Virtual Learning Environments
For European Schools

A Survey
and
Commentary

January 2003
## Executive Summary

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THANK YOU

The writers of the report would like to thank all the contributors for the study.

First the French Directorate of Technology under the Ministry of Youth, National Education and Research who made resources available for this type of far-reaching study in the field that itself is still in an early stage.

Thanks are particularly due to all the 500 teachers, teacher trainers, and other VLE users in 28 countries who gave voluntarily their precious time to fill in the questionnaire and share freely their experiences, and to the 17 European Schoolnet Policy Innovation Committee educational ministries and national agencies who provided the information needed for the analysis. Their contribution was especially appreciated, since, in many cases, this information did not exist in a reusable format and they had to go through extra work to gather it.

Finally the authors would like to acknowledge the help of the behind the scene contributors, who read draft documents and gave valuable contributions in many formal and informal means!

The report may be downloaded from Insight (http://insight.eun.org) by registered EUN Consortium members.

Brussels 06.02.2003
On behalf of the EUN Team

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EXECUTIVE SUMMARY

European Schoolnet published a report “Virtual Learning Environments for European Schools, a Survey and Commentary” in February 2003. The report was commissioned by Direction de la Technologie, Sous Direction des technologies de l'information et de la communication pour l'éducation (SDTICE), Pôle International in the French Ministry of Youth, National Education and Research. The Policy Innovation Committee (PIC), functioning within European Schoolnet, was in charge of the survey, while the work was conducted by the EUN Office team.

The background to the report is the fact that the introduction of ICT in schools represents an opportunity to diversify and enrich the pedagogical relationship between pupils, teachers, the administrations, the parents, and more generally to enhance the way schools are run.

The drive towards e-learning and virtual schools raises the importance of appropriate tools and services for online teaching and learning that match user needs and align with innovative pedagogical models. In order to do so, Virtual Learning Environments (VLEs) and online services must be offered to the users according to their needs.

This report gives an outlook on the use of Virtual Learning Environments in educational settings in Europe. The report has two major parts; one is based on two on-line surveys and the second comprises desk research on the state of art.

The report addresses one key question that underpins next generation ICT in schooling: How should online learning services be specified and integrated so as to support transformed learning? It addresses several related issues:

- What does the research tell us about VLEs in schools?
- How are VLEs being used in schools?
- What are the characteristics of the tools currently available?
- What are the pedagogical needs for VLE use?
- What are the different approaches of ministries of education to VLEs?
- What are the issues for schools to consider?

From September through December 2002, over 500 schools and 17 ministries and national agencies responded to surveys exploring how VLEs are used in schools across Europe, and what kind of national priority VLEs occupy in overall national policies, plans and initiatives for ICT and eLearning in schools.

Key points from the surveys:

1. According to the survey analysis, in-house development of VLEs is booming in European school sector. Ten out of 17 national agencies fund the development and localisation of VLEs at the national level, and about 60% of them have a high priority for VLEs in their national policies. About two thirds of respondent schools use an in-house or open source VLE, whereas commercial products represent about one third of the VLEs in the field.

2. Teachers in the secondary education use VLEs mostly with their pupils in classes, suggesting that teachers mix different teaching styles such as computer-supported teaching with face-to-face teaching, applying what is known as “blended learning”. Teachers use VLEs more than students. Teachers use them also for administrational tasks, and as a means of communicating with other educational staff in their own schools and with educational staff in other schools. In many cases, this exchange takes place in the framework of international and European-wide school collaboration programs.

3. VLEs are mostly used in teaching ICT and cross-curricular subjects. About 90% of teachers said that they teach ICT regularly and sometimes using VLEs, whereas for cross-curricular education VLEs are used regularly by 44% and sometimes by 40% of respondents.
4. In teaching, VLEs are used mostly for the reinforcement of previous knowledge (32%) and in the introduction of new teaching items (29%). A great majority of surveyed VLE users, about 80%, have access to learning materials through the VLE that they use. About 40% of the learning material is open, i.e. one can add, edit, and modify content to adapt to different learning styles, time, etc. One third of learning material is in “flexible modules”, where teachers can decide about the use, and one fourth of the material is pre-packaged content i.e. ready to use as such and already sequenced.

5. 90% of respondents said that personal motivation drives them to use a VLE in teaching, only about 10% of replies suggested that they use VLEs because of outside pressure or requirement by the school authorities. 90% of respondents seems to be happy using VLEs, saying that they would recommend VLEs to their colleagues.

6. National agencies and ministries who have put VLEs high on their agenda have various expectations for VLE use in schools. However, the common factor seems to be the facilitator of changes in education and pedagogy towards more learner-centred approaches, enhancing interactivity in learning, helping constructional knowledge building, as well as complementing the learning and teaching that takes place in classrooms.

7. The survey analyses suggest that high expectations are not yet delivered by VLEs. The introduction of VLEs should be seen as a means of enabling desired changes in organisational, pedagogical and cultural level, e.g. management efficiency gains, improved learning outputs, student-centred learning, not as a means of causing them. ICT in general is a pre-condition for improvement, but not a cause.

8. The practices for which VLEs were used according to this survey don’t necessary support the learner-centred view. Tasks that teachers perform through VLEs seemed to be more focused on the communication between participants (email and community mail), as well as features like assigning tasks to students, file share, file upload area, link lists and lists of students homepages. It can be estimated that teachers use VLEs just as a digital distribution place of tasks and school assignments, and not for activities to support learners’ knowledge building and acquisition of new cognitive skills.

9. To answer to the question why VLEs are used in such a traditional way, there may be two possible answers; firstly teachers are only slowly learning how to use VLEs with students in a more constructive way. The other possible answer is that VLEs in their current form hardly support the desired change in the learning and teaching paradigm. If VLEs are mostly designed for course delivery in higher education, one could argue that it is easier for a teacher to practice “traditional” teaching with VLEs than try new ways for collaborative exercises that support learner-centred pedagogy, since tools for this don’t necessary exist.

10. VLEs development for the school sector being at an early stage, it is worth noting that 70% of national agencies are concerned about interoperability issues. Seven national agencies said to take a proactive part in eLearning standards, such as implementing standards on the national and/or regional level, setting up expert groups, participation in pilot projects, etc.

11. Most of national agencies were also concerned about the transferability and reusability of the content, whereas different system and application compatibility were issues of less concern. This might indicate that the developers design individual applications that cannot become part of an already-existing application or system. What is missing is a long-term strategy to develop a modular management information system (MIS) that allows seamless data exchange between different applications to be used in one school or even on the regional, or even national, level.

Chapter 6 deals with emerging issues that rose during the writing process of the report.
1. INTRODUCTION

This report gives an outlook on the use of Virtual Learning Environments in educational settings in Europe. The report has two major parts:

- one based on two surveys run on-line from September to November 2002
- the second comprising desk research on the state of art

The report is aimed at policy-makers at all levels in school education: ministries, municipalities and schools, and also researchers and developers. It is the second issue paper in the series of EUN Insight\(^1\) reports.

The first chapter defines terminology and methodology used in the report and survey. The second chapter gives an outline of VLEs used in schools across Europe. The third chapter explores the outcomes of two surveys, one in the school sector and the other aimed at national agencies and Ministries working with European Schoolnet.

The fourth chapter focuses on the expected pedagogical outcomes and benefits, whereas the fifth chapter gives an outlook on the standards and interoperability issues in the field of learning technologies.

The annex has six major parts. The first part gives a detailed view of some of the major studies in the field, concentrating on previous research reports and recommendations that various committees and bodies have produced. The second part is a list of definitions of VLE functionalities. The third part gives more detailed information about the school setting survey. The fourth part comprises individual country reports based on the survey of national agencies and Ministries focuses on VLEs. The fifth annex lists all the VLEs mentioned by schools, and the last one has an example of survey questionnaires.

1.1 Scope of the survey and methodology

The survey had two parts;

- The first part was targeted at users in school setting. The main aim of the survey was to find out how Virtual Learning Environments are being used in schools across Europe.
- The second part was targeted at national agencies and Ministries to find out about their policies and priorities concerning VLEs.

The users’ survey was conducted in the European Schoolnet’s member countries during a period of one month (September-October 2002). The focus is on how VLEs are used educationally in European schools, ranging from primary schools up to secondary education.

All together 502 replies came from 28 countries: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, Former Yugoslavia Republic of Macedonia, France, Germany, Greece, Iceland, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Ukraine, and the United Kingdom.

The French represented one third of all replies, whereas other large countries like Spain and Germany represented another third (16% and 13% respectively). Other high eLearning achievers like Finland, Italy, Norway, the Netherlands, and the United Kingdom had over 15 responses each, representing about 20% of all participants.

\(^1\) [http://insight.eun.org](http://insight.eun.org)
It is important to note that the survey was conducted based on volunteer contributions. The fact that responses vary significantly from one country to another doesn’t necessarily mean that VLEs are less used in countries with lower representation. However, it may show that European Schoolnet’s information channels are more efficient in those counties.

