A. COLLABORATIVE WORKSPACES

Virtual CSCL 2002: Making the Most of CSCL 2002 by Extending it Virtually

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"Virtual CSCL 2002" is aimed at extending the process of knowledge sharing and creation by conference participants, organizers, tutors and authors before, during and after the conference. We will provide a collaborative learning support server, ALE-BSCW. ALE-BSCW consists of a course authoring and learning environment (ALE) and a Shared Workspace System (BSCW). Conference participants may register with the ALE-BSCW server and may view the uploaded material, comment on it, add their own documents, engage in discussion forums and much more; any Web browser will suffice to access ALE-BSCW. The server will remain available after the conference for participants to stay in contact and cooperate. In the following, we will very briefly describe the two components of the "Virtual CSCL 2002" server: ALE and BSCW.

ALE – *A*DAPTIVE *L*EARNING *E*NVIRONMENT

The ALE framework utilizes hypermedia technology and AI (Artificial Intelligence) methods to deliver individualized hypermedia instruction. The framework is comparable to our previous ACE framework described in (Specht, Oppermann, 1998). Two different learning strategies are supported by ALE: expository learning, where students follow predefined paths through learning material, and exploratory learning, where students explore learning material on their own. Furthermore, awareness information integrated into the ALE learner portal and course interface support synchronous and asynchronous learning in learner groups.

Besides the adaptation of a goal oriented instructional process, the integration of cooperative learning components into ALE enables the support of a wider range of learning activities and the support of individual styles of learning. Students can learn in ALE not only by discussing with other students but also by following the individualized guidance of a pedagogical agent through all available learning material. The only criteria for a successful learning path are the test results of a student at the end of a learning unit or even a curriculum.

The ALE architecture consists of four main models: the *structural model* describes the learning units of the domain and their interrelations and dependencies, the *content model* comprises the concepts to be learned, the *pedagogical model* contains pedagogical strategies and diagnostic knowledge and the *learner model* stores the preferred settings of a learner, the domain concepts and learning units a learner worked on, and the interface components used by the learner.

When students log into ALE they enter an individualized learner portal, where they may book courses, contact courseware authors and other learners, maintain and update their profile, and access a collection of resources linked to that page. Additionally, students get awareness information about current online discussions, teachers' online lessons in their courses booked, and co-learners that are present on the ALE server. From their personal ALE portal they start working on their courses booked.

Based on the learner model, the content model, the structural model, and the pedagogical model, the presentation component of ALE selects appropriate learning units and generates individual hypermedia documents. When a learner requests information about a learning unit, the ALE system checks if the learner has already mastered the requested unit or has seen some material about this unit. In a second step the system looks up relations and available material for the requested unit. In a third step the presentation component retrieves a plan for presenting the unit depending on the available learning material for this unit, the knowledge of the learner, and the teaching rules and pedagogical specifications of the course author. The retrieved plan describes the presentation of the requested unit, which is translated into HTML by the presentation component. Throughout the whole course the learner's knowledge is tested so that the system can adapt to the dynamically changing knowledge, interests, and preferences of the learner.

BSCW – *B*ASIC *S*UPPORT FOR *C*OOPERATIVE *W*ORK

The BSCW system is a Web-based groupware system around the *shared workspace* metaphor. A BSCW server (a standard Web server extended by the BSCW functionality through the Common Gateway Interface) manages a number of shared workspaces – repositories for shared information, accessible to the members of a group via any normal Web browser. Registration with a BSCW server and administration of a workspace user group is performed in a self-organized manner:

by default no system administrator's action is required for user administration and workspace set-up. The only pre-requisites to become a BSCW user are an email address and a Web browser.

A workspace may contain different kinds of information, represented as information objects arranged in a hierarchical order. A shared workspace can contain different kinds of information such as documents, graphics, audio/video, URL links to other Web pages, threaded discussions, member contact information and more. The contents of each workspace are represented as information objects arranged in a folder hierarchy.

The main features of the system are (for details see (Appelt, 1999), (Bentley, 1997) and http://bscw.gmd.de/):

- *Authentication and security*: Identification of clients by basic name/password scheme or X.509 Client Certificates. BSCW runs well with SSL (Secure Socket Layer) compatible Web servers and thus supports encrypted data transfer.
- *Version management*: For joint document production, documents may be put under version control. Additionally, documents may be locked to prevent document replacement or upload of new versions by other users.
- *Discussion forums*: Threaded discussion forums may be set up in any shared workspace for closed group discussions in context. Discussion forums may additionally be attached to documents like "post-its".
- *Group awareness*: The *event service* of the BSCW system provides users with information on the activities of other users. Events are triggered whenever a user performs an action in a workspace, such as uploading a new document, reading an existing document, editing a document etc. The system records the events and presents the recent events to each user. Event notification may be individually configured to be rendered in-system by event icons or via email, both direct or in aggregated daily activity reports.
- *Access rights management*: The system contains a role concept which allows for flexible and fine-grained access rights settings. While some roles are system-defined (manager, administrator, member, anonymous user), others may be defined by the users themselves: for instance the roles of *teacher* and *student*.
- *Interface to synchronous communication*: Through this interface users can specify synchronous sessions and launch respective tools, e.g., audio/video conferencing software or shared whiteboard applications.
- *Customization*: Through user preferences the users can modify the system interface to some extent, e.g. to what detail information on the server should be displayed. Additionally, system administrators may almost entirely replace the user interface by providing their own XHTML and CSS user interface templates.
- *Multi-language support*: The interface of the system can be tailored to a particular language by straight-forward extensions. Various language versions have been created and published by users of the system.

The Fraunhofer FIT institute is operating a public BSCW server since October 1995 where everybody is invited to register and create workspaces free of charge. As of October 2001, more than 70,000 users have registered on FIT's public BSCW server and the server software for local installation has been downloaded several thousand times.

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