

An e-Learning Strategy for Africa based on Open Source Experience in Europe

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Abstract: Teaching using the Internet requires adequate Learning Management Systems (LMSs). Experience with such commercial and open source software tools in Europe extends now over nearly ten years. As an introduction, the strategies followed by commercial vendors and open source initiatives are analysed. Then the largest LMS open source initiative in Europe, CampusSource, is introduced and its evolution, present status, current experience and future trends described. The next aspect discussed is open content. Experience with open content worldwide, has been rather disappointing, however open content is of high relevance for Africa. A recent open content initiative CampusContent is introduced and its aims are described. A short glance at future trends leads to some strategic conclusions relevant for all institutions in Africa involved in teaching using the Internet.

Keywords: e-Learning, Open Source, Open Content, CampusSource, Campus-Content

1. Introduction

Appropriate tools, suitable content and adequate online tutoring are essentials for successful e-learning. In the following paper these aspects are reviewed in light of experience made in Europe with the aim of formulating a suitable e-learning strategy for African universities.

Many e-learning providers (universities, authors and tutors) do not realise that they need tools to handle content, administer students, support staff and manage tutoring and communication. They develop their own environment and thus waste a lot of time and effort, because they are basically trying to reinvent the wheel. Others decide to use a commercial e-learning platform. There are over 350 platforms to choose from and several hundred relevant criteria for the choice. One has to identify ones own individual relevant criteria and their importance and then evaluate available platforms accordingly [1], [2]. This is both a time and effort consuming process. We propose an alternative approach based on open source. The fundamental idea behind open source is the common use and mutual development of software. Open source software can be downloaded and used free of charge. The documentation, usually including an installation guide and the source code are freely available. The software can as such be modified, improved, adapted for different applications and generally enhanced - the only requirement being that a copy of the altered software has to be made available for common use. Usually a community of users and developers emerges, which supports the further development of the software, its de facto standardisation and influences the direction of future development. The conditions of use and modifications of the software are fixed in an appropriate license agreement. The best

known license today is the GNU General Public License (GNU GPL) [3], which also allows commercial utilisation of the software.

The second essential element for e-learning is suitable content. Good multimedia content is very cumbersome and expensive to produce. Today a number of repositories offer open content. Our survey has shown that although a large amount of multimedia content is available in these repositories, the reuse of this content is very limited [4], [5], [6], [7]. The content of information (entropy) of the materials is high, but the pedagogical level rather low. In view of this situation the only suitable approach is to find partners, who possess appropriate content and are willing to enter into a partnership with African universities.

Our observation of the development of tools for teaching in the network leads us to believe, that in a few years, these tools will emerge as standardised software available for general use (generally at either a very low cost or no cost at all) – just as operating systems today. Thus they will not be a distinguishing feature of a university. A somewhat similar development can be expected in the field of multimedia teaching content. We will have some standard materials of very high quality being used by many institutions and of course a lot of attempts to reach this standard. However, we do not expect multimedia content to become the distinguishing feature of a university. What will make a substantial difference is the supervision and the coaching offered to students online. This is an important aspect for African universities and should be followed up on accordingly.

2. Tools for teaching in the network

An electronic platform (commonly referred to as learning management system) is an elementary requirement for teaching in a communication network using new media. The basic features of a platform are: administration of students, management of content, support of authors and tutors and organisation of the communication and tutoring.

If an educational institution seriously intends to use new media for its teaching, it has the following four possibilities to choose from in order to realise a platform: proprietary development, commercial product, open source product and application service provider.

With a proprietary development it is possible to implement the intended business case exactly and to integrate the existing infrastructure in the platform design. Since the source code is available and was developed by oneself, one has a great flexibility and is not dependent on others – particularly on commercial suppliers and service providers. However, this kind of solution is unreasonably expensive and therefore only appropriate for large companies and institutions with high financial and developmental resources or if very special application requirements have to be fulfilled.