The following means have been used to inform teachers and other target audiences about the survey:

- EUN mailing lists: SMC, ENIS, eWatch, MyEurope, IST Rebels, and Virtual School
- Websites: EUN Portal: News and eSchoolnet
- Email newsletters: EUN News, Teachers letter, and Comenius

The survey of national agencies and Ministries was online from October until the end of 2002. The following 17 countries have contributed in the survey: Flemish Community of Belgium, French Community of Belgium, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Netherlands, Norway, Portugal, Spain: Catalonia, Spain: Madrid, Sweden, Switzerland and United Kingdom.

1.2 Terms of reference

This survey report is commissioned by the French Directorate of Technology\(^2\) under the Ministry of Youth, National Education and Research through the Policy Innovation Committee (PIC) functioning under the European Schoolnet.

European Schoolnet was asked to provide a European wide outlook to existing school practices in using Virtual Learning Environments in schools and classrooms, and to national policy making priorities regarding VLEs.

\(^2\) [http://www.educnet.education.fr](http://www.educnet.education.fr)
1.3 Terminology for the report on Virtual Learning Environments

There is currently a lack of precision in definitions used to describe online learning systems, because they are still evolving, and developers and vendors are rapidly adding new functionalities. As definitions of what constitutes a Learning Management System (LMS), Learning Content Management System (LCMS), Managed Learning Environment (MLE) etc. are constantly being redrawn, in this report we have decided to use Virtual Learning Environment (VLE) simply as an 'umbrella' or top-level term to describe the broad range of online learning Environments currently available. Our expectation is that, as VLEs evolve, they will increasingly provide seamless integration of many or all of the following tools and services:

- Both synchronous and asynchronous tools for communication and collaboration
- Access to repositories of digital learning resources, particularly standards compliant Learning Objects (LOs)
- Templates and authoring tools to create, edit and re-use LOs and other types of content
- Automatic generation of metadata for learning resources
- Tools that allow users to sequence LOs to create modules and courses
- Tools for knowledge building
- Tracking of pupil/pupil progress through content
- Assessment tools for learning progress
- Access to online help and tutoring
- Linking to pupil data and administrative information
- Diagnostic tools that detect where learners experience difficulty and provide intelligent remediation by re-sequencing content and personalising assessment

The services that VLEs provide are aimed at teachers, pupils, administrative personnel, and parents. Access to the VLE is via the Internet or an intranet, and there is usually an option to work offline. A key characteristic of a VLE is that learning can, potentially, take place "anytime anywhere" and is not dependent upon the traditional school timetable or whether the learning is taking place inside or outside the school building.

For example, several systems that were primarily designed to track pupil progress and manage learning activities are being extended so that they can also deliver and manage content and allow users to create their own learning materials. Other systems are being enhanced so that they link seamlessly to Management Information Systems (MIS) that contain pupil and administrative data. Developers are also working to create 'intelligent' environments that can analyse the preferred learning styles of users and predict when, how and in what order information can best be presented to pupils or when pupils require some form of remedial work.

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3 For a comparison of how terms are interpreted see JISC (http://www.jisc.ac.uk/), Masie (http://www.masie.com), Becta ICT Advice http://www.ictadvice.org.uk/index.php?section=te&rid=1994&wn=1, etc.
1.3.1 Confusion of terms; is it a VLE, CMS, LMS, LCMS, MLE…?

There is currently a variety of terms that pop up in discussion related to any type of Virtual Learning Environments. Some terms commonly in use to describe online learning systems include:

- Content Management System (CMS)
- Learning Management System (LMS)
- Learning Content Management System (LCMS)
- Managed Learning Environment (MLE)
- Virtual Learning Environment (VLE), see the definition above.

A Content Management System (CMS)⁴ is an environment where learning developers can create, store, reuse, manage, and deliver digital content from a central object repository. CMSs are nowadays used to manage big websites’ workflow, which means an automated system that takes care of the life cycle of a web page or content step by step. A CMS also takes care of publishing functions with version control, among other features the different systems have. There is a plenitude of CMSs on the market ranging from proprietary systems to open source applications. The key is to use one that is compliant to common open standards to achieve interoperability.

A Learning Management System (LMS) can be anything from a simple course-by-course registration system for both on- and offline material to a more complex system that keeps track of which material the learner has accessed and which exercises are completed. A LMS manages and delivers digital learning content, as well as tracks the use of it and predicts the future needs of a learner based on the previous information. “Learning Objects”, i.e. different size chunks of learning material described with descriptive metadata, are closely tied to LMS. The key is the ability to achieve sequential Learning Objects to acquire knowledge and skills wanted.

LMSs are generally delivered using a standard browser, and are designed to undertake administrative and management tasks such as pupil tracking and online assessments and assignments, and to provide a learning environment which enables online delivery of courses and resources. A LMS may include a database of pupil records with administration and delivery interfaces. Typically, Learning Management

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⁴ SUN Microsystems, Inc. White Paper, e-Learning Application Infrastructure
Systems handle the processes involved in learning delivery and administration and are structured around the course and not the course content.5

A Learning Content Management System (LCMS) and LMS do different things, they might work together or be standalone. LCMS is intended for Learning Objects (LO), it provides extensive tracking of learning objects that the learner has interacted with allowing even more precision in adapting to individual learning needs than LMS.

LCMS provides the ability to store, assemble and deliver personalised learning content in the form of Learning Objects. As described in the IDC White Paper6, systems may include:

- A Learning Object Repository which serves as a database for storage and management of learning content
- An Automated Authoring Application to create re-usable learning objects, using templates and storyboarding capabilities
- Dynamic Delivery Interface to serve up learning objects based on learner profiles, pre-tests and/or user queries.
- Administrative Application used to manage pupil records, launch eLearning courses, track and report progress and other basic administrative functions.

A Managed Learning Environment (MLE) includes the whole range of information systems and processes of a whole school (including its VLE if it has one) that contribute directly, or indirectly, to learning and the management of that learning. This term is widely employed in Anglophone research papers and reports. It is endorsed by the Joint Information Systems Committee (JISC)7. JISC acts as a strategic advisory committee in England, Scotland, Wales and Northern Ireland. They have conducted profound work promoting the use of Virtual Learning Environments in further and higher education.

1.4 eLearning standards

All the terms listed above relate closely to the use of standards. Standards enable interoperability. While so many different actors are investing in educational applications and content now, it is important to make sure that they are, and will remain accessible, compatible, portable and re-usable in the future.

One area where standards become important is content. Standardised way of using metadata assure that the right learning content is delivered to the right person at the right time. This also makes sharing of learning content possible. For example the use of metadata gives a clever way to store, search, index, access and even revise content. Standards also facilitate exchange of learning materials from one application to another. Hence the use of eLearning standards is recommended8.

The usage of standards also enables modular way of developing applications; this becomes handy when modular parts of applications are added to one application to create new functionalities. Instead of buying an off-the-shelf proprietary VLE product a school might want to assemble a modular VLE themselves and make it seamlessly working with another system that already exists (can be students records, administrational information etc. see page 5, MIS). Here conformance with existing industry standards is the key, it enables “plug and play” of different applications together creating a system that corresponds exactly to the needs of the users. More about eLearning standards in the chapter dedicated to “Interoperability and Security”.

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5 Corporate LMS and LCMS! Emerging systems manage content for personalised learning, Elas Schelin, E-Learning Magazine, June 2001
6 The Learning Content Management System, IDC http://www.idc.com
7 http://www.jisc.ac.uk/mle/reps/briefings/bp1.html
2. EXPERIENCES FROM SURVEYS: PRODUCTS USED IN THE FIELD

This chapter presents the products according to the user survey that are commonly used in schools in Europe, without pretending to be an exhaustive list of products currently available on the market.

2.1 Most used products with different license agreements

This chapter will outline the three main categories used in the survey to classify the VLE applications that are used in schools around Europe. It also attempts to name the products that are most used.

The classification has three categories: commercial products, open source initiatives, and "in-house products" - an umbrella term for products developed by local and national educational services, Ministries and university services, etc.

Out of the identified VLE application names, in-house products had the biggest user group representing over half of the respondents (165). Commercial products had 33% of users (107), and the open source products had 48 users representing 15%.

There might be some doubts about the overall figures suggesting that people didn’t always have a clear idea of the nature nor the name of the VLE that they use. 15% of respondents were not able to name the product that they use. Consequently, only 320 names of VLEs were relevant, leaving about 35% of replies obscure and irrelevant in what comes to naming the VLE.
2.1.1 In-house products

In-house VLEs are used by over half of the respondents of the survey. These products are developed in many cases by national networks, local or regional educational services, local universities, and in some cases by schools themselves.

