Web based Training: Experience within a German Project

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Abstract

This paper presents the design, development and implementation of a group oriented, decentralized virtual learning environment where the participants/trainees and tutors as well as the participants themselves communicate via the Internet. It is based on our own experience with developing telelearning systems and sharing knowledge in telelearning environments, namely our current project FrauTelNet (supported by state North Rhine-Westphalia under the QUATRO programme), which is coordinated by SOKOM Internetprojekte GmbH, Cologne and carried out in cooperation with the Institute for Work and Technology (IAT), Gelsenkirchen and other partners.

1 Introduction

Telelearning[1] over the Internet is a new way of imparting knowledge. It can also be defined as web based training (WBT). One major potential of applying the Internet in the area of education lies in its connectivity, as the Internet allows connecting tutors and participants from all parts of the country or even the world in a common course. The current project aims to create, demonstrate and evaluate a web based learning environment for Internet skill development for women in SMEs. We offer telelearning modules on information technology, project development and management, electronic commerce as well as telecooperation.

This article first presents the objectives of the current project (section 3) and then gives an insight into the technical implementation (section 4). Section 5 describes the system architecture and presents the advantages and disadvantages of several Internet services used within the learning environment. The way of combining these applications within the learning environment according to their special characteristics will be discussed in section 5.

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[1] Telelearning can be defined as *"making connections among people and resources, via communication technologies, for learning-related purpose"* [Collins, 1996].

2 Objectives

The functionality of the Internet allows courses that are offered to a wide range of participants regardless of their location as well as a high degree of flexibility.

- Flexibility of time of study and place of study
- Choice ('modularity') of learning content
- Frequent updates
- Ability to respond to specific demand

In the present project, flexibility of time means, that the trainees can choose when to log on, when to study, when to communicate within the set framework. On the one hand, there might be restraints, when the learning takes place in the workplace. On the other hand, the open choice of when to learn might facilitate the agreement of management, because relatively idle periods of the workday or -week can be used in a productive manner. Flexibility in choosing where to study is more limited; it really only exists when equipment and Internet access are available at home. With regard to modularity, there is the opportunity, which of the four module(s) to choose, but also whether to go into greater depths on a particular topic within the modules. While the basic course material is fixed, additional material and the discussion forums can be used to transmit and exchange very specific content fairly rapidly. This makes it possible to respond to problems coming up from the practical circumstances or projects in the companies.

The communication process among the participants via Internet provides the trainees with a decentralized, cooperative learning experience. The trainees will be prepared for new forms of working arrangements as they can be found more and more in practice - especially in international organizations.

One of the more specific aims of the project is to provide learning, which combines sound 'generic' know-how with tightly fitting solutions for the companies. We do believe that this is where the demands for professional qualification will be more and more directed in the (not so distant) future. As anyone familiar with distance learning will know, motivation is a key element. As trainees' motivation - accompanied by an increased sense of responsibility and more accountability by the learner - are clearly demonstrated effects of collaborative learning[2], a

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[2] In science education, the concept of collaborative learning is often viewed as effectively synonymous with team learning. The term team is used for a collection of two to six individuals.

further aim is to develop a learning environment where self-directed[3] learning is combined with collaborative learning.

In general telelearning over the Internet presents its own particularities and characteristics, which must be in the forefront of the designer's mind when creating a learning environment. The designer is facing challenges like *"... responding to a high attrition rate due to student isolation, lack of sense of belonging, and problems in sustaining motivation and commitment; adapting individual cognitive and effective profiles; and providing adequate cognitive and metacognitive support to the learners."* [Winer, 1998].

3   Implementation

The virtual courses, which are offered within the current project, have a decentralized coordination team and participants within North Rhine-Westphalia. The coordination team functions as content provider, didactical designer, technical implementation and coordinator.

The content provider function includes the general design of each of the single courses, the learning units and the exercises based on the decision whether the content is delivered dynamically or statically. We have chosen a combination of both.

The didactical design is a major challenge in these kind of virtual courses. After the decision upon the content of the course and each learning unit the didactical design has to take into consideration the special form of learning. This is one of the main problems of web-based training: A poorly designed didactical method can prevent the attainment of the learning objective.

