GD Bildung und Kultur
Programm für lebenslanges Lernen

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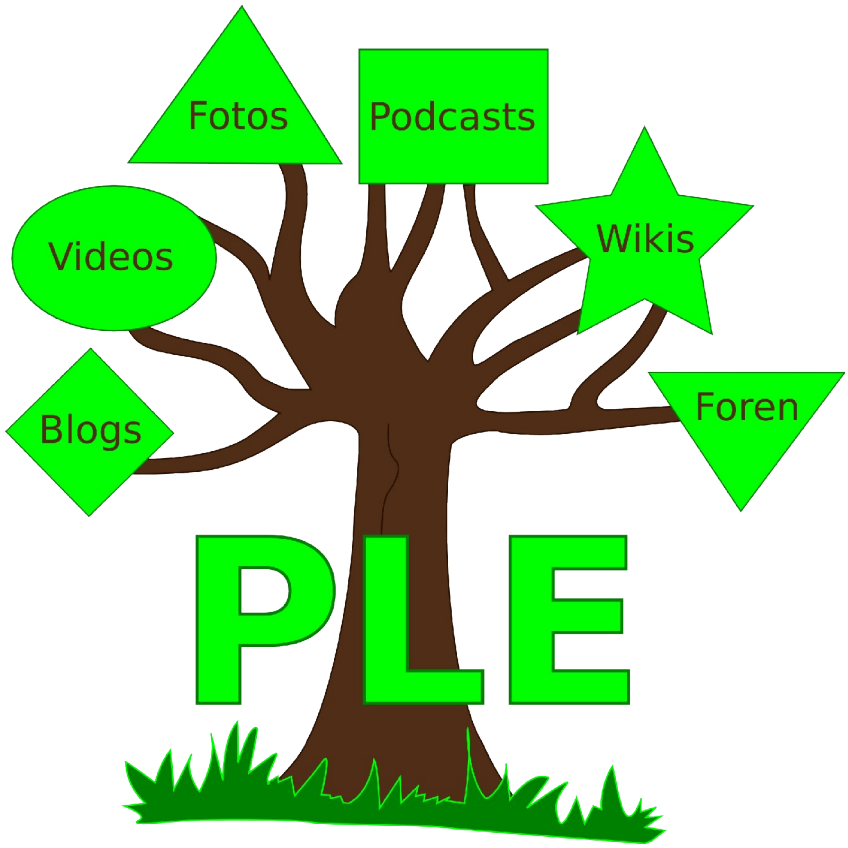

PLEbaum - Guide

Printable version of the project-guide located at http://www.plebaum.eu

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1. Summary

PLEbaum was selected for funding under the annual Call for proposals of the Lifelong Learning Programme in autumn 2009. This project has been funded with support from the European Commission within the Leonardo da Vinci programme. We started in December 2009 and finished in November 2011. The project is managed and coordinated by LVG Heidelberg. The project partners which come from four European countries developed and implemented a Personal Learning Environment (PLE) in arboriculture and forestry by using Web 2.0 technologies like wikis, blogs, podcasts etc.

The project focuses on innovative companies and educational institutions in arboriculture which are looking for a learning management system for individual and efficient knowledge processing.

We focus on two target groups: on the one hand, we created a PLE for the schools and training centers involved in this project under the context of the topic “climate change and its consequences for urban trees”. For the students we built up a common infrastructure with different Web 2.0 technologies so that they were able to produce and study content on their own or together with other students. On the other hand, we aimed at arboricultural firms which are involved in this project as associated partners. Th0se firms are mainly located in Baden-Württemberg, Germany. In the firms we also wanted to establish a PLE which shall improve the flow of information and enable a more productive and efficient work in the working process. A special transfer coach counseled and coached the firms for example by checking the possibilities of supporting the communication process with different Web 2.0 technologies. So what we expected for our target groups - mainly low-skilled workers - is a learning outcome in terms of practical media competence as well as in terms of knowledge. So the PLE which meet the different needs of the target groups will improve their practical, methodological, media and social skills and so contribute to a higher competitiveness and maintenance of the employability of the employees. The main result of this project is this English-language guide. Here we are reflecting and evaluating our experiences gathered during the project and giving recommendations for other persons and institutions interested in this matter.

This guide shows how to implement a Personal Learning Environment (PLE) in arboricultural firms and arboricultural training centers. With the help of different web 2.0 tools (wikis, videos, blogs, podcasts etc.) integrated in this special user-interface, it is possible to document experience and knowledge of students, employers and employees. The PLE contributes to a new kind of knowledge management and is also suitable for the introduction and training of new employees in the companies.

2. Introduction

Aims and target groups

The project focuses on innovative companies and educational institutions in arboriculture which are looking for a learning management system for individual and efficient knowledge processing. On the one hand the target groups of this project are represented by arboricultural employees and employers of small and medium enterprises (SME) and on the other hand by teachers and students in arboricultural schools. The professional, media, methodological and social competence shall be enhanced in the context of lifelong learning and so contributing to a better competitiveness and employability. Also, the efficiency and productiveness in the SME and schools shall be improved.

Which company did not experience this scenario: a long-standing employee in responsible position is leaving the company. Normally, he took his valuable professional knowledge completely with him. If a knowledge management system would have been exist, this professional knowledge could have been stored. Thus, this information would have been available for the company, independent from time and place, also with regard to the induction of new employees.

The theme e-learning in schools is being discussed for a long time and constitutes a main project in the education policy. Present learning systems supporting normally formal, institutional learning as required by classical theories of learning. In contrast, new learning theories are trying to meet the requirements of the societal change towards lifelong learning by including informal learning situations as well (Drummer, J., 2011). The European Commission defines in its action plan as follows: "E-learning shall encourage the acquisition of competences and knowledge, which are necessary for the personal and professional development and for an active participation in an information-oriented society" (Europäische Kommission, 2005). Web 2.0 technologies open up new possibilities op participation, interaction and motivation of learning.

Project progression

In the project we developed a so called Personal Learning Environment (PLE) which integrates on a common user interface different web 2.0 technologies like podcasts, videos, wikis etc. The users of the PLE can adopt and exchange knowledge in formal and informal learning processes among colleagues and classmates. The project consortium consists of participants from four different European countries. Except of the IT specialist all other project partners are arboricultural experts. Their years of experience and their knowhow is the basis for the success of this project. The partners at the arboricultural schools are involved in a big network of important contacts to national committees and other disseminators.

