

## Experiences with Learning Management Systems in 113 European Institutions

**Morten Flate Paulsen**

NKI Distance Education  
Box 111, 1319 Bekkestua, Norway  
Tel: +47 67 58 88 00  
Fax: +47 67 53 05 00  
[morten@nettskolen.com](mailto:morten@nettskolen.com)

### Abstract

This article presents the major findings from six regional analyses conducted within the framework of the European Web-edu project ([http://www.nettskolen.com/in\\_english/webedusite/index.html](http://www.nettskolen.com/in_english/webedusite/index.html)). It analyses the experiences of European institutions with the Learning Management Systems that they have purchased or developed themselves. Data was collected from in-depth interviews with 113 European experts, usually the systems managers in the institutions, in 17 countries. The analyses of the interviews revealed as many as 52 different commercial and 35 self-developed LMS systems. The article presents the data from these interviews and includes a series of important findings from the study. One conclusion is that there is a host of commercial and self-developed systems that seem to work satisfactorily in various educational institutions throughout Europe. The systems are not able to handle all the functions the institutions want, and they can be improved in many ways. But most systems encountered in the analyses seem to be good enough for handling online education successfully. Another conclusion is that the European market is not dominated by the American LMS systems. In countries that do not use English as the first language, locally developed LMS systems have successfully ousted the American products. Remarkably, a large number of the LMS systems used in Europe are commercial systems developed locally, or self-developed systems built by the institutions.

### Keywords

Learning management system (LMS), Virtual learning environment (VLE), Online education, E-learning, Web education, Europe

### Introduction

Evidence of the worldwide spread of e-learning in recent years is easy to obtain. In April 2003, no fewer than 66,000 fully online courses and 1,200 complete online programs were listed on the TeleCampus portal from TeleEducation, New Brunswick, Canada (<http://courses.telecampus.edu>). It is also interesting to observe that 4,500 of the courses were listed as free. The portal includes information about a very broad range of courses with URLs for each course, making it easy for prospective students to study course summaries with a view to enrolling. In spite of the comprehensiveness of the TeleEducation database, up till now about 90% of the listed courses have been from the United States and Canada. Even though the courses represent 17 different languages, it is unlikely that the portal lists many of the courses provided by the 113 European institutions studied in this report.

Much of the success of e-learning can be attributed to the availability of Learning Management Systems (LMS), also known as Virtual Learning Environments (VLE) or learning platforms. An LMS enables an institution to develop electronic learning materials for students, to offer these courses electronically to students, to test and evaluate the students electronically, and to generate electronically student databases in which student results and progress can be charted.

Hall (2003) defines an LMS as: "software that automates the administration of training events. All Learning Management Systems manage the log-in of registered users, manage course catalogs, record data from learners, and provide reports to management." The definitions of LMS systems and related terms encountered in this article are further discussed in the article *Online Education: Discussion and Definition of Terms* (Paulsen, 2002).

The focus of the Web-edu project is on the satisfaction, or lack of satisfaction, that European institutions have with the LMS systems that they have purchased or developed themselves. This is a timely analysis because in the English-speaking world the major American LMS providers dominate the e-learning industry. This is in spite of the fact that a number of these originated in Europe. WebCT, was developed by Murray Goldberg at the

University of British Columbia in Vancouver, Canada and then sold to an American company in Pennsylvania. TopClass originated as a European project at University College Dublin, in Ireland, before becoming an Irish campus company and then migrating to the United States.

A number of important themes emerged during the analyses. These are especially discussed in the following:

- Internet penetration and use of LMS systems
- Large-scale providers of online education
- Commercial LMS systems
- Regional preferences and market leaders
- Competitive issues
- Self-developed systems
- E-learning standards
- Course creation tools
- Student and tutor support tools
- Administrative
- Technology
- Economy issues

## Interviews and Regional Analyses

This article represents a meta-analysis of six regional analyses conducted within the framework of the European Web-edu project. The regional analyses are listed in Table 1 and published at the project web site ([http://www.nettskolen.com/in\\_english/webedusite/index.html](http://www.nettskolen.com/in_english/webedusite/index.html)). They are also available in printed English (Paulsen, 2002) and Portuguese (Keegan et al., 2002) versions.

**Table 1.** List of regional analyses

<b>Regions</b>	<b>References to regional analyses</b>	<b>Number of institutions</b>
Northwestern Europe	Keegan (2002)	18
The Nordic Countries	Paulsen (2002)	20
Norwegian Universities and Colleges	Runnestø and Ristesund (2002)	24
Germany	Fritsch and Föllmer (2002)	17
Southern Europe	Dias, Dias, and Pimenta (2002)	20
The Czech Republic and Slovakia	Mičincová (2002)	14
Total		113

All regional analyses are based on in-depth interviews with systems managers or systems experts at the user institutions. The interviews were conducted in the Fall of 2001 and Spring of 2002 as face-to-face meetings, telephone interviews, or e-mail interviews. All interviews were based on a common interview guide, and many of them are available at the project's web site.

The researchers had no intentions of selecting interviewees that constituted a representative selection of European system managers. Data is provided for Norway, which virtually includes all the universities and colleges in that country, but it was not a goal of the project that every European country be included in the project or that every institution in a country could be covered. However, it is considered that the total of 113 institutions throughout 17 European countries gives an fairly large database for important, tentative findings on the satisfaction of European institutions with the LMS systems they have developed or purchased.

The researchers were encouraged to find interviewees in various types of institutions. However, in some countries and types of institutions, it proved hard work to find interviewees that were both competent and willing to take the necessary time to participate.