The third function is the technical implementation. The range and possibilities within the didactical design is strongly determined by the available technical equipment and its functionalities. The design of the virtual learning environment is based on the combination of Hypertext Markup Language (HTML), JavaScript and Practical Extraction and Report Language (Perl), which is used for the required CGI-programming. The learning environment is operated

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[3] *"Self-directed learning is a continuous engagement in acquiring, applying and creating knowledge and skills in the context of an individual learner's unique problems."* [Fisher, 1998]

on a Unix Server and contains the following services: Chat, discussion forums, email, web pages and various forms.

Concerning the technical service it was a major objective to keep the necessary equipment of the trainees at a minimum to avoid technical discrimination. Within the current project the only requirements are Internet access and a web browser version 4.0 or higher. To ensure the availability of browsers in the required version every trainee gets a CD with current versions of the Internet Explorer and Netscape Navigator as well as other useful tools (i.e. Acrobat Reader 4.0). Technical support is available throughout the delivery of the course by email, at certain regular times also by phone.

4 System Architecture and features

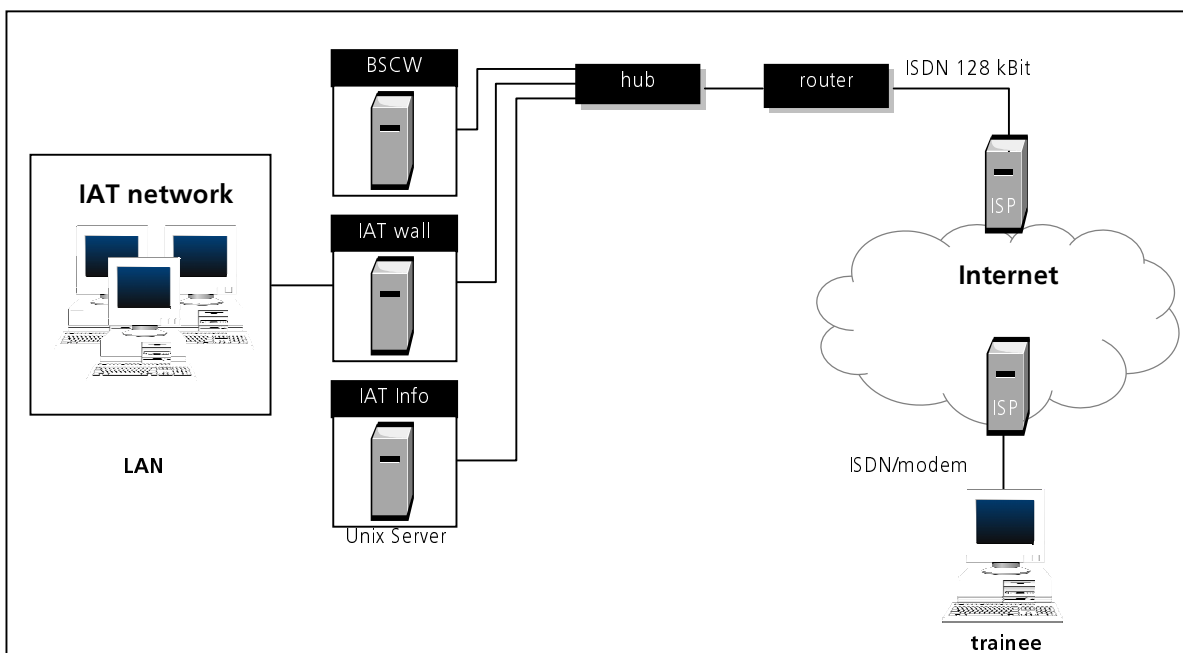The system architecture shows the following structure:

Figure 1: System architecture

The Institute is connected to its ISP through a 128 kBit-dedicated line. Therefore, the trainees simply will have to connect to their ISP via modem or ISDN to log on to the learning server. The IAT router will convert the first two layers of the 'seven-layer-model' from TCP/IP to ISDN and route the trainees request directly to IAT-Info. The Server IAT-Info, which is a Unix Server, stores all web pages of the learning environment, as well as the required Perl version and MySQL database, which is used for the administration of the registered participants.

The URL http://frautelnet.iatge.de/home.htm of the learning environment is an alias address on this server. Since the Institute is equipped with a dedicated line the trainees are able to log on to the server whenever they like to. To protect the Institute's network a firewall (IAT wall) has been installed. A portion of this computer also functions as proxy server to provide an Internet connection for the Institute's employees.

Within the project FrauTelNet we offer the five main services web pages, email, chat, discussion forums and forms, which are stored – as mentioned above – on the Unix Server.