165 named an in-house product, the most used were:

- Educational services provided by the “academies” in France\(^9\) (24)
  - [http://www.ac-dijon.fr](http://www.ac-dijon.fr) (5)
  - [http://www.ac-rouen.fr](http://www.ac-rouen.fr) (4)
  - [www.ac-montpellier.fr](http://www.ac-montpellier.fr) (2)
  - [http://www.ac-rennes.fr/](http://www.ac-rennes.fr/) (2)
  - ULP Multimedia
    - [http://dessuticef.u-strasbg.fr](http://dessuticef.u-strasbg.fr) (2)
  - XTEC [www.xtec.es](http://www.xtec.es) (16)
  - Intranet (11)
  - Lo-net [www.lo-net.de](http://www.lo-net.de) (6)
  - Kennisnet [www.kennisnet.nl](http://www.kennisnet.nl) (5)
  - Cartable Electronique [http://www.cartable-electronique.org](http://www.cartable-electronique.org)\(^10\) (3)
  - Edu365 [http://www.edu365.com](http://www.edu365.com) (3)
  - Netlibris [http://www.netlibris.net](http://www.netlibris.net) (3)
  - n@tschool [http://www.fontys.nl/natschool/](http://www.fontys.nl/natschool/) (3)
  - Bureau virtuel [www.lyc-bv.crdp.ac-montpellier.fr](http://www.lyc-bv.crdp.ac-montpellier.fr) (2)
  - Educanet [www.educa.ch](http://www.educa.ch) (2)
  - NUMA (CRDP Montpellier) (2)
  - Schoolnettet [http://www.skolenettet.no](http://www.skolenettet.no) (2)
  - T-online Schulförderprogramm (2)
  - Viadesk [www.viadesk.com](http://www.viadesk.com) (2)
  - A complete list is available in annex V.

An additional evaluation study was conducted on the use of European Schoolnet’s [virtual environments for education](http://community.eun.org), known as Communities\(^11\). The total number of active communities is more than 450, adding up to about 5000 users. Communities are free to use for everybody and available at [http://community.eun.org](http://community.eun.org).

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\(^9\) In France VLEs are in many cases provided by the “academies” i.e. regional education authorities (including all the http://www.ac-something.fr websites) or “rectorate” is the case of CRDP.

\(^10\) Joint venture between the University of Savoie and the Savoie département (local authority), and the Etablissement Scolaire Virtuel provided by the University of Strasbourg.

\(^11\) [http://www.eun.org/goto.cfm?did=22108](http://www.eun.org/goto.cfm?did=22108)
2.1.2 Commercial products

Commercial product users represent 33% of survey respondents. Commercial products are usually based on a licensing agreement. There is a variety of arrangements for license agreements that are signed between the supplier and the customer, and they very a lot from a product to product. The agreement can be based, for example, on a flat rate or per number of pupils using the application. One basis for the agreement can also be the size of the institution or it can be licensed annually, including some support, maintenance and hosting. Some have extra fees to set up the service.

106 named a commercial product, the most used are:
- Blackboard (14)
- FirstClass (14)
- WebCT (8)
- Bscw (7)
- i-m@nuel (France) (4)
- Cisco (3)
- Lotus (3)
- wanadoo groupes (2)
- A complete list is available in annex V.

2.1.3 Open source products

The basic idea behind open source is very simple: when programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, people fix bugs.12

It is relevant to note that some of the open source applications are developed by university services, and could therefore be categorised in the section of in-house products, too. The reason to place them in the category of open source products is to emphasise the transferability and scalability of the products’ success.

48 who named an open source product, the most used are:
- Solstice, Académie de Bordeaux (based on phpNuke: GPL Licence) [http://solstice.ac-bordeaux.fr](http://solstice.ac-bordeaux.fr) (9)
- Ganesha (GPL License) [http://www.anemalab.org](http://www.anemalab.org) (6)
- Abuledu (GPL License) [http://www.abuledu.org/](http://www.abuledu.org/) (5)
- Fle3 (GPL License) [http://fle3.uiah.fi](http://fle3.uiah.fi) (3)
- Argos (partly based on Ilias, University of Cologne13) [http://www.ac-bordeaux.fr/argos/](http://www.ac-bordeaux.fr/argos/) (2)
- SambaEdu (based on Samba) [http://www.crdp.ac-caen.fr/sambaclg/](http://www.crdp.ac-caen.fr/sambaclg/) (2)

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13 [http://www.ilias.uni-koeln.de/](http://www.ilias.uni-koeln.de/)
What is open source?

From the responses to the questionnaire, it was clear that the term “open source” was not clear to everyone. Out of 89 who identified themselves as open source application users; only 42 products named were truly based on open source initiative, leaving room for mistakes in more than half of the cases.

To download and use an open source product is free of charge. However, one has to be aware of maintenance and human resources allocations, which obviously add up to the overall costs, when budgeting.

There is already a vast variety of mature open source products that are used in the education field. They vary from operating systems to software for word processing and web browsing to even Educational Content Management Systems and Virtual Learning Environments. A website called SourceForge\(^\text{14}\) provides a list of diverse open source products. Search for “education”.

Open source products have also licence agreements, they mostly deal with changes made to a product and the release of it to the community. The most common agreements are GNU General Public License (GPL), GNU Library or "Lesser" Public License (LGPL), BSD, MIT, and the Mozilla Public License. Open Source Initiative (OSI) is a non-profit corporation which runs a Certified Open Source Software mark and program, on the website there are copies of approved licences\(^\text{15}\) available.

\(^{14}\) http://sourceforge.net/
\(^{15}\) http://www.opensource.org/licenses/index.php
3. EXPERIENCES FROM SURVEYS AND COMPARATIVE CASE STUDIES

This chapter highlights the key findings from the survey conducted on Virtual Learning Environments in educational settings in Europe.

The first section of this chapter explores the key findings of the survey in school settings where about 75% are secondary school teachers, and about 20% teacher trainers.

The second section summarises some of the finding from the survey targeted at national agencies and Ministries, to find out about their policies and priorities concerning VLEs.

3.1 Key Findings of the survey: school settings

In September 2002, a VLE user survey was announced through European Schoolnet's media to the European Schoolnet's members. The interest focused on how VLEs are used educationally in European schools, ranging from primary schools up to secondary education. All together, 502 replies came from 28 countries.

It is reasonable to note that teachers who replied in this survey are often early adopters, some ICT enthusiasts, who are therefore atypical of the majority of teachers and learners, hence the experiences don’t present views of all teachers.

3.1.1 What type of VLEs are used?

In-house VLEs are used by over half of the respondents to this question. The term “in-house product” is used as an umbrella term for products developed by national educational networks, local or regional educational services or regional education authorities, local universities and local authorities, and in some cases by schools themselves. About half of the in-house and open source users said that they also take part in the development of products.

The popularity of in-house products might indicate several things, such as that commercial products may be too rigid to be used in the school sector, or that people prefer to create their own system corresponding exactly to their needs, one that they are able to control, maintain and feel ownership of. It may also indicate that there have been money allocations for this task, rather than for buying proprietary software.

![Distribution of VLE users](image)

3.1.2 Who uses them?

It appears that VLEs are mostly used by teachers in higher (33%) and lower (28%) secondary education. This indicates that over half of teachers have experience of using VLEs at the secondary level, whereas elementary teaching has roughly 10% representation. This finding correlates well with figures for computers per student at different school levels. See annex III “Level of Teaching” for exact graphics.
3.1.3 With whom are they used?

VLEs are mostly used in classrooms with more than two thirds (2/3) of respondents reporting that they use VLEs with their pupils in class. This indicates that VLEs are used as part of classroom practices mixing face-to-face teaching with the use of a virtual learning environment. This leads us to think that blended learning, the mixture of different teaching styles, is becoming more prominent.

Out of all respondents, 20% use VLEs with virtual classes outside of their schools. Also about 20% said to use VLEs in the setting of a mixture of audiences, i.e. to communicate with pupils, colleagues, parents and other communities outside of school.

25% of teachers, who use VLEs within their own class, also use VLEs to run virtual classes with pupils outside of their own school. These activities often take place in the framework of international or European-wide school collaboration programs, which seem to be a popular context for VLE use. Also, a study on European Schoolnet’s communities correlates with this, over 50% of EUN community users use VLE in the context of collaborative projects.

One the other hand, only 15% of teachers using VLEs within their own class said they used them to collaborate with a mixture of audiences such as communities outside school and parents.

This might indicate that teachers are comfortable using VLEs in their conventional classroom setting, but are rather careful users in when it comes to fully exploiting possibilities that VLEs offer in regards to opening up outside the regular classroom.

The other major use of VLEs is as a communication medium. Half of the respondents said that they use VLEs to communicate among teachers and other educational staff within the same school. Two thirds (2/3) of them seem to communicate within the framework of sharing administrative tasks, whereas one third (1/3) said they used VLEs also to communicate with colleagues from other schools. This correlates well with the EUN community study, where the EUN community tool is mostly used in the setting of communication with teacher and other educational staff in other schools (25%).

42% of respondents indicated that they use VLEs only in one of the above-described settings. About one third said that they use VLEs in two different settings. Only 14% use VLEs in three different settings, less than 10% in four different settings, and 2% said they used VLEs in multiple settings. See annex III “In what setting do you use the VLE?” and “In how many settings are VLEs used?” for detailed information.

---


17 with pupils in class, with teachers and educational staff in my school, with teachers and educational staff in other schools, virtual classes outside school, mixed audience.
The average time teachers spend with the VLE for their professional tasks (presumably including inside and outside of classroom use of VLEs) per month is about 26 hours, or around an hour a day. Students seem to spend less time with the VLE than teachers; the average time for students spend using VLEs is 13 hours a month. Students’ time spent with VLEs outside of classroom use wasn’t in the scope of survey, hence the unbalance in the figures.