Currently, commercial solutions are still relatively inexpensive to begin with and usually offer extensive features. However one's own corporate identity is restricted and the business model is basically determined by the commercial software. Since commercial providers generally do not make source codes available, one is seriously restricted in case extensions or modifications are necessary. Usually commercial providers bind their customers through licensing, versioning and compatibility policies, which lead to a vendor lock – an expensive affair. The commercial market is in a stage of refinement after which the costs of primary installations and the licenses both will rise. One also has to face the risk that the vendor one chooses might not survive the refinement process.

Open source solutions are the alternatives with the lowest costs, both in acquiring the software and in operating the system. Since all source codes are available, they are as flexible as proprietary development as far as extensions and modifications are concerned. Usually open standards are used for the development, which means that product compatibility is high and one is not dependent on any commercial provider. Particularly for university applications, many matching solutions are available. However a number of tools offered are not mature enough and neither tested nor appropriately documented. It is

recommended to participate in the respective user and developer communities, to get an accurate impression of the product considered. Since open source products for e-learning have become available quite recently, commercial support for them is frequently not available.

Today a number of application service providers run commercial or open source learning management systems and offer all services required for teaching in the network to educational institutions. The services offered can be very diverse and range from common portal and management systems to enhanced dedicated outsourcing. With respect to the total cost of ownership, such solutions are very attractive, particularly when there is a shortage of own manpower. On the other hand one is heavily dependent on the service provider, has little flexibility and is restricted in the choice of ones own business model.

3. Open Source Initiative CampusSource

From 1996 to 1999 the Ministry of Science and Research of the state of North Rhine-Westphalia (NRW), in Germany financially supported a great number of projects with the goal to develop e-Learning infrastructures and e-Learning content in the framework of a research programme. As a result of the research programme several research platforms were developed at universities in North Rhine Westphalia. To make the result of this work available to the general public, the ministry decided to setup the CampusSource initiative with the goal to bundle efforts, use synergies, share competences and experiences and invest in parallel development instead of leaving each project to reinvent the wheel. Since the tools, which have been developed so far were research prototypes, they had to be adapted to be operational platforms and meet one of the fundamental requirements of CampusSource software, which is Open Source. The adaptation process started in 1999 and lasted two years.

When the CampusSource pool was launched in 2001, 6 tools were available in the CampusSource pool, which had been developed between 1996 and 1999 at universities in NRW. Today eighteen different tools - a growing number of them from other universities outside North Rhine-Westphalia - including ten complete electronic platforms are available in CampusSource and an active community supports their development (see www.campussource.de for further information). A number of small and medium sized companies offer support for these tools on a commercial basis. In the meantime software and documentation, originally in German, is also available in English.

Figure 1 shows the growth in registered users at CampusSource. The numbers are consolidated in a way that each institution is counted only once, even if several members of an institution are registered. This means for example that a university is counted only once, even if several departments are registered and use different tools from the CampusSource pool. We have more than 4000 registered users – 2500 from Germany and 1500 from more than 100 different countries. Figure 2 shows the countries with more than 15 users. Figure 3 shows that apart from universities the CampusSource pool is also used by enterprises, educational institutions and private persons.