In general web pages are an appropriate tool for publication of announcements, descriptions, overviews, instructions and so on. Our web pages contain the course materials (i.e. basic texts for the four modules, exercises), which are also issued as a printed textbook. Experience with other telelearning projects (e.g. University of Sheffield ITMA course) has shown that many trainees prefer to have a printed version of the text, instead of reading everything from the screen. The texts are available from the web server as well, in order to facilitate the visit of URLs quoted. In addition, they include instructions for the usage of the virtual learning environment and various browsers, daily news around the topic Internet as well as a café as meeting point for the trainees for social communication. Web pages have the advantage that they can be looked at when needed and can be accessed by the trainees restricted by password.

Figure 2: FrauTelNet – homepage and login

Figure 2 shows the entrance to the virtual learning environment, which at the same time functions as homepage. After subscription every trainee gets an individual username, which is used as password to restrict the access. The trainees are free to navigate within the web pages that are structured as shown below:
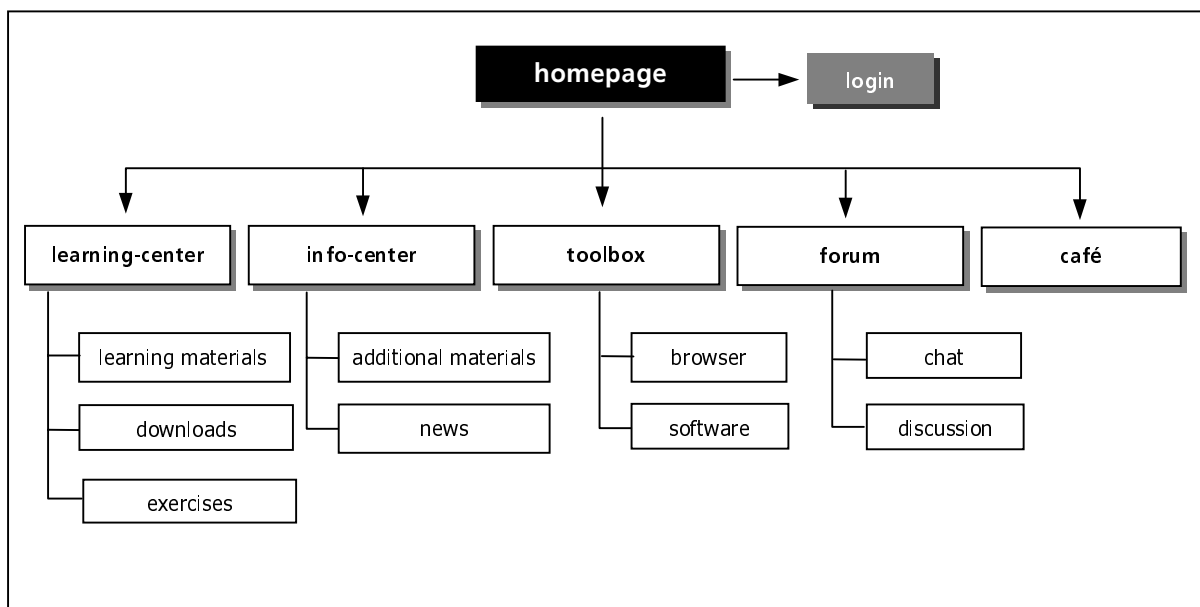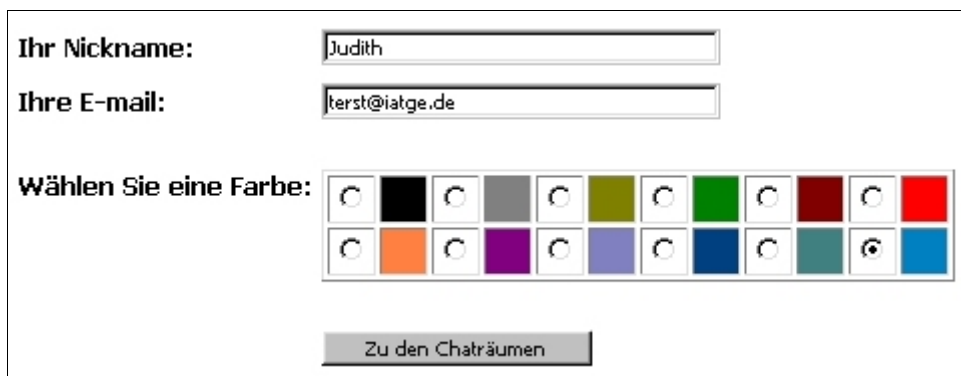

