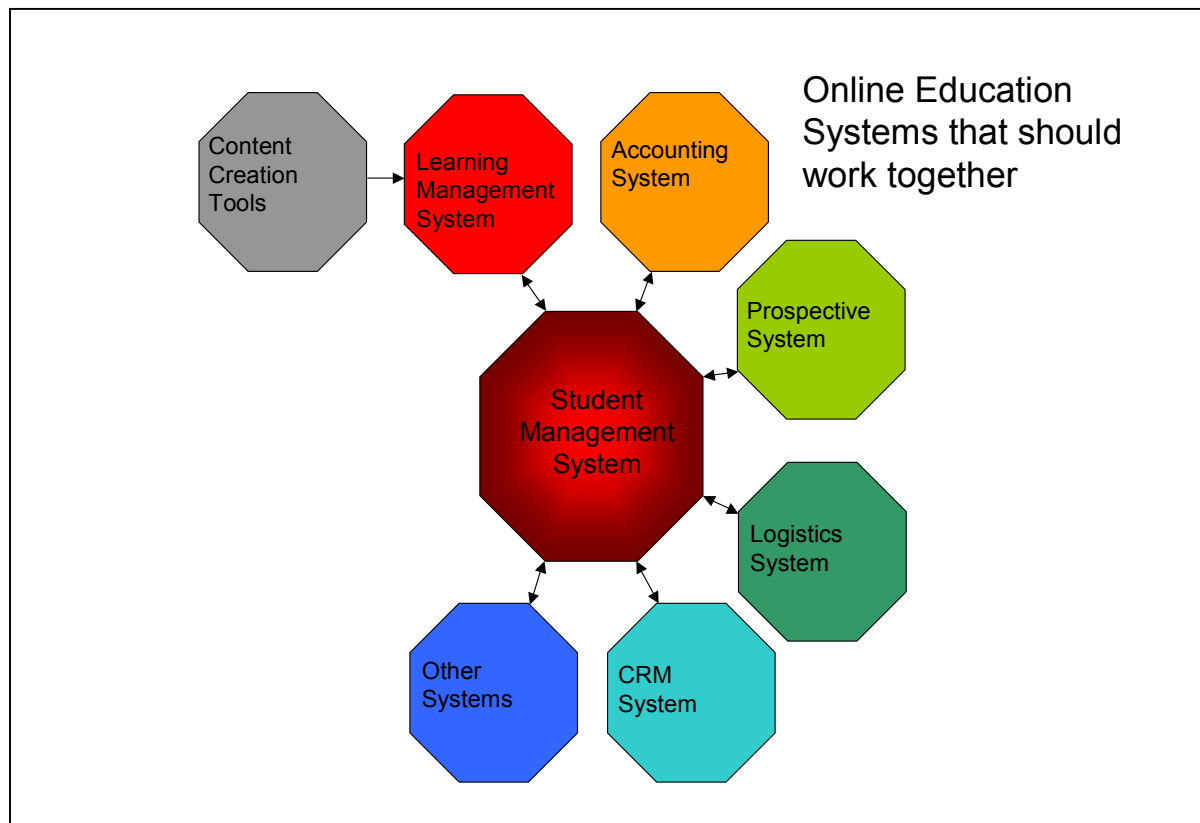


The Hub Model for Online Education Systems

The Hub model, presented in Figure 2, is more complex than the Jigsaw model. It is included to show that online education systems are becoming more and more complex. This is partly due to the institutions' need to rationalize the operation to handle the growing number of online students and courses, and partly due to the fact that the users are increasingly expecting more sophisticated services.

The model is termed the Hub Model to indicate that the Student Management System is the central, most important system for large-scale online education. For historical, legal, and financial reasons, the SMS system is the most important system for an educational institution. Hence, all other systems that could offer online education services should rely on the SMS system as the master system with which they exchange data.

Figure 2. The Hub model for online education systems



The Hub model includes Customer Relation Management (CRM) systems and prospective systems to show the need for integration with marketing and sales related systems. It also includes logistics systems to show that it could be necessary to integrate systems that handle shipment of textbooks and other physical material to distance students.

Content Creation Tools (CCT)

Content creation tools are the tools that course designers and teachers use to create the content in online education courses. The content creation tools are used to develop learning material. There are many types of content such as for example plain text, slides, graphics, pictures, animations, simulations, assessments, audio, video etc. Typical examples of these systems are DreamWeaver, FrontPage, Word, PowerPoint, and Director. These are generic tools with few features developed specially for online education.

In addition to the much-used generic CCT tools, there are a number of CCT tools that are specially made for development of educational content. The most important of these CCT tools are termed authoring tools and assessment tools.

Authoring Tools

Authoring tools could be regarded as a subset of content creation tools. Hall (2001) defines an authoring tool as “a software application, used by non-programmers, that utilizes a metaphor (book, or flow chart) to create on-line courses”. One may say that authoring tools are content creation tools that are especially developed for creation of educational content.

Assessment Tools

Content related to assignments and assessment is especially important for educators. It has therefore been developed various tools for development of different types of assignments such as for example quizzes, multiple choice assignments, etc.

Learning Content Management System (LCMS)

Institutions that have a large amount of learning content that they want to use in several courses and various formats may need a Learning Content Management System. Hall (2001) explains a Learning Content Management System this way:

A learning content management system is an environment where developers can create, store, reuse, manage and deliver learning content from a central object repository, usually a database. LCMS generally work with content that is based on a learning object model. These systems usually have good search capabilities, allowing developers to find quickly the text or media needed to build training content.