The project started with an assessment of demand in the above mentioned schools and SMEs which gave important cognitions for the development of the PLE and the methodological conception. With this information the IT specialists in the consortium conducted a market analysis and selected a freeware tool called "TikiWiki" as a prototype for the PLE. The partners developed the pedagogical and didactical concept with the support of a college of education which was involved in the project as a subcontractor. The mentioned target groups tested and evaluated the PLE in the schools and SMEs. Students produced content in the PLE in the context of climate change and its consequences for urban trees. A special transfer coach - an arboricultural expert from the project consortium- supported the SMEs. The results of the evaluations in the project and also the evaluation results provided of an external institution serves for optimizing the PLE and the didactical concept in an

iterative way. All the experiences which are gathered during the project will be published in this English language guide for free. It gives concrete recommendations for the implementation of a PLE in schools and SMEs. It is also published at the project homepage www.plebaum.eu. The results were presented in the final symposium in September 2011 as well.

What is Web 2.0?

The term web 2.0 rings out everywhere, is present everywhere and there is much discussion about this topic. However, not everybody knows exactly what this term implies. As the name itself implies, there should have been existed a web 1.0. Web 1.0 is a synonym for the first web generation. It could be considered the "read-only web". In other words, the early web allowed us to search for information and read it by linking webpages with hyperlinks. For many people web 2.0 means a changed perception and use of the internet less a technical development. The user gains in importance and emancipating itself from the information consumers to an active participant of contents, communities and services. The "read-only web" turned into an "interactive web". More information about the differences between web 1.0 and web 2.0 you will find here. The instruments which make this interaction possible are web 2.0 tools e.g. wikis(texts), videos, photos, podcasts (audio) etc. By using this technology everybody is able to upload certain content on platforms like e.g. social networks (facebook, xing etc.), blogs, forums,wikipedia.

What is a PLE?

Personal Learning Environments are systems that help learners take control of and manage their own learning. This includes providing support for learners to:

- set their own learning goals
- manage their learning, both content and process
- communicate with others in the process of learning

A PLE is an open learning platform provides web 2.0 tools which enables learners to use the internet passive and active. This learning environment adapt itself to the individual learning situation. The social network facebook is a very good example for PLE.

Mohamed A. Chatti, computer scientist at the university of Aachen/Germany, defined Personal Learning Environments: "A PLE is characterized by the freeform use of a set of lightweight services and tools that belong to and are controlled by individual learners. Rather than integrating different services into a centralized system, the idea is to provide the learner with a myriad of services and hand over control to her to select and use the services the way she deems fit. A PLE driven approach does not only provide personal spaces, which belong to and are controlled by the user, but also requires a social context by offering means to connect with other personal spaces for effective knowledge sharing and collaborative knowledge creation (Mohamed A. Chatti).

Who are Digital Natives?

The term Digital Native is formulated in the public first by Marc Prensky, an author, game designer and consultant. In 2001 he published the article Digital Natives, Digital Immigrants on a platform for educators named On the Horizon. Prensky uses these terms to describe a change of information reception and learning behavior he noticed on people who grow up with the use of digital technologies (internet, smartphones, social networks etc.). The antonym of digital natives are digital immigrants who have grown up with the classic media and teaching methods.

Prensky uses these terms for drawing a parallel to the American history of the 19thcentury, when

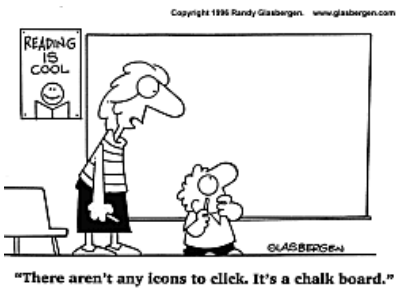
mainly immigrants from Europe came to America and came in contact with the American natives who had been adapted to the conditions of the continent over thousands of years, while the settlers often suffered and died from hunger and diseases.

In 2001 Prensky describes the digital natives as the pupils up to the College, other authors define the digital natives as born after 1980 and the digital immigrants as the generation born before 1970.

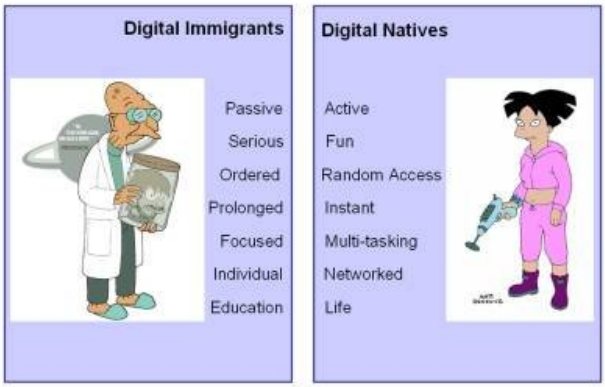
What are the differences between Digital Natives and Digital Immigrants?

Prensky sees differences in reception, storage and reproduction of information. In some popular publications is mentioned that digital natives prefer receiving information from different sources at once while digital immigrants prefer the recherche of single limited sources. Digital immigrants prefer the printing of documents for reading.

Digital Natives	Digital Immigrants
Prefer receiving info quickly from multiple sources	Prefer controlled release of info from limited sources
Prefer multitasking and parallel processing	Prefer single or focused tasks
Prefer pictures, sounds and video before text	Often prefer to get information from text
Prefer user-generated content, hyperlinked sources and interacting in real-time	Prefer the info being presented linearly, logically and sequentially
Prefer instant, relevant learning with fun	Have a greater need for private and personal space for introspection
Prefer networking	Prefer individual working



"There aren't any icons to click. It's a chalk board."



Some Cartoons dealing with the theme of the conflict between Digital Natives and Digital Immigrants.Discussion:While some authors fix the terms Digital Natives and Digital Immigrants to the age of the person, other authors and educationals say the age of a person is not necessarily related to its way of using web 2.0: some older persons are more familiar with the usage of new ways of communication because they adapted these technologies very well than some young people who prefer the classical ways of communication, reception and learning. They say the behavior of a person towards web 2.0 is more adequate to judge him or her as a digital native or a digital immigrant. Because beneath the age other factors have important influence, as the social surroundings, the flexibility of thinking, the grade of education, the availability of web 2.0 technology etc. So some people's claims for a revolution of teaching in schools and universities has no scientific foundation and is overdrawn.

http://www.marcprensky.com/writing/Prensky - Digital Natives, Digital Immigrants - Part1.pdf
http://www.zhw.uni-hamburg.de/pdfs/Schulmeister_Netzgeneration.pdf

3. Assessment of demand

3.1. Results of assessment of demand in schools

The assessment of demand in the schools was made in the LVG Heidelberg, CFPF, Inverde and IPC. The investigation has been realized to find out how the knowledge transfer is carrying out between the students and the teacher and among all students. Furthermore, we wanted to know which expectations students and teacher have by working with a PLE. Based on this results appropriate web 2.0 tools for optimizing the existing knowledge management should be determined.

Results

In all schools was the formal learning, means the classical teaching style, the primary way of knowledge transfer between the teacher and the students.

