iCamp Space - an environment for self-directed learning, collaboration and social networking

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Abstract: - In the paper a learning environment for self–directed learning, collaboration and social networking composed of loosely coupled web 2.0-based educational tools is described. The set of building blocks includes blogs, wikis, social bookmarking tools, tools for synchronous and asynchronous communication, tools for federated search, tools for management of learning contracts and personal communication, feed aggregators, tools for scheduling appointments, etc. Contrary to monolithic learning environments, such as learning management systems, learners can choose the tools from the set by themselves and compose a personal learning environment according to their preferences. The environment has been validated in teaching process in the context of higher education. Five facilitators and 27 students from 4 countries participated in the trial that was conducted from April 2007 till June 2008. The presented work has been performed within the iCamp project (www.icamp.eu) from the 6th Framework Programme of EU.

Key-Words: - self-directed learning, iCamp, learning environment, social networking, collaboration, trial

1 Introduction

Learning environments in technology-enhanced learning have started to move from monolithic LMS (learning management system) based settings prescribed by educational institutions to individual (personal) learning environments composed of loosely coupled educational tools selected by learners themselves. Schaffert and Hilzensauer identified seven aspects where the changes between PLEs and LMSs are most obvious: role of the learner, personalization, content, social involvement, ownership, educational and organisational culture and technological aspects [15]. New approach brings many advantages to the learner, but also some problems that still need to be solved.

The learner can choose the tools by herself and compose an environment according to her own preferences. The environment can easily be changed or updated when new, better tools appear or when learning goals or interests change. One of the benefits for the learner is also that she can continue using such an environment after leaving the educational institution, for example a university. In the LMS based settings the systems are normally closed and made available to the students only when they are involved in the educational process at the institution. Other advantages of personal learning environments (PLEs), according to Anderson, are learner's control and responsibility of ownership, ability to make decisions regarding copyright of the resources and their reuse, and social presence of the learner [1].

On the other side, the large number of available learning tools, systems and learning resources challenges the learner to select the most appropriate solution for her learning needs. Interoperability among the heterogeneous tools and systems also needs to be provided, as well as privacy and security of the learners and sensitive data.

The iCamp (Innovative, inclusive, interactive & intercultural learning campus) project, a research project from the 6th Framework Programme of EU has created an open learning environment for higher education across Europe by connecting different learning systems and tools with a special focus on open source software [5, 6]. The networked learning environment is a learner centred environment where participants can find scaffolds for self-directed and self-organized learning, collaboration and social networking across national borders and disciplines [7]. A portfolio of open source learning tools and systems, together with the iCamp Folio tool help a learner in choosing the right tools for her learning needs [18]. The developed environment is being validated in the context of higher education. Three trials with different foci and scales were implemented within the project. The first one was focused mostly on student collaboration across borders [9, 12]. Self-directed learning component was added to the second trial, which is described in this paper, while the last trial focused also on social networking.

Paper's main objective is to describe a learning environment for self–directed learning, collaboration and social networking composed of loosely coupled web 2.0-based educational tools. The findings of validation of such environment are also given. The paper is organised as follows. First we describe the validation methodology and the main concepts, such as a learning contract. In Section 3 the learning environment is presented with short descriptions of the tools and examples of their use, and in Section 4 the results of the validation trials are described. Conclusions are given at the end.

2 Methodology

The main goal of the trial was to validate how self-directed learning can effectively be supported with the use of social software in online cross-cultural collaborative learning settings. Within the trial the students were supposed to advance their competencies for self-directed learning, including their skills in deploying technological tools to collaborate, their interaction skills with international partners in a foreign language, their abilities to locate learning resources, and their autonomy to negotiate and make relevant decisions [10].

The trial was carried out in the context of formal higher-educational settings in which students and facilitators were distributed geographically and culturally (nationally). Facilitators are faculty members responsible to supervise and facilitate groups of students working on a common project. The students were master students in computer science, new media and social science. A few iCamp project members were also involved in the trial in order to provide pedagogical and technical support (local coordinators), if necessary.

A total of 5 facilitators and 27 students from Czech Republic, Poland, Slovenia and Turkey participated in the trial, which was conducted from April 2007 till June 2008 in three phases. Two of the facilitators were external to the project, i.e. not involved in its daily activities.

