

Communication Tools in E-learning Systems

**Marian Bučko¹, Igor Sivý¹, József Gáti², Gyula Kártyás²,
Ladislav Madarász¹**

¹ Department of Cybernetics and Artificial Intelligence
Department of Computers and Informatics
Technical University of Košice
Letná 9, 04200 Košice, Slovakia
bucko@elfa.sk, ladislav.madarasz@tuke.sk

² Budapest Tech
Bécsi út 96/B, H-1034 Budapest, Hungary
gati@bmf.hu, kartyas@bmf.hu

Abstract: Communication is important part of the education. Internet provides new and very effective forms of communication between students and teachers. This possibility positively influences the pedagogical process. It enables confrontation of ideas, exchange of materials and on-line communication on various projects. This contribution analyses the available communication tools and their utilization in various aspects of education. In summary describes communication tools, which are implemented in the eEDUSER portal (eEDUSER - "Efficient E-Learning Network Services Establishment for Education without Borders", project within Leonardo da Vinci Programme).

1 Introduction

Communication possibility and sharing of information are the basic attributes of every e-learning system because they are key factors. Communication in the e-learning systems may be divided into the following two groups:

- synchronous
- asynchronous

Synchronous communication is a real time event. It means that both participants have to be present in the same time. The quick response is advantage and problems may be discussed immediately. This form of communication is based on text, voice and audio-video transfers.

Asynchronous communication is performed in different time. Due to this fact, participants may communicate in different time slices. The most general form of this type of communication is the e-mail. Popular is also discussion forum. This

type of communication does not require demanding HW, SW and Internet connectivity.

We differentiate the following forms of transfer and sharing of information:

- **One to one.** This form is represented by e-mail, Fig. 1. This commemorates telephone conversation or sending personal classical mail.

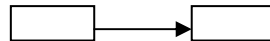


Figure 1

Sharing of information (one-to-one)

- **Broadcast** (one-to-all, Fig. 2). This is mainly represented by the server or instructor, who sends information to all participants.

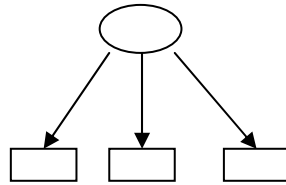


Figure 2

Sharing of information (broadcast)

- **Somebody to somebody** (Fig. 3). In this form of communication every participant may receive message only from selected participants. This form may be modified when participant selects messages from definite senders, i.e. filters the messages

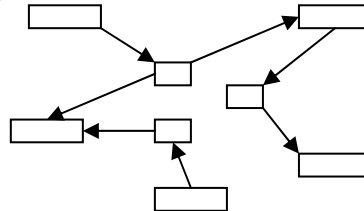


Figure 3

Sharing of information (somebody-to-somebody)

- **Everybody with everybody** (Fig. 4). This form of communication everybody may receive messages from everybody. This recalls round table.

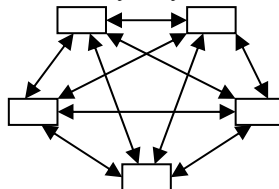


Figure 4

Sharing of information (everybody with everybody)

2 Communication Tools in E-learning Systems

E-learning systems contain plenty of communication tools, which enable teachers, communicate individually with selected students. These tools enable more intensive communication than in classical teaching.

E-learning system utilizes mostly the following communication tools:

- Electronic (e-mail). Electronic mail is the most widespread Internet service. This enables sending text messages through the Internet. In spite of the fact that e-mail is intended for sending text based messages mainly, today it is possible to deliver any type of file. I.e. picture or files from table calculators etc.
- Mailing list. Mailing lists were created on the top of the e-mail. They are also called as discussion forums. In these groups, communicate groups of persons. Groups are created according to the interests of these groups. The majority of these groups are administered automatically, i.e. administration is done by programs. Some discussion forums could be moderated. It means that the forum is owned by a concrete person, moderator, who decides about the inclusion and then distribution of the particular message.
- News groups (groups for new messages). They are called also as network news or servers of messages. These are special servers or web pages, which accepts messages of a definite topic. These servers sends the messages through standard protocols (they are called newsreaders) to every participant in the group. The advantage of the newsgroups is the fact that they are created very easily. Newsreaders are easily used programs. The advantage is also the fact that answers are suited immediately after the message.
- Discussion forum. Typical example is the discussion about an article of special server where the readers explain their views. Contributions are well-arranged into a hierarchy. The advantages are as follows:
 - anonymity
 - time and place independence
 - discussion in any time
 - students are active, they may help each other in doing common projects
 - contributions are composed more carefully because students have time to work on them
 - every student has chance to be heard out
 - written expression is well-organized and based on facts
 - is part of the assessment

