Collaborative learning through multimedia interaction

Margarita Todorova	Donika Valcheva	Mariyana Nikolova
Associate Prof. Dr.	PhD student	Assistant Prof. Eng
Head of Computer Systems and Technologies Dep., St.Ciryl and St.Methodius University of Veliko Turnovo, Bulgaria	Computer Systems and Technologies Dep., St.Ciryl and St.Methodius University of Veliko Turnovo, Bulgaria	Computer Systems and Technologies Department, St. Cyril and St. Methodius University of Veliko Turnovo, Bulgaria
Phone:+35962 649831	Phone:+35962 649831	Phone:+359 62 649831
E-mail: marga_get@abv.bg	E-mail: doni_ka@mail.bg	E-mail: mnikolova_vt@abv.bg

ABSTRACT

In this paper, the different kinds of interactions in the web-based learning are discussed. Some examples of interactive web-based learning activities through multimedia interaction and collaboration are listed. The traditional and modern technologies for collaboration work are also examined in the report. A list of some typologies (or taxonomies) of collaborative actions and environments are investigated.

Categories and Subject Descriptors

K.3.1 [Computer Uses in Education]: Collaborative learning

General Terms

Design, Human Factor

Keywords

Multimedia interaction, Collaboration work, Web-based learning, Collaboration learning technologies and tools

1. INTRODUCTION

It's clear that multimedia is playing a big role in research and development both in academia and industry. Interaction is a key feature supported by multimedia systems. This is especially important in education and training. Interactive features provided by multimedia systems make learning as well as teaching more attractive. Increasingly, we've seen classrooms begin to integrate these systems in various formats. With the advent of online classrooms offered over the Internet, interactive multimedia could play a much larger role in the near future organization, attitude, cost and human resources.

Interactive multimedia features have to structure and guide the learner's access to educational content. Learning technology systems need to present the content in the most appropriate form to a learner. Multimedia ideally suits these requirements. Learning content is a collection of stored media resources that presents the learner with different views and activities relating to the central concepts of the subject domain. At the core of the learning environment is multimedia delivery systems that allow the learner to access content resources and to interact with content in the most appropriate, educationally sound way.

Interactions and interactivity have become key elements characterizing much of the teaching and learning associated with new technologies. In essence, the terms describe the means by which the user communicates with the technology and brings about a change or response as a consequence. An important aspect in the development of technology-based learning materials is the consideration and choice of the interactions that are needed to support the required learning outcomes. The presence of interactions and interactivity in technology-based instructional materials has become synonymous with enhanced learning. There are many forms that interactions can take in the development of instructional materials. [4]

2. INTERACTION IN WEB-BASED LEARNING

There are three kinds of interaction in any learning situation. [3] These are:

➢ Learner - Content Interaction;
➢ Teacher - Learner Interaction;
➢ Learner - Learner Interaction;

The three main types of interaction can be visualized in a diagram:
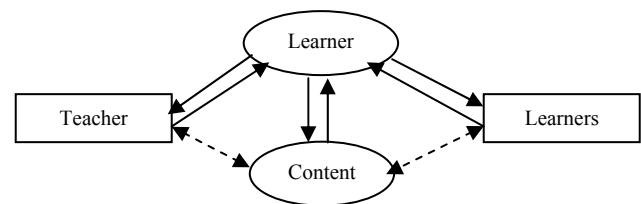
The web-based learning differs from the conventional forms of teaching and learning with opportunities for real time communication through multimedia interaction.

There are four types of interaction in web-based learning: [7]

➢ Interaction with media (e.g. navigation around a web resource using local hyperlinks);

➢ Interaction with hypermedia (e.g. visiting other web resources through global hyperlinks);

➢ Asynchronous Interaction (e.g. e-mail, bulletin board, threaded discussion group);

➢ Synchronous Interaction (e.g. chat room, internet relay chat, videoconference).

The first two types are connected with the Learner-Content interaction type, whilst the last two types are found in both Teacher-Learner and Learner-Learner Interaction.

