FLE3 - Future Learning Environment

for Collaborative Knowledge Building and Design

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ABSTRACT

Future Learning Environment (Fle3) is software for computer supported collaborative learning (CSCL). Fle3 is a web based learning environment, which can be used with standard web-browsers. Fle3 is designed to support learner and group centered work that concentrates on creating and developing expressions of knowledge (i.e. knowledge artifacts). The software is developed by an Open Source research and development community, which includes pedagogical researchers, user interface designers, software engineers, practitioners of education, teachers and students. Fle3 software is already in use in many educational institutions, but the research and development is still work-in-progress. The users are all the time innovating new ways to use the software varying from classroom use to distant learning and community development projects. The aim of the present paper is to introduce Fle3 and how the designers of the system believe it could support learning and development in different contexts.

Keywords

education, design, development, software, computer support, collaborative learning, CSCL, community development, Fle3, open source, free software, libre software

FUTURE LEARNING ENVIRONMENT 3 (FLE3)

Since spring 2001 the research group of learning environments for progressive inquiry of the UIAH Media Lab has been developing an experimental web-based learning environment called Future Learning Environment 3 (Fle3).5

"development by design" (dyd02), Bangalore Copyright 2002 ThinkCycle
Fle3 is software for computer supported collaborative learning (CSCL). The main aim of CSCL is to provide students with advanced computer tools for knowledge production taking place in interaction among a community of learners.15 In most of the CSCL applications (e.g. CSILE, CoNotes, Belvedere, Knowledge Forum) the knowledge production takes place in a shared working space where students add to the database their knowledge products and carry out progressive discourse interaction.10 Fle3 is designed for learner and group centered work that concentrates on creating and developing expressions of knowledge.11
In Fle3 each user has a user account. To use Fle3 one may install Fle3 software to a server in a network

or just use it in a single computer. The network used can be the "public internet" or local area network or Intranet using Internet protocol. This way Fle3 can be installed at a classroom, school, school district, communal center,at national or international level depending on what kind of learning, design or development projects it will be used for. Installing it into a local area network is a good solution in order to achieve better security and ensure students' privacy than when installing the system to the public Internet. For instance in schools with wireless local area network (wlan) the teacher's computers can act as the Fle3 server for the class and the students may contact the server with their laptops or any computer in the school building.

On the other hand Fle3 can be used just with a single PC computer. Each user may login to the system with their own user name and password and work with the Fle3, rotating the use of the computer. Connection to "public Internet" is not required but recommended as students may use Internet to browse and search information related to their studies or project work.

Fle3 users, teachers and students, can use Fle3 with standard web browsers. Fle3 is designed to work with every web browser (Netscape, Opera, Explorer, Mozilla, Konqueror) on every operating system (Unix, Linux, Mac OS, Windows, etc.). Furthermore Fle3 is usable with standard web browsers in hand held computers and mobile phones (e.g. Nokia Communicator). Fle3 is easy to localize to different languages. Currently Fle3 supports twelve languages.

Fle3 is Open Source13 and Free Software6 (also called Libre Software) released under GNU the General Public License (GPL)7. The license is protecting users freedom to use, modify and distribute Fle3. Fle3 is a Zope product, written in Python. Zope is Open Source application server that runs on almost all Operating Systems (Linux, MacOs X, *BSD, etc.) and Microsoft Windows.
Fle3 consist of modules that are designed to facilitate collaborative knowledge building and collaborative design work through a constructive process. The modules are: user's WebTop (virtual desktops), Knowledge Building module and Jam Session module12. The staff and people taking care of the courses and course participants have tools for managing users, courses and participants of the courses.

WebTop

Each user of Fle3 gets a personal WebTop. WebTops can be used to store different items (documents, files, links to resources in the web, link to knowledge building notes and jam session artifacts) related to the studies or project and organize them into folders. The items in the WebTops are shared with other users in the same course or project, as users may visit each other WebTops.

Only the owner of a WebTop may create, edit and remove items in her WebTop, but visitors may read the items. The WebTop also includes a shared "course folder" for each course or collaborative project. The shared folder is available in the Knowledge Building and Jamming, modules as well.

Knowledge Building

With the Knowledge Building tool, groups may carry out knowledge building dialogues, theory building and debates by storing their thoughts into a shared database. The knowledge building discussion is scaffolded and structured by knowledge types, which label the thinking mode of each discussion note. The Knowledge Building tool contains two default "knowledge type sets": (1) Progressive Inquiry, and (2) Design Thinking. Fle3 Users with enough user rights may also copy, edit and create new "knowledge type sets" to the system. Depending on the knowledge type set selected, users gets guidelines and checklist to write their notes to the database.

The Progressive Inquiry knowledge type set contains the following knowledge types:

Problem;
My Explanation (Picture 3);
Scientific Explanation;
Evaluation of the Process and
Summary.

The knowledge types scaffold students to carry out research kind of activities, which are deepening their understanding of the area under study. Complementary the knowledge type set made for collaborative design contains the following knowledge types:

Design Context;
Design Challenge;
My Design Idea;
New Information;
Evaluating an Idea;
Organizing the Process and
Summary.

To write their contributions to the knowledge building, the system offers a checklist (Picture 3) explaining the participants what kind of things the note should include to advance the process. E.g. when writing New Information -note in design knowledge building the Flea "agent" asks from the author:
"Does the note present some new information related to the design task?

