

RTU  
ZINĀTNISKIE  
RAKSTI

SCIENTIFIC  
PROCEEDINGS  
OF RIGA  
TECHNICAL  
UNIVERSITY



# DATORZINĀTNE

RĪGA 2003



ISSN 1407-7493

RĪGAS TEHNISKĀS UNIVERSITĀTES  
ZINĀTNISKIE RAKSTI

SCIENTIFIC PROCEEDINGS  
OF RIGA TECHNICAL UNIVERSITY

5. SĒRIJA

**DATORZINĀTNE**  
**COMPUTER SCIENCE**

**LIETIŠKĀS DATORSISTĒMAS**  
**APPLIED COMPUTER SYSTEMS**

17. SĒJUMS

IZDEVNIECĪBA "RTU", RĪGA – 2003

**Galvenais redaktors:  
Editor in Chief:**

Profesors J.Grundspenķis (Rīgas Tehniskā universitāte, Latvija)

**Redkolēģija:  
Editorial Board:**

Profesors J.Bārzdiņš (Latvijas universitāte, Latvija)  
Profesors J.Bubenko, jr. (Stokholmas universitāte, Zviedrija)  
Profesors A.Čaplinskis (Matemātikas un Informātikas institūts, Lietuva)  
Profesore H.-M.Haava (Konkordijas universitāte, Igaunija)  
Profesors A. Kalniņš (Latvijas universitāte, Latvija)  
Profesors L.Novickis (Rīgas Tehniskā universitāte, Latvija)  
Profesors J.Osis (Rīgas Tehniskā universitāte, Latvija)

**Editor:  
Redaktore:**

Dr. O.Ņikiforova (Rīgas Tehniskā universitāte, Latvija)

---

**Redkolēģijas adrese:  
Editorial Board Address:**

Rīgas Tehniskā universitāte  
Meža iela 1/3  
LV 1048 Rīga  
Latvia

Phone : +371 708 95 06

## CLARIFICATION OF THE TERMINOLOGY USED IN THE FIELD OF VIRTUAL LEARNING

### VIRTUĀLO MĀCĪBU JOMĀ LIETOTĀS TERMINOLOĢIJAS PRECIZĒŠANA

A.Anohina

*Learning, technology based learning, virtual learning environment, managed learning environment*

This paper presents an initial attempt to clarify the broad terminology in the field of virtual learning. Such widespread terms as computer-based learning, distance learning, Internet-based learning, online learning, technology-based learning, and Web-based learning will be examined and the subset relationships between them will be defined. The meaning of the educational concepts that are constituent part of all the terms will be explained. In addition the essence of virtual learning environment, managed learning environment and learning management system will be described.

#### 1. Introduction

Rapid growth of information and communication technologies in addition with traditional ways of learning has provided new opportunities how people can acquire knowledge. Many terms such as resource-based learning [1], e-learning [2, 3, 4], distance learning [2, 3, 4, 5], networked learning [6], online learning [7, 8], Internet-based training [3, 4, 9], technology based training [2, 3], Web based training [3, 8, 10] etc. are used while speaking about the support of teaching and learning by different technologies. Typically these terms are formed combining one of the five educational concepts- education, instruction, learning, teaching, training-each with its nuance of meaning and the word characterizing learning or used technology such as “distance”, “Internet”, “online”, “networked”, and so on. As a result, the huge set of terms is obtained. Furthermore, the offered definitions of the terms are often very vague and their relationships aren't explicitly defined that raises confusions and ambiguity in the applied terminology. This article attempts to clarify some aspects of this issue. It is based on investigations of the broad set of information sources (up to 70, but not all of them are referenced here), which includes monographs and Internet resources.

The paper is organized as follows. The introduction examines the need to clarify terminology used to describe technologies and software that support the learning process. The second section explains some pedagogical concepts such as education, instruction, learning, teaching and training. The third section describes the main construction schemes of terms, as well as six groups of the most widespread terms. The subset relationships between different terms are defined at the end of the third section. The fourth section gives definitions of virtual learning environment, managed learning environment and learning management system. It points out the main differences between virtual learning environment and managed learning environment. The conclusions summarize the most important issues of this article and outline some directions of the future work.