Table 2 lists the types of institutions in the study. A majority (67 out of 113) of the institutions are universities and colleges of higher and further education. Other types of institutions are more or less under-represented. This reflects the willingness of systems managers in universities and colleges to co-operate in the study.

**Table 2.** Types of institutions. Sorted by total number of institutions

Type of institution	North-western Europe	The Nordic Countries	Southern Europe	The Czech Republic and Slovakia	Germany	Norwegian Universities and Colleges	Total
Universities	4	8	10	8	7	1	38
Colleges of higher and further education	7				2	20	29
Private companies		1	3	2	6		12
Distance education institutions		3		2	1	3	9
Nonprofit institutions (training)			6	1	1		8
Institutes of technology	5						5
Primary and secondary schools		3					3
University centers		1		1			2
Training organizations	1	1					2
Consortia		2					2
Government training agencies	1						1
Commercial providers of LMS-related services		1					1
Anonymous			1				1
Total	18	20	20	14	17	24	113

## Internet Penetration and Use of LMS Systems

Table 3 shows that 113 institutions in 17 European countries were interviewed. It also gives the official languages, population, and Internet penetration in the countries. These factors influence the selection and use of LMS systems. The data presented are compiled from various sources used in the regional analyses. The primary sources are CIA World Factbook 2002 and Eurostat 2002.

From this analysis we would like to emphasize the differences between the Internet use in northwestern and southeastern Europe. The Internet users range from 50% of the population in the Nordic countries to 33% in Northwestern Europe, 30% in Germany, 18% in Southern Europe, and 10% in the Czech Republic.

**Table 3.** List of countries including official languages, inhabitants, and Internet penetration. Sorted by Internet users per 100 inhabitants

Country	Number of institutions interviewed	Language	Area in square km	Inhabitants in millions	Internet hosts per 100 inhabitants	Internet users per 100 inhabitants
Sweden	5	Swedish	449 964	8.9	7.0	56.4
Norway	28	Norwegian	324 220	4.5	11.2	52.7
Finland	4	Finnish	337 030	5.2	13.6	44.5
Denmark	5	Danish	43 094	5.3	13	43.0
Great Britain	6	English	227 480	57.6		33.5
Northern Ireland	4	English	14 120	1.6		33.5
Germany	17	German	357 021	82.2	2.3	29.6
Ireland	8	English	70 280	3.8	2.3	27.5
Italy	6	Italian	301 230	57.8	2.7	23.3
France	4	French	547 030	59.5	1.7	16.9
Switzerland	1	German	41 290	7.2	4.4	24.0
Spain	1	Spanish	504 782	39.5	1.4	13.9
Slovakia	4	Slovak	48 845	5.4	0.7	12.1

Portugal	8	Portuguese	92 391	10.2	1.2	10.0
Czech Republic	10	Czech	78 866	10.3	1.6	9.7
Greece	1	Greek	131 940	10.6	1.0	9.5
Iceland	1	Icelandic				
Total of 17 countries	113	Total of 14 languages				

There are significant regional differences within Europe with regard to how far the institutions have come in their use of LMS systems. The differences seem to follow the regional statistics for Internet users, which means that Southern Europe, the Czech Republic and Slovakia seem to be less developed with regard to use of LMS systems than the other regions.

The analyses for Northwestern Europe and the Nordic countries show that these regions already have come far in their use of LMS systems. The systems seem to be widely used in Nordic higher, further, and continuing education. It is in fact not easy to find Nordic institutions without experiences with LMS systems. In the United Kingdom and Ireland there is a very extensive implementation of e-learning via LMS systems. This includes provision at degree and diploma level. It seems that very many universities and colleges have purchased an LMS, and many corporations too.

The analyses for Southern Europe indicate that this region is less developed. It is, however, clear that the rising number of Internet users in Southern Europe is expanding the e-learning market. There is a growing number of institutions with web presence and e-learning offerings, and the analyses show that Southern European institutions are further developing their existing e-learning offerings. The pilot projects are no longer dominating the e-learning field in Southern Europe. But, the research still shows that 50% of the institutions analyzed have less than 15 courses online.

The analyses for the Czech Republic and Slovakia also indicate that these countries are less developed. E-learning is not widespread in these countries, and public opinion about online education is not always positive. Online education providers are often associated with curious educational experiments. In most cases online education is used as an addition to traditional face-to-face education. However there are some fully online experiments. One institution would like to improve the LMS so that it could offer paid courses as lifelong education to the public. Of the 14 institutions interviewed, nine had used their LMS for less than one year, but the results are nevertheless visible. Recently, a virtual university collaboration was started by three Czech universities.

## Large-scale Providers of Online Education

It is interesting to distinguish between institutions that can be characterized as large-scale providers of e-learning and those in which provision is, as yet, on a smaller scale. The analysis shows that there is a clear trend towards large-scale online education in the Nordic countries. It shows that 12 of the 20 institutions offer at least 50 online courses. According to a 1998-99 analysis (Paulsen, 2000), only 3 of 22 Nordic institutions surveyed offered more than 50 online courses three years earlier. Further, the interviewees talk about LMS systems as large-scale systems capable of handling thousands of users.

A regional overview of large-scale providers, in which provision of 50 or more online courses is considered to represent large-scale provision, is presented in Table 4. It shows that 30 of the 89 institutions (34%) data is available from are large-scale providers. The table also shows that the trend towards large-scale online education has come further in the Nordic countries (60%) than in the other regions.