The expectations of the students and teachers on a PLE were:

- easy to use
- self-explained
- benefits of this kind of learning should be obviously
- they need external technical support if problems are occurring
- trainings for the use of the new technology (external courses)

3.2. Results of assessment of demand in companies

The assessment of demand in companies has been realized to find out how the knowledge transfer is carrying out in the companies. Furthermore, we wanted to know which expectations employers and employees have by working with a PLE. Based on this results appropriate web 2.0 tools for optimizing the existing knowledge management should be determined.

Results

The size of the companies supposes that the tradition of oral transmission of knowledge is highly

prevailing. The computer as a tool to disseminate and share information is being relatively little used. Advanced training is mostly done by classical advanced training in seminars or courses. For this reason it is not surprising that almost none of the employers and employees surveyed have experiences with E-learning. It has been mentioned by all arboricultural companies that the most important requirements of an PLE should be an simple handling and the possibility of a quick implementation of the PLE. Every company said that they need an external expert for technical support and training for the use of the new technology by e.g. external courses. The biggest problem for all arboricultural companies is the lack of time.

4. Selection of technical tools

Before you can start building an PLE have to select and provide the software tools you want to use. To do that, you have analyze your needs and define what your do should be able to serve. Then you have to screen the software market for tools that fit your needs, test the ones that you like most und decide for one to use.

When starting a project like this, that uses a web-software to provide services you have to be sure that you have at least one project member with the needed skills to build and maintain such a software or look for an external expert to support you.

4.1. Defining the needs

PLE, a Personal Learning Environment is a big word and it can include almost everything you use for learning or even information transfer from the arrangement of your desk to the weekly seminar you use to the Wikipedia you have bookmarked to research information.

In our case we call the environment of web 2.0 tools combined under one surface to create and consume knowledge as our PLE. Here the PLE is used to show our users the possibilities of web 2.0 tools, show them how to use, not only consume and qualify them to use those technique for their further education.

So before you start defining the needs of the tool you want to use you have to be clear about the goal of your PLE. With this goal in mind you have to define the needs.

You can classify the needs in different categories and as fine as you are able to:

Economical needs

- license costs
  Freeware or standard software?
- maintenance costs
  Are the updates included?
- hardware needs
  Which platform do you need to run the tool?
- installation and configuration time
  how long does it take to get it running?

Functional needs

- Basic functions
  What should be included? List the necessary functions
- Usability
  How is the user interface structured?
- collaboration
  Should the user be able to work together and how?
- multi language support
  Is it possible to produce content in different languages? can the navigation be switched to different languages?
- full text search
  Can the content be indexed
- security concept
  Can user structured in groups? Is is possible to interlace groups? How can the created objects be secured?

Restrictions

Restrictions can be caused by your staff or other available resources. That means, for example, that you have already a web-tool running on an Apache webserver, so you would like your new tool to use the same platform or you have an employee experienced in programming with PHP, you would select a tool that uses this programming language to use the resources you have available.

4.2. Creating a decision table

When you have defined your needs you have to bring all your needs together and find a way to compare different tools how exact they fit to you needs.

The easiest way to do that is to build a decision table where you list all your needs and give each of them a weight how important this feature is for your selection.

We recommend to create two decision tables. An initial one with the "must have" criteria that are absolutely necessary for your project like the license model should be open source, the web-server should be an Apache or the latest release shouldn't be older than one year.

The criteria you define in this first step should only be those ones that you are not able to change later on. Many features that are not or not fully included could be created ore adapted later. In the first step you want to reduce the amount of possible tools to those that could be adapted to your needs. This first step you can mostly be done with an internet research. There are some quite useful websites to do that. See Tool+selection+and+software+test for more information.

To create the second table is a little more complicated. Here you have to list your needs and find a factor for every need that classifies the significance of this feature for your selection. This table you couldn't fill without testing the tools, because the documentation never tells you anything about usability and is not focused on your needs.

First you have to define your test criteria. We defined 6 main criteria to test and gave them a percentage of how important they are for our decision. Than you have to test the tool and give them a number of how good the tool fulfills the test criteria. Give numbers from 0 to 10, where 0 would

not fit at all and 10 would be perfect. See Tool+selection+and+software+test for more information about how to fill this table with the test results.

When you have filled the table with your test results you can compare the average points of the tools and find your favorite.

To get a better idea how this could look like, see the example below:

Criteria	emphasis	tool1	tool2	tool3	....
installation/configuration	5%	6	7	6	
usability	25%	6	7	6	
security concept	20%	4	5	3	
sum of functions	10%	7	8	6	
documentation for user and developer	20%	5	8	2	
adaptability in design and function	20%	3	6	3	
average points		5	6,75	3,95	

In this case tool 2 would fit the needs best and should be selected.

4.3. Tool selection and software test

When you have thought about your needs and created the decision table you can start with the selection process.

There are some quite useful websites to do the basic comparison of the main web 2.0 tools.

- Wikimatrix
- Forummatrix
- Podcatchermatrix
- Weblogmatrix

With these websites you can preselect the tools that fulfill your basic needs to have a reduced amount of tools for the main test. The main test has to be a realistic test in an environment as near as possible to the later productive environment.

In the step before you defined the categories to test for, now you have to fulfill the decision table with the test result. Therefor it is useful to have a short look at all tools first to have the possibility to compare and set the level for the assessment. Like already described in Creating+a+decision+table we used 6 areas for testing, which are quite useful for most of other tool selection too. You can use these if they fit to your needs or modify the areas or only the loading.

Installation/configuration

- Intuitivity of installation process

- Are there prepared installation packages or do you have to assemble them by yourself?
- Are there potential security holes like pre-defined root access?
- How can you change the settings, by admin -dialogs or direct in the code?
- Are the setting dialogs logically structured and do they have the expected effect?

Usability

- Intuitivity of user interface
- How are the action buttons labeled and placed (same action every time in the same place)?
- Are there wizards available?
- Is there example content prepared?
- Are editing and layout-options customizable to the knowledge level of the user

Security concept

- Hierarchy of the user concept
- Group structure (is it possible to interlace groups?)
- Do user or groups succeed rights?
- Which elements can have individual rights?
- How detailed can the rights be set (Read/Write/Edit/Administration access)?

Sum of functions

- Total amount of functions
- Check functions against list of defined needs

Documentation

- Integrated help pages
- Online help
- Administration and programming help available
- Availability and activity of online communities
- Developer forum

Customization of design and functions

- Is the layout based on templates?
- Are there free templates available and how many?
- How difficult is the implementation of new design?
- Can can new functions be integrated?

Try to answer these questions for all your tools and fill out the decision table with numbers from 0 to 10 for all test categories and each tool and use the result to select the software that fits best for your needs.

4.4. Needed skills for development and maintenance

The skills needed to build and maintain a PLE like are surely depending from the tool you use but some basic skills are independent from the tool and should be available from the beginning of the project.