2.1 Preparation phase

In the preparation phase (April 2007- July 2007) the facilitators and iCamp project members were defining student project topics from computer science to new media and web 2.0, and clarifying and fixing technical and conceptual details for the next phase. An example of a proposed student project topic was: "*Cybercrime in Europe - This project should analyse and compare cybercrime situation in particular European countries.*" Different educational tools, described in Section 3, were

made available to the facilitators and students, and a help centre for the use of those tools established.

2.2 Project work and learning contracts

The second phase, where students did their project work, ran from middle of October 2007 till the end of January 2008. The start and end of the phase were aligned with academic calendars of participating institutions. First, the students were required to deploy a subset of the educational tools made available for the trials (assemble their personal learning environment), create their personal blog and make self-introduction. Self-introductions were meant as a tool for easier group formation, i.e. we assumed that the students would easier find their peers with whom they would be interested to work together. After that, they registered in a Wiki-based system for their preferred project topic. There were no constraints in selecting the projects, except that not more than two students from the same country were allowed to register for the same project in order to create multinational groups. Unfortunately, after initial group formation all Czech students had to leave selected groups and form their own one due to language problems. The list of all student groups and their project themes is given in Table 1.

Table 1: Student groups and their projects

Students	Project theme	Facilitator
JSI (1), ISIK(1)	Group#1: Nuclear energy and its alternatives in Europe	TBU (Czech Republic)
JSI(1), ISIK(1)	Group#2: Multidimensional best cost estimators	TBU
AGH (1), ISIK(2)	Group#3: Open Source	ISIK (Turkey)
AGH(1), ISIK(2)	Group#7: Cybercrime in Europe	JSI (Slovenia)
AGH(2), ISIK(2), JSI(1)	Group#11: New media - new movements? The role of the Internet in shaping the social movements in the age of globalization	AGH (Poland)
JSI(1), ISIK(2)	Group#13: Selection and evaluation of P2P tools for content delivery	JSI
JSI(1), ISIK(2)	Group#14: The future network society	JSI
TBU (6)	National Group – Mixed topics of the above	TBU

The task of each student group was to produce a paper that documented and organised their project achievements. Additional artefacts, such as software in Group 1, could also be the result of student work. For example, the students in Group 7 had to compare cybercrime situations in several European countries. The paper was supposed to contain an introduction about cybercrime (e.g. terminology, current situation in the World), a brief discussion on the situation in EU, comparison of situations (statistics, legislation, countermeasures) in Turkey, Poland and Czech Republic, and conclusion. While the students could work individually on their country topics, they should have collaborated together about the other issues such as definition of the indicators for comparison of cybercrime situations (e.g. security incidents in the past years, estimated losses, measures for prevention of cybercrime), definitions of the basic terms and establishment of a common vocabulary, editing of the final paper, etc.

One of the main pedagogical concepts in the second trial was a learning contract. Learning contracts allow a learner to specify what she wants to learn, how she wants to do it and how her learning will be assessed. Every student in a group was required to prepare a personal learning contract. There were four main elements of the contract: goals, actions, resources, and evaluation criteria. The information included the topic and goals of a project, actions the students were responsible for (as a member of a group), what resources they intended to use for their work, what were criteria of evaluating their work, etc. Students negotiated their personal learning contracts with a group facilitator. In the middle of the second phase, each student was required to revise her learning contract.

In addition, the students had to fill two questionnaires about the tool usage, while some of them were also interviewed by project members.