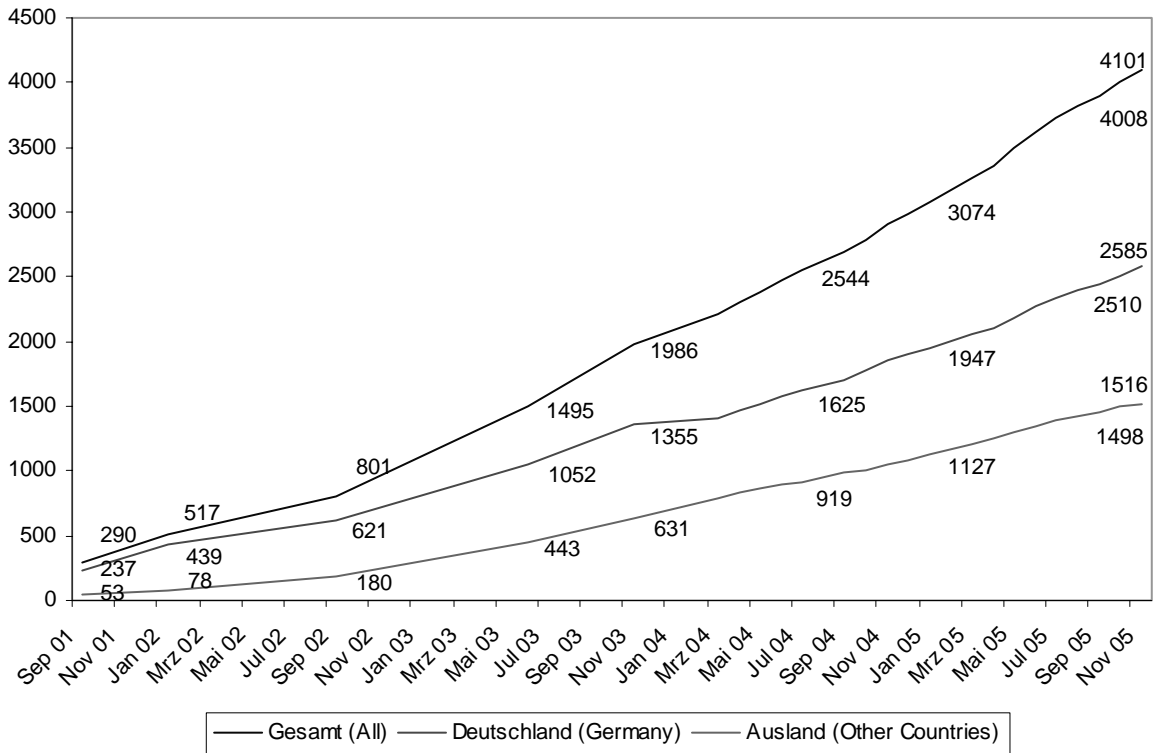


Figure 1 Growth in registered users at CampusSource

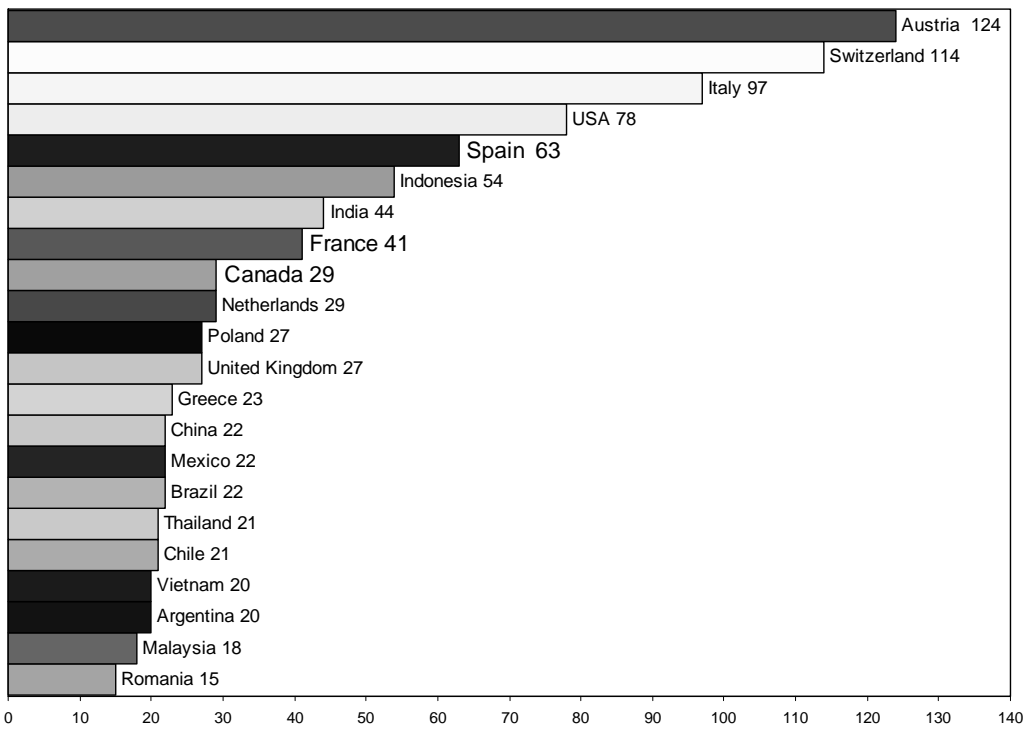


Figure 2 Countries with more than 15 CampusSource users

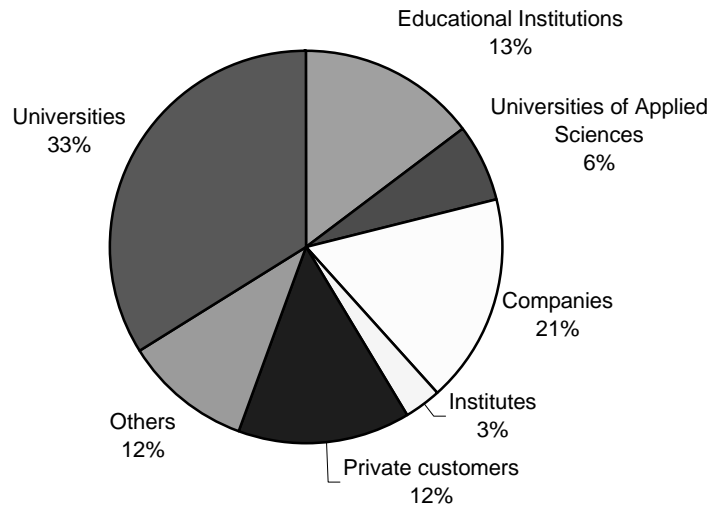


Figure 3 Distribution of CampusSource users

The growth in demand for open source tools has led to a community of more than 40 small and medium sized enterprises, which participate as service providers for CampusSource products. Recently qualified service providers will be listed on CampusSource homepage, with the services they provide and a link will be made to their offers.

In the meantime several universities have applied for systems and tools developed by them to be included in the CampusSource pool. The enrolment procedure begins with a rudimentary check of the suitability of the software as an open source product by the CampusSource secretariat and two reviewers. On one hand some legal issues have to be dealt with (free from copyright of others, no commercial software used) and on the other hand the product must be easy to manage (install, run, use). The present trend indicates clearly that the number of systems in the CampusSource pool will steadily increase in the near future.

A large number of competing open source systems in the CampusSource pool also means that only a small community of developers (which fosters and enhances the software) can be built for each system. It also implies that basic functionalities are developed several times in the already available systems which, of course, is a waste of development resources. On the other hand to restrict the number of systems in the CampusSource pool by decree is surely not a reasonable choice. Thus, another alternative has to be found, namely to achieve a certain convergence of the available systems.

A somewhat similar constraint emerges from the user's point of view. Most users find that no single system completely satisfies all their requirements. At best, they would choose several functionalities from one system and some others from other systems. This of course is seldom possible, since even if available standards are met, compatibility at a functional level is not reached. This is because the architectural concepts followed and the interfaces implemented in the individual systems are often very different. Therefore, modularity on a functional basis and convergence of the available systems will be a major issue in future, the ultimate vision being an extremely modular architecture with extensive compatibility. In this vision e-learning providers enumerate the features they require and put together software modules, which build an appropriate e-learning environment. This would be fully

individual and highly scaleable and also enable different (pedagogical) e-learning scenarios. Users (students, teachers, administrators) would on the other hand be able to choose their individual working or learning environment. Such modularity on a functional basis using component standards (EJB) and the mentioned convergence of systems and tools using integration technologies (Web Services, JMS) are an urgent requirement of the future. A first approach in this direction has already begun (see [9], [10]) and is being actively pursued by the CampusSource community as well as the definition of a join Document Type Definition (DTD) to share documents in XML format (existing standards e.g. MathML, QTI, CALS, SVG are integrated as modules) and a related Rendering Framework for cross-media publishing. The production of SCORM packets is also intended.