3. CLASSIFICATION OF INTERACTIVE WEB-BASED LEARNING ACTIVITIES THROUGH MULTIMEDIA INTERACTION AND COLLABORATION

Interactive multimedia materials by their very definition involve large amounts of learner initiated activity and action. While many consider that the interactions in programs make a significant contribution to achieving learning outcomes, most interactions play no such role. Interactions are present in all components of instructional materials, the content, its organization and the interface through which it is presented. Interactions play a communicative role in the human-computer dialogue. Much of the communication is given to instructions and controls of an operational nature.

In the last few years a lot of research work has been made in the direction of defining the most appropriate for the teaching and learning process interactive multimedia activities [1,2,4,5,6,9]. Here a classification of interactive web-based learning activities through multimedia interaction and collaboration is presented:

➢ **Demonstrations and Visualizations** – Computer multimedia provide powerful tools for visualizing complex information in ways that make it more understandable or useful. Clearly multimedia software favors visual learners. Images, graphs, animations, movies, schematics and other visual objects greatly enhance the presentation of material. In developing multimedia software, one must be particularly aware of the opportunities to improve the presentation through the use of visual clues.

➢ **Simulations and Lab Studies** - Some of the most interesting current interactive applications are simulations. The use of multimedia engages students actively in their learning, and exposes students to the subject matter in exciting ways that traditional learning methods cannot. Using multimedia allows students to take an active role in the educational process, in that it frees them from being passive recipients of information.

➢ **Problem Solving** - Various forms of problem solving lend themselves to interactive approaches. Problem-Based Learning is a structured approach that has proved particularly popular in training for professions such as Medicine and Engineering in which problem solving is a central activity. With conferencing software, problem solving can be collaborative and can use information from databases.

➢ **Concept Mapping and Model Building** - Concept maps, which are useful in consolidating learning, have already been computerized and have been proposed as a useful learning tool online. A number of concept mapping software tools are now available. They are applications that deserve further exploration since it not only provides a useful learning device but also enables teachers to monitor the development of students' concepts.

➢ **Investigations** - Discovery is a very important part of the educational process and is easily achievable through the proper implementation of multimedia. Investigations and Discovery Learning approaches use a range of interactive online resources including simulations, collection and analysis of data and collaborations with other students online. Even when they are little more than routine searches, they still require an understanding of what the project is about, its goals, strategies that can be useful and decisions about the selection and relevance of information retrieved. Publication on web sites adds another dimension.

➢ **Asynchronous Discussions, Debates and e-Seminars.** The first interactive online activities were supported by e-mail and asynchronous discussions and these are still a mainstay. With increasing use of groupware, collaborative elements can be added to investigations and other activities. In addition to their uses in providing social interaction, they remain powerful tools for critique and for comparing understandings and points of view. Asynchronous discussion is often more thoughtful because it allows time for reflection, clarification or help. Following the threads of such discussions and seminars often shows how the conceptual interactions between participants shape their ideas.

4. COLLABORATIVE LEARNING TECHNOLOGIES AND TOOLS

The question of how people can learn from each other is part of the larger question of how they work together - or, if one is less task-oriented, how they live and play and understand things collectively [8].

Collaborative learning rather obviously implies learning with others - which may be better than learning on one's own, but is not in itself a particularly exciting idea. Collaborative learning becomes powerful and exciting when it occurs in the context of a community of practice**.** Such communities have, developed a certain level of trust and evolved sets of assumptions, practices, hierarchies, and projects, which enable their members to work together. In the real world we learn most in the process of becoming part of such a community and of contributing to what it is doing.

Traditional technologies for collaboration work

Excluding (for now) synchronous tools (such as face-to-face meetings and telephone conferencing), these are the older (but still useful) collaboration tools we can think of:

➢ **E-mail** - ubiquitous and very flexible, but difficult to build coherence.

➢ **Discussion groups** - simplifies broadcasting e-mails to a group, but volume can get overwhelming and lack of coherence remains a problem.

➢ **Threaded discussions** - supposedly allows for greater coherence than plain discussion lists (by linking different threads of the group conversation), but cumbersome and time consuming to use in practice.

- **File sharing by e-mail** - allows for different people to work on a common document, but version control very difficult, especially for larger groups.

- **File sharing via a network** - better version control (depending on the system), but difficult to set up.