## 2. Meaning of the educational concepts

The terms that are used while speaking about the support of the learning process by different technologies typically include following concepts, which have come from pedagogy: education, instruction, learning, teaching, and training. Their meaning should be clarified in the first instance.

The term “training” emphasizes the practical direction of the learning and typically is used on the professional or corporate level. The similar meaning has a concept “instruction”. It also implies the practical direction of the learning, but unlike the term “training” it is more common within the academic settings. In addition, it points to assistance component as important aspect of the learning process. These two terms are often used as synonyms while speaking about the learning with practical orientation in general and they are distinguished emphasizing the environment, where the learning process takes place.

The concept “teaching” is related to teacher’s activity and is used mostly, when it is necessary to highlight the teacher’s role in the learning process.

The term “learning” is broader and is used in twofold meaning, speaking about the learning in general and emphasizing the learner’s activity in the learning process.

The concept “education” has the broadest meaning and is related to learning activities that have objectives to develop knowledge, attitudes, skills and values in general, not that are related to specific work area. It encompasses both learning and teaching and is more common within the academic settings.

## 3. Groups of terms in relation to technologies supporting learning process

While investigating the broad set of information sources it was noticed that the terms describing technologies that support the learning process consist of two parts. The second part is common to all the terms and includes one of the following pedagogical concepts: education, instruction, learning, teaching, and training. The first part may be in two forms: as a word characterizing learning (for example, “distance”) and as a combination of the word pointed out a technology used in the learning process and a connective (for example, “Internet based”). The first part shows the difference between the terms and this feature was used forming six basic groups of the most widespread terms: group “C” (computer), group “D” (distance), group “I” (Internet), group “O” (online), group “T” (technology), group “W” (Web).

**Group “C”.** Using the concept combinations from Table 1 could form the terms of this group.

**Table 1. The terms of the group “C”**

Technology describing word	Connective	Educational concept
Computer	Aided	Education Instruction Learning Teaching Training
	Assisted	
	Augmented	
	Based	
	Extended	
	Managed	
	Mediated	
	Monitored	
	Related	
	Supported	

The word “computer” refers to technology for delivering of the learning, but its meaning is too broad and doesn’t point to concrete computer technology. So, it can be applied to any use of a computer in the learning process. However, as it is specified in [8] “although computer could generically refer to any learning experience on a computer, it typically just refers to those experiences that are stand-alone- either because the computer is not connected to a network or because the learning materials do not contain links to material outside of the program. Similarly, although computer could generically imply that all types of media are included in a course, it typically implies that the course has just text, graphics, and simple animation”. The fact that a computer is offline and isn’t connected to a network follows from many definitions [see, 2, 6]. In this way the word “computer” as the constituent part of the terms of this group implies in its basic meaning that the learning materials are local and are delivered via CD-ROM or floppy disk.

The second column of the Table 1 contains the connectives. They can be divided in three categories that determine major distinctions in the applied terminology:

- The word “based” assigns the general meaning to corresponding term as it points that a computer is used in the learning process, but doesn’t specify the way of use. A computer can be used both to support the learning process and to manage it. The words “related” and “extended” also could be placed into this category due to their little expressiveness.
- The connectives “aided”, “assisted”, “augmented”, “mediated”, “supported” are used speaking about the support of the learning process by a computer or computer use as a learning environment.
- The words “managed” and “monitored” imply that a computer serves as a medium in the managing of the learning process.

The word combinations that include the same words from the third columns and the connectives from the same category of the second column are used as synonyms. Sometimes the word combinations that contain the words from the first two categories of the second column also are used as synonyms.