2.3 Final phase

The last phase (February 2008 – June 2008) was devoted to the analysis of collected information. The main objectives of this phase was to assess impacts of the trial on the facilitators and students involved, to reflect on lessons learnt, and to draw implications for the last iCamp trial. Semi-structured online interviews with the selected students and all facilitators were conducted. Schematic presentation of the whole trial is given in Figure 1.
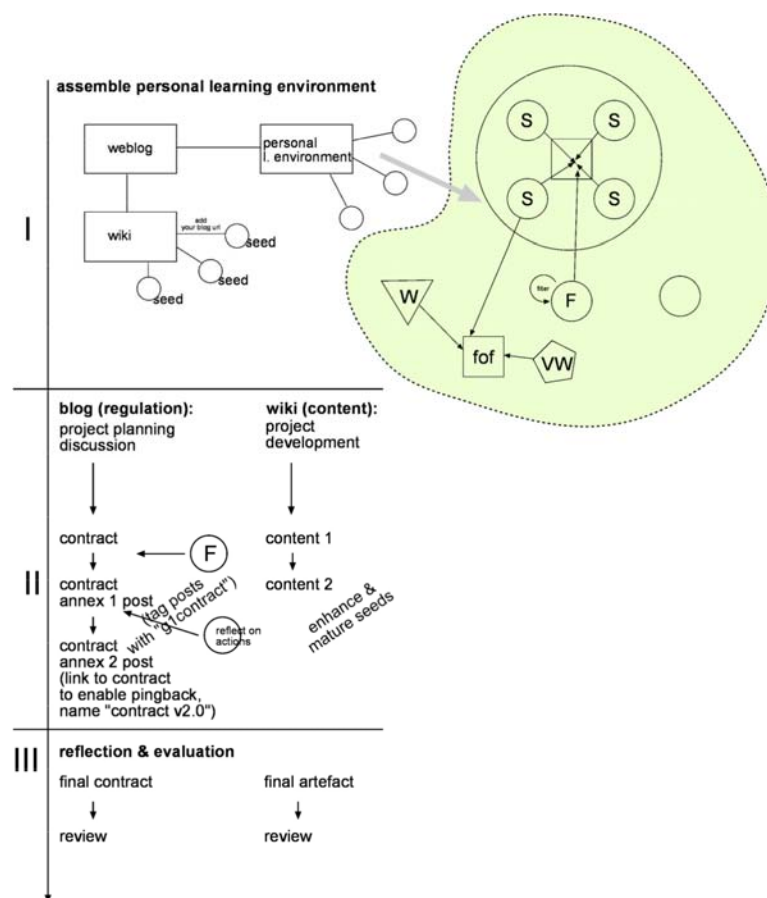

Fig. 1: Schematic representation of the validation trial plan [10, p. 9, by Kai Pata]

3 Learning environment

Building an iCamp Space was one of the main goals of the iCamp project. The term space here refers to the heterogeneous and distributed virtual environment incorporating multiple interoperable systems and tools combined with a set of activity patterns, where an activity is understood as a pattern of persons with objectives, rules and regulations, tools and artefacts, and events they are involved in [19]. Within the iCamp project various open source learning tools supporting self-directed learning, collaboration and social networking have been developed or adapted to the iCamp pedagogical requirements and made interoperable. The tools learners can assemble into a personal learning environment support activities such as learner's self-introduction to other students and facilitators, group formation, description and negotiation of one's personal learning contract, synchronous and asynchronous conversational activities, joint work on the common project topics, searching for learning resources in a network of learning repositories, meeting appointment scheduling, peer review and organisation of own resources and social links.

Table 2: Educational tools

Tool	Main functions
Blog	Personal presentation, describing and negotiating personal contracts, personal reflection and for group communication
Doodle	Scheduling the meetings between group members
E-Mail	Asynchronous communication
Feed on feeds	Feeds aggregation and reading
Flashmeeting	Synchronous communication
iLogue	Description and negotiation of personal contracts
myDentity	Visualization of personal e-mail communication
ObjectSpot	Federated search for learning resources
Scuttle	Organisation and sharing of bookmarks, tagging interesting resources
VideoWiki	Personal video presentation
x-Lite	Synchronous communication
xoWiki	Registration for the projects; work on a joint artefact

In Table 2 we list the tools that were used during the second iCamp trial and their main functions. Most of the tools are later described in more detail, together with examples of use. Table 2 does not list all iCamp building blocks, but represents a set of reference implementation of selected open source tools and systems for dealing the iCamp pedagogical challenges. An iCamp building block refers to the iCamp compliant technology-enhanced learning system or the tool developed to support learners and facilitators performing in the iCamp Space. The tools developed within the project are available at Sourceforge in the "iCamp codebase" directory. Guides and tutorials for tools used in Trial 2 can be found in the iCamp Help Centre (http://helpcenter.icamp.eu/). The centre provides user-friendly assistance during installation and initial utilization of the products.

