More for Less – Live Systems Learning

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Abstract. The Input aims to show the implications of Cloud Computing for learning and working and will discuss how schools' ICT concepts and media competences might look like. But local, affordable solutions will be considered as well. Particularly in the absence of the financial means necessary to purchase expensive hardware and networks, local solutions could be favoured. For these purposes the School for Teacher Education at the University of Applied Sciences Northwestern Switzerland has developed the "Lernstick".

Keywords: Cloud Computing, Learnstick, media competences, ICT concepts for schools

1 Introduction

The concepts of "Cloud Computing" and Saas (software as a Service) have occupied a central position in recent discussions about their relevance in schools. To put it simply, they promise access to software directly over the Internet. Instead of being available locally on a computer, software is provided to users via Web services. In terms of costs, this model creates advantages because the amount of money spent on the support of the individual PC and its software can be reduced significantly. In return, reliable broadband Internet connections are necessary.

The development towards "Cloud Computing" is also taking place within educational contexts. It requires high-capacity connections to all classrooms as well as suitable software for teaching. On a didactical level, new questions will be raised. In particular, discussions about the possible implications of a gradual relocation of learning contents from the classroom to digital spaces will become essential.

New questions will also be asked about the consulting of schools regarding the acquisition of new infrastructure. Does it make sense to continue investing in servers and providing classrooms with expensive hardware? Or would it, in the near future, suffice to opt for cheaper local solutions and to invest in high-capacity networks for every classroom and school area instead?

The input aims to show the implications of "Cloud Computing" for learning and working and will discuss how schools' ICT concepts might look like in the future. Local, affordable solutions will be considered and will play a central role. Particularly in the absence of the financial means necessary to purchase expensive hardware and

networks, local solutions should be favoured. For exactly these purposes "imedias" Consulting the use of digital media in class at the University of Applied Sciences Northwestern Switzerland, School for Teacher Education, Institute of Further Education (www.fhnw.ch/ph) has developed the "Lernstick" (http://www.imedias.ch/lernstick). It will be part of the presentation and available as a download to participants.

2 Global Internet Applications or Local Computer Platforms?

Schools continually renew the computer systems installed in their classrooms, corridors or computer labs. The relocation of many applications to the Internet, keyword "Cloud Computing", raises the question whether schools should continue to invest in technical infrastructure in the same scale as they do today. Against the background of limited financial resources this question becomes increasingly pressing.

Taking into consideration both the protection of resources and the simultaneous adherence to didactical promises, two different models for the didactical use of ICT will be presented. The first model makes reference to fast networks and applications on the Internet, while the second approach examines local solutions that do not require fast exchanges of data. Both models can be combined and scaled for their use in teaching.

3 Model 1. The Applications Are Available Online - How Does Cloud Computing Work?

Put simply, on the one hand, Cloud Computing facilitates the use of an IT structure at a specific location, such as a school. On the other hand, the existing IT structure obtains applications from the Internet without the need to install them on the local hard disc. The applications are purchased and used as required. However, a universal definition of the concept Cloud Computing does not exist.

From a historical point of view, the development to Cloud Computing could be compared to the industrial revolution at the end of the 19th century [1]. Electricity was originally produced with hydropower in the factory itself. Later, the production of electricity was outsourced to large, decentralised power plants. Thus, the industry switched from a self-supply model to an external supply model and had the amount of electricity required delivered directly via power lines to the factories. For that purpose, the necessary infrastructure had to be built and made available. At around the same time, it also began to supply individual households with electricity.

In a similar way to how electricity was starting to be distributed back then, broadband Internet connections now deliver applications, which do not need to be generated locally anymore. Today, Cloud Computing is a reality and applications have become a scaleable commodity.

3.1 Use of Cloud Computing

By opting out of installing permanent applications, schools can access applications over the Internet. They are either free of charge or subject to a subscription model, according to which users only pay for what they consume. Thus, it becomes conceivable for schools to upgrade their own IT infrastructure dynamically with additional resources from the "cloud" and to adjust their learning environments to the respective requirements.

3.2 Advantages of Cloud Computing

- IT infrastructure is easily scaleable, flexible and adaptable
- Data storage without server maintenance by school
- Schools do not pay for operating costs
- Schools do not need expensive system management

Braun et al. [2] distinguish between three different Cloud Computing architectures from an organisational point of view: Public Cloud, Private Cloud and Hybrid Cloud. According to them, a Public Cloud includes "the range of clouds, where the providers and the potential users do not belong to the same organisational entity"[1]. A Public Cloud bears risks that cannot be neglected in an educational context, in particular with regards to [3]:

- Data safety
- Availability of services
- Sensitivity of data stored on servers that cannot be controlled

The Private Cloud is considered to be a closed system, within which applications and user groups are clearly defined. Users obtain the necessary applications centrally. This model is interesting for educational institutions, if large schools decide to share the use of a server farm. Thus, the closed system remains manageable and facilitates the creation of e-learning environments.

However, hybrid models that incorporate both a Private and a Public Cloud seem more realistic for educational purposes. Hybrid models possess a closed area that is only available to students and teaching staff, yet they do not prevent the use of Public Clouds. This solution could have various advantages for schools. Many applications would not need to be installed on each computer. Keeping servers in each school would become superfluous. Applications could be obtained and paid for according to the actual requirements. At the same time, the use of Public Clouds, such as Google Docs, remains a possibility.

[1] My translation

4 Model 2. The Local, Low-Cost Solution "Lernstick[2]"

The aim of the "Lernstick" is to provide schools with access to an efficient working and learning tool. The central idea of the "Lernstick" is based on the combination of the potentials inherent to Live-Systems on a USB-stick and the possibility to develop a learning environment that responds to the pedagogic needs of a school.