Figure 3: Structure of the learning environment

The learning-center contains the basic course materials and exercises. Within the info-center the trainees find additional information referring to the offered courses and daily news about the topics computer, Internet, eCommerce. The toolbox provides the participants with useful tools, e.g. browsers in current versions, Acrobat Reader and software that will be needed within the modules (i.e. trail versions of project management software), as well as instruction for those tools. The forum can be described as communication platform for trainees and tutors. So does the café, which is only used for communication as far as it is not related to the courses.
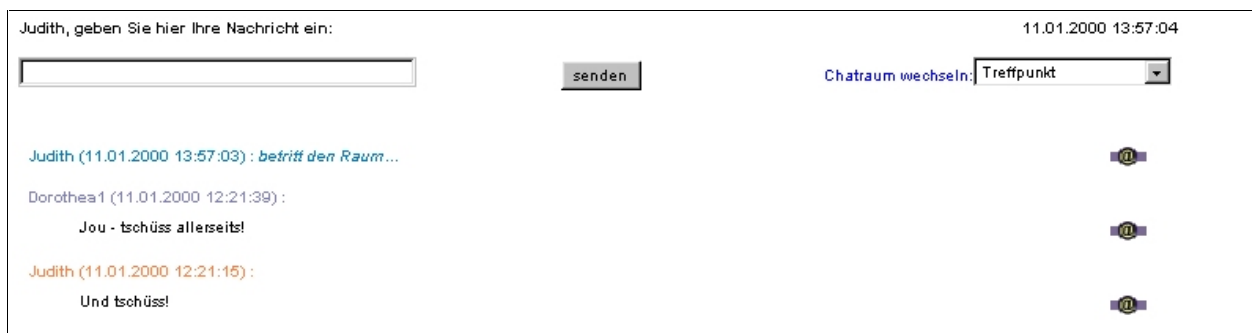
The chat is a useful service for synchronous communication. It is appropriate to ask short questions, to discuss special topics, and to assign working exercises. Problems may arise when the chat is used for the exchange of long statements or when used for the discussion with more than 5 to 6 partners about various topics. Therefore, we opened one chat-room for every module and a meeting point. Within the various chat channels only topics, which are connected to the chosen course, will be discussed. In general, the chat is open to every trainee every time, but during prefixed hours the chat will be accompanied by a tutor to structure the discussion process

and to encourage trainees to participate. Figure 4 shows the chat that is based on a combination of HTML, Perl and JavaScript. To access the chat one needs to choose a nickname and a color. The system automatically generates the first name as nickname, which of course can be changed by the trainee.

Figure 4: Login Chat

Figure 5: Chat

When somebody enters the chat it will be displayed on the screen with name, date and time. To start/join a discussion one simply types the statement into the text field and hits the 'enter'-button, the message will appear underneath the text field with the name of the author above. A specific chat room can be chosen by using the pull-down-menu on the left-hand side (see figure 5).

One advantage of the chat is that this form of communication allows the fast and efficient exchange of comments on one topic. However, a major disadvantage lies in the impossibility to follow different discussions at the same time and the loss of remarks, which are forgotten along the discussion process. A tutor may be able to solve this problem to a certain level, as do the various discussion channels.

Discussion forums can be used for the exchange of longer text and data material (i.e. results of a group work, papers and so on). The structure of the discussion forums is supported by an optical structure, which shows the discussion process.

Figure 6: Discussion forum

Figure 7: Discussion within the discussion forum IT-Management

Therefore, one advantage lies in a structured discussion and the possibility for every trainee to comprehend the discussion process. This allows a certain flexibility concerning the working hours of the participants. One disadvantage - as we experienced within our project - is the publicity of the discussion forums. The participants rather send an email or discuss in the chat than to contribute a message to a discussion forum, which is readable for everybody who has access to the forum. Therefore, a strong tutor is needed to encourage the trainees to participate.

As discussion forums email can also be used for the exchange of longer text and data material. An advantage and disadvantage at the same time is that the communication by email can be

limited to a certain cycle of addressed people and therefore not be available for the rest of the group. Another disadvantage of the use of email for discussion are time delays between a notice and a comment on it. The discussion gets spread over a time interval.

Web based <u>forms</u> are useful instruments to collect standardized information through data entry. They support data collection for a database as its inputs can be preformatted and processed automatically. The so received data can be published on the web pages. We do use forms, for example, to create a portrait of every participant, for exercises (i.e. multiple choice) and black board. The generated data is evaluated by CGI-/Perl-scripts.