All the above findings indicate that in schools VLEs seems to be more prominently used by teachers to communicate with teachers. Maybe in this stage of VLE adoption teachers perceive VLEs rather as a tool for themselves to organise their work, than as a tool for pupils to learn and construct their knowledge. Considering the expectations set for VLE as a facilitator of change in pedagogy towards more learner-centred learning (see the chapter on pedagogy), there still seems to be room for change in teacher practises.

3.1.4 What subjects are VLEs used for?

Informatics and ICT are the most popular curriculum subject to teach with VLEs. Over 60% of respondents said that they regularly use VLEs in this subject area. This finding is not unexpected, as ICT teachers are seen as early adopters when it comes to taking up ICT use in education.

Cross-curricular education had the second-highest score, more than 40% of respondents they used VLEs regularly in cross-curriculum teaching. However, there is no specific data about what subjects were included in "cross-curriculum teaching".

20% of respondents said that they regularly use VLEs in the following subject areas:

- Informatics and ICT
- Cross-Curricular
- Language and literature
- Mathematics
- History
- Biology
- Media education
- Culture
- Natural sciences
- Geography
- Environmental education
- Physics

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18 The reply percentage to this question was relatively low; only about 40% of all respondents identified the curriculum subject areas that they use VLEs in teaching. The average number of N/A was 303.
See annex III for more detailed lists of “Most and least popular subject areas to teach with a VLE”.

Use of VLEs in Curriculum Teaching

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Regularly</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informatics/ICT</td>
<td>159</td>
<td>73</td>
<td>23</td>
</tr>
<tr>
<td>Cross-curricular education</td>
<td>91</td>
<td>85</td>
<td>33</td>
</tr>
<tr>
<td>Foreign languages</td>
<td>76</td>
<td>99</td>
<td>54</td>
</tr>
<tr>
<td>Language and literature</td>
<td>67</td>
<td>81</td>
<td>51</td>
</tr>
<tr>
<td>Mathematics</td>
<td>62</td>
<td>94</td>
<td>43</td>
</tr>
<tr>
<td>History</td>
<td>55</td>
<td>90</td>
<td>45</td>
</tr>
<tr>
<td>Media education</td>
<td>54</td>
<td>64</td>
<td>59</td>
</tr>
<tr>
<td>Biology</td>
<td>54</td>
<td>78</td>
<td>58</td>
</tr>
<tr>
<td>Culture</td>
<td>51</td>
<td>85</td>
<td>45</td>
</tr>
<tr>
<td>Natural sciences</td>
<td>50</td>
<td>78</td>
<td>54</td>
</tr>
<tr>
<td>Geography</td>
<td>47</td>
<td>94</td>
<td>42</td>
</tr>
<tr>
<td>Environmental education</td>
<td>43</td>
<td>87</td>
<td>52</td>
</tr>
<tr>
<td>Physics</td>
<td>39</td>
<td>76</td>
<td>53</td>
</tr>
<tr>
<td>Chemistry</td>
<td>32</td>
<td>52</td>
<td>81</td>
</tr>
<tr>
<td>Citizenship</td>
<td>32</td>
<td>82</td>
<td>54</td>
</tr>
<tr>
<td>Special education</td>
<td>31</td>
<td>37</td>
<td>89</td>
</tr>
<tr>
<td>Economics</td>
<td>30</td>
<td>48</td>
<td>100</td>
</tr>
<tr>
<td>Social sciences</td>
<td>29</td>
<td>37</td>
<td>98</td>
</tr>
<tr>
<td>Home Economics</td>
<td>21</td>
<td>29</td>
<td>115</td>
</tr>
<tr>
<td>Social studies</td>
<td>20</td>
<td>35</td>
<td>95</td>
</tr>
<tr>
<td>Music</td>
<td>19</td>
<td>44</td>
<td>92</td>
</tr>
<tr>
<td>Art</td>
<td>19</td>
<td>79</td>
<td>76</td>
</tr>
<tr>
<td>Politics</td>
<td>18</td>
<td>29</td>
<td>110</td>
</tr>
<tr>
<td>Ethics</td>
<td>16</td>
<td>49</td>
<td>88</td>
</tr>
<tr>
<td>Religion</td>
<td>13</td>
<td>50</td>
<td>97</td>
</tr>
<tr>
<td>Psychology</td>
<td>11</td>
<td>15</td>
<td>117</td>
</tr>
<tr>
<td>Physical education</td>
<td>11</td>
<td>34</td>
<td>108</td>
</tr>
<tr>
<td>Philosophy</td>
<td>8</td>
<td>20</td>
<td>115</td>
</tr>
</tbody>
</table>
Most of respondents (32%) said that they use VLEs in reinforcement of previous knowledge, i.e. in practice. 29% said that they use VLEs in the introduction of new teaching items, whereas the use of VLEs in remediation and supportive exercises represents 23% responses. 16% said they used VLEs in assessment of learners’ progress, i.e. for formative and/or summative evaluation. It can be seen that teachers start with safe activities like practices, gradually getting more comfortable in expanding the VLE use to other segments of teaching.

About 44% of all the survey respondents have assessment tools for students’ learning progress in their VLE and most of them make use of it (only about 10% who have these tools don’t use them).

3.1.5 Functionalities of VLEs

Email is without doubt the most present function that the surveyed respondents have. Over 90% of respondents have the possibility to access email. Other used functions in rank order are possibility to assign tasks to students, file share, file upload area, mailing lists, link lists, community mail, tools to create online material and courses. See annex III “VLE Functionalities and their use” for detailed figures.

The functionalities that VLEs offer are not always entirely exploited. Some features that are present are very seldom used, for example only 21 respondents use Voice over Internet Protocol. Other least exploited features are Shared Whiteboard, and some other synchronous tools. This might be related to connectivity issues as well as to the fact that these tools are mostly used in distance education. See annex III “Less Accessible Functions” for detailed figures.

A great majority of VLE users have access to learning materials through the VLE that they use. 79% can access learning resources through the VLE, whereas about 21% don’t have that possibility.

VLE users seem to have access to many different kinds of types of learning resources. 39% of the learning material is open, i.e. one can add, edit, and modify content to adapt to different learning styles, time, etc. 34% said to have access to flexible modules, where they can decide about the use. Pre-packaged content i.e. ready to use as such, in an already sequenced way is accessible to 27% VLE users.

![Type of learning materials and resources](image)

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19 347/441
3.1.6 Motivation for the use of VLEs

90% of respondents seem to be happy using VLEs in their classroom, saying that they would recommend the use of VLEs to their colleagues. The satisfaction rate correlates well with the fact that about 90% of respondents said personal motivation drives them to use a VLE in teaching.

Some respondents stated that the use of VLE combined with a more “active” pedagogical approach, the possibility to collaborate, and given independence to learners, helped to deliver expected pedagogical outcomes and made a difference in learners’ achievement. Some teachers mentioned the possibility to differentiate and individualise teaching thanks to a VLE as a positive factor for learning. Among replies to the motivational question were replies indicating that some learning difficulties can be alleviated thanks to the use of a VLE.

Teachers seem to be motivated to use VLEs in teaching, many teachers noted that they found that learners were actually more motivated in using VLEs than to traditional teaching methods. Whether the motivation will only have a short-term effect is not known.

3.2 Key Findings of the survey: national agencies

The following 17 countries have contributed to the survey: Flemish Community of Belgium, French Community of Belgium, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Netherlands, Norway, Portugal, Spain: Catalonia, Spain: Madrid, Sweden, Switzerland, and United Kingdom.

3.2.1 VLEs importance in national policy planning

Virtual Learning Environments are regarded as having high importance by 60% and medium importance by 30% of respondent ministries and national agencies in overall national policies, plans and initiatives for ICT and eLearning in schools.

<table>
<thead>
<tr>
<th>High importance</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flemish Community of Belgium</td>
<td>Denmark</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>French Community of Belgium</td>
<td>Estonia</td>
<td>Spain-Madrid</td>
</tr>
<tr>
<td>Finland</td>
<td>Norway</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Sweden</td>
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<tr>
<td>Germany</td>
<td>Switzerland</td>
<td></td>
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<tr>
<td>Hungary</td>
<td></td>
<td></td>
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<tr>
<td>Iceland</td>
<td></td>
<td></td>
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<tr>
<td>Netherlands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td></td>
<td></td>
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<tr>
<td>Spain- Catalonia</td>
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</tbody>
</table>

According to national agencies’ replies, VLEs are mostly used in higher education in all the countries (40%), in vocational training by about 30% of countries, in secondary education by one quarter of countries, and only two countries mentioned that they are mostly used in elementary education.
3.2.2 National agencies expectations of VLE benefits

Many of the national agencies have various expectations of the benefits of VLEs, however the common factor seems to be the facilitator of change in education and pedagogy towards more learner centred approaches, enhancing interactivity in learning, helping constructional knowledge building, as well as complementing the learning and teaching that takes place in classrooms.