**Group “D”.** The terms of this group correspond to the concept combinations from Table 2.

**Table 2. The terms of the group “D”**

Word characterizing learning	Educational concept
Distance	Education
	Instruction
	Learning
	Teaching
	Training

The word “distance” characterizes the learning process, pointing that it is delivered at a distance, that is, a learner and a source of learning are physically separated one from another. However, this word doesn’t specify the technology that is used for delivering of learning, so it could be any information and communication technology that allows to provide learning to remote locations: correspondence, TV, phone, audio conference, videoconference, course material on the Web, radio, satellite broadcasts, videotape, and so on. As a rule, the presence of the teacher is assumed in distance learning and his role is to provide support and tutorials.

**Group “I”.** The definitions of these terms are the narrowest ones in comparison with the terms of other groups because they clearly point out technology used for learning providing. Typically learning content is delivered via the Internet, intranet or extranet. In contradistinction to the learning that is characterized by the terms of group “C” Internet based learning allows to access not only local materials, but also materials outside of the course.

The terms that form this group are presented in Table 3.

**Table 3. The terms of the group “I”**

Technology describing word	Educational concept
Internet based	Education
	Instruction
	Learning
	Teaching
	Training

**Group “O”.** The terms of this group are included in Table 4.

**Table 4. The terms of the group “O”**

Word characterizing learning	Educational concept
Online	Education
	Instruction
	Learning
	Teaching
	Training

The word “online” can be defined both in the narrow and broad meaning. In the narrow sense it means “the state in which a computer is connected to another computer or server via a network. A computer communicating with another computer” [3]. So, it refers to the presence of network connection. Exactly this feature underlies many definitions of online learning. However, this word is very often used to point out that there is an access to some electronic medium in general. For example, it can be applied to the help files, which are stored on CD-ROM and can be accessed immediately when it is necessary. Some definitions of the terms from group “O” are based on this understanding. However, typically this word is used while speaking about the learning via the Internet.

**Group “T”.** The concept combinations from Table 5 form the terms of this group.

**Table 5. The terms of the group “T”**

Technology describing word	Educational concept
Technology based	Education
	Instruction
	Learning
	Teaching
	Training

The terms of this group have the broadest meaning among the terms from other groups. They emphasize that some technology that is used for delivering of learning content and developing of skills and knowledge has the primary role in the learning process. These terms don't describe the technology itself and as a consequence it can be any: computer (also connected to the Internet, intranet or extranet), TV, audiotape, videotape, DVD disc, CD, satellite broadcast, etc.

**Group “W”.** The terms of this group like the terms of the group “T” have the narrowest meaning as they clearly describe the technology that is used to deliver the learning, namely, Web technology. The terms are presented in Table 6.

**Table 6. The terms of the group “W”**

Technology describing word	Educational concept
Web based	Education
	Instruction
	Learning
	Teaching
	Training

As it was specified above the terms of group “T” have the broadest meaning because the word “technology” implies the use of any technology in the learning process. So, we can conclude that these terms encompass the terms from other groups.

Internet based learning and Web based learning are online learning, but computer-based learning is outside of this group because it mainly implies that the learning is delivered via CD- ROM or floppy disc than via the network technology.

The terms from groups “I” and “W” are often used interchangeably, but it is not correctly. As it is pointed in [3] “Internet-based training is not necessarily delivered over the Web, and may not use the HTTP and HTML technologies that make Web-based training possible”.

Internet based learning, Web based learning and online learning is the forms of distance learning.

Figure 1 shows the subset relationships between the terms taking into account all the above told.