Modern technologies for collaborative work:

- **Computer Conferencing, User Discussion Forums** –The user discussion forums are very useful collaboration tools, because they offer opportunities for presenting different points of view in order problems to be solved in most effective way. Another opportunity is for the teacher, who can check the most frequently asked questions (FAQ) and add useful information in his Web-course.

- **Bulletin Boards** – Opportunity for storing and presenting messages from all participants of the web-based course. The bulletin boards are static. The communication is not in real time.

- **Chat** – Allows communication between each of the participants of the web-based course. The communication is implemented in real time.

- **Audio-conference** Synchronous tool for communication and collaboration. The interaction is through sound and real time voice communication.

- **Video-conference** – Conference that offer real time visual and voice communication. There is an opportunity for applying other media tools.

- **Virtual classrooms** – the simultaneous implementation of several elements of the synchronous communication (white board, joint chat, etc.)

Learning Management Systems (LMS) and Content Management Systems (CMS) as tools for collaborative work

Large, all-purpose learning management systems typically include features aimed at facilitating collaborative learning - although many of these systems do not seem to get much past providing for threaded discussion groups. These LMS claim to be strong on collaborative learning features. Learning management systems typically have some content management functionality (some are referred to as Learning Content Management Systems), but it is also worth considering systems that focus primarily on content management.

5. COLLABORATION TYPES
Here we list some typologies (or taxonomies) of collaborative actions and environments.

A typology based on interactivity and group size

- Library (a few people place material in a repository, many draw on it)

- Solicitation (a few people place requests, many respond e.g. a Request for Proposal system)

- Team (a small group working together on a project)

- Community (e.g. a Community of Practice)

- Process Support (systems that support repetitive workflows)

A typology based on communication patterns

- Point-to-point two-way (as in phone calls)

- One-to-many outbound (as in newsletters)

- Many-to-many two-way (as in a group discussion)

A typology based on spaces
- A space for gurus and beginners to connect (provide mentorship)

- A space for self-expression

- A space for debate and dialogue (discussion forum/listserv)

- A space to search for archived knowledge

- A space to learn in a structured manner (tutorials)

6. CONCLUSION AND FUTURE WORK

Collaboration systems enable people in remote places to communicate and cooperate. And most collaboration systems are not designed in the approach of an open system and cannot communicate with each other. It will bring substantial benefits to Internet users if we can build an integrated collaboration environment, which combines conferencing, streaming, instant messaging as well as other collaboration applications into a single easy-to-use, intuitive environment. However, traditional collaboration systems can only provide limited collaboration capabilities to a small group of people in a local or private community. Therefore it is very important to create a more general framework to cover the wide range of collaboration solutions and allow different users from different communities to collaborate in a modern way, using modern multimedia technologies and tools.

7. REFERENCES
[1] Csete Josephine, Lam, P., Wong Yiu-Hing, Online Learning Strategies: Interaction Examples That Works, 21st Annual Conference on Distance Teaching and Learning, 2005
[2] Lander Denis, Online Learning: Ways to Make Tasks Interactive, Royel Melbourne Institute of Technology
[3] Moore, M. G. and Kearsley, G. (1996) Distance Education: A Systems View. Belmont, CA: Wadsworth
[4] Oliver, R., Interactions in multimedia learning materials: The things that matter, Edith Cowan University, Proceedings of the 3rd International, Interactive Multimedia Symposium, Perth, Western Australia. 21-25 January 1996
[5] Schrum, L., & Berge, Z. (1997). Creating student interaction within the educational experience: A challenge for online educators. Canadian Journal of Educational Communication, 26(3), 133-144
[6] Sims, R. (1997). Interactive learning as an "emerging" technology: A reassessment of interactive and instructional design strategies, Australian Journal of Educational Technology, 13(1), 68-84.
[7] Soo, K. S. and Bonk, C. J. (1998) Interaction: what does it mean in online distance education? Paper presented at the Ed-Media and EdTelecom 98 Conference, Freibourg, Germany.

[8] Collaborative learning environments sourcebook, Online book available in: http://www.criticalmethods.org/collab/v.mv?d=1_1

[9] Тодоров Г., М. Тодорова, Въведение в мобилното обучение, Фабер, Велико Търново-2006г.