**Table 4.** Regional list of institutions with more than 50 online courses. Sorted by percentage of large-scale providers

<i>Regions</i>	<i>References to regional analyses</i>	<i>Number of institutions that offer at least 50 online courses</i>	<i>Percentage of large-scale providers</i>
The Nordic Countries	Paulsen (2002)	12 out of 20	60
Germany	Fritsch and Föllmer (2002)	7 out of 17	41
Northwestern Europe	Keegan (2002)	6 out of 18	33

Southern Europe	Dias, Dias, and Pimenta (2002)	5 out of 20	25
The Czech Republic and Slovakia	Mičincová (2002)	0 out of 14	0
Total		30 out of 89	34

Table 5 compares the number of online courses found in the Web-edu analysis with a previous international analysis of web-based education conducted in the CISAER-project (Paulsen, 2000). This comparison indicates that there is a clear trend that institutions offer more online courses today than they did three years ago. One may say that the trend goes from small-scale to large-scale online education.

**Table 5.** Distribution of institutions per number of courses

Number of courses	The Nordic Countries		Germany		North-western Europe		Southern Europe		The Czech Republic and Slovakia		Sum Web-edu analyses		CISAER analysis (Paulsen, 2000)	
	%	#	%	#	%	#	%	#	%	#	%	#	%	#
1	0	0	0	0	6	1	10	2	7	1	4	4	23	30
2-4	5	1	18	3	11	2	10	2	14	2	11	10	23	30
5-15	10	2	24	4	22	4	33	7	21	3	22	20	22	28
16-99	35	7	35	6	17	3	38	8	36	5	32	29	22	28
100-	40	8	24	4	22	4	0	0	0	0	18	16	3	4
No Answer	10	2	0	0	22	4	10	2	21	3	12	11	8	10
Total	100	20	101	17	100	18	101	21	99	14	99	90	101	130

## Commercial LMS Systems

Altogether, the 113 institutions had experiences with 52 different commercial systems. It is however important to observe that only a few systems are used by several institutions. The analyses found only four European and four North American systems that five or more institutions had experiences with. So, the analyses indicate that these eight systems are among the most used commercial LMS systems in Europe:

### European systems

- ClassFronter (16 institutions)
- TopClass (7 institutions)
- LUVIT (5 institutions)
- Tutor2000 (5 institutions)

### North American systems

- WebCT (20 institutions)
- BlackBoard (14 institutions)
- FirstClass (7 institutions)
- Lotus Learning Space (6 institutions)

There seems to be an overall satisfaction with the most used LMS systems. The analyses in Northwestern Europe show a general satisfaction with WebCT as a user-friendly, competent product. Blackboard has given general satisfaction, but is less widely marketed than WebCT. The strong position of these two North American systems is not surprising, since they might be the two dominant systems on the international market:

Some higher education institutions continue to develop in-house systems or buy into open source alternatives, but an ever-larger majority is purchasing licenses for proprietary platforms. Indeed, two vendors, Blackboard and WebCT currently dominate the market, not only in their native North America, but internationally. Yet both have been trading for little more than five years. Market consolidation is also underway. (*Observatory on Borderless Higher Education*, 2002)

FirstClass is a Canadian system that seems to have a strong position in Scandinavia, and Lotus Learning Space is an IBM product that is also much used in Europe.

The analyses found that four European LMS systems seem to be significant competitors on the European market. TopClass may have a strong position in Europe since it originated in Ireland, and it is praised for its student and records database. ClassFronter is a Norwegian developed system that has a very dominant position in Norwegian universities and colleges. The system is available in a number of languages and sold to institutions in several countries. In Norway, there is great confidence among the users of ClassFronter with regard to the service offered by the contractor. LUVIT originated at the University of Lund in Sweden, before it became a Swedish commercial company with reasonable success in Scandinavia and some other countries. Tutor2000 seems to be a successful LMS provider in the Czech Republic.

Table 6 lists the 52 commercial LMS systems identified in the study with their origin, URL and extent of usage.

**Table 6.** Alphabetical list of commercial LMS systems included in the analyses

Commercial LMS systems	Original nationality	URL of LMS	Number of institutions using it as primary LMS	Number of institutions using it as additional LMS	Sum of institutions using the LMS system
Ascot CourseMaster	British	<a href="http://www.ascot-systems.co.uk">http://www.ascot-systems.co.uk</a>	1	0	1
Aspen	American	<a href="http://www.click2learn.com">http://www.click2learn.com</a>	1	1	2
Aulanet			0	1	1
BettyCOM	Swedish		0	1	2
BlackBoard	American	<a href="http://www.blackboard.com">http://www.blackboard.com</a>	9	5	14
Centra	American	<a href="http://www.centra.com">http://www.centra.com</a>	1	0	1
ClassFronter	Norwegian	<a href="http://www.fronter.com">http://www.fronter.com</a>	16	0	16
Clix campus	German	<a href="http://campusonline.uni-freiburg.de:8181">http://campusonline.uni-freiburg.de:8181</a>	1	0	1
COM-C	Danish	<a href="http://www.comc.dk">http://www.comc.dk</a>	0	1	1
Corporate learning	German	<a href="http://www.global-learning.de">http://www.global-learning.de</a>	1	0	1
CourseKeeper	Norwegian	<a href="http://www.coursekeeper.com">http://www.coursekeeper.com</a>	2	0	2
Decus System			0	1	1
Destinations			0	1	1
DLS from ETS	German	<a href="http://www.click2q-online.com">http://www.click2q-online.com</a>	1	0	1
Docent	American	<a href="http://www.docent.com">http://www.docent.com</a>	1	3	4
EDWIN	Danish		0	1	1
FDL Learning Environment	British	<a href="http://le.reading-college.ac.uk">http://le.reading-college.ac.uk</a>	1	0	1
FirstClass	Canadian	<a href="http://www.firstclass.com">http://www.firstclass.com</a>	3	4	7
Fle3	Finnish	<a href="http://fle3.uiah.fi/">http://fle3.uiah.fi/</a>	1	0	1
GLN – Global Learning Network	American	<a href="http://cisco.netacad.net">http://cisco.netacad.net</a>	1	0	1
Granada Learnwise	British	<a href="http://www.oakwise.oakland.ac.uk">http://www.oakwise.oakland.ac.uk</a>	1	0	1
Imaker	Norwegian	<a href="http://www.imaker.no">http://www.imaker.no</a>	0	1	1
Interwise-ecp	German	<a href="http://www.learnnetz-sh.de">http://www.learnnetz-sh.de</a>	1	0	1
Intralearn	American	<a href="http://www.intralearn.com">http://www.intralearn.com</a>	2	1	3
Intranets	American	<a href="http://www.intranets.com">http://www.intranets.com</a>	1	1	2
IT Campus			1	0	1
It's Learning	Norwegian	<a href="http://www.itsolutions.no">http://www.itsolutions.no</a>	1	0	1
Kark	Norwegian	<a href="http://kark.uib.no">http://kark.uib.no</a>	1	0	1
LC Profiler	Finnish	<a href="http://www.lcprof.com">http://www.lcprof.com</a>	1	0	1
Learning solution	German		1	0	1
Learnlink evoeeye	American	<a href="http://www.learnlink.com">http://www.learnlink.com</a>	1	0	1
LEKTOR	Swedish		0	1	1
Lotus Learning Space	American	<a href="http://www.lotus.com">http://www.lotus.com</a>	3	3	6
LUVIT	Swedish	<a href="http://www.luvit.com">http://www.luvit.com</a>	5	0	5