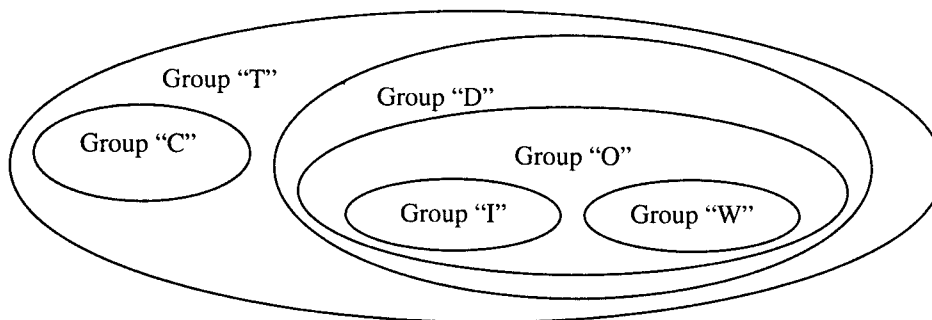


Figure 1. Relationships of the terms

#### 4. Virtual learning environment, managed learning environment and learning management system

The broad range of the terms is used to describe the software applications and technologies that support the learning process, for example, managed learning environment [11, 12], virtual learning environment [11, 12, 13], asynchronous learning network [11], collaborative learning software [13], learning management system [11, 12, 13], online learning environment [13]. However the most common are virtual learning environment, managed learning environment, and learning management system.

The virtual learning environment is online software that supports communications between learners and teachers, provides the delivery of learning materials, student tracking and assessment and constitutes the part of the managed learning environment. The basic functions of the virtual learning environment includes [based on 12, 13, 14, 15, 16, 17, 18]:

- support and facilitation of communication and collaboration (one- to- one, one- to-many, many- to- many, synchronous and asynchronous) between teachers, students and others learning specialists, using chat rooms, discussion boards, e- mail, conferences, bulletin boards, collaboration tools;
- controlled access to course curriculum, course information (content and structure), course materials and resources;
- access to resource base, including multimedia repositories and file uploading;
- knowledge assessment (including self-assessment) and assessment tools (tests, question pools, grade book);
- tracking and managing of students' progress and achievements;
- individual customized workspaces for course participants, where they can share, interchange and store materials;
- tools for the creation and modification of the course materials;

- support for course participants (search tools, diary, navigation structures, online help, calendar).

Figure 2 shows the constituents parts of the managed learning environment. The managed learning environment encompasses many systems both computerized and non-computerized. The virtual learning environment is only one part of this environment and it is related to curriculum mapping, course delivery, students' assessment and tracking, communication, and tutor support. The systems in the managed learning environment communicate using some interoperability standard.