3.1 Blog

The main tool used by the students and facilitators was a web log or blog. Blog is an online diary where one can post her thoughts, information, links, or interests. The posts are displayed in a reverse chronological order and can be commented by other users. Recently, many researchers have been investigating potential benefits of blogs on learning. According to Richardson blogs can promote various types of thinking (e.g. critical and analytical [14]. Duffy and Bruns describe that within the structure of a blog, learners can demonstrate critical thinking, take creative risks, and make sophisticated use of language and design elements [3]. They have also identified some of the possible uses of blogs in education and the activities blogs can support, such as reflection on teaching experiences, comments based on literature reading, online space for review of works and writings in progress, or collaborative space for joint work [3].

In the iCamp trial, each student as well as each facilitator created her own blog. The blogs were used as a communication and reflection tool, personal presentation, and for documenting personal learning contracts. A special blog that served as some sort of an entry point into the trial was also prepared. This blog provided links to blogs of all participants and a link to help information about the educational tools. In the blog general posts about the trials relevant for all participants were published. An example of a learning contract prepared in a student blog is shown in Figure 2.

The blog system set up at ISIK University was based on Wordpress that contained an additional Feedback module created within the iCamp project [20, 21]. Feedback module allows users to subscribe themselves to other blogs posts or to suggest another blog to accept posts from the user's blog. The communication process defined by Feedback includes the following steps: informing the learner about the opportunity of subscribing to a blog, learner's acknowledgment whether she wants to be informed about future updates of the advertised blog, and informing about every update when

it is available [21]. Feedback modules have been made for Moodle, Wordpress, Scuttle and Feed-On-Feeds.
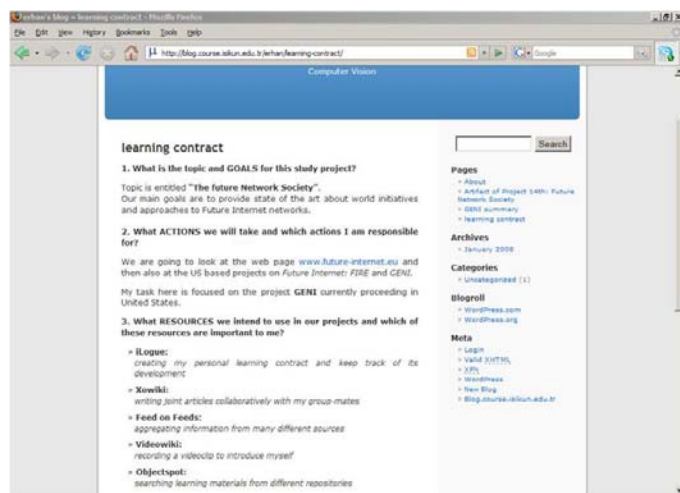

Fig. 2: Learning contract in a blog

3.2   iLogue

The second option for describing learning contracts was made available to the students by the iLogue tool. This software, based on the weblog- and wiki-style authoring environment, was developed in iCamp specifically for realising the concept of personal learning contracts. The tool supports various activities, such as negotiating and developing learning contracts, creating records of actions and review phase [17]. Figure 3 shows an example of a personal learning contract presentation in iLogue.
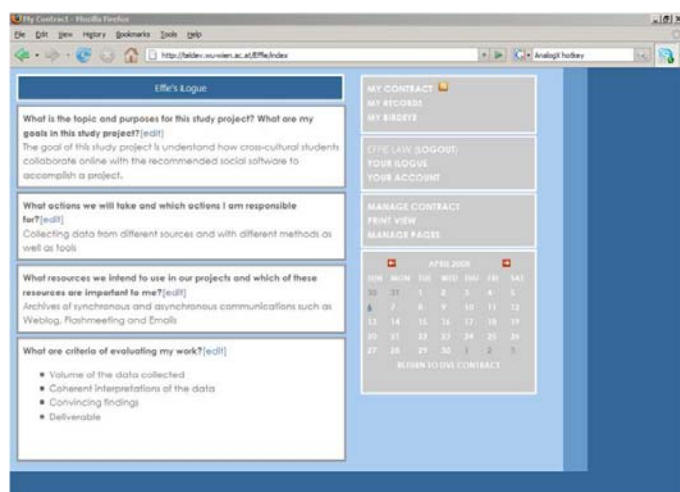

Fig. 3: Presentation of a learning contract in iLogue

3.3   Feed aggregation
Searching for new posts at different blogs can become time consuming for the students and facilitators, especially when the number of blogs is high. Feed aggregators help learners to subscribe to different blogs

and other information resources, periodically check for new posts, and provide a consolidated view on the subscribed content. Feed aggregators can also be used for realisation of a virtual group blog, combining feeds from all group members' blogs.