Commercial LMS systems	Original nationality	URL of LMS	Number of institutions using it as primary LMS	Number of institutions using it as additional LMS	Sum of institutions using the LMS system
Nettutor			0	1	1
Ping Pong	Swedish	<a href="http://www.partitur.se">http://www.partitur.se</a>	1	0	1
Plato			0	1	1
Proto			0	1	1
Response				1	1
Saba	American	<a href="http://www.saba.com">http://www.saba.com</a>	1	2	3
Simulnet			0	1	1
Skills Vantage			0	1	1
Solstra Hybrid			0	1	1
TeamWave				1	1
TopClass	Irish	<a href="http://www.wbtsystems.com">http://www.wbtsystems.com</a>	5	2	7
Tutor2000	Czech	<a href="http://www.kontis.cz">http://www.kontis.cz</a>	5	0	5
Verkkosalkku, Verkko-opisto	Finnish		0	1	1
Virtual-U	Canadian	<a href="http://www.vlei.com">http://www.vlei.com</a>	0	1	1
Visit			1	0	1
WebCT	Canadian	<a href="http://www.webct.com">http://www.webct.com</a>	16	4	20
Weblearn Plus			0	1	1
West			0	1	1

## Regional Preferences and Market Leaders

In the countries that use English as the first language, the American LMS systems seem to dominate. The overall impression is the domination of the scene by the major American-based LMS systems, notably WebCT, Blackboard and TopClass. This is likely because of the use of English in the United Kingdom and Ireland. WebCT has pushed hard to become the market leader with extensive promotion and presence at e-learning conferences.

In Australia, another English speaking country, WebCT seems to be the most widespread LMS system and Blackboard seems to be the first runner-up. A NCODE-FLA (<http://ncode.mq.edu.au>) LMS survey (NCODE-FLA, 2002) of 34 Australian institutions conducted by Sue McKnight shows 25 instances of WebCT, 12 instances of BlackBoard, and seven instances of self-developed LMS systems. This is supported by a briefing on leading learning platforms (*The Observatory on Borderless Higher Education*, 2002) which claims that Australia is the country with the highest penetration of BlackBoard and WebCT licenses in the world since 76 percent of the country's 34 universities have such licenses.

In countries that do not use English as the first language, the American LMS have many user institutions. The research indicates that the Norwegian ClassFronter, and the North American WebCT, FirstClass, and BlackBoard seem to be the most used LMS systems in the Nordic countries. In the Czech Republic and Slovakia, five interviewees referred to the Czech TUTOR2000, three stated that they had developed their own systems, and the last six applied American commercial systems (BlackBoard, Click2learn, GLN, Intralearn, Learning Space and WebCT).

But, the analyses show that locally developed systems have a strong position in the countries that do not use English as their first language. Nordic institutions seem to prefer LMS systems developed in the Nordic countries. Among the 25 different LMS systems that were identified in the Nordic analysis, 16 were of Nordic origin. All other systems were of American, Canadian, or Irish origin. According to Runnestø and Ristesund (2002), ClassFronter is by far the market leader in Norwegian universities and colleges. Of those that offer online education, 65% used ClassFronter. In the Czech Republic and Slovakia, institutions are converting to the national LMS vendors as these commercialize their products, since their systems are provided in the national language. Language is an important issue also in the Southern European countries and LMS systems that are not translated into their national languages are disadvantaged.

## Competitive Issues

There were some interesting findings, which showed that customer loyalty, user-friendliness, cost-effectiveness, integration, openness, and adaptability could be of special interest to LMS providers that want to compete in the future market:

- The institutions do not seem to be especially loyal to, or dependent on, one LMS provider. The majority of the institutions had changed system, planned to change system, or operated additional systems.
- LMS systems could have reached a point where user-friendliness, cost-effectiveness, and integration with other systems are more important than new features.
- The open source strategy may have an impact on the future LMS market.
- Adaptability and management facilities on the level above individual courses are requested.