Remember to mention the source where you got the new information:

- by interviewing users
- by analyzing the design context?
- studying earlier design solutions of others."

The knowledge type sets guides students to think adequate and important things related to the process, and this way helps students to write more significant notes to the database. As an aid for helping users to follow the knowledge building discussion, users may take different kind of views to the knowledge building database by sorting the notes as a discussion thread, by writer, by knowledge type of by date. An advanced search engine for the knowledge building is under development and will be published in the next version.

Jamming

Jamming tool is a shared space for collaborative construction of digital artifacts (pictures, text, audio, video). A study group may work together with some digital artifacts by simply uploading and downloading files. Versions are tracked automatically and different versions are displayed graphically. Users may also add annotations to artifacts.

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When setting up a jam session the tutor may choose from three types of jam sessions; (1) "mutate on previous" or (2) "explore possibilities" and (3) diverge and converge. This gives the users slightly different possibilities to make new versions and to make references to earlier versions. Originally the Jamming tool was designed (to be used) for visualizing ideas in a group. However we have noticed that Jamming could be used for many different kinds of collaborative design work that requires versioning. The artifacts under process can be text, picture, poster, music, video, animation, multimedia or a piece of software.

Course and User Management

The staff and teachers taking care of the courses and course participants have tools for managing users, courses and participants of the courses. With the user management tools staff users may add new users manually or by inviting them via email. With the course management tools staff users may add users to courses with a role of being student, tutor or teacher in that particular course.

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Furthermore staff users may manage the knowledge type sets, create new ones, copy and edit existing ones and export and import them between Fle3 systems.

The staff users may also import and export course in XML format, compatible with the Educational Modelling Language - EML defined by the Netherlands Open University.4 In the same way the administrator of Fle3 server may export the whole database in XML and import the package to another Fle3 server.

FLE3 USER AND DEVELOPER COMMUNITY

Fle3 is already in use in several educational institutions. The design of Fle3 is done in Open Source / Free Software community adapting also the methods of user centered and participatory design.3 The members of the development community include pedagogical researchers, user interface designers, software engineers, and practitioners of education, teachers and students. The community developing Fle3 is using several online tools to coordinate the work. The main development activities take place in the Free Software Foundation's Savannah14 service set up for Open Source software development. Furthermore mailing lists are used to coordinate development activities and Fle3 is used itself by the core design team for collaborative design.

Fle3 research and development follows the procedure of action research, which can be described as an interacting spiral and loop of (1) looking, (2) thinking and (3) acting.16 In our core research and development team in the UIAH Media Lab the looking stage takes place by using Fle3 ourselves. From other users we also collect User Stories that propose changes and new features. Thinking and analyzing possible new features is done in cooperation with pedagogical researchers of the Centre for Research on Networked Learning and Knowledge Building, University of Helsinki.1 All potential features are considered deeply from pedagogical, usability and accessibility points of view. Finally the research and development group takes action by designing and building the first prototypes for testing. The aim is to get into rapid prototyping process where possible new features are quickly implemented to be part of the software and tested with real users in a real situation. Rapid prototyping is a method used in design process for problem solving, exploration and sharing of thoughts.9

DISCUSSION

Originally the term hacker means a person who wants to do things he is passionate about, uses his creativity and builds things for the good of all. Originally the word hacker doesn't refer to computer criminals. Hackers doing Open Source / Free Software base their work on the belief that information sharing is a powerful positive good.8

Most of the Open Source / Free Software is done by hackers for hackers. Most of the hackers doing software are highly skilful programmers. For this reason usability and learnability have not been any crucial questions. In Fle3 research and development we have tried to combine the best hackers' ways of working with meaningful design process to ensure that end-users not familiar with computer technology and software can also benefit from Open Source and Free Software. In addition we have tried to design similar kind of tools for schools and universities, which are used by the hacker community.

In the growth of Open Source / Free Software, critical tools have been email, FTP, newsgroups, IRC and WWW (all these tools were developed by the community itself). Without these tools there would not be such community of developers as there is today. There is analogy between the tools of the Open Source / Free Software community and the tools of Fle3. In the case of Fle3, the WebTops are like home directories in Unix world, Knowledge Building is one kind of easy to use newsgroup application with specific pedagogical and cognitive support and the Jamming module can be seen as a Concurrent Versioning System 2 (CVS) for the rest of us. However, Fle3 is made not for the Open Source / Free Software community but for ordinary people in schools, universities and other communities. For this reason the usability, accessibility, learnability and pedagogical aspects are critical.

Fle3 research and development is still work in process. The software is already released, but a lot of pedagogical testing, evaluation and research must be done to recognize and develop the best practices of using the software. Naturally, Fle3 software is also under ongoing reviewing and may change in time. Cooperation with teachers, students and pedagogical researchers around the world are essential when designing and developing this kind of specific tool.
Our research group's vision, which we hope we share with other members of Fle3 Open Source / Free Software community, is that Fle3 could empower people in many different areas of human interest, varying from science, to politics and social questions, to art and design. Same way as the tools of the Open Source / Free Software community have lead to empowerment and emancipation of the members of the community in the field of technology we hope that Fle3 could do something similar in other areas of human development.

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