In Trial 2, simple access to information from different sources at one place was provided to the trial participants mostly in two ways; within the Wordpress blog or by means of the Feed on feeds tool. Feed on feeds (http://feedonfeeds.com/) is software based on an open source project that provides RSS and Atom feed reading, aggregation, management and sharing. Contrary to various desktop feed readers, Feed on feeds is a server side aggregator, which means that learners can access it from anywhere. An example of the use of the Feed on feeds for aggregating information from group members' blogs and social bookmarking systems is presented in Figure 4.
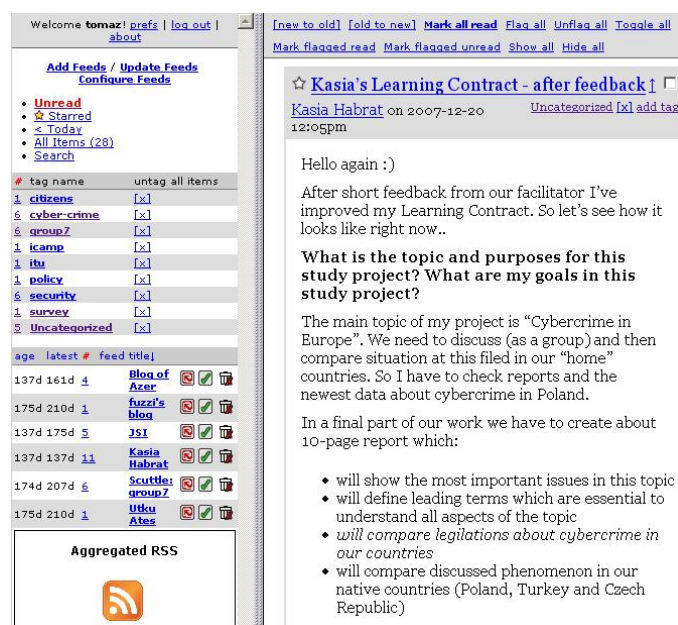

Fig. 4: Use of Feed on feeds

3.4   Social bookmarking
Social bookmarking is a common activity in social networking, used for storing learners' favourite links in one place, making them accessible from anywhere via Internet, and sharing them with other learners. Tagging gives possibility to organize and search stored links easily by extending search to public links of other users. Tags are keywords that users assign to resources. Usually, they are visually presented to the user as a tag cloud, i.e. as a group of tags, where tags that are more often used are written in larger letters. Golder and Huberman identified seven types of tags in social bookmarking: what the resource is about, what it is, who owns it, what are its characteristics or qualities, what is

its relation with the user (tagger), for refining categories and for organising tasks [4]. Social bookmarking systems also enable learners to find resources other learners with similar interests found interesting. Comments and ratings to the bookmarks might also help one decide on usefulness of shared resources.

In the trial social bookmarking was used mainly for storing personal links and sharing interesting resources among the group members and among all trial participants. The users could make their bookmarks private, shared with watch list or public. Tags were used mostly to describe what the resources are about and for organizing or grouping them. All resources shared within a group had a group tag, for example group7, so that all group members could filter them. The open source social bookmarking system available in the trial was Scuttle (http://distance.ktu.lt/scuttle/). Figure 5 shows an example how Scuttle was used in trials in Group 7. On the left side of the picture resources that a facilitator shared with students are displayed, while on the right side the used tags are given in the form of a tag cloud. The most often used tags were group7, cyber-crime and security.
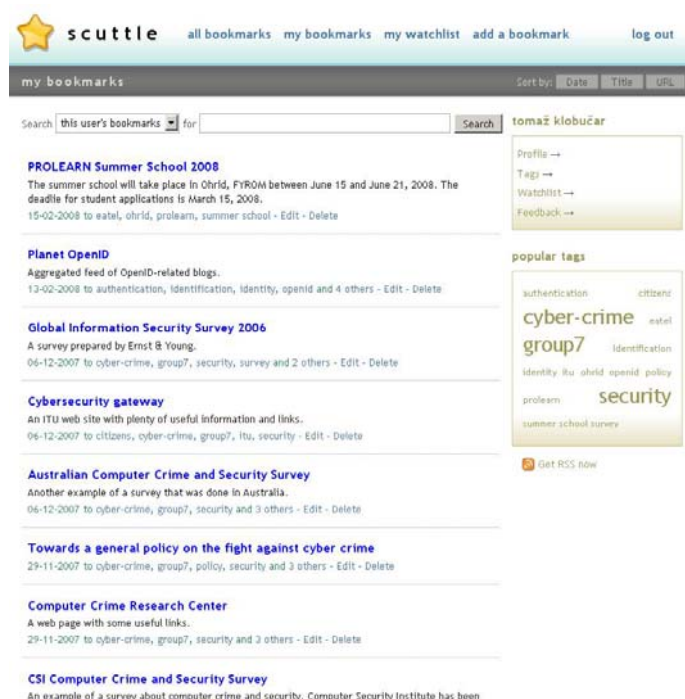