It should also be noted that many systems could be improved with regard to linguistic issues, assessment tools, pricing, content creation and management. The Southern European analysis showed that the commercial systems can be very easy to start with, but they may have problems with linguistic issues, as well as with assessment tools, suitability to target groups, and pricing. Many systems seem to have problems with content creation and content management, student monitoring, and assessment tools. Online administration and integration with other systems and platforms were also insufficient.

## Self-developed Systems

The analyses revealed as many as 35 self-developed LMS systems. They are all listed in Table 7. From this, one may infer that there are remarkably many European institutions that use self-developed LMS systems. It is however not always easy to distinguish between commercial and self-developed LMS systems. Many systems have started as self-developed systems that after a while have been commercialized. Other self-developed systems are shared among several partners. So, some of the LMS systems listed here as self-developed systems, could be included on the list of commercial systems.

**Table 7.** List of institutions with self-developed LMS systems

<b>Name of institution</b>	<b>Nationality</b>	<b>Web address</b>	<b>Self-developed LMS systems</b>
Czech-Swiss Institute	Czech		
Danmarks Netskole	Danish		
CNED	French		
Netzentwurf	German		
TU Chemnitz	German		
Akademie	German		
Virtus	German		ILIAS
Akademie	German		Lernen-im-netz
Virtuelle Universität	German		Planetux
Osnabrueck	German		VC Prolog Tutor
LVU	German		VU
Darmstadt	German		Wave learn
Aristoteles University of Thessaloniki	Greek		
Instituto Formazione Operatori Aziendali	Italian		Aula virtual
Anonymous	Italian	<a href="http://www.esperienze.net">http://www.esperienze.net</a>	Esperienze
Sinform1	Italian	<a href="http://www.greenteam.it/greenteam/education">http://www.greenteam.it/greenteam/education</a>	Greenteam
University of Trento	Italian		Proprietary
Høgskolen i Narvik	Norwegian		
Høgskolen i Oslo	Norwegian		
Høgskolen i Sør-Trøndelag	Norwegian		



<b>Name of institution</b>	<b>Nationality</b>	<b>Web address</b>	<b>Self-developed LMS systems</b>
Høgskolen i Stord/Haugesund	Norwegian		
Handelshøgskolen BI	Norwegian		Apollon
Høgskolen i Vestfold	Norwegian		Ed-On-Web
Norges Landbrukshøgskole	Norwegian		Kurs.nlh.no
Dronning Mauds Minne	Norwegian		MvForum
Globalskolen	Norwegian		PedIT
NKI Fjernundervisningen	Norwegian		SESAM
Associação Empresarial de Portugal	Portuguese	<a href="http://www.e-cursos.com">http://www.e-cursos.com</a>	e-cursos
Prodigio	Portuguese		Evolui
PT-Inovação	Portuguese	<a href="http://www.formare.pt">http://www.formare.pt</a>	Formare
Universidade Católica Portuguesa	Portuguese	<a href="http://www.mytw.net">http://www.mytw.net</a>	TWT Teaching Web Toolkit
AINova	Slovak		
LCDE	Slovak		
University of Vigo	Spanish	<a href="http://www.elearning.uvigo.es">http://www.elearning.uvigo.es</a>	ELIAS
Statens skolor för vuxna	Swedish		SSVN2000

It is interesting to observe that most of the respondents expressed satisfaction with their self-developed systems. But, one should be aware that there might be many covert or vicarious reasons for choosing self-developed LMS systems. The German analysis stated that there is a tradition saying that a high-quality computing center does not need to buy programs developed by others. The need to buy external programs would question the center's qualifications.

But the analyses also indicate that institutions with self-developed LMS systems perceive the commercial systems as expensive and complex. The self-developed systems avoid linguistic problems and they are regarded as supportive of local needs and target groups.

Several Nordic institutions prefer self-developed systems. They perceive the commercial systems as expensive and complex and want to develop the systems to support their local needs. They wanted cost-effective systems with the ability to handle continuous enrollment and integration with student administrative systems and economy systems.

A Norwegian large-scale distance education institution using a self-developed LMS expressed it this way:

SESAM is developed by NKI to support the services that are important to NKI. We have based the work on evolutionary systems development over a period of 15 years. As a result, we have a system that is very well adapted to our special needs. SESAM is excellent for handling continuous student enrollment 365 days a year. The major, additional advantages we have over the commercial systems, is the focus on cost-effectiveness and the integration with our critical student administrative systems and economy systems.

The Southern European analysis found that self-developed systems could be simpler and directly adapted to the target groups; they avoid the linguistic problems of the commercial systems and are constantly updated, being able to improve their features according to trainers, trainees and administration evolution. Besides the linguistic advantage, national marketing strategies together with competitive pricing contribute to the widespread use of those self-developed LMS systems.

## E-learning Standards

E-learning standards intend to make LMS systems and learning content less proprietary. The analyses show that there is an interest for standards and standardizations that can make it easier to exchange content and data between LMS systems and between LMS systems and other systems. Some of the interviewees spoke about the importance of standardization in general terms. Many were concerned with the possibility of using, importing, and exporting standardized course content and learning objects. Two German experts talked about the importance of XML and meta-tagging. And many references were made to standards specifications and initiatives such as SCORM, IMS, AICC and IEEE.

All the analyzed institutions in Northwestern Europe are sensitive to the SCORM and IMS standards and they are considered almost as a norm. The Nordic interviewees are aware of the standards, and several claim to follow them. But few state that the standards are important to their institution, and e-learning standards do not seem to have had much impact on online education in the Nordic countries. The German analysis states that standardization will play an important role in the future.