5   Media mix

The above named Internet services should be combined in such a way that each one is applied according to its specific characteristics. Experience within our project show that each course setting should consist of synchronous and asynchronous communication parts to serve best the demands of the trainees.

Asynchronous communication can mainly be used to inform about the general curriculum, the content of single courses, and can provide papers or other information. It consists of web pages where material and literature are provided which put the trainees into a position to study at different times on their weekly assignments and send results, questions and comments to the responsible tutors or the other group members via email, discussion forum or web based forms.

The synchronous communication part plays a major role in creating a 'learning community' and to 'keep the whole group together'. Only in the synchronous parts the participants interact more or less directly, communicate only with little delay, and get the feeling of 'belonging to a group'.

6   Conclusions

"Learning can no longer be dichtomized into a place and time to acquire knowledge and a place and time to apply knowledge." [Fisher, 1998] Modern communication and information technologies have an increasing impact on learning - how we learn, where we learn, when we learn, what we learn, what learning resources we have, and why we learn.

Web-based telelearning offers new approaches to adult continuous learning and training methodologies. Its flexibility eliminates geographical isolation and overcomes other barriers to lear. The learning environment is no longer narrowly defined as one instructor lecturing to a single classroom. Instead, outstanding teachers or experts can reach out to multiple learning sites, allowing more students access to the best in education.

The main experiences made so far can be summarized as follows:

- Telelearning is much more than transferring a curriculum from paper onto the Net. More time and effort needs to go into the curriculum planning process, as opposed to in traditional teaching. Besides, having to work out the course content details carefully, the particular combination of teaching methods needs to be designed ahead of time.
- One major effect of virtual learning environments is a change in the roles and functions of trainees and teachers, as well as the relationship between teachers and trainees and between the trainees: within our current project teachers become coordinators and the participants get a much more active role. One result is that the participants have to be taught how to learn without a teacher by using the learning environment.
- In a web course one must work at building community and getting students to engage in discussions. We experienced that the trainees do not naturally engage in electronic discussions and/or community building. Therefore active trainers are needed to motivate the trainees to become part of the learning community and to use discussion forums.
- Technical support for the trainees is very important.

7 References

[1] BRÖDNER, P., HELMSTÄDTER, E., WIDMAIER, B., Wissensteilung - zur Dynamik von Innovation und kollektivem Lernen, München, Mering 1999.

[2] COLLINS, B., Tele-Learning: From Television to the World Wide Web and Beyond, International Thomson Computer, London 1996.

[3] EISENBERG, M., EISENBERG, A.N., Shop Class for the Next Millenium: Education through Computer-Enriched Handicrafts, in: Journal of Interactive Media in Education, 98(8), http://www-jime.open.ac.uk/98/8.

[4] ENGERT, St., HAMBURG, I., TERSTRIEP, J., Kompetenznetzwerke zur Kontextsteuerung von Wissensteilung: Ein Beispiel, in: P. Brödner, I. Hamburg (Hrsg.), Strategische Wissensnetze: Wie Unternehmen die Ressource Wissen nutzen, Schneider, Gelsenkirchen 1999.

[5] FISHER, G., SCHARFF, E., Learning Technologies in Support of Self-Directed Learning, in: Journal of Interactive Media in Education, 98(4), http://www-jime.open.ac.uk/98/4.

[6] MILLER, M., SCHIEFER, P. et al., Mobile Applikationen: Lernen und Arbeiten im weltweiten Netz, in: it+ti - Informationstechnik und Technische Informationen, 40 (1998) 6.

[7] REPENNING, A, IOANNIDOU, A., AMBACH, J., Learn to Communicate and Communicate to Learn, Journal of Interactive Media in Education, 98(7), http://www-jime.open.ac.uk/98/7.

[8] SCHWARZER, R, MultiMedia und Telelearning - Lernen im Cyberspace, Frankfurt am Main, New York, 1998.

[9] SIMONS, J., Selbstgesteuertes Lernen, in: H. Mandl, H. Friedrich, Lern- und Denkstrategien, Göttingen 1992.

[10] WINER, L. R., CHOMIENNE, M., VÁZQUEZ-ABAD, J., "The Electrical Circuit Simulator" Towards a Collaborative und Distributed Science Learning Laboratory, URL: http://www.telelearn.ca

[11] PALLOF, R., PRATT, K., Building Learning Communities in Cyberspace, San Francisco 1999.