Fig. 5: Use of Scuttle

3.5 Communication tools
Several standard synchronous and asynchronous communication tools were made available to the participating students for coordinating working tasks and discussing project topics among themselves and with a facilitator and local coordinator. The list includes e-mail, SIP-based XLite, videoconferencing tool Flashmeeting

and Skype. Though the iCamp project promotes open source educational tools, lack of reliable and easy to use open source videoconferencing tools forced us to allow also Flashmeeting, and Skype. Figure 6 shows the use of Flashmeeting (http://fm.ea-tel.eu/) for Group 7 student discussion on how to proceed with their work. The tool has been developed by Open University of United Kingdom and made available to the project participants. Unfortunately, only certain facilitators and students could book a meeting on the Flashmeeting server, which hindered ad-hoc videoconferences among the students to a certain degree.
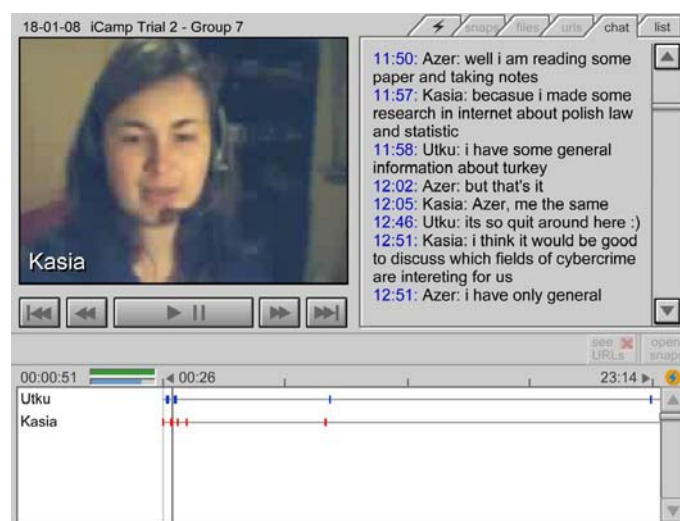

Fig. 6: Use of Flashmeeting

Tracking and visualizing learner's e-mail communication was enabled by the web based software myDENTITY (www.mydentity.eu), which acts as a mail proxy server. Each trial participant subscribed to the myDENTITY server, obtained an @icamp.eu email address, and associated it with her regular email address. The proxy server changed mail headers in such a way that all e-mail communication would go through myDENTITY service. To protect participants' privacy only the relationship between the e-mail sender and receiver was stored in the server, not the content of emails. This relationship information was used solely to calculate user's professional network and its visual representation.
Nodes representing third parties (not direct contacts) are presented to a user in an anonymous form to protect other users' privacy.

An example of visualization presentation of email communication for certain time period is given in Figure 7. In that period the user marked in red had only two direct email contacts, all the other users are anonymised. The myDENTITY service can be useful for anyone to gain insight into her email communication and to facilitate deliberate changes in her social network.
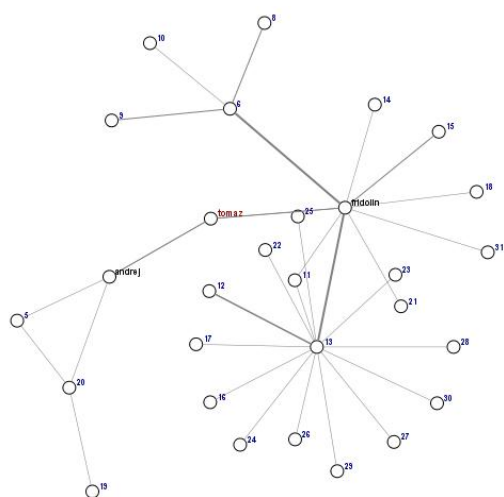
Fig. 7: Visualisation of personal email communication