In Southern Europe there seems to be a considerable ambivalence with regard to e-learning standards. Interviewees stressed the absence of both de facto and formal technical standards. One interviewee claimed that standardization would have a positive impact on internationalization of the e-learning businesses. Another argued that since courses often are country specific, standards are not yet relevant. But standards are welcomed for marketing reasons, for cost reduction, and for LMS migration.

## Course Creation Tools

Even though many LMS systems provide internal course creation tools, the analyses showed that a broad range of external tools is used to develop the content before it is published in the LMS system. The interviews show that the LMS systems use text, multimedia, audio, html-pages, graphics, and tests that are developed with external software. The software tools for course creation referred to in the interviews are listed in Table 8.

**Table 8.** Software tools used for course creation

<b>Software tools</b>	<b>Type of content</b>
Word	Text
PowerPoint	Text
Macromedia Authorware and Director	Multimedia
Flash	Multimedia
Windows SoundRecorder	Audio
Wimba	Audio
Flash	Multimedia
FrontPage	HTML-pages
DreamWeaver	HTML-pages
Netscape Composer	HTML-pages
Viewlet	Graphics (Screenshots)
Coral	Graphics
PhotoShop	Graphics
PaintShop	Graphics
Autotest	Tests
Webwinder	Tests
Learner Interface	Tests
Questionmark perception	Tests
Hot potatoes	Tests
ToolBook	Tests
Quia	Tests

The Nordic analyses show that LMS systems are not usually used for development of course content. According to some Southern European interviewees, LMS systems are mainly used for support and sharing of information.

Other institutions need to use external tools and specialist support for course production. In the majority of the German cases, there is no course creation with or inside neither the commercial nor the self-developed LMS systems. Finally, the analyses also indicate that there is a lack of available course content.

A few of the interviewees pointed out that they especially wanted more flexible solutions because they felt too dependent on the systems' intrinsic structure and design. One especially wanted better control of graphical design, logos, etc. Another would have liked to have access to the system's source code.

## **Student and Tutor Support Tools**

There is a host of student and tutor support tools included in the LMS systems. However, the availability and quality of specific tools vary. Many interviewees were concerned about the need for better and more advanced communication and collaboration tools. Two simply stated that they wanted better communication possibilities and secure communication. Others requested better support and more tools for teamwork and collaboration. In addition, some especially focused on the need for better tools for synchronous communication and immediate feedback.

The analyses indicate that several LMS systems should improve their test and assignment tools. They could also be improved with regard to evaluation, e-portfolio, commenting on student presentations, knowledge management, assessment tools, and reports. The German analysis did not find one LMS system using an integrated examination procedure, and the North West European analysis found that the concept of quizzes and multiple-choice questioning, a feature of most American LMS systems, is not considered adequate for European academic evaluation.

The analyses in the Czech Republic and Slovakia pointed out that not all LMS systems have tools to track student progress and monitor their performance. Existing tools are not good enough. Student data are not available for tutors who have to contact the system administrator in order to get the data they need.

## **Administrative Systems**

The need for sophisticated administrative systems increases with the administrative workload, and there is a general need for better administrative systems and tools. The analyses show that many systems could have better tools for administration of students, tutors, and content. The interviewees asked for better group management tools, student record systems, improved course management, and better password management facilities. Some interviewees more specifically want better services for student tracking and reporting functions.

The Southern European analysis revealed that the administration facilities seem much more important for professional training institutions that usually provide short, repeated courses in several versions, than for universities. The university model, with year-long courses, requires less frequent administration since it has a more stable association between course, teacher, and student.

With the introduction of large-scale online education, the need for integration between LMS systems and other online education systems increases. The analyses revealed a general lack of such integration.

The Nordic analyses show that the LMS systems need to be integrated with a number of other systems in organizations that aim at providing efficient, large-scale, online education. Integration between the LMS systems and the student administrative systems seems to be relatively poor, and the integration between the LMS systems and the economy systems seems to be very poor. In addition, several interviewees are concerned about the opportunities and challenges regarding integration with the administrative system that records student grades.

It is also interesting to see that the Nordic universities have standardized on a few national student management systems. The systems are LADOK (Sweden), MSTAS (Norway), FS (Norway), STADS (Denmark), INNA (Iceland) and to some extent Oodi (Finland). The high levels of national system coordination, or governmental coercion, in these countries may possibly result in more collaboration among the universities and a competitive advantage on the international market.

Some interesting integration efforts are in progress, but Runnestø and Ristesund (2002) confirmed that there is a general lack of integration between the LMS and the student management systems in Norway. Their analysis

showed that some LMS systems have no possibility for integration, others have the possibility to import data from the student management system, but only one system (SESAM, a self-developed system by NKI Distance Education) has full integration both ways.

The analyses of the Northwestern European countries showed that data produced by the LMS systems are not yet generally integrated into the institutions' administrative databases. Further, there are many German projects where university enrollment is the only prerequisite for access to the LMS system. But this does not mean that the LMS is integrated with the normal university enrollment procedures. On the contrary, in most cases they are completely separated. The German analyses also showed that record or test-databases are separated from the enrollment databases. Because of the privacy laws of data protection, it is not easy to change these procedures.

## **Technology**

The analyses found three categories of server solutions, and all seem to work well. In the first category, the institutions have access to commercial service providers that host the LMS. In the second category, the institutions host the LMS for internal use. And in the third category, the institutions host the LMS for internal use and as a service for other institutions. The institutions that have access to service providers that host the LMS seem to be positive to the solution, but they experience some problems with limited access. Several institutions have chosen to host the LMS internally. They are typically either the institutions that have self-developed systems or larger institutions with high internal competence that can operate commercial LMS systems locally. The users of the commercial systems claim that the systems are stable and reliable. The users of self-developed systems also experience few problems. Virus attacks and firewalls, however, are mentioned as serious problems. A few institutions that have self-developed systems host the LMS for internal use and as a service for other institutions.