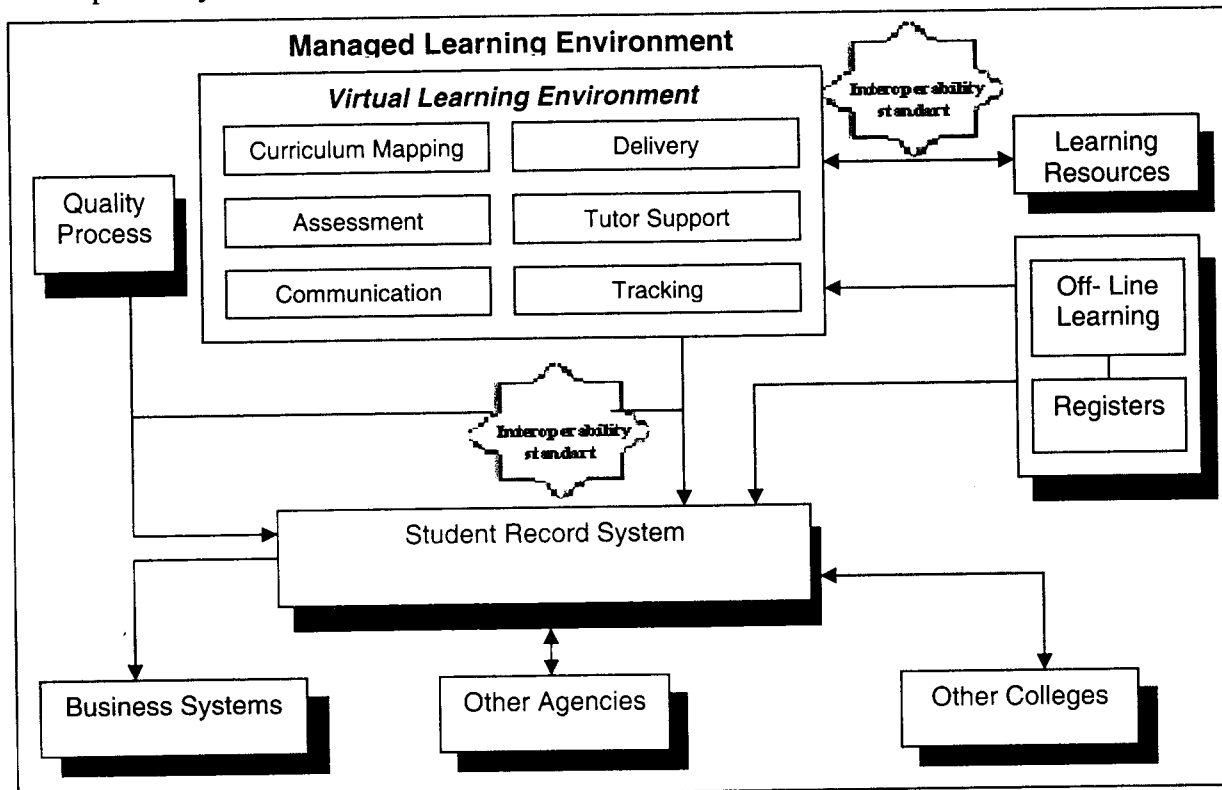


Figure 2. The VLE as a sub-system within the college MLE (adapted form [20])

One of the definitions of the managed learning environment is: "A Managed Learning Environment (MLE) is a computer based system that provides the infrastructure for a "virtual" university – either as a complete distance learning package or as an additional support layer for campus based students. A MLE provides a suite of tools to enhance teaching and learning by delivering course materials, examination and assessment via a common interface, a web browser. Features will include email facilities, discussion groups, and bulletin boards as well as interfacing through individual profiles to all appropriate university systems and information to integrate information resources, course materials and student services" [19].

To remove confusion between these two terms the Joint Information Systems Committee (Britain) [20] offers such explanations:

- The term Managed Learning Environment (MLE) refers to the whole range of information systems and processes of a college or university (including its VLE if it has one) that contribute directly, or indirectly, to learning and the management of that learning.
- The term Virtual Learning Environment (VLE) is one possible component of a MLE: it refers to the component(s) within an MLE that provides the "online" interactions of various kinds, which can take place between learners and tutors, including online learning.

The learning management system can be defined as "software that tracks student progress in a course and indicate completions. At the least, learning management systems track

individual student progress, record scores of quizzes and tests within an online learning program, and track course completions. At the most, learning management systems transfer this information to other record management software, ..., so permanent educational records reflect progress in online learning” [8] or “infrastructure platform through which learning content is delivered and managed. A combination of software tools perform a variety of functions related to online and offline training administration and performance management” [21]. The model of the learning management system is shown in Figure 3.