National agencies also mentioned that VLEs can potentially facilitate organisational change, shifting the role of teacher and learner to give learners more chances to be proactive, act as a tutor or even be an expert teaching others.

VLEs are also seen as something that have the potential to link outside of school communities closer to schools' practices. The collaborative aspect of VLEs was mentioned frequently, the use of VLEs enabling collaboration between schools in the same region, up to international collaboration. Also the improvement in relationships between schools, teachers and students was mentioned, not excluding the dimension reaching out to parents and communities outside schools.

Some national agencies praised VLEs as they facilitate the delivery of study material for upper secondary, vocational and university level, make better and richer resources available for students. VLEs could also help learners to understand education as a lifelong process. Flexibility is also one of the desired outcomes of VLE use in schools. VLEs enable students to access material also outside school buildings and school hours.

3.2.3 Development and localisation of VLEs

Ten Ministries and national agencies fund the development or localisation of VLEs. There are many models available for development in Europe. In some countries it is the national agency who funds the development, whereas in some countries where a more decentralised system is in place this is the responsibility of local educational agencies.

Some of the countries represent an opposed attitude without any public money allocation from the national agencies. In these cases the money allocations might come from other bodies making public funded research available in this field.

In the Flemish Community of Belgium the Ministry of Education allocates schools an annual budget for ICT-implementation, and VLE-software is mentioned as one of the subsidy categories. The French Community in Belgium cooperates with regions creating an intranet at regional and school level.

Estonia and France fund software for educational school use, Switzerland continues funding of “educa.ch” and “educanet.ch”, and along the same lines the Ministry in the Netherlands continues the development of Kennisnet's integration of the VLE for Vocational Education (BVE-net).

Hungary has an ongoing project for developing a CMS for teachers in public education. Hungarian and European partners have been working on this public-private partnership project.

Although Norway doesn't fund VLE development, they offer a simple VLE for free to schools.
### 3.2.4 Pilots

VLE pilots are run in 14 of the surveyed countries, namely Flemish Community of Belgium, Denmark, Finland, France, Germany, Hungary, Netherlands, Norway, Portugal, Spain-Catalonia, Spain-Madrid, Sweden, Switzerland, and the United Kingdom listed some of the most interesting pilots. A more complete list can be found from each country report.

<table>
<thead>
<tr>
<th>Country</th>
<th>Funding</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flemish Community of Belgium</td>
<td>Yes</td>
<td>Schools receive an annual budget for ICT-implementation.</td>
</tr>
<tr>
<td>French Community of Belgium</td>
<td>Yes</td>
<td>Intranet developed for schools use at the regional level.</td>
</tr>
<tr>
<td>Estonia</td>
<td>Yes</td>
<td>A VLE VIKO created for general education by Tiger Leap Foundation.</td>
</tr>
<tr>
<td>France</td>
<td>Yes</td>
<td>Co-financing of many VLEs, see Country Report for detailed list.</td>
</tr>
<tr>
<td>Germany</td>
<td>Yes</td>
<td>lo-net has been implemented for schools.</td>
</tr>
<tr>
<td>Hungary</td>
<td>Yes</td>
<td>Contract with Cisco Learning Institute, and development of CMS in public education.</td>
</tr>
<tr>
<td>Iceland</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Yes</td>
<td>Kennisnet, integrating a VLE (BVE-net) for Vocational Education. Projects producing content tools and databases.</td>
</tr>
<tr>
<td>Spain-Catalonia</td>
<td>Yes</td>
<td><a href="http://www.edu365.com">www.edu365.com</a>, in the near future the Virtual Campus will be launched.</td>
</tr>
<tr>
<td>Spain-Madrid</td>
<td>Yes</td>
<td>Under development: an educational Virtual Center for distance education (secondary and primary) and vocational and teachers training.</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Yes</td>
<td><a href="http://www.educa.ch">www.educa.ch</a> and <a href="http://www.educanet.ch">www.educanet.ch</a></td>
</tr>
<tr>
<td>Country</td>
<td>Actions</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Flemish Community of Belgium</td>
<td>• BridgED (<a href="http://www.bridged.org">www.bridged.org</a>) and Smartschool.</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>• Virtual Gymnasium (upper secondary education) <a href="http://us.uvm.dk/gymnasie/almen/it/virtueltgym.html">http://us.uvm.dk/gymnasie/almen/it/virtueltgym.html</a> (in Danish)</td>
<td></td>
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<td></td>
<td>• Netskolen (completely virtual offer for Danish pupils living abroad) <a href="http://www.netskolen.dk">http://www.netskolen.dk</a></td>
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</tr>
<tr>
<td></td>
<td>• Quite a few of the projects supported in the project ITMF are also relevant <a href="http://www.itmf.dk">http://www.itmf.dk</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• References to a number of projects initiated as part of &quot;The Virtual Gymnasium&quot; are available at <a href="http://us.uvm.dk/gymnasie/almen/it/visionsseminar?menuid=150535">http://us.uvm.dk/gymnasie/almen/it/visionsseminar?menuid=150535</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• A number of relevant ITMF supported projects dealing with virtual learning in primary and lower secondary education can be searched (use keyword &quot;virtuel&quot;) at <a href="http://www.itmf.dk/itmf_tilskudsprojekter.htm">http://www.itmf.dk/itmf_tilskudsprojekter.htm</a></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>• National Virtual School Project involving about 1000 schools and different institutions. Most of the schools involved in the project use a VLE. <a href="http://www.edu.fi/virtuaalikoulu">www.edu.fi/virtuaalikoulu</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Additionally there is a distance education project involving 80 upper secondary schools. <a href="http://www.oph.fi/etalukio">www.oph.fi/etalukio</a></td>
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<tr>
<td></td>
<td>• A research program VETO (2001) ran an evaluation about five different VLS in vocational training.</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>• I-manuel (Editronics)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AbulEdu</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Argos (Académie de Bordeaux)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Scolastance (Infostance)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Etablissement Scolaire Virtuel (University of Strasbourg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ArianeDijon (Académie de Dijon)</td>
<td></td>
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<tr>
<td></td>
<td>• Phares (Académie de Rennes)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Numa (Académie de Montpellier)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cartable électronique de Savoie (University of Savoie)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Etablissement Numérique (Académie de Besançon)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Pilots Public funding (except Scolastance and Editronics, who sell an annual right of use). In September 2002 there were two rollouts school wide by Scolastance, and Etablissement Scolaire Virtuel.</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>• Pilots on BSCW and lo-net</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>• Recently signed a contract with Cisco Learning Institute and will make the system available for Hungarian public education. A 6-months pilot project is about to be launched in 40 schools and in September 2003.</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>• Study assigned by ICT op School to Expertise Center VLE (EXCELO), There are also several development projects with schools, some with universities/companies. Final reports of pilots are available:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• SURF: <a href="http://e-learning.surf.nl/e-learning/achtergrond/1489">http://e-learning.surf.nl/e-learning/achtergrond/1489</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• BVENET: <a href="http://www.bvenet.nl/~mselo/Evaluatie%20mselo.htm">http://www.bvenet.nl/~mselo/Evaluatie%20mselo.htm</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• HOGESCHOOL AMSTERDAM: <a href="http://www.euronet.nl/users/warnar/toetsmogelijkhedenelo.html">http://www.euronet.nl/users/warnar/toetsmogelijkhedenelo.html</a></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Projects and Initiatives</td>
<td></td>
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<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| Norway             | No national pilot projects, but a number of small-scale, user-centred, local pilots. Some examples of local pilots:  
  - Akershus County has completed a user evaluation study made as a basis for VLE selection.  
  - The Norwegian Support System for Special Education (Statped [http://www.statped.no/english/](http://www.statped.no/english/)) in cooperation with The Norwegian Board of Education: a pilot project using FirstClass  
  - A cluster of schools in southern Norway: a pilot on FirstClass  
  - Nesodden upper secondary school: a pilot on IT’s Learning  
  - Svensedammen school: a pilot on First Class. The school has also completed an evaluation rapport from the project.  
  - Haram municipality: have translated, adapted and tried out IBM’s Learning Village.  
  - Some pilots and studies are planned for the future |
| Portugal           | Nonio Competence Centres include communication tools and pedagogical resources on the websites that are open to all schools.  
  - See the list and URLs in the Country Report |
| Spain-Catalonia    | The major product Edu365, an interactive educational environment.  
| Spain-Madrid       | Educational Virtual Center is under development, will be offered for regions’ use in the future. |
| Sweden             | VA-project, Sandviken [http://www.skolverket.se/skolnet/testplats/va.html](http://www.skolverket.se/skolnet/testplats/va.html)  
  - LerNet/School Tools, Lerum info: utbildningsforvaltningen@lerum.se  
  - There is a public-private-partnership pilot project together with Denmark concerning Think.com by Oracle. |
| Switzerland        | A project of integration of foreign pupils with a distance learning environment (human ecology project) [http://www.progetto-poschiavo.ch](http://www.progetto-poschiavo.ch)  
  - The ICT.SIBP-ISFP is an Information, Communication, and Technology project that is managed by the Swiss Institute for Professional Training Pedagogy. The project consists of several sub-projects, all of which aim to develop the use of information and communication technologies (ICT) in vocational training.  
  - [http://www.ict.sibp-isfp.ch/ict_e/e1_ict-project/e1_description.html](http://www.ict.sibp-isfp.ch/ict_e/e1_ict-project/e1_description.html)  
  - Pilot project of a vocational school with the aim to combine education in the real classroom with eLearning and to ameliorate education  
  - [http://www.virtual-bsl.ch](http://www.virtual-bsl.ch)  
  - [http://www.progetto-poschiavo.ch](http://www.progetto-poschiavo.ch)  
  - [http://www.ict.sibp-isfp.ch/ict_e/e1_ict-project/e1_description.html](http://www.ict.sibp-isfp.ch/ict_e/e1_ict-project/e1_description.html) |
| United Kingdom     | TCT’s  
  - AcademiesEspresso Study by Learning Circuit  
  - ICT Research Centre  
  - Learnwise Pilot - although this is not a principal one  
3.2.5 Recommendations for the use of VLEs in schools

Some national agencies and ministries have recommendations for VLE use in schools, namely the Flemish Community of Belgium, France, Netherlands, Spain-Catalonia and Switzerland. See the details in annex IV at the Country Reports.