Web 2.0 technology

- Idea and functions of Wikis
- What is a Blog?
- How to interact in a Forum
- What are RSS feeds and how can you participate
- How are multimedia-files like mp3 or videos are published in the internet

Webserver technology

- Basic webserver administration
- Web-database development (mySQL or similar)

Webdesign

- Basic HTML
- CSS
- Image editing
- Basic idea how to enhance usability

Web-programming

- Basic HTML Knowledge
- JavaScript

If you want to create own functions you have to be able to use the programming language of your tool, so select the tool by the knowledge of your staff or the other way round.

5. How to implement a PLE in schools

5.1. Social requirements in schools

Primary social requirement for the implementation of a PLE in schools is a certain openness of the school administration and the teacher towards using new technologies in the lessons (Karbautzki, L., 2011).

Not only the students but also the most teachers are used to a face-to-face learning. This classroom methodology is predominantly teacher-dominated means the learning process and the students behavior is completely controlled by the teacher. The communication is focused between the teachers and the students, the interaction among the students plays a tangential role. Working with a PLE in schools causes a change of teaching style. The role of the teacher is changing from a source of knowledge providing information to students to the creator of a learning environment in which

students can learn from themselves (Haasler 2010). The teacher should provide and manage learning opportunities to facilitate the learning process for helping students become autonomous learners. They should be able for organizing their own learning (Heid 2009).

For implementing a PLE in the school, the attitude of teachers concerning their way of teaching has to change. They must have the willingness to rethink their lessons whereby it does not mean that a PLE constitutes a tool which replaces the whole course. It shall be a system which should be used additional to the classroom. Thus the students have the possibility to learn how to learn self organized.

Students should have very basic computer knowledge to work with the TikiWiki. They should know how to open a website and it is helpfully if they have basic knowledge with the program "Microsoft office word". Here you will find common shortcuts to create media content faster.

Students should have a certain educational level:

- They should be able to read and write
- They should have a certain professional knowledge about the content before starting wikis. The higher the knowledge about the subject the more qualified the created content. The teacher should provide informative literature and/or give time for researches in the internet.

Teachers should have very basic computer knowledge. However they should already know how the TikiWiki works. The teachers should familiarize themselves with the functionalities before working with the TikiWIki in the schools.

5.2. Technical requirements in schools

A person in charge should be available in case of technical problems. Technical support at hand is very important otherwise the fluently work process will be interrupted.

For implement a PLE in schools it is recommended to consider the following points:

1. Internet connection: In order to guarantee fluently work, the internet connection should not be less than 1 Mbit/sec and it is recommend having internet access with flat-rate.
2. Computer access for every student: Experiences showed that working in the group is more effective when every student has the possibility to make entries. It occurred very often, if there is only one computer available for more than two students that only one student is really working with the PLE .

Requirements of the PLE

1. The language has to be uniform: The framework, which means all buttons, manuals and explanatory information should be the language of the students. Experiences showed that translated content together with non-translated content on the user interface causes confusion.
2. The user interface should have a good clarity of layout: The amount of buttons should be as small as possible. The navigation and the toolbar of the editor should not be complicated, only the most necessary functions of the user interface should be displayed. Below you can see examples of removed buttons:
    - In the navigation
    - showing the most activated blogs

- showing the most popular tags
- chat: showing nicknames
- gallery: the option to resize an image with pixel-measures is not necessary because for a user it is too complicated to set pixel measures. The pictures should be uploaded automatically in the right size.
- freetags: putting all tags in chapters for the different language: depended from the amount of existing freetags it is getting more and more difficult to find a tag. It is getting more clear by arranging them in language order.
- freetags: only one option to search for a tags is necessary: the availability of more than one option to search for a freetag causes confusion and misunderstandings.
- freetags: The "clear"-button next to the freetag search is needless: for deleting the search-entry, there is the classical option to mark all text and delete it.
- blog: The blog-description sometimes appears too big, perhaps the amount of possible characters should be limited.

In the editor:

- No programming codes in the editor: Due to the most students and teachers of our target group did not had any programming knowledge they had much problems with coding. It costs too much time to acquire the necessary knowledge. The editor WYSIWYG (What You See Is What You Get) constitutes an editor, which is easy to handle and self-explanatory.

3. A basic version with basic buttons is needed: Every user has the possibility work with the basic version means a reduced amount of buttons are available or with the advanced version, in which more functions are existing.

5.3. Organizational requirements in schools

For implement a PLE in the class it is recommended to consider the following points:

1. The topic has to be relevant to the students: The students do not see the need to work with a PLE if they cannot use the content for exams etc.. There has to be some kind of benefit for the students e.g. an integration of a small project within teaching with a test at the end to gain points for the course or the ability to see the structures of other countries for exchange of international experiences about a relevant topic ("How do the arborists in France, the Netherlands or other countries do this?"). By providing information to their colleagues and to students in another country, students are able to "show what they learned". They produced their own content and are "proud" of it. The students should be convinced that there is a benefit in exchanging videos with other countries, they will use a PLE. Furthermore, if there is subject-matter, which cannot be made in the classroom (lack of time etc.), the students could get the task to prepare the information on their own by using the PLE.
2. The teacher has to be aware of the students IT-skills, skills in group-work, and also skills in basic understanding. By taking this information into account the teacher will avoid to demands too little or too much from the students. Furthermore, the teacher can adapt the learning concept to the existing abilities of the students.
3. Maximum one day, optimal are 2 half days of project work: Students in the arboricultural

sector are used to „go outside“ every day (according to school, course, …) instead of sitting in front of the computer.

4. At least on supervisor is needed for 10 students in arboricultural and technical background
5. Continuity is important. By using such kind of media only once, the learning effect, with regard to the professional, methodological and media competences will not be long-termed. It has to be continued in the teaching concept.
6. The teacher has to work out a concrete methodological concept: If the students have too much "freedom" in a group there is nearly no chance to get a result.
7. Producing text by the students: The ability of students to write and read can be a barrier. The learning process takes a certain amount of time. So, it is possible that long-time students can learn how to produce a text, but that is impossible in short terms.
8. Due to lowering the threshold the main task should still be written on paper: start basic.
9. The content has to be accessible for other courses, perhaps by closing topics: The sustainability is ensured.
10. The teacher has to check the entries students did: Many students transfer the information from the internet directly and without filtering. It is possible that they do not check if the information are correct. You have to consider this extra working hours.
11. Copyrights: The teachers have to sensitize the students to copyrights, the students should learn how to handle with copyrights. It is important that the teacher is checking if the students infringes on any copyrights. You have to consider this extra working hours.
12. Participation in forum: If the students have to use the forum school-related in their free time, the teacher also has to participate to control the participation of the students. You have to consider this extra working hours.
13. Purchases: Cameras (e.g. easy handling "ciso flip camera") and other hardware has to be paid.