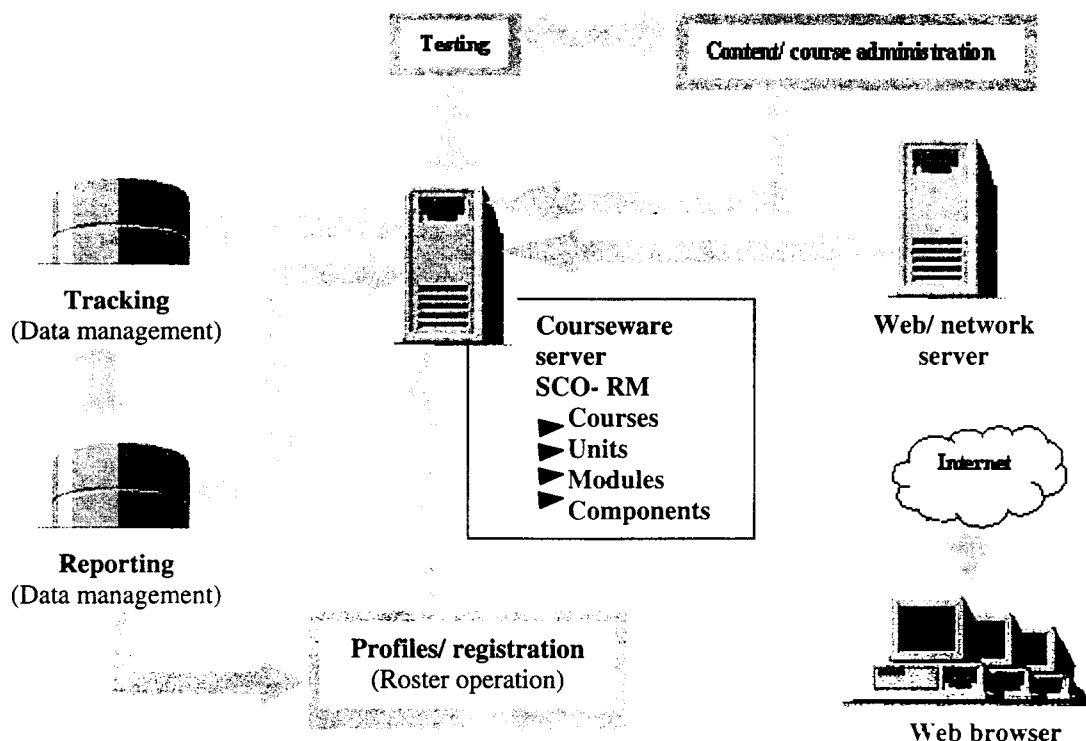


Figure 3. Learning management system model (adapted from [21])

The central part of the learning management system shown in Figure 3 is the courseware server. It is related to the content of multiple courses and is based on the Sharable courseware object reference model (SCO- RM). This model allows easily updating and reusing of courses, swapping out the old content and replacing it with new one. The courseware server interacts with the network server and databases. Databases accumulate data about students' activity and participation in courses. This data is used for tracking, administration and reporting students' progress.

Hence the managed learning environment covers both systems within some learning organization and external systems, so students can take various courses, to move between them and between the different institutions. Virtual learning environment can be constituent part of the managed learning environment and it provides working with and delivery of course content and resources, as well as supports students activities and interaction. The learning management system has a more administrative direction, recording data about students and providing reports to course management about their progress. The learning management system is often designed to manage multiple courses.

## 5. Conclusions and future work

This paper presents an attempt to clarify and classify the terminology in the field of virtual learning. The purpose is to eliminate existent confusions and misunderstandings in this

subject. The classification of the widespread terms in six groups is proposed. Also some of multiple terms describing software systems that are used to support, facilitate and manage the learning process are examined.

In future the work related to the clarification of terminology will be continued, investigating both the terms that have been described in this article and the new ones such as e-learning, distributed learning, networked learning, resource based learning, open learning etc. The relationships between the terms will be examined deeper. The list of the connectives will be extended.