3.6 Searching for learning resources

Opening various repositories of knowledge resources and connecting them into a network provides learners with more possibilities to satisfy their demand for gaining knowledge. Large number of repositories raises the problem of finding and selecting the right learning resources. Federated search supports a learner for finding items that are scattered among a distributed collection of information sources or services and then merging the results to present in an integrated, consistent, coordinated format. To enable a learner to find relevant articles, books, presentations and other learning resources in a network of learning resource repositories and digital libraries the iCamp project created the ObjectSpot service (http://www.objectspot.org). The ObjectSpot client comes as a portlet and can be easily embedded in a web site or any educational tool. Integration of the repositories and libraries into the network is based on the SQI (Simple Query Interface) protocol [2, 16], which became a couple of years ago an official CEN/ISSS Workshop Agreement. The iCamp partners integrated SQI into several open source learning management systems, in particular Moodle, .LRN, IVA, Drupal Course Online, as well as they provided SQI gateways for digital archives OAIster, ACM, IEEE EBSCO, DOAJ (Directory of open access journals) and others. SQI interface to learning resource database has been coded in 7 different programming languages, e.g. PHP, python, xoTcl, C or Java, which means that it can be easily adapted to new educational systems based on any of those languages.

The iCamp project supports an open access strategy when integrating learning resource repositories into the iCamp Space. Learning resource providers are encouraged to provide their resources for free to anyone. In case a business model does not support this, at least

meta-data has to be freely available in order for the ObjectSpot service to be able to find the most relevant resources for the learner.

Before integrating their repositories into the iCamp Space, the providers also have to be sure that they do not violate any copyrights by providing resources. The learners should be informed about eventual licensing models and access restrictions before they access the resource itself. Examples of licenses are human readable Creative Commons licence or any other license that specifies conditions of use. If commercial considerations and third-party rights are not relevant, the Creative Commons licenses are recommended.

When searching for resources by means of the ObjectSpot service a learner enters query words, e.g. cybercrime, into the ObjectSpot, which sends them to the educational network, i.e. to a number of repositories and digital libraries connected together by means of the SQI protocol. The query returns several relevant results from different learning repositories. Before presenting the results to the learner, ObjectSpot ranks them in order to display the most relevant ones first. When the learner clicks on a title, she can access the resource in a library where it is stored if the resource is offered for free or the access rights have been granted to her, e.g. if her institution is subscribed to the library. An example how the found learning resources are presented to the user is given in Figure 8.

Fig. 8: Use of ObjectSpot

3.7 Other tools

The other tools were not as widely used during the trial as the ones described above. Doodle (www.doodle.ch) is a web-based tool for scheduling meetings. The tool enabled the students to plan their meetings with a

facilitator and other group members, and also to carry out voting.

The main role of the Video Wiki server (http://distance.ktu.lt/videowiki/) was recording, storing and playing back public video content. Learners could easily record a videoclip of themselves with the purpose to introduce themselves to other learners and facilitators.

XoWiki is a wiki implementation for OpenACS, combining aspects of wiki with aspects of content management system [11]. In Trial 2 XoWiki was mainly used for describing project topics and registering students to the projects. Initially, it was also meant to be used as a platform for joint work of the students on their papers, but the students preferred to use other solutions.