3.2.6 Interoperability issues

70% of the national agencies and Ministries are concerned about standards and interoperability issues. Following three levels can be noted; firstly there are countries that are very aware of the issue and are proactively taking part in the development of eLearning standards by different means, such as implementing standards on the national and/or regional level, setting up expert groups, participation in pilot projects, etc. The second group is concerned, but not yet taking action. The third group is not well aware of the complexity of the issue. Most of respondents are concerned at the first mentioned level.

It was reflected in the responses that interoperability on the content level, i.e. creation of platform independent LOs and learning resources, is easier to comprehend than the challenges of interoperability on the system level, i.e. LMS, LMCS interfacing with other information systems (MIS) or applications (see the first chapter).

Actions taken on interoperability

National agencies in Denmark and France are developing national recommendations and guidelines for interoperability issues, and Finland has established a special working group under the Ministry of Education. The agencies in the Netherlands and Catalonia create applications that support the use of XML, which potentially allows the separation of the actual learning content from the application logic and presentation enabling better reusability and transferability of the content. The national agencies of Iceland and the Netherlands have made efforts to conform to SCORM.

Swedish national agency regards international standards as very important for a sound long-term development of learning technologies; they actively participate in the development of the standards in order to influence the work in a pedagogical and technological direction that also supports their learning tradition.

Both national agencies in Iceland and the Netherlands apply metadata for resources, Iceland using Dublin Core and Netherlands often referring to SCORM compliancy. Additionally Kennisnet has interests in Educational Modelling Language (EML) that has now become an IMS Learning Design. Switzerland’s national agency regards interoperable content important ensuring compliance of the out coming eLearning platform in cooperation with the CELEBRATE project. Hungary is also taking its first step in technical standards, and the development is compatible with other European standards. This technical pre-consideration provides the basis for the ongoing developments in the area of LMS, LCMS (VLE) and content.

The Flemish Community of Belgium, Norway, and the United Kingdom, among other countries, also mentioned their concerns about interoperability, but there weren’t any reports of special national actions.
4. DESIRED PEDAGOGICAL OUTCOMES OF VLES FOR LEARNING

Learning, taking place in its plethora ways, is about interaction in social and cultural environments. This interaction can take place between teacher and learner, between learner and learner, or between learner and environment. In the case of talking about computer mediated learning, the interaction takes place firstly between learner and the interface (face-to-interface) and secondly between learner and the community that s/he can reach through the network.

Using computers and networks to simulate a learning environment is used commonly in higher and further education, there the media is mostly used to deliver content from one place to another to bridge distances and time gaps. Digital or virtual platforms and environments are build to support the learning experience that takes place regardless the physical placement of the learner. In using a virtual environment, the learner engages him or herself with a learning experience that could be described as anything but "virtual" in a literal meaning.\(^\text{20}\)

The use of VLEs in the school setting has different functions and needs. In some cases, VLEs in school settings are also used to deliver courses to remote locations where the offer of courses doesn't meet the demand. A more prominent usage of VLEs, though, is the use for collaborative learning exercises, project or problem based learning, building knowledge and networking with external communities, hence the need for a VLE application that supports exactly these needs.

4.1 Survey outcomes: VLE’s pedagogical potentials
(Pedagogical needs: models, objects, communication, etc.)

Both in the surveys for teachers and national agencies, the desired outcomes for VLE use in schools were set high. The highest appeal seemed to be as facilitator of change in pedagogy towards a more learner-focused paradigm.

The demand for a facilitator of pedagogical change could be seen as a long-term goal to reach in VLE use. This kind of outcome is impossible to evaluate from replies to a questionnaire like the one used for this survey. What can be stated, though, is the nature of functionalities that teachers use VLEs, although this doesn't necessarily give any indication of the underlying pedagogical practices that take place in teachers’ everyday activities.

The practices for which VLEs were used according to this survey don't necessary support the learner-centred view. Tasks that teachers perform through VLEs seemed to be more focused on the communication between participants (email and community mail), as well as features like assigning tasks to students, file share, file upload area, link lists and lists of students homepages. It can be estimated that teachers use VLEs just as digital distribution place of tasks and school assignments, and not for activities to support learners' knowledge building and acquisition of new cognitive skills.

For example, about 44% of the survey respondents have assessment tools for students’ learning progress in their VLEs. Although it is not clear how these assessment tools are used, it can be speculated that they are just used for a normative evaluation of isolated individual performance which can lead to a maladaptive motivational orientation in students.\(^\text{21}\) Rather than using “old tools” where new ways of learning and teaching are desired, there should be more creation of new tools to support the desired pedagogical outcomes.

To answer to the question why VLEs are used in such a traditional way, there may be two possible answers, firstly teachers are only slowly learning how to use VLEs with students in a more constructive way. The other possible answer is that VLEs in their current form hardly support the desired change in the learning and teaching paradigm. If VLEs are mostly designed for course delivery in higher education, one

\(^{20}\) Dictionary.com Virtual (five entries) 2. Existing in the mind, especially as a product of the imagination. Used in literary criticism of a text.

\(^{21}\) [http://www.helsinki.fi/science/networkedlearning/eng/redene.html#moti]
could argue that it is easier for a teacher to practice “traditional” teaching with VLEs than try new ways for collaborative exercises that support learner-centred pedagogy, since tools for this don’t necessarily exist.

4.2 Models of learning and a succinct research review

(New tools for new ways of teaching)

Recently, pedagogical research has taken new approaches like progressive inquiry learning. The idea is to support a research-like study process, where students generate research problems, make hypotheses, and search for explanatory scientific information as a group. The Centre for Research on Networked Learning and Knowledge Building in the University of Helsinki describes its mission as follows:

Progressive Inquiry has been developed as a pedagogical model for helping teachers and students to structure and concretise knowledge-building practices in schools with the support of collaborative technology.

This trend brings along the socio-cognitive aspect to pedagogical research emphasising that cognition and intelligent activity are not only individual and mental processes, as assumed by traditional cognitive theories, but ones which rely on socio-culturally developed cognitive tools, physical and conceptual artifacts as well as socially distributed and shared processes of intelligent activity embedded in complex social and cultural environments.

The aim is to bring conceptual change to teaching, emphasising teaching for understanding, collaborative and cultural learning, as well as research on the development of expertise. This strand of research is looking into creating tools for knowledge building and collective management of knowledge, accumulation of notes, visual representations of databased tools to support knowledge building and production between users.

One of the VLEs mentioned in the survey is called the Future Learning Environment 3 (FLE3). This VLE is designed to support the development of innovative pedagogical models, design principles and technology for collaborative knowledge building in European education. Apart from the transferable pedagogical model, the software itself is free to use for anyone under the GNU General Public License.

More examples to this kind of use of Computer Supported Collaborative Learning (CSCL) in Europe can be found at the website of Euro-CSCL.

4.3 VLEs supporting change

(e.g. integrating a holistic curriculum and re-engineering learning)

There are many expectations for VLEs, one of them is as being the facilitator of pedagogical changes supporting learner centred pedagogical approaches. VLEs can potentially contribute to the acquisition of new skills that tomorrow’s learners need in order to survive in the knowledge society where new type of talents are valued, but so can many other activities that take place in schools and classrooms. Is there anything that makes VLEs special?

Changes in education take place slowly and they need to be reinforced and nurtured constantly. Political change alone is not enough, it has to reach teachers, principals and teacher trainers before it enters classrooms. It is doubtful that VLEs can do that alone, but they can surely act as facilitator of the change and shift towards a new pedagogical paradigm that re-engineers the whole learning environment and takes into account a holistic approach including cultural and organisational changes in schools.