The interviewees talk about LMS systems as large-scale systems capable of handling thousands of users. The interviewees are confident that the systems can handle a large number of users without special technological problems. The interviewees did not seem to be concerned with how the systems technically could organize the administration of large numbers of students, courses, and tutors. One mentioned, though, that large-scale operations could impose some pedagogical challenges.

Some comments point out that students have all kinds of connections to the Internet, ranging from low speed modems to broadband access. But the speed of the LMS system does not seem to be any problem. The bottleneck seems to be the network bandwidth and local lines. To handle this, the institutions adapt their bandwidth requirements to the users' equipment. Due to the bandwidth limitations, several of the institutions limit their use of high bandwidth content. At the same time, many interviewees expressed a wish for higher bandwidth to be able to provide more multimedia content and services. Several interviewees wanted to include video services such as streaming video, video-conferences, web-cameras, and moving pictures. Audio services such as voice communication and audio files were also requested. Some of the interviewees especially focused on multimedia tools such as video-conferencing and voice chat for better synchronous communication.

## **Economy Issues**

E-learning is not cheap, and cost-effectiveness becomes more important as the institutions become large-scale providers of online education. Recent price rises, often quite considerable, have made the commercial LMS systems a reasonably costly investment. Prices in the range € 20,000 to € 50,000 are being quoted. The cost and pricing structure for the commercial systems vary from system to system. This could make it difficult to compare real costs.

The staff time for the development and maintenance of self-developed systems proves to be a costly investment too. The German analysis shows that installing a complete system often includes buying a new server and database software, which easily sums up to some €100,000. But many respondents hide these costs behind the statement that it is self-developed, open source, or not available information.

Expenditure on LMS systems is only the first stage of spending. Hardware and software to run them is necessary too. The respondents list considerable sums for the staffing and maintenance of the system, and others add that the provision of content is at least as much again. Expenditure on staff and student training is, however, much less onerous.

The interviewees have only a vague knowledge about the maintenance and operation costs. Many interviewees mentioned that economic aspects are hard to identify. The issue is perceived as complex and hard to estimate. Further, it seems they have little knowledge about how much time and money is spent on training staff and students to use the LMS systems.

## Conclusions

There are significant regional differences within Europe with regard to how far the institutions have come in their use of LMS systems. The differences seem to follow the regional statistics for Internet users, which means that Southern Europe, the Czech Republic and Slovakia seem to be less developed with regard to use of LMS systems than the other regions.

The analyses show that there is a clear trend toward institutions offering more online courses today than they did three years ago. One may say that the trend goes from small-scale experiments to large-scale operation of online education. If one characterizes institutions that offer at least 50 online courses as large-scale providers of online education, 30 of the 89 institutions (34%) we have data from could be characterized as large-scale providers. The analyses indicate that the trend towards large-scale online education has come further in the Nordic countries (60%) than in the other regions.

One striking conclusion is that there is a host of commercial and self-developed systems that seem to work satisfactorily in various educational institutions throughout Europe. The systems are not able to handle all the functions the institutions want, and they can be improved in many ways. But most systems encountered in the analyses seem to be good enough for handling online education successfully. It is however important to observe that only a few systems were used by several institutions. This probably means that many system providers could have a fragile economy.

The Southern European analysis showed that in almost all cases, neither the commercial nor the self-developed systems were able to provide all the services the institutions needed. Administrative aspects, integration with existing software and content management are some of the problems encountered in most of the LMS systems.

The analysis in the Czech Republic and Slovakia also showed that there were cases in which certain facilities were not available (e.g. synchronous communication). However, it must be taken into consideration that the institutions choose their system according to their needs. So, in spite of the fact that a system seems to have a shortcoming, it is actually not the case, because the system is suitable and satisfactory for the institution.

Another conclusion is that the general position that the market is dominated by the American LMS systems is not the norm throughout Europe. In the countries that do not use English as the first language, locally developed LMS systems have successfully ousted the American products. Remarkably, a large number of the LMS systems used in Europe are commercial systems developed locally or self-developed systems at the institutions. However, very few of these systems seem to have more than a few user institutions.

The analyses indicate that BlackBoard, ClassFronter, FirstClass, Lotus Learning Space, LUVIT, TopClass, Tutor2000, and WebCT are among the most used commercial LMS systems in Europe. Four of these are of European origin. TopClass originated as a project at the University College Dublin, in Ireland, before becoming an Irish campus company and then migrating to the United States. ClassFronter is a Norwegian-developed system that has a very dominant position in Norwegian universities and colleges. The system is available in a number of languages and sold to institutions in several countries. LUVIT originated at the University of Lund in Sweden, before it became a Swedish commercial company with reasonable success in Scandinavia and some other countries. Tutor2000 seems to be a successful LMS provider in the Czech Republic. It seems that the four European systems may have a competitive advantage in their local markets since they often have a relatively good local representation and support of local languages.

There are remarkably many institutions that use self-developed LMS systems, and there may be many covert and vicarious reasons for choosing them. But the analyses indicate that these institutions perceive the commercial systems as complex and expensive with escalating licensing costs. The self-developed systems avoid linguistic problems and are regarded as flexible and supportive of local needs and target groups. One may also expect that a self-developed system is one reason for expertise to stay in-house.

With the introduction of large-scale online education, the need for integration between LMS systems and student management systems increases. The analyses revealed a general lack of such integration. It is however interesting to see that the Nordic universities have standardized on a few national student management systems and that interesting integration efforts are in progress.