Nextspace (http://nextspace.zsi.at) is actually not part of the iCamp building blocks portfolio, but was used by facilitators and iCamp project members as a support tool for the execution of the trial, mainly for trial preparation, discussion about the progress and specific topics, and for document repository. Nextspace is a tool for collaborative knowledge management with several social software features. These include chronologically ordered posts, tagging, RSS feeds, calendar, and member overview. A screenshot of the tool is given in Figure 9. Nextspace was also used within the iCamp project as the main communication tool and shared workspace for all partners.
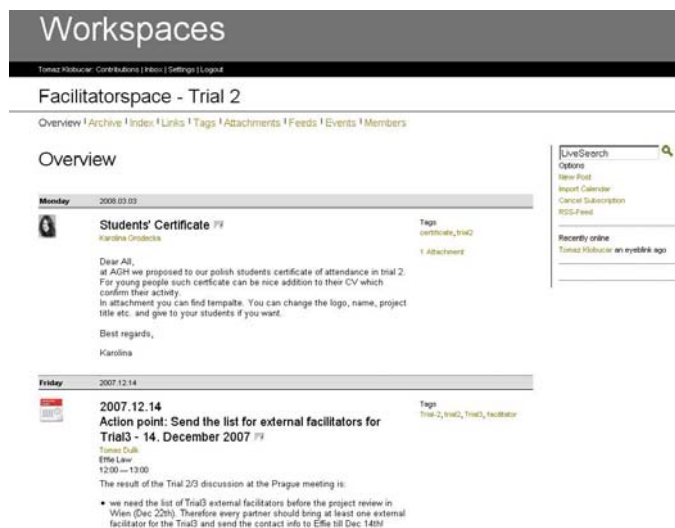

Fig. 9: Use of Nextspace

4 Validation results

The evaluation instruments employed were surveys, interviews, digital archives (i.e. blog messages, email archives, videoconference recordings), and automatic data logging (i.e. blog feeds, myDentity).

Results from the surveys show tool usage patterns of the students. Among the recommended tools the most popular one was blog, where most of the students published their personal learning contracts. Despite its popularity the numbers of posts in groups were relatively low, ranging from 29 blog posts in group 3 to only three posts in group 2. In group 7 there were 21 posts published. One of the reasons for lower usage could be that students and facilitators still relied more on email communication than communication via blogs. For example, members of group 7 exchanged 51 email messages. Usability of educational tools is an important selection factor when creating a personal learning environment [8, 13]. In Trial 2, the students found the tools quite easy to use as they learned to use them without need of external help. Due to the nature of the project topics collaboration activities were lower than expected and the tools for joint work, i.e. xoWiki, not used as much as expected. Most of the time, the students divided their work into individual tasks and worked alone on their pieces. At the end they glued the contributions into a common paper.

The self-directed learning competencies of the students were generally low. This was also the cause of relatively slow start of the work. While students were expecting direct guidance from their facilitators, the facilitators assumed the students would organize among themselves and carry out necessary tasks. Some of the students also had problems with low responsiveness of their group peers.

Learning contracts were relatively new concepts for both the students and facilitators. The students were late with preparation of their contracts, which somehow diminished the goal of personal contracts in the trial, i.e. to help the students in regulation of their learning process. Most of the students also accepted proposed assessment scheme without attempting to propose their own one. The proposed scheme assumed that the final grade would depend on the quality of their joint work, quality of their individual work, their personal learning contract, and participation in the surveys and interviews. In Group 7, for example, quality of the work contributed 50% to the student's final grade, personal learning contract 20%, and the rest was based on the participation in the surveys and interviews.

Empirical experiences of the trial lead to several implications [10, p. 4]:

- Some guidance and instructions are necessary in the beginning phase for the groups to kick-off their work;
- Facilitators should have better knowledge on both pedagogical aspects and technical tools;
- Peer induction could even be a more effective incentive than course grades to sustain the students' motivation for the collaborative work;

- Self-directed learning competence could be fostered in a social setting, but the effectiveness hinges apparently on the quality of social inputs;
- Using social software tools to fulfil learning goals seems plausible, but it may take some time for students as well as facilitators to accept such alternative functionalities; further, it seems quite challenging to break the habitual use of convenient and well-received tools like email.

5 Conclusion

The validation trial has provided useful feedback about the developed learning environment and self-organized learning of the students in higher education. We have realized that language problems still represent a barrier in collaboration among the university students in Europe. As the students came from four European countries with different languages they had to communicate and produce final results in English. Unfortunately, the knowledge of English at one of the involved institutions was too low for successful student collaboration. Synchronization of student activities can become a significant problem when working in multicultural groups, as students come from different time zones, they have different schedules, etc. Empirical experiences were taken into account for the preparation and realization of the final trial that started just after the end of the trial described in this paper. The trial was focused on social networking, self-direction and collaboration.

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