5.4. Learning arrangement

Within the following learning arrangement (Martin 2008), the students had to create content concerning the theme “climate change and the consequences for trees in urban areas”:

With the presentation of a real-life scenario (phase 1) the students created content in the wiki by answering subtitles concerning the above mentioned theme (phase 2). They worked self-regulated in small groups. After this phase the groups presented their results in the plenum and all students had the opportunity to discuss (phase 3). Based on the results of the discussion they returned to their groups to modify their wiki entries (phase 4). The students verified their results in the plenum and discussed about them. Also, they had to do a written and oral evaluation about the realization of the learning arrangement (phase 5).

phase	function/aim of phase	class arrangement	role of teacher	materials
phase 1: introduction	explanation of aims, proceedings, confrontation with scenario and guiding questions, division into group, handout of info material,	plenum	information about project and its organization	time schedule, scenario with concrete work order and guiding questions, instructions of use for wikis, videos, photos, links, podcasts, forum, info material
phase 2: self-regulated working in small groups	-information research (intern, extern) -definition of key words and web 2.0 tools, preparation of realization (e.g. screenplay) Self organized working at home (networking)	small groups	observation and advice	see above forum
phase 3: presentation and discussion	-presentation and discussion of phase 2	plenum	moderator	
phase 4: Creation of PLE entries	-Creation of PLE entries (production of wikis, videos etc) Self organized working at home (networking)	small groups	observation and advice	see above forum
phase 5: presentation, discussion and evaluation	-Presentation and discussion of PLE entries - evaluation (written and oral by producing a video)	plenum	moderator	questionnaire, camera

6. How to implement a PLE in companies

The background of the project Trees and arboriculture Unlike forestry's aims of the sustainable and profitable management of forest for the production of primary materials and energy, the aims of arboriculture are the creation and preservation of sustainable, vital, nice and secure trees in urban areas, that have a positive effect on humans and their environment. Trees are symbols of life, fertility, strength, and consistency. As mythological links between the powers of heaven and earth they are deep-rooted especially in European culture, but also in other culture areas like Middle and Far East. An old, gnarly tree with a bulky stem and a wide crown is found to be powerful and majestic, within the Bark we discover facial features and we tend to concede character and spirit to those objects, which are able to grow so much older than other creatures. Beyond the commercial use have trees fulfill many important and occasionally measurable functions in our environment.

- Compositional element: arrangement of spaces, guidance of sight and traffic, living blinds
- Protection against weather influences: windbreaks, shady, erosion protection
- Promotion of biodiversity: as a habitat and food source for animals, plants, fungi, algae, lichens, bacteria and viruses.
- Improvement of microclimate: temperature regulation, reduction of solar radiation and soil evaporation, reduction of air pollution, Improvement of the soil´s water balance
- Social welfare effects.

European Arboriculture evolved from horticulture and landscape business during the last 30 years to a self-contained and highly-specialized field of work. It extends on all tasks dealing with trees in housing and traffic areas, e.g.:

- preparations for planting
- planting trees
- pruning from planting to felling
- crown cabling
- planning and realization of methods for protection and limitation of damage at construction sites
- grubbing roots
- actions to improving vitality
- pest management
- consultancy
- tree risk assessment

The range of tasks in arboriculture is from the pruning of the single tree in a private garden, a less than four-hour job for two arborists up to the action for a contracting authority which claims several teams and machines over several years. Legal bearing basic conditions aspects of arboriculture within Europe In some European countries (e.g. Austria, Germany, Netherlands) the duty of tree owners to avert hazards towards other people which may be caused by property (trees) result from legislation and current legal practice. If a tree causes a significant hazard, the owner has to eliminate it within an appropriate period to put the tree into a secure state again.The job of arboriculture companies is the professional support for the tree owners at the task of tree risk assessment and eliminating hazards. For optimal security and efficiency in work-flow the employees have to be well-trained and competent specialists to redound to the company's advantage in the competition. Constant further trainings help raising the standards and keeping the level of knowledge up to date. New media can be helpful tools for the development of several competences, the exchange of knowledge and experience. This results in positive influences on the employees and at least in the success of the company. Assignment of tasks and corporate structures Safety: because of its high potential of danger tree work demands physical strength, power of concentration and team spirit der. With additional stress factors as working at a strong frequented road, beneath power lines or sensitive parts of a building (e.g. a winter garden, solar energy modules), the working conditions become even more complex. In cooperation of insurance companies with arborists high working security standards and efficient working techniques have been developed, that´s why the percentage rate of working accidents of certified arborists decreases. Knowledge and skills: arborists need to have a comprehensive understanding about the complex organism of a tree, its wood properties and biological processes subject to the tree species, time of year and site conditions. This includes also the understanding of mechanical loads occurring in a tree, the knowledge about pathogens and damages and their different impacts on the tree, last but not least the knowledge about the important technical and legal guidelines. Additional knowledge and skills in handling and maintenance of machines (wood chipper, chainsaw, truck, crane, root grinder, etc.) and devices (pulleys, winches, air spade, etc.) which also work under heavy load. For an efficient work-flow the arborist has to be able to do little maintenance and repairing duties at the site.

The current development with the comprehensive structural upgrading of the mobile communication networks with with better digit rates offer new and better possibilities for the companies´ information managements.

- Installing of an intranet for the mobile use of data, e.g. data about clients, time-tables, site management tables, data about the common pests and diseases, data about repair- and service-plans
- The usage of digital media for site preparation: descriptions, photos, films, about the situation at the site or the ways towards and at the site.
- The digitalization of reporting system for site data (working hours, needed materials etc.)
- The production of web 2.0- based contents for the company´s website, e.g. for the introduction of the personnel and equipment
- The production of web.2.0-based contents for Internet-platforms

Obstacles in flow of information

Excessive workload

The digitalization of a company´s management produces increasing data which can be used for the analysis of working and information processes and their optimization.The frequent analysis of data, results and the atmosphere is important for a successful controlling.These important tasks of advanced controlling means an additional pensum of work for the responsible persons. But the increasing workload bears the danger that other important tasks, e.g. the site preparation are disregarded, what can lead to fall off in working quality.

Refusing employers/employees

When an employer decided to install a digital management-, education- and controlling system she/he has to be aware that this system is dependent on the acceptance and the cooperation of the employees. If there are some persons who refuse to work with new and digital applications, the system can fail. The employer has to understand that the person has not chosen the job because of computer affinity, but because of affinity towards working outside and towards nature and trees.Therefore, mostly the older employees have difficulties with handling computers, smartphones, but even younger employees aren´t familiar with these technologies and often mistrust such a controlling system, because wrongly they fear to be observed and pressurized all the time.In fact one aim of this information management is the transparency of working efficiency and the optimization of working processes.Then less efficient teams have to tolerate an outright discussion about their work. But some people aren´t open for criticism, they refuse to accept the results of the controlling management because they don´t want to change their working processes.