## References

1. Ryan S., Scott B., Freeman H., Patel D. *"The virtual university: the Internet and resource- based learning"*// Kogan page, London, 2000, 204 p.
2. *Glossary of e-Learning Terms*// RM Automation Systems, [www.rmautomationsystems.com/elearning/glossary.xml](http://www.rmautomationsystems.com/elearning/glossary.xml) (visited 10.03.2003)
3. Kaplan-Leiserson E. *E-Learning Glossary* // [www.puw.edu.pl/puw/docs/elearn\\_gloss\\_learncircuits.pdf](http://www.puw.edu.pl/puw/docs/elearn_gloss_learncircuits.pdf) (visited 10.03.2003)
4. *E- Learning Glossary*// Manitoba, [www.edu.gov.mb.ca/ks4/tech/wbc/wbcgloss.html](http://www.edu.gov.mb.ca/ks4/tech/wbc/wbcgloss.html) (visited 10.03.2003)
5. Picciano A.G. *"Distance learning: making connections across virtual space and time"*// Merrill, N.Y., 2001, 253 p.
6. *Glossary of open and distance learning terms*// The Commonwealth of Learning, 2000, [www.col.org/resources/startupguides/glossary.htm](http://www.col.org/resources/startupguides/glossary.htm) (visited 10.03.2003)
7. Kearsley G. *"Online education: learning and teaching in cyberspace"*// Wadsworth Thomson learning, Belmont, Calif., 2000, 207 p.
8. Carliner S. *An overview of Online Learning*// [www.lakewoodconferences.com/wp/what.htm](http://www.lakewoodconferences.com/wp/what.htm) (visited 11.03.2003)
9. *Internet-Based Training Lecture*// Northeastren Illinois University, <http://www.neiu.edu/~akommel/intlect/index.htm> (visited 18.03.2003)
10. Horton W.K. *"Designing Web- based training: how to teach anyone anything anywhere anytime"*// Wiley, N.Y., 1999, 607 p.
11. Bent M. *MLE or VLE- is that the question?*// [www.leeds.ac.uk/library/ustlg/spring01/moira/report.htm](http://www.leeds.ac.uk/library/ustlg/spring01/moira/report.htm) (visited 03.03.2003)
12. *Virtual learning*// University of Salford, The Faculty of Business & Informatics, 2002, [www.fbi.salford.ac.uk/flexible-learning/virtual\\_learning.htm](http://www.fbi.salford.ac.uk/flexible-learning/virtual_learning.htm) (visited 01.03.2003)
13. Britain S., Liber O. *A Framework for Pedagogical Evaluation of Virtual Learning Environments*// [www.jtap.ac.uk/reports/htm/jtap-041.html](http://www.jtap.ac.uk/reports/htm/jtap-041.html) (visited 05.02.2003)
14. Stiles M.J. *Disability Access To Virtual Learning Environments*// 2001, [www.techdis.ac.uk/resources/stiles01.html](http://www.techdis.ac.uk/resources/stiles01.html) (visited 18.02.2003)
15. *Virtual Learning Environments (VLEs)*// University of the West of England, Bristol, 2001, [www.uwe.ac.uk/library/nlsf/euwe/vle.shtml](http://www.uwe.ac.uk/library/nlsf/euwe/vle.shtml) (visited 01.03.2003)
16. *What is virtual learning?*// SWAPItsn, [www.swap.ac.uk/elearning/vle1.asp](http://www.swap.ac.uk/elearning/vle1.asp) (visited 18.02.2003)
17. *Virtual Learning Environment (VLE) Functional Specifications*// The joint information systems committee, 2002, [www.jisc.ac.uk/index.cfm?name=mle\\_briefings\\_3](http://www.jisc.ac.uk/index.cfm?name=mle_briefings_3) (visited 03.03.2003)
18. O'Leary R. *Virtual Learning Environments*// [www.ltsn.ac.uk/embedded object.asp?id=17213&prompt=yes&filename=ELN002](http://www.ltsn.ac.uk/embedded_object.asp?id=17213&prompt=yes&filename=ELN002)(visited 03.03.2003)
19. *Managed learning environments*// LTDU Learning and Information services, 2000, [www.herts.ac.uk/ltdu/projects/mle-intro.html](http://www.herts.ac.uk/ltdu/projects/mle-intro.html) (visited 03.03.2003)
20. *Overview of MLE issues and how JISC can help*// The joint information systems committee, 2002, [www.jisc.ac.uk/index.cfm?name=mle\\_overview](http://www.jisc.ac.uk/index.cfm?name=mle_overview) (visited 25.02.2003)
21. Clark D. *Learning Glossary*// [www.nwlink.com/~donclark/hrd/glossary.html](http://www.nwlink.com/~donclark/hrd/glossary.html) (visited 10.03.03)
22. *Learning management system*// <http://www.dsv.su.se/~klas/Learn/LMS/lms.html> (visited 20.03.2003)