4.3.1 Behavioural aspects like motivation, enjoyment and user friendliness considerations: Positive Outlook

Based on the survey replies, a reflection on VLE’s ability to support changes can be suggested. Making the assumption that cross-curricular activities support the shift towards integrated curriculum teaching, the outlook is good. Over 80% of respondents said they used VLE regularly (44%) and sometimes (40%) to teach cross-curricular education. Even more often, VLEs are used to teach ICT and informatics, which, of course, is a valued skill.

Both teachers and students seem to be inspired by VLEs. Teachers reported a high personal motivation to use VLEs; only about 10% of replies suggested that they use VLEs because of outside pressure or requirement by the school authorities. Many teachers also reported that they had taken up the VLE use after participating in a pilot project. This can be seen as a positive transfer of a good experience into daily practice.

It can also be considered that teachers are willing to use VLEs as a trampoline to get out of old practices, and to try something new in teaching. For example, the results of the EUN Community Survey indicate that the EUN VLE is mainly used in the context of collaborative projects, hence the shift towards a more holistic approach to curriculum teaching.

When EUN VLE users were asked to describe the learning situation in which they use the VLE, the most popular were:

- Cooperative learning
- Discussions
- Project-based learning
- Interdisciplinary
- Discovery learning

What can also be taken as a very positive sign is the fact that teachers use VLEs for their own communication needs with other teachers and staff both in their own school and external schools. What has been claimed as a handicap in some traditional teaching paradigms is the lack of synergy between teachers. Using an asynchronous communication means like VLE (email, fora,…) enables organisational work, planning and a communication flow that is independent of time and physical constraints, allowing teachers to better manage their professional collaboration. Like about 40% of the EUN Community respondents said, "It suits my needs". Teachers adapting VLEs as their professional tools may be one of the most important burdens lifted from hindering VLEs entry to the classrooms.
4.3.2 Behavioural aspects like motivational, enjoyment, and user friendliness considerations: Pessimistic Outlook

VLEs being in their early stage, it can be questioned if they really support any change in the pedagogy. First of all, many teachers seem to lack ideas and tools to really make the change happen in their teaching. Secondly, the most used VLE features mentioned in the survey (file upload, assign tasks....) let us predict that teachers actually still use VLEs in a very traditional way to support a traditional way of teaching. Thirdly, many of the VLEs haven’t been designed to actually support the change in learning process; they are not designed to support students’ knowledge building, but just to deliver distance courses at the university level or at the corporate training. It should be seriously questioned whether many of the currently used VLEs are able to be the facilitator of the desired change in teaching and learning.

What can be reflected from the survey replies is that VLEs are by far the most used in teaching ICT and informatics. This might indicate that the full potential of VLEs is not reached. VLEs could act as a tool in any learning situation, whereas the above finding hints that teachers are still held back by thinking that using a “digital tool” fits only in teaching ICT and informatics.

When 24/7 access to learning is implied, there is also need for 24/7 assistance. Can learners count on getting help just at the crucial moment when they need it? Are the tools designed convenient enough for learners? One practical example is a VLE where the interface designer had made a bulletin board for students to post their questions regarding homework. The bulletin board was hardly ever used, but when the teacher gave his GSM number he started receiving short text messages from students who needed assistance. Another question is if teachers want to be available 24/7.

If teachers are not trained to use VLEs as organisational tools for their professional needs, nor for using VLEs in a constructive way to support the acquisition of learners’ new cognitive skills, VLEs will remain as just one tool among other tool that have been introduced to classes with a lot of fuss and enthusiasm, but without any further thinking of underlying concepts. There will always be teachers who find VLEs fascinating and who can find good ways to use them, but for a bigger break-through some re-organising of the whole school setting is needed, along with supportive political actions ranging from infrastructure to teacher training and giving teacher proper tools to work.
5. INTEROPERABILITY AND SECURITY

5.1 Interoperability and use of standards with VLEs

While so many different actors from industry to local school authorities, are investing in educational applications and content, it is important to make sure that they are, and will remain accessible, compatible, portable and re-usable in the future. To facilitate transferability of the content and interoperability between different parts of applications the use of open standards is recommended.

Nowadays many of LMS and LMCS application vendors add a note to their product stating that it is conforms to some of the existing specification and standards. IMS and SCORM are probably the most mentioned ones for content. This means that if the content is created following these specifications, any of the applications designed to support these specifications can render the content correctly. The advantage for the user is that the content use is independent from the platform, i.e. the content user is free to buy content from any vendor being always sure that it will be correctly displayed in the VLE, LMS or LMCS s/he uses, and not bound to one and only propriety system.

The bodies working with eLearning standards and specifications have different needs and ambitions. The following short descriptions give references for further information on the area of content specifications.

Learning Object Metadata (LOMv1.0)
ltsc.ieee.org

LOM is the first ever standard for learning content intending to give a detailed metadata description of learning objects. The status has been approved by the standardisation board of IEEE (The Institute of Electrical and Electronics Engineers).

IMS Global Learning Consortium
www.imsglobal.org

IMS develops and promotes open specifications for facilitating online distributed learning activities. IMS metadata specifications follow Learning Object Metadata (LOM) dealing with content packaging and runtime environments. Recently IMS has taken up a new initiative regarding Learning Design, where EML (Educational Modelling Language) will serve as a base.

SCORM (Shareable Content Object Reference Model)
www.adlnet.org

SCORM is a very specific ‘map’ that vendors and content developers can follow to enable the interoperability and reusability of content across systems. Therefore, conforming to SCORM means conforming to many of the IMS specifications and also to LOM. SCORM uses specifications also from other organizations such as AICC

A conformance test suite is available from ADL (Advanced Distributed Learning, SCORM developer) so that a LMS or LCMS truly conformance to SCORM can be tested. ADL also organises an event called PLUGFEST to allow developers to test the conformance to SCORM.

As an example, EUN project Celebrate opted for SCORM 1.2.

AICC (Aviation Industry CBT -Computer based training- Committee)
www.aicc.org

AICC was originally created to answer airline companies (Airbus, Boeing, and McDonald-Douglas) needs to create a standardised platform to run aviation training. AICC specifications define learning paths based

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26 www.aicc.org
27 www.adlnet.org
28 http://www.adlnet.org/index.cfm?fuseaction=plugmulti&cfdid=8154&cftoken=95661150
on learning objectives and prerequisites. AICC specs are compatible with SCORM, but will probably evolve to another direction in the future. Products can be certified with AICC logo as a proof of compatibility.

**World Wide Web Consortium (W3C)**

[www.w3c.org](http://www.w3c.org)

W3C helps to develop interoperable technologies to lead the Web to its full potential as a forum for information, commerce, communication, and collective understanding. W3C doesn’t have standards, but specifications, guidelines, software, and tools.

There are over 40 recommendations published covering a range of Web technologies: multimedia, privacy, XML, and metadata. Maybe the most important is the Semantic Web initiative that intends to make the Web even more intelligent and more machine-readable. The buzzword is Resource Description Framework, RDF.

One can argue that being compliant to W3C recommendations allows a lot of interoperability and especially enables access for all (initiative to ensure that impaired people also have access to the content on the internet).

### 5.2 Transferability (import and export) of learning resources between applications

Although many developers and vendors make statements about compliance to certain specifications, the reality is very different. An evaluation on Content Exchange[^29] by Cetis ec-sig gives very good insight to very primary problems that persist on the field.

The Evaluation on Content Exchange compared six applications focusing on practical exchange (import and export) of learning materials in the form of IMS packages, and on the capacity to maintain the information and the organisation of the metadata after transfer to another application. The following products were tested:

- Microsoft LRN toolkit
- Macromedia Dreamweaver (with Manifest Maker Extension)
- Blackboard Learning System
- SeSDL
- PackageIt!
- EC-Pac JISC IMS Package Editor

5.3 Safety and security issues

Issues around safety use of Internet ("Internet safety") can comprise:

- Awareness building
- Filtering
- Moderation
- Registration

Issues around security are related to more technical aspect like:

- Firewalls
- Protection of users’ data from external attacks
- Data privacy measures like Spam protection and encryption of users’ info

5.3.1 Internet safety

There have been many awareness campaigns about the safety use of Internet targeted both at adults and younger users. A project run by European Schoolnet called dotSafe addressed these issues.\(^\text{30}\)

Awareness campaigns often focus on empowering user counting on the awareness building. For example using chats and forums one should make sure not to give out personal details to strangers, not to set up dates with people met on the Internet chats, etc. This kind of guidelines and hints can be made explicitly available for VLE users in means guidelines when signing in or more actively, for example, in means of pop-up windows while using the service.

Filtering can be used effectively in VLEs, apart from setting filters for the Internet use, they can be also set for links to upload. For this one can use blacklists of URLs (for example for some porno sites...) or white lists on the server level that allow users to visit only certain URLs. Also sources that act more as a recommendation of good educational sites (like EUN service for European Learning Resources\(^\text{31}\)) are good to use.

Moderation can be an effective safety tool in VLEs. Fora can be moderated by a human, as well as automated filtering can be used to prevent certain language. Netiquette is a good way to guide users. See the netiquette at the EUN’s new Zap portal for Kids\(^\text{32}\).