So the employer at first has to be the model for the personell and has to be sensible with installing a digital mobile information management system. The advantages for the employees must overweight the disadvantages, the curiosity and the will for transparency must overweigh the fear towards the new ways of communication. For providing useful results the site manager and the team leaders have to support the system with conviction. The communication devices have to be adapted to and have to be handled with care in critical situations (wetness, mud, mechanical stress, the risk of

falling down). Codes of practice dealing with the use of the devices can help to preserve the devices.

For preventing of losses of information, the optimized structure of data can be a important support. With the employees´ help formatted masters and guidelines the digital mobile site management can be enhanced. Photos and videos can visualize the collected data and be helpful for the employees in orientation at the site. Pictures also can be helpful in describing the tasks for the arborists. For example can be described where in a crown the cables are supposed to be installed or how much of the crown is supposed to be reduced.

Summary:

arboriculture companies can use the new technologies individually for:

- improvement of information flow
- teaching of employees
- improvement of working quality
- the motivation of employees
- improving the productivity
- to improve the company´s competitive capability

6.1. Social requirements in companies

Educational level

Employers and employees should have a certain educational level. They should be at least able to read and write. Furthermore is it helpful to have already the basic computer knowledge means if somebody knows the basics of Microsoft Office Word or how to attach a file to an email message is it sufficient to work with the TikiWiki.

Role of the employer

The employer aspires to optimal efforts of his employees. Best commitment can be reached if the employees identify with the company e.g. responsibility. The chief has to acknowledge the work of the employers otherwise a sense of responsibility will be very difficult to develop. Concerning the implementation of a PLE it is for this reason very important that the employer supports this kind of knowledge management system in his company. Furthermore, they must be sure that the information are useful for the company. Thus, the employees are motivated to create content in a PLE and feel responsible to support the documents. If one single employee shows interests in working with a PLE even if his employer does not, experiences shows that the fear of disgrace is bigger than the curiosity and the interest about a new software. They are probably afraid to contribute unprofessional content for which being the person responsible.

6.2. Technical requirements in companies

A company needs at least one computer with internet access.

6.3. Organizational requirements in companies

Data security

Data security is of paramount importance. The employers and employees are not able to read the information of another company, only the company can view its own content. But, there exist a general platform, means a platform on which every company is able to up- and download information. So, the companies have the opportunity to share information which are not subject of the company secret like legislation or operating instructions for the use of devises. The companies are also able to take a look at the content of the schools. Even though the companies content is of more interest for students than vice versa (read here for more information). The idea to provide an access to the content of the companies for the students does not meet the security aspect of the PLE for companies and will be therefore not provided. The prevention of this information flow is not a specific problem of this project. Hauswald (2011) mentioned in his work about the improvement of the learning location co-operation due to web 2.0 optimized entries of record books that some areas of the record books had to be secured. The companies did not want that the vocational schools have access to business documents and processes.

Technical support

The PLE should improve the knowledge transfer in the companies. If technical problems occur, especially during the daily work, is it likely that the work with the software will be discontinued. Due to lack of time or maybe poor computer knowledge a company will not solve computer problems in their working time. After a long working day is it understandable that the employer or employees do not feel like sit in front of the computer for work-related issues. Thus, the companies need external technical support in the implementation of PLE and in the daily work with it.

Suggestions for scenarios

Firstly, before creating content, a company should think about scenarios of working processes which could be usefully fix in a PLE. It is helpful that the employee and employees answer following questions about their working processes:

- how can I work with my colleagues on content together?
- how can I call attention to my colleagues to interesting information quickly and without considerable additional efforts?
- how do I structure and share information?
- where is my knowledge/ where are my special skills needed?
- how can I integrate the creation of content best possible in my daily work?

Here are some practical examples of useful scenarios for arboricultural companies which could be documented in a PLE:

1. documentation of measures of tree care: one task of arboricultural firms constitutes the cutting of trees. On the basis of an annual chronology of the cutting measures by creating e.g. photos or videos, the company gets a very good overview about the growth of the trees over the years resulting from the tree care measures. Thus, the person responsible can better assess which next procedures are necessary. Also by watching the videos or photos the

workers know exactly which tree or even which special branches needs to be cut.

2. documentation of varmints and diseases: if an arboricultural firm has a good overview about different varmints and diseases which occurred on their trees treated over a certain time, the person responsible is able to draw conclusions about special treatments or to make decision about next measures.
3. documentation of new construction side: if an employer views a new construction side, he/she could make photos or videos about the area. So, the employees have a better idea about e.g. how the construction site looks like, which equipment they need, where the best access is, how much space exists etc..
4. documentation of laws and guidelines: fixing for the company relevant laws and guidelines e.g. by copying the relevant chapters in a wiki, attaching different scans, using web links to etc. all relevant important information are easy and fast available.

Suggestions for integrating the creation of content in the daily work

The adjusting of content does not have to be done every day; one time per week would be enough. Choosing a day on which it is due to climatic conditions not possible to work outside would be an option to to put content in a PLE. Whereas, this is depended on the amount of created material and the importance of actuality, of course. Embedding of photos or videos, maybe added with a short text, could be done during idling time e.g. drive to or back to/from construction site.

6.4. Barriers

Some employers mentioned that they have to give too much input at the beginning comparing to the output they gain. So, the project partners decided to create a model company and fill the PLE-Wiki with some content that may inspire and motivate the participants. They can use this content, complete and improve it, add some new ideas and take the initiative. In our opinion this is an adequate way to lead the companies carefully to the subject. In addition the companies can communicate with us and we are able to answer their questions right on the platform. The content we develop for the model company contains e.g. the description of several pruning tools, several specimen of wood to visualize decay and other wood damages, the description of working techniques, etc. Usually in nearly every company there are persons who collect that kind of specimen. This, for example could be a good opener, the participants can easily react upon. So they can practice using and creating social media.

A PLE improves the professional, social, methodological and media competence. Nevertheless it is not without any problems to implement a PLE in a company. There are some barriers to consider:

1. Creating content is time-consuming
   It requires preparation by the actors and the recording person. If one shooting does not succeed, it has to be repeated. The creation of content itself is a learning process that may cause frustration after the first failures. Furthermore, there has to be a person responsible and enough time to rework the produced content like e.g. editing finished raw material.
2. Creation of content during working-time may lead to dangerous situations:
   Arboriculture is a dangerous work, all participants have to pay their complete attention to the subject, especially during deciding moments, e. g. when a tree has to be felled or a branch has to be rigged. If a person neglects its duties at the site for taking photographs, it may cause hazard for the team, the customer and for passers-by.