**Alla Anohina,**  
Riga Technical University,  
Meza ¼, Riga, LV-1048, Latvia,  
Mr. sc.ing., alleila@algs.lv

#### **Anohina A. Virtuālo mācību jomā lietotās terminoloģijas precizēšana**

*Strauja informācijas un komunikāciju tehnoloģiju attīstība nodrošināja jaunas iespējas zināšanu iegūšanai. Rezultātā parādījās plaša terminoloģija iespējamo mācību veidu, kas balstās uz dažādu tehnoloģiju izmantošanu mācību procesā, apzīmēšanai. Šī terminoloģija prasa sakārtošanu un izskaidrošanu. Dotais raksts ir sākotnējais mēģinājums to izdarīt. Tajā tiek precizēti tādi plaši izmantotie termini kā computer based learning, distance learning, Internet based learning, online learning, technology based learning, Web based learning. Raksta autore analizē katru no iespējamām terminu sastāvdaļām, t.i. ar mācībām saistītus vārdus (education, instruction, learning, teaching, training), savienotājevārdus (piemēram, aided, augmented, based, managed), mācības raksturojošos (piemēram, distance, online) vai tehnoloģiju aprakstošos (piemēram, computer, Internet) vārdus. Balstoties uz iegūtiem analīzes rezultātiem rakstā ir definēti apakškopas attieksmes starp dažādiem terminiem.*

*Papildus ir apskatītas tādas mācību procesa atbalsta programmatūras sistēmas, kā virtual learning environment, managed learning environment, learning management system. Rakstā ir aprakstīta virtuālo mācību vīžu funkcionalitāte, bet galvenā uzmanība ir veltīta atšķirību noteikšanai starp virtuālām mācību vidēm un pārvaldāmām mācību vidēm.*

*Dotais raksts tika sagatavots, balstoties uz plašu informācijas avotu (ap 70 avotiem, bet ne uz visiem no tiem ir atsauce šeit) klāstu, kurā ietilpst gan monogrāfijas, gan Internetā pieejami resursi.*

#### **Anohina A. Clarification of the terminology used in the field of virtual learning**

*Rapid growth of information and communication technologies has provided new opportunities for knowledge acquisition. As a consequence the broad terminology describing possible ways of learning that uses various technologies in the learning process has appeared. This terminology should be ordered and precisely defined. This paper presents an initial attempt to solve this problem. It clarifies such widespread terms as computer based learning, distance learning, Internet based learning, online learning, technology based learning, Web based learning. The author analyzes each possible constituent part of terms, that is, educational concepts (education, instruction, learning, teaching, training), connectives (such as aided, augmented, based, managed), words characterizing learning (such as distance, online) or technology describing words (such as computer, Internet). The obtained results of analysis are used to define subset relationships between different terms.*

*In addition some software that supports the learning process is described, that is, virtual learning environment, managed learning environment, learning management system. The functionality of virtual learning environments is described, but the main focus is on differences between virtual learning environment and managed learning environment.*

*This paper is based on investigations of the broad set of information sources (up to 70, but not all of them are referenced here), which includes monographs and Internet resources.*

#### **Анохина А. Уточнение терминологии, используемой в области виртуального обучения**

*Стремительное развитие информационных и коммуникационных технологий привело к появлению новых возможностей приобретения знаний. Следствием этого явилось возникновение обширной терминологии для обозначения возможных способов обучения на основе использования различных технологий. Появившаяся терминология требует упорядочивания и разъяснения. Данная статья представляет собой начальную попытку внести ясность в данный вопрос. В ней уточняются такие широко распространённые в англоязычной литературе термины как computer based learning, distance learning, Internet based learning, online learning, technology based learning, Web based learning. Автор статьи детально рассматривает каждую из возможных составных частей терминов, а именно дидактические понятия (education, instruction, learning, teaching, training), соединительные слова (например, aided, augmented, based, managed), слова характеризующие учебный процесс (например, distance, online) или описывающие используемую в нём технологию (например, computer, Internet). На основе проведённого анализа в статье определяются отношения подножества между различными терминами.*

*Также рассматриваются такие системы программного обеспечения использующиеся для поддержки учебного процесса как virtual learning environment, managed learning environment, learning management system. В статье описывается функциональность виртуальных сред обучения, однако главное внимание уделено различиям между виртуальными и управляемыми средами обучения.*

*Данная статья была подготовлена на основе изучения обширного множества источников информации (около 70 источников, не на все из которых имеется ссылка в данной статье), в числе которых имеются как монографии, так и ресурсы сети Интернет.*