Learning Content Management Systems often strive to achieve a separation of content, which is often tagged in XML, from presentation. This allows many LCMS to publish to a wide range of formats, platforms, or devices such as print, Web, and even Wireless Information Devices (WID) such as Palm and windows CE handhelds, all from the same source material.

An alternative definition is provided by Kaplan-Leiserson:

LCMS (learning content management system): A software application that allows trainers and training directors to manage both the administrative and content-related functions of training. An LCMS combines the course management capabilities of an LMS (learning management system) with the content creation and storage capabilities of a CMS (content management system).

Learning Object

It is possible to split content in a number of learning objects and reassemble them to create new learning material or courses in the same way you play with Lego blocs. Kaplan-Leiserson explains a learning object as:

A reusable, media-independent chunk of information used as a modular building block for e-learning content. Learning objects are most effective when organized by a meta data classification system and stored in a data repository such as an LCMS.

Learning Management System (LMS)

Learning Management System is a broad term that is used for a wide range of systems that organize and provide access to online learning services for students, teachers, and

administrators. These services usually include access control, provision of learning content, communication tools, and organizations of user groups. Another term that often is used as a synonym to LMS is learning platform.

Two examples of well-known, commercial LMS systems are WebCT and Blackboard. There are however a large number of other commercial systems and systems that educational institutions have developed themselves.

Kaplan-Leiserson provides the following definition of LMS:

LMS (learning management system): Software that automates the administration of training events. The LMS registers users, tracks courses in a catalog, and records data from learners; it also provides reports to management. An LMS is typically designed to handle courses by multiple publishers and providers. It usually doesn't include its own authoring capabilities; instead, it focuses on managing courses created by a variety of other sources.

Hall (2001) presents this alternative definition:

A Learning Management System (LMS) is software that automates the administration of training events. All Learning Management Systems manage the log-in of registers users, manage course catalogs, record data from learners, and provide reports to management.

There used to be a distinction between Learning Management Systems and more powerful Integrated Learning Management Systems. That distinction has now disappeared. The term Learning Management System is now used to describe a wide range of applications that track student training and may or may not include functions such as:

- Authoring
- Classroom management
- Competency management
- Knowledge management
- Certification or compliance training
- Personalization
- Mentoring
- Chat
- Discussion boards

Virtual Learning Environment (VLE)

Virtual learning environment is a term that to some extent is used instead of LMS. The two terms have more or less the same meaning, but one may argue that VLE focus less on the features related to the management of learning. Bandon Hall (2001) defines learning environment this way:

A Learning Environment is software designed as an all-in-one solution that can facilitate online learning for an organization. It includes the functions of a learning management system for those courses within the learning environment, but it may not be able to track online courses that were not created within this particular learning environment.

A learning environment is characterized by an interface that allows students to register and take courses, staying within that environment for the duration of the course. The program will usually include some self-instructional portions, along with an academic model of a

multi-week course. This model is often facilitated by an instructor, where a group can proceed on a week-to-week basis with seminar assignments. Most learning environments also include an authoring capability for creation of additional courses for the instructor.

Learning Service Provider (LSP)

There are a number of institutions that host Learning Management Systems and provide this as a commercial service for educational institutions. These institutions could be termed Learning Service Providers (LSP): Kaplan-Leiserson explains it as a specialized Application Service Provider "offering learning management and training delivery software on a hosted or rental basis".

Student Management System (SMS)

The student management system is the core system in an educational institution. It is used for management of the most pivotal information about entities such as students, faculty, courses, applications, admissions, payment, exams, and grades. An effective SMS system is crucial for all educational institutions.

Two examples of commercial SMS systems are PeopleSoft and Banner. In the Nordic countries, the universities have national systems such as STADS (Denmark), LADOK (Sweden), MSTAS (Norway), and FS (Norway).

Enterprise Resource Planning (ERP) System or Human Resource Information System (HRIS)

Companies and corporations have employees, not students. But they have systems that hold similar data as the SMS systems with important information about their employees. These could be termed Enterprise Resource Planning (ERP) systems or Human Resource Information Systems (HRIS). These systems will provide some of the same functionalities as the student management systems.

Hall (2001) provides the following descriptions of ERP and HRIS systems:

Enterprise Resource Planning (ERP) is an industry term for large, often multi-module software applications that manage many facets of a company's operations including product planning, parts purchasing, maintaining inventories, interacting with suppliers, providing customer service, tracking orders, and managing resources and financials. SAP, PeopleSoft, and J.D. Edwards are some well-known ERP providers.

Human Resource Information Systems (HRIS) are similar to ERP applications but are aimed specifically at the management of a company's human resources.

Other names for related systems used in companies could be Knowledge Management Systems or Competency Management Systems. Kaplan –Leiserson defines it this way:

Competency management: A system used to identify skills, knowledge, and performance within an organization. Enables an organization to spot gaps and introduce training, compensation, and recruiting programs based on current or future needs.

Accounting System (AS)

The accounting system is used for recording the economic transactions between the institution and its customers and suppliers. In an online education setting, the most important customers and suppliers are the students and the teachers.

The data from the accounting systems could be used to deny system access to students who do not pay their tuition fees. Some institutions already accept online enrollment, online payment, and online student credit account information. Other institutions provide online tutors with their updated salary account information. This functionality requires some integration between the systems.

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