3. Everyone on the site is needed:
   For economic reasons the employer can not put a supernumerary person to the site for making recordings. Usually this person is required on another site where a team now has to work without an important member.
4. Occupation of the team leader:
   In companies with a strong hierarchy and strictly structured working processes the leading persons often have the distinction with the task of creating content, because they are supposed to have the better media competence, they are reliable, interested in the theme and motivated. So in addition to their great responsibility anyway the leading persons have to handle the new task. This may make it more difficult for him to do his actual work.
5. Winter time is busy and an every strains nerving season:
   The felling season is strenuous to the whole company, because all bad factors accumulate: bad weather conditions, bad sight, most dangerous work, illness, therefore a bigger fluctuation of staff, short daylight, more time on the road because of ice and snow, high pressure on the site, machines refuse to work due to low temperatures etc. So all members of a company are under high stress, profession, talent for improvising, physical and mental strength are required. An additional task can overtax the person, which is entrusted with.
6. Sharing contents with other companies is not important:
   Even when some employers have contact with each other they are in a competition and refuse to give too much information to a partner company. The own weak points must not be abandoned to a potential rival.
   Furthermore, it is difficult for those persons who have to deal with the PLE for the first time, to have just little or even no support by their colleagues or employers.

In principle the companies are interested in working with the PLE . On the other hand the PLE is neglected when the participants realize the disturbance of important working processes by paying attention to the PLE. In comparison with the economic success the PLE is definitively secondary at the time.

7. About the project

7.1. Project members and tasks

7.1.1. M-BITS

M-BITS is a small ICT-company specialized on internet technology and development of e-learning applications, located in a small city near Heidelberg.

In the last years M-BITS realized numerous internet and e-learning projects mainly focused on the green industry. Payers have been for example the ministry of food and rural area Baden Württemberg, the association of gardeners in Baden, German association of gardeners and the german union of producers of herbaceous perennials (Bund deutscher Staudengärtner) and some SMB from other sectors.

Another field of activity is consulting in planning and realizing it-projects – not restricted to e-learning projects.

If necessary the staff is trained in preparing content for e-learning, writing screenplays or just in

using the ict for their work.

Role in the project

M-BITS is responsible for the technical conception and programming of the PLE and has to train the participants in using the PLE and its components.

To do that, the first step is to formulate the needs for software and try to find the one that fits best, by reading software documentation and tests. The most convenient ones have to be tested and the best one selected.

Than this software has to be installed, configured and the project members has to be trained to use it, by writing instructions, producing tutorial videos and presenting the software in classroom courses.

When the partners used it for a while, the software has to be adapted to the needs that the users formulated as a result of their work. This is an iterative process that was done several times. With every new version the partners has to test again and make suggestions for improvement and these things have to be adapted to the next software release.

Especially for the use of the PLE in the companies training and support is very important. The company users need attendance not only in technical things, they also have to be assisted in structuring their ideas to build useful content.

7.1.2. LVG Heidelberg

The State Horticultural College and Research Institute of Heidelberg (Staatliche Lehr- und Versuchsanstalt Heidelberg (LVG)), with around 50 employers, is a school for vocational training for gardeners and arborists. Furthermore, we offer climbing courses to get the certification "European Tree Workers (ETW)". On average 150 students per year are visiting the LVG. In addition to the lectureship, the LVG performs different plant experiments with vegetable, perennial or ornamental plants to test e.g. their growth behavior or to sighting new species before they come to the market. The testing ground includes 5000 qm of greenhouse and 10800 qm of field area.

LVG members involved in the PLEbaum project

Birte Krüttgen was the project leader of "PLE Baum" from January 2010 to September 2011. She acted from September 2010 to August 2011 as a teacher for work pedagogic at the LVG as well. Since October 2011 she is doing a vocational training for horticultural consulting and teaching.

Holger Strunk is working at the LVG since 2002. He is responsible for the Learning Management System OLAT which is used for the students for data exchange and blended learning. He is also programming E-learning multimedia and solves all computer related problems which occur during the working days.

Dr. Hella Herrmann is working since September 2010 in the LVG. She is a teacher for horticultural economics.

Since September 2011, Gerrit Kleeman is leading the section economics, information and communication in the LVG and is the new project leader of "PLE-Baum". He is also a teacher for horticultural economics and landscape gardening.

LVG members and their role in the PLEbaum project

Birte Krüttgen was the project leader of "PLE Baum" from January 2010 to September 2011. Her tasks were to organize the project meetings, to correspond with all participants of the project, to lead the project processes, to manage the finances, to write the reports for the EU, PR etc.

Holger Strunk is a technical assistant of "PLE-Baum". He managed the data exchange between the project members by OLAT. Via the virtual classroom, another component of OLAT, we conducted small project meetings and used it for the online dissemination of the final symposium at the 30th of September. He was the technical contact person for these processes as well.

Since October 2011, Gerrit Kleemann is the new project leader. He is responsible for the financial issues, the final report and the last project processes.

Dr. Hella Herrmann is working for the project "PLE-Baum" since October 2011. She will write the final report.

7.1.3. CFPF

The CFPF (Vocational Training Institute dedicated to Forestry) is a training institution dedicated to the qualification in the fields of forestry and environment.

Pioneer intimber construction, the CFPFsat up new wooden buildingsin 2001.

Particular attention was paid to materials used during construction which mostly came from the regional timber industry.

The wood volumes used in the wooden construction are the following:

- 100 m3 of spruce from the Vercors massif for framing and structure
- 25 m3 of douglas-fir from the Ardèche department as sunshade and for the cladding
- 3 m3 of oak from the Chambarands massif for the boiler room silo

namely about 130 m3 of sawed wood corresponding to 260 m3 of harvested wood in local forests.

With regard to the logic of this project, 18 local companies worked for the construction of these buildings.

The CFPF is a centre specialized

- in the harvesting and marketing of forest products from wood for furniture to wood energy,
- in ornamental arboriculture, tree pruning and tree management,
- in the management of riparian forest, that is to say vegetal layout and river bank care.

The CFPF belongs to the Chamber of Commerce and Industry of the Drôme department and provides to job seekers, employees and entrepreneurs qualifying trainings.

Its experience and position makes the CFPF well integrated in the professional environment and on the market

It is further a major actor in the elaboration of new methodologies and practices in matter of organization and delivering trainings. Thus, the communication and training tools developed within various projects in which the CFPF is either leader or partner, bring an added value for the development of the forest/wood and arboriculture sectors at the European level which gives the

inhabitants the benefit of the development of rural areas.

The work team is composed by 12permanent employees and 50external interveners Presentation of persons working on the project and their task

The team working on the Leonardo da Vinci PLE Baum projected was constituted by :

- Marie Dominique MICHEL, trainer in the arboriculture sector
- Frédérick CROS, computer specialist
- Pascal MARCHAISON, assistant director in charge of the education coordination.