The "Lernstick" was designed as a portable learning space to be used flexibly in educational (as well as extracurricular) contexts. As a pedagogic and didactic learning and working tool it balances out its disadvantages vis-à-vis the Internet by providing students with a well-structured personal learning environment, whose content, on the one hand, is oriented towards educational objectives, yet on the other hand, it remains individually organised. Using the "Lernstick" helps developing both the students' media competencies as well as their ICT skills.

The "Lernstick" was conceived across several school levels and disciplines. Thus, it gives students access to a diverse range of contents – from language class to mathematics and IT-skills – depending on their individual interests and needs. The "Lernstick" is a tool that can be implemented flexibly and in many different ways by teachers – as a mediator during periods of instructional learning, as a learning support during periods of individualisation and as a communication medium for cooperative learning.

The "Lernstick" encourages the use of media and ICT and makes a valuable contribution to the acquisition of media competencies. Its concept is based on a technological solution that relieves schools from having to pay for elaborate and expensive support and instead allows them to focus on pedagogical questions about media education.

The concept of Live-System-Learning is an artificial expression made up of the words Live-System and e-learning. The 'e-' has been replaced by Live-System in an attempt to highlight the specific form of learning with digital media facilitated by the "Lernstick". Teachers and students have the possibility to learn from and with contents that are located directly on the data carrier. As a result, learning content is independent from spatially fixed computers, operating systems and networks. This way of supplying learning content and its use for educational purposes is called "Live-System-Learning" (LSL).

The "Lernstick" has been evaluated within the framework of a master thesis [4]. Further research projects are being carried out at the moment. A master plan [5], prepared by imedias, shows the "Lernstick's" potential for development, but also its boundaries.

5 Combining Both Models

In a client-server environment, which is being re-launched in an updated form by Cloud Computing, the "Lernstick" becomes a personal working space for students.

[2] USB-stick, based on Debian GNU/Linux system and software, www.imedias.ch/lernstick

Data that needs to be available locally can be stored on the "Lernstick" without having to use individual memory space within the school.

However, the "Lernstick" offers more than the transfer of data. It can become a space for learning environments that cannot be accessed via the Internet, either for legal reasons or because of the lack of financial resources. "To refine this view we have to consider the different levels of interaction that accompany this process. Here we find a progression from the level of individuals to the level of communities, and, finally, to the level of organisation. During the maturing process from expressing ideas to formalization we find patterns in the flow of knowledge from the individual to the organisational level." [6]

5.1 Pedagogic Concept that Combines Local and Web-Based Applications

The media are used to accomplish developmental tasks. What this means is the acquisition of skills and competencies that are necessary for a constructive and satisfactory conduct of life within a specific society [7]. This process is to be encouraged and supported. The adoption of one of the two models, or the combination of both possibilities, is based not only on economic, but also on pedagogic, cultural and education policy considerations.

Media Competence. Following the model of Dieter Baacke's [8] media competence defines the ability to use the media and their contents in a goal-oriented and needs-oriented way. Baacke distinguishes between four different dimensions: media criticism (analytical, reflexive, ethical), knowledge of the media (informative, instrumental, qualificatory), media use (use through reception, offer interactivity) and media design (innovative, creative, aesthetic). Media competence is activity based. In particular it is concerned with knowledge and skills.

Media Education. Media education expands the idea of media competency with the dimensions of reflection and behaviour. According to this concept, the media are an integral part of culture; they are a means for comprehensive education and form the background for education. In relation to lifelong learning, media education is considered to be a process "[…] in which the adolescent and the adult is building a critical distance to the media and their further developments throughout his entire life and takes a position of responsibility towards media and their handling"[3] [9]. In a context of pedagogy, Kerres et al. [10] stress that media education links the two different aspects of education towards the competent use of media on the one hand, and the competent use of media for educational purposes on the other hand. Therefore, media competence becomes part of, and at the same time prerequisite for, media education.

Media Socialisation. Socialisation describes the interaction between the subject and its environment that leads to individual development and self-discovery within a

[3] My translation

social context [11]. Children do not simply adapt to their environment but actively interact with it and participate in its creation. Hence, what is important is not the assimilation of the subject to its environment but the meaningful interrelationship between the individual and its surroundings. Media socialisation is influenced by educators, peers, the individual and the social frameworks, which create possibilities and impose restrictions on the use of media and their contents. It is a two-way process (reciprocal socialisation).

Media socialisation of children and adolescents includes all aspects, within which the media play an important role for the psychosocial development of young adults [12].

Communication media. Communication media support communication practices among students as well as between students and teachers. This stretches from educational supervision in a chat room to communication via e-mail, flipcharts used by a group of students to create a mind map, a blog (an electronic diary), or a wiki that enables the collaborative development of a text.

Net didactics. Moser [13/14] describes a net didactics that does not emphasise the importance of techniques but shows a new learning culture. The aim is to teach students how to learn with digital media in order to prepare them for a knowledge-based society. The requirements of Web 2.0 are the central focus of net didactics. In addition, Moser shows the didactic forms of representation and models that are available to a net didactics. He presents the didactic star as a model for the integration of media in the classroom. Moser distinguishes between mediation media, media-based learning aids and communication media.

6 Conclusion

The combination of Cloud Computing and the "Lernstick" brings into existence an interesting Personal Learning Environment (PLE). Two topics emerge for discussion: Will it be possible to meet the expectations we have for media education with the help of these tools? Which future investments will still be necessary in the area of education to ensure an up to date ICT infrastructure?

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