The aim of the Zap portal and the project is to create a multi-lingual international collaborative environment for young people aged 8 to 14 acceptable to differing national educational philosophies and approaches to Internet safety, thereby improving learning opportunities, demonstrating the value of the Internet and helping to build eLearning in eEurope (full project details at http://www.eun.org/goto.cfm?did=12594).

Registering and ID verification should be used for VLEs. Each user should be identifiable while logged in and when uploading files to the VLE. It could be also recommended that email addresses are not used as identification, since this enables some misuse of users’ privacy.

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\(^{30}\) http://dotsafe.eun.org
\(^{31}\) http://resources.eun.org
5.3.2 Security

Data privacy is a serious issue, and some nations have set very strict rules for educational use to comply with. Encrypting users’ passwords, letting registered users to hide their profile while logged in a VLE, and protecting users from Spam are crucial measures to take. Also protecting a VLE from outside attacks is crucial, here the use of a firewall and latest security patches are necessary.

5.3.3 National agencies actions regarding security

Actions

National agencies in general seemed to be concerned about data protection and students’ privacy while using a VLE and storing the information. The actions varied from clear data protection to campaigning and awareness-raising work with schools.

In the French Community of Belgium the Ministry has set up a system with safety access. The ministry also has an administrative unit in charge of this question. The Ministry of Education in Spain said it uses the safe protocol (https) and isolates student data in the databases. In Catalonia privacy is assured by encoding all private details. A report was made and sent to schools in order not to show students’ details. Catalonia’s Oracle database is carefully kept away from external attacks.

To protect users privacy Dutch Kennisnet uses in some cases SSL, e.g. www.projectplace.nl. However, most educational systems do not have that level of protection. In the United Kingdom the security issue is managed through local Internet use policy or by systems set up by the developer.

Campaigns and awareness raising

In the Flemish Community of Belgium, an awareness raising campaign was organised at the end of 2002 for schools. The Norwegian Board of Education informs schools and school owners on the laws and regulations regarding this issue.

France has its concerns about the issue, and they want to include privacy issues in the rules aimed at ICT use in schools. The issue is also being studied in more detail for the VLE blueprint project.

Sweden has a cooperation with The Swedish Data Inspection Board in the field of information to municipalities and schools.

In Switzerland, the “educa server” has students’ information stored in a database that is not public, also all the publishing of that data is limited. Estonia and Portugal take measures by protecting students’ data with passwords, usernames, etc.
6. EMERGING ISSUES AND RECOMMENDATIONS

1. The report shows that VLE use is at an early stage in Europe’s schools, especially compared with higher education and workplace training. Nevertheless there is considerable interest at all levels. Teachers and students are inspired by VLEs and use them by choice not because they have been obliged to. This suggests the enormous potential of online learning to modernise schooling and help teachers do what they entered the profession to do.

2. Nationally it is clear that VLEs are a high priority for national agencies and ministries. Most are supporting the development of a particular VLE for their schools, sometimes with Commission funding. Yet the evaluation of their value for teaching and learning, and school management is not evident. The EUN ValNet project will obtain some evidence of School of Tomorrow VLEs.

3. Use of VLEs appears fragmentary and there is considerable reinvention of wheels. There is a need for more sharing of practice and lessons learnt. There is some ignorance of what is available, often freely. This report goes some way to overcoming this problem.

4. Teachers need training to use VLEs and their tools in new teaching settings. Investing only in equipment is insufficient, teachers need hands-on training on their use as well as ideas on how to use them in new teaching settings in an innovative way to provide new skills for students.

5. Teachers use VLEs to communicate with other teachers and educational staff both in their own schools and outside. Teachers also use VLEs more in a month than pupils. Teachers adapting VLEs as their professional tools may be one of the most important burdens lifted from hindering VLEs entry to the classrooms.

6. Teachers mostly use VLEs to communicate, assign work, direct pupils to materials and store resources, i.e. VLEs act as a digital distribution place of resource, not an environment for the actual learning experience. Is this because other tools, such as knowledge building tools, are not available or because teachers lack ideas on how to use VLEs for more constructive ways?

7. The mainly used features of VLEs, despite their myriad features, are e-mail and document management. This reflects partly the early stages of online learning in schools. It can also advocate the inadequacy or unattractiveness of other features, maybe usability testing and accessibility issues are not addressed for school users? It can also evoke the tendency of people to use new tools to reinforce or make easier old practices. Therefore some scepticism can be applicable when people report that VLEs are in use; in use as an intranet perhaps but not for virtual learning.

8. ICT is the most commonly taught subject using VLEs, again indicating that we are at the early adopter phase of uptake. However, the second subject is cross-curricular topics and this may open more possibilities for exploring the potential of VLEs.

9. In the area of assessment it is discouraging to see old pedagogies and cultures reinforced, i.e. drill and practice testing of individuals. In future development of VLEs needs more sophisticated ways of capturing learning paths and the processes learners go through in knowledge building.

10. VLEs are more used the older the learner (and perhaps the more motivated). Is this because they are *per se* not suitable for younger children or because older learners are more tolerant of this style of learning?

11. The preponderance of ‘in-house’ and open source VLEs is surprising given the high cost of developing them and the many skills needed. Investigation of the transferability of these local solutions would be interesting on the European level. The choice not to opt for proprietary systems seems to reflect dissatisfaction with off-the-shelf products and their licensing costs, and also an appreciation that a VLE for the school sector has to be of outstanding quality if it is not to disappoint and fail children.
12. VLEs are still at an early stage, products are being constantly improved and the supply is far from mature and stable. Decision-makers at all levels should consider adoption of any VLE as a short-term measure within a longer-term online learning strategy, and be prepared to change to another one as quality improves.

This is only possible if open standards for system and architecture development, content, and user management are used from the start. In-house developers as well as commercial vendors should pay more attention to accessibility issues\(^3\), Web should be a tool used for inclusion, not exclusion.

13. The introduction of VLEs should be seen as a means of enabling desired changes, e.g. management efficiency gains, improved learning outputs, student-centred learning, not as a means of causing them. ICT in general and in all sectors of the economy does not change education; it is a pre-condition for improvement, but not a cause. The evidence in this report suggests that VLEs likewise do not necessarily facilitate the changes thought to follow from their use. It may be that most of the current generation of VLEs are not designed to support learning changes but to deliver distance-learning courses to university students.

14. The teachers currently using VLEs are early adopters, often ICT enthusiasts, who are therefore atypical of the majority of teachers and learners. The views of all teachers and the full range of learners should be taken into account in specifying next generation VLEs.

15. The report was conducted within the available resources. The survey of users, for example, relied on volunteers and this provided a large and varied, but not necessarily, representative response. With more time and budget surveys could be more rigorous and sampling more scientific.

\(^3\) Web Accessibility Initiative (WAI) [http://www.w3.org/WAI/](http://www.w3.org/WAI/)
7. CHECKLIST FOR SCHOOLS

Decided to obtain a VLE? Take a moment to contemplate on the following points.

- **What purpose is the VLE for?**
  “You get what you order” It is good to ask yourself (and your colleagues!) what purpose do you need the VLE for? If is it going to be used as a communication tool in collaborative school projects different functionalities are needed than when having a Learning Content Management System that interfaces seamlessly with the rest of your school’s administrational system.

- **What kind of a VLE to obtain?**
  Get information from user-groups, other users, and ask your colleagues for experiences and best practices. You have plenty of options; the field of VLEs is near to saturation soon. There are different off-the-shelf products or are you going to opt for free software or open source applications?

- **What kind of resources do you have?**
  It is not only about money, it’s also about time, time, and time again.
  It’s good to think how much money do you have to put into a VLE. Think about the maintenance costs and about administrating the system. And don’t forget about the training of the staff! It is absolutely no use to buy a system if you are not going to train and motivate your staff. More complicated VLE requires more training!

- **Pedagogical aspects**
  Are you planning a whole pedagogical shift to come along a new VLE or is it going to be a complementary element in the teaching? Think how much learners can benefit of the VLE if you set clear pedagogical targets and educational objectives for its use. Collaborative projects can be great motivational push for students, but you can also support learners’ cognitive skills with a VLE that has build in pedagogical guidance.

- **Security**
  Take the safety of your learners seriously. Make them to read the privacy policy, use passwords to sign in, and make them to understand that the netiquette rules on the Net!

- **Standards**
  Think if you need a system that conforms to existing eLearning standards. Do you create and transfer content into and out of your VLE? Are you going to link the VLE to some other applications in your school, is the system compatible with the wider ICT infrastructure of your school?

- **Accessibility**
  Accessibility for all is enormously important issue! Web should not exclude anyone regardless his or her impairments. Make sure that the VLE you are about to select conforms to World Wide Web Consortium’s Web Accessibility Initiative (WAI)\(^34\).

- **Problems?**
  Try to envisage possible problems and hurdle to overcome. Being well prepared helps you to face them!

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\(^34\) Web Accessibility Initiative (WAI) [http://www.w3.org/WAI/](http://www.w3.org/WAI/) and QUICK TIPS TO MAKE ACCESSIBLE WEB SITES at [http://www.w3.org/WAI/References/QuickTips/](http://www.w3.org/WAI/References/QuickTips/)