Cost-effectiveness becomes more important as the institutions become large-scale providers of online education. The interviewees have, however, only a vague knowledge about the system's maintenance and operation costs. The cost and pricing structure for the commercial systems varies from system to system. This can make it difficult to compare real costs. Some interviewees were concerned about high and increasing prices for the commercial LMS systems.

The analyses indicate that there is a need for increased focus on LMS knowledge, policy, and strategy in Southern Europe. In particular university e-learning managers are concerned with the university policy in this field. Apparently they mean that Southern European universities are not dedicating enough importance and attention to this subject. The analyses further indicate that the introduction of LMS systems could be a source for conflict between administration and academia.

The analyses show that there is an interest for standards and standardizations that can make it easier to exchange content and data between LMS systems and between LMS systems and other systems. The institutions in Northwestern Europe are sensitive to the e-learning standards and they are considered almost as a norm. The Nordic interviewees are aware of the standards, and several claim to follow them. But few state that the standards are important to their institution, and e-learning standards do not seem to have had much impact on online education in the Nordic countries. The German analysis states that standardization will play an important role in the future. In Southern Europe there seems to be a considerable ambivalence with regard to e-learning standards.

## References

Dias, A., Dias, P. & Pimenta, P. (2002). Learning Management Systems (LMS) used in Southern Europe. In Paulsen, M. F.; Keegan, D.; Dias, A.; Dias, P.; Pimenta, P.; Fritsch, H.; Föllmer, H.; Micincova, M. & Olsen, G. *Web-Education Systems in Europe*, Hagen: Zentrales Institut für Fernstudienforschung, FernUniversität, 29-57.

Fritsch, H. & Föllmer, H. (2002). The use of Learning Management Systems in Germany. In Paulsen, M. F.; Keegan, D.; Dias, A.; Dias, P.; Pimenta, P.; Fritsch, H.; Föllmer, H.; Micincova, M. & Olsen, G. *Web-Education Systems in Europe*, Hagen: Zentrales Institut für Fernstudienforschung, FernUniversität, 82-102.

Hall, B. (2003). *New Technology Definitions*, retrieved August 5, 2003 from <http://www.brandonhall.com/public/glossary/index.htm>

Keegan, D. (2002). The use of Learning Management Systems in North Western Europe. In Paulsen, M. F.; Keegan, D.; Dias, A.; Dias, P.; Pimenta, P.; Fritsch, H.; Föllmer, H.; Micincova, M. & Olsen, G. *Web-Education Systems in Europe*, Hagen: Zentrales Institut für Fernstudienforschung, FernUniversität, 58-81.

Keegan, D.; Dias, A.; Baptista, C.; Olsen, G.; Fritsch, H.; Föllmer, H.; Micincova, M.; Paulsen, M. F.; Dias, P. & Pimenta, P. (2002). *Sistemas de Educação Online: Discussão de Termos. O Papel dos Sistemas de Gestão da Aprendizagem na Europa*, Portugal: Inofor.

McKnight, S. (2002). *NCODE-FLA LMS Survey*, retrieved August 5, 2003 from <http://ncode.mq.edu.au/papers/lmsSurvey.doc>

Mičincová, M. (2002). The ABCs of e-learning, the use of Learning Management Systems in the Czech Republic and Slovakia. In Paulsen, M. F.; Keegan, D.; Dias, A.; Dias, P.; Pimenta, P.; Fritsch, H.; Föllmer, H.; Micincova, M. & Olsen, G. *Web-Education Systems in Europe*, Hagen: Zentrales Institut für Fernstudienforschung, FernUniversität, 121-157.

Observatory on Borderless Higher Education. (2002). *Leading Learning Platforms: International Market Presence*. Briefing no. 2, March 2002, retrieved September 25, 2002 from <http://www.obhe.ac.uk/products/briefings/pdfs/LearningPlatforms.pdf>

Paulsen, M. F.; Keegan, D.; Dias, A.; Dias, P.; Pimenta, P.; Fritsch, H.; Föllmer, H.; Micincova, M. & Olsen, G. (2002). *Web-Education Systems in Europe*, Hagen: Zentrales Institut für Fernstudienforschung, FernUniversität.

Paulsen, M. F. (2002). Online Education: Discussion and Definition of Terms (Paulsen 2002). In Paulsen, M. F.; Keegan, D.; Dias, A.; Dias, P.; Pimenta, P.; Fritsch, H.; Föllmer, H.; Micincova, M. & Olsen, G. *Web-Education Systems in Europe*, Hagen: Zentrales Institut für Fernstudienforschung, FernUniversität, 23-28.

Paulsen, M. F. (2002). An Analysis of Online Education and Learning Management Systems in the Nordic Countries. *Online Journal of Distance Learning Administration*, 5 (3), retrieved August 5, 2003 from <http://www.westga.edu/~distance/ojdla/fall53/paulsen53.html>

Paulsen, M. F. (2002). Online Education Systems in Scandinavian and Australian Universities: A Comparative Study. *The International Review of Research in Open and Distance Learning*, 3 (2), retrieved August 5, 2003 from <http://www.irrodl.org/content/v3.2/paulsen.html>

Paulsen, M. F. (2000). *Online Education. An International Analysis of Web-based Education and Strategic Recommendations for Decision Makers*, Oslo: NKI, retrieved August 5, 2003 from [http://home.nettskolen.com/~morten/artikler/Online\\_Education.pdf](http://home.nettskolen.com/~morten/artikler/Online_Education.pdf)

Runnestø, R. & Ristesund, G. (2002). *Experiences with Learning Management Systems in Norwegian Universities and Colleges*, Oslo: NKI, retrieved August 5, 2003 from <http://www.nettskolen.com/forskning/Diploma%20project.pdf>