Each was implied according to his/her competences in the different tasks of the project:

1. Regarding the evolution of the needs, Pascal MARCHAISON adapted and translated the questionnaires in French, sent them to target populations, classified and analyzed the results by category and synthesized the whole.
2. As for the implementation of the PLE-experiments with regard to the climate change tasks were distributed as follows:
    - Pascal MARCHAISON a présenté le projet aux stagiaires afin de recruter les apprenants volontaires pour participer à l'expérimentation.
    - Frédérick CROS was responsible for the configuration of all computer equipments required for the experiments and gave to the trainees the bases on how to use web 2.0 technologies
    - Marie Dominique MICHEL supervised the trainees during the several experimental steps to help them searching, summarizing and creating the content to be inserted into the wiki database. She synthesized the evaluation of the participants and held a presentation on these two experiments for the project partners during transnational meetings.
      She also took part, as trainer, into the virtual class and produced online contents.
3. Marie Dominique MICHEL and Pascal MARCHAISON shared the task of writing, translating and reviewing the guide as well as creating the different supports, following the logic of the work they realized in the project and their presence during transnational meetings.
4. Last, the part concerning the project promotion and diffusion was left to Pascal MARCHAISON.

7.1.4. Arboriculture Academy Sachs

P5 in the Project PLEbaum (2009-2011) by the European Lifelong Learning Program

Employer: Mrs. Tanja Sachs

Employee: Mr. Oliver Wendt

Registered office in Untersteinbach near Heilbronn in Southern Germany.

Main tasks

- education of arborists
- trainings and workshops for arborists, members of administrations, interested

laymen

Our tasks in the Project PLEbaum:

- transfer between the partners and the participating companies
- taking part in the assessment of demand
- taking part in training sessions for the use of web 2.0 applications
- attending and helping the companies
- recording the companies´ ideas for improvement
- taking part in the evaluation of the results
- informing the project partners about the progress
- writing articles for the guide
- taking part in the final presentation

7.1.5. Inverde

In this project there are three staff members who dedicate a considerate amount of time to this project:

Rollin Verlinde is a teacher at Inverde and teaches all to do with ecology and game management. Apart from teaching he is in charge of the technical support to Inverde-employees and was therefore asked to contribute his knowledge and time to this PLE project.

Alexandra Mannaert is a project coordinator and a teacher at Inverde. As project manager she takes care of applying and coordinating different national and international projects. She is a part time teacher in forestry, but does not like to be filmed. Coordinating and making critical comments were her contributions to PLE Baum rather than providing content in a technical package.

Tom Joye is also a teacher at Inverde and is an expert is tree matters: arboriculture, park management, tree diseases, … He uses his knowledge both to teach and to take part in different projects dealing with this subject. His role in PLE Baum is obviously providing content for the website and together with Alexandra he took part in the meetings.

7.1.6. IPC

(Video)

7.2. Situation of the project and the project members during the project work (2009 - 2011)

Perhaps it is necessary to make a separate chapter concerning the actual situation of the project and the project-members. In about 10 years all technical matters explained in the guide is not needed anymore, just because that is "old stuff" then. That's why it should be mentioned that right now this media is totally new especially for companies, and also that the companies got the chance to handle this media. (Getting interested in using smartphones, web-technology, …)

7.2.1. IPC facilities

(Video)

7.2.2. LVG Heidelberg facilities

At the LVG Heidelberg there are several courses with a blended learning concept. Students can prepare for the next lessons with learning-programs and other content like presentations, pdf-documents, pictures. All those didactical material is located in a Learning Management System OLAT (http://www.gartenbauschule.de)

- 3 computer-rooms for students with summing up 36 computers
- 100 MBit internet-connection, also wirelessly available for students with their own laptops
- all classrooms with computer, interactive whiteboard and high-resolution document-camera

7.2.3. Inverde facilities

Together with two other organizations in the forestry sector, the Flemish government founded Inverde as a neutral information centre. Since 2009 it is part of the Support Centre for the Flemish Agency for Forestry and Nature (OC-ANB). Inverde is a training centre for forest, green areas and nature conservation. The key tasks of the centre are training and educational information. The wide variety of courses involves both theoretical and practical training.

Furthermore, the centre has developed an excellent knowledge and skills in small-scale forestry and nature conservation. A part of the courses is designed for professionals, such as municipalities, companies, and associations. Another part of the courses targets individuals who are interested in forestry, nature, park and green space management without being professionally active in those areas. Inverde has also a lot experience in European projects, both as promoter and as partner.

Since merging with OC-ANB Inverde also deals with the sale of a limited number of books about forestry and nature management and we also provide counsel and advice to third parties about these matters. Our main source of income is the sale of timber harvested from the forests in property of the Flemish government.

Inverde is located at three different locations around Brussels: east and west of Brussels our buildings are set in a park and next to the Sonian forest, our head office is situated in Brussels. We have about 39 employees, teachers and administrators together.

If interested in any of our projects, visit www.inverde.be/en/inverde

Inverde is a teaching organization who’s strategy is to provide information and courses close to our target groups; this means our teachers cross the Flemish countryside (and sometimes cities) to teach. Since most of our teaching happens outdoors, ICT equipment is not always needed or possible in the course. To prepare our lessons and for the indoor courses all teachers have a personal laptop and personal beamer which they are expected to take along when teaching. The ‘class rooms’ are booked all over the country.

Most of our learners enroll through online subscription on our website and have access to additional information at the ‘support pages’ edited by the teachers through our backend system. We also have an online learning website.

7.2.4. CFPF facilities

The CFPF possesses two computer rooms of 8 places each with an access to internet and shared use printer/scanner. This equipment is completed with 12 laptops, 1 beamer and a Wi-Fi access.

The CFPF, as training centre belonging to the Chamber of Commerce and Industry of the Drôme department, uses the cooperation platform SharePoint available for all the training institutions. Each trainee has an access on his/her dedicated network space to the presentation of the CFPF and to the information related to trainings proposed (agendas, trainers, list of participants…) as well as to news, blogs, FAQ, Wiki space and documents (lesson contents, department notice…).

On his/her private space each trainee finds convention documents related to the training (internal rules, training rules, rules on the use of computer rooms…), documents on his/her own training courses (specific teaching documents, formulation and correction of exercises, transcripts…) as well as synchronized and synchronized communication tools to exchange with the other trainees and/or the trainers.

SharePoint is then more and more used to provide training resources before, during or after training sessions and to create cooperation or collaboration exchange places. When a training action which alternates between on-site and e-learning training is implemented, a link is developed allowing the trainee to access a training platform (Moodle) to work more efficiently.

7.2.5. M-BITS facilities

Because M-BITS is an IT-company the technical stuff is always up to date. That means that all the programmers use a laptop not older that 2 years with an additional TFT screen for desktop work (at least 22" wide) and wireless or rather UMTS internet connection.

For developing and offering web applications M-BITS has rented webspace from a big internet provider and is also working with in-house webspace hosted on own servers. All web-content is backed up daily and uses a raid file storage system for security reasons.

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