4. Open Content Initiative CampusContent

In the past a vast quantity of multimedia content was produced in different projects. Prominent examples of such projects are MIT's "OpenCourseWare" [4] in which more than 700 courses in 33 different subjects are offered on the internet, and the German BMBF project "Neue Medien in der Bildung" whose product list encompasses nearly 400 pages [6].

Freely available content, however, is hardly ever used by teachers despite the high costs involved in producing high quality multimedia content by oneself. Thus the acceptance is very low. To overcome this low acceptance response is a main concern of the project CampusContent [7], which has just been launched at the FernUniversität in Hagen. It will run for five years and is funded by the German Research Association (Deutsche Forschungsgemeinschaft – DFG). The main idea is to have very fine granular learning object modules, which are well documented by metadata, easy to find and to reuse. This should, for example, enable professors to use the learning object modules in their lectures without having to fear that their lecture notes become unrecognizable or that the feeling, "this is not my lecture anymore", comes up.

A multidisciplinary approach is being pursued in the project CampusContent to establish and run a service centre for the production, collection, quality control, dissemination and reuse of modular multimedia teaching materials for information technology, science and engineering on open content basis.

The major aim of the project is to establish content oriented communities for teaching, learning and research and to support them by methodical, technical and administrative measures. The approach includes the design of a course development model, the realisation of a software technical framework and support tools for the development of component oriented teaching and research materials. Furthermore, some basic representative content components from several relevant fields and various media presentation forms will be developed and presented, in order to further animate material development activities and the use of available materials. For further information refer to [7].

5. Strategic considerations

We now turn to formulating some possible strategic issues;

- African universities and educational institutions should concentrate on using available and tested open source tools for teaching on the internet e.g. one from the CampusSource pool. Since these tools are open source, the advantages of open source software which were previously enumerated can, on the one hand, be utilised. On the other hand, one of the main problems of open source products is the lack of support. This problem can be solved by local small and medium sized enterprises which offer support services for open source tools, which vary from hotline support, complete installation and training course to adaptation and order programming. Providing support

means that a profound knowledge of technologies used for the development of the tools has to be there. This is a good opportunity for small and medium sized enterprises to enter into co-operations with CampusSource. The enterprises could have a look at products used for support services in Germany, participate in discussions, workshops and intensive training courses. They would then be able to support the products locally in Africa.

- Another strategic issue with regard to e-Learning in Africa is the building of well organized local communities which can operate locally and at the same time be attached to the international community. The building of local communities will encourage local co-operation and use of synergies. Joining the international community will enable African universities to share experience and knowledge, discuss about current development and future trends and most importantly to build co-operation networks which are vital for sustainable e-learning in Africa.
- Further, African universities should find strategic partners who are willing to share their multimedia content on an open content basis. Here particularly distance teaching institutions are of major importance, since they generally have exhaustive high quality multimedia teaching materials. Eventually African universities should reuse modular open content to prepare their own teaching materials. In this context modularity is extremely important and a key component with regard to “localisation of content” as it is a fact that monolithic content or complete courses can not be easily reused and therefore adapted to new contexts, in this case to the local situation in Africa.
- African universities should train their staff to use tools for teaching using the internet and choosing as well as using available materials. They should also be trained to enhance and modify available (open content) material and produce their own new material according to their own needs as well as local didactical and educational methods.

References

- [1] Virtual Learning Community (in German),
<http://www.virtual-learning.at/evalplattform.htm>
- [2] Online educational delivery applications: a web tool for comparative analysis,
<http://www.edutools.info/course/productinfo/index.jsp>
- [3] GPL-License
www.opensource.org/licenses/gpl-license.html
- [4] MIT's OpenCourseWare
<http://ocw.mit.edu/index.html>
- [5] Ariadne
<http://www.ariadne-eu.org/>
- [6] BMBF project “Neue Medien in der Bildung” (in German)
<http://www.medien-bildung.net/>
- [7] Homepage CampusContent
www.campuscontent.de
- [8] Homepage CampusSource
www.campussource.de
- [9] CampusSource Reference Architecture
<http://www.campussource.de/org/projects/>
- [10] CampusSource Engine (in German)
http://www.campussource.de/projekte/CSE_HIS.html