- Chat. This asynchronous communication based on the exchange of short texts, which are entered through the windows of the application. The window is divided into several ranges. The largest portion of the window contains the whole communication process. The bottom part is a row, which is the input area for the text. This text is visible for all participants. Chat is realised in few minutes and the exchanged information could be collected during several days in other forms of communication. These tools are constantly in evolution and development on various operating systems platforms. Recently new modern communication means appeared e.g. ICQ.
- Response pads. This form of communication allows immediate voting in real time. This is utilised for the enhancement of the students' activity, e.g. their participation in questionnaires.
- Whiteboard. Whiteboard equals to the classical blackboards. In the computer milieu this represents sharing area of the monitor for drawing. When somebody draws with special software (it remains paint utility), every student notes the drawings. For the efficient utilisation of the whiteboards, every student may prepare his/her own clipart (set of pictures, symbols, arrows, lines, texts, which may be utilised in the given area). Very often, the participants are identified through the colours. It is not suitable to criticise somebody for his/her bad drawings. Every relation has to be summarized, what new ideas were created, what was solved and what was not solved.
- Shared screen. The shared screen enables to watch the screens of the instructor. Some types of programmes enable to follow also the progress of students on their own screens. The majority of software with shared screens enables instructors to divide the screens into several parts in order to follow the progress of the students at once.
- Audioconference. Audioconference utilizes the computer network as telephone. This is called also as videoconference. This is mainly provided by the program, which is part of the internet browser, that is why the quality depends on the selected program. Audioconferences are suitable for complex and emotional discussions.
- Videoconference. This is remote interactive communication between two or more remote participants in real time. This is providing mainly by program, which is not part of the internet browser and that is why the quality of the transfer depends on the selected program. Disadvantage is the high demand on the hardware and the network transfer rate. It is important to guarantee the speed rate through the whole session.

3 Utilisation of the Communication Tools at the Realization of the Pedagogical Aspects

It is important to organize the pedagogical process in e-learning systems, i.e. the communication between the teacher and the student. Besides this fact the organization depends on educational methods. These methods depend on the utilization of communication tools and the mode, which may be provided for single student or for a group. Mutual communication between the participants may be provided in text, voice or picture forms. The next part of the contribution is devoted to the utilization of communication tools in the realization of pedagogical aspects of education.

3.1 Counselling

Counselling is also important part of the communication between the teacher and student. This is true because the student has to acquire the knowledge him/herself. E-mail may be utilised in this form of education when questions and answers are sent between the teacher and groups of students.

Assignments may be distributed in this way and also collection of the students' solutions. It is suitable in subjects where students have to deliver individual solutions.

3.2 Webcast Lecture

Webcast is communication in real time. These are web spaces, which are owned by educational institutions. Every authorised participant (who has access to the server) is allowed to participate on the lecture, which requires constant communication between the tutor and student. We need only tools as *RealPlayer*, *Windows Media Player*.

In spite of the fact that the most common form is lecture there are also other interesting variants of the webcast:

- **Demonstration.** Tutor shows the educational steps through the shared screens. In the next step student is invited to solve similar tasks in the „virtual class” or to the tutor.
- **Debate.** Two authorities from tutors or two students represent opposite sites to one definite problem. Participants may put questions to the authorities. At the end participants vote for debating partners.
- **Interview.** Tutor makes interview with a recognized expert authority. Students may put questions or prepare questions beforehand.

- **Questions and answers.** Tutors somewhere interrupt the lecture and students give questions. In order to simplify the procedure, tutor asks students to prepare question before the webcast.
- **Lecture in circle.** Teacher begins to deliver the lecture. After an interval tutor asks some student to continue in the lecture. Then this student asks another student to continue etc.

3.3 Team-work

The majority of the educational methods is aimed at individual and individual work. Team-work is activity exercised in team. In ideal case the team has to conduct original research.

3.4 Brainstorming

Brainstorming is a method of solving the problem in a group. This is based on the suggestion of any kind of criticism or evaluation of the ideas. The aim is to gather at full fart ideas in spite of their strange impact. This discussion is moderated. Tutor defines some problem during the brainstorming and students propose solutions. Every participant has to generate as many as possible ideas. The quality of the ideas does not matter. Questions have to be short and simple.

Brainstorming is part of more exercises including the team-work, problem solutions and creative thinking. This is method allows finding original solution of a given problem.

Examples on brainstorming:

- 1 Tutor invites students and defines the problem.
- 2 Students give questions where the quality of the question may be different. It is important not to ponder to long on the given question and to ask quickly. New ideas are generated, not prepared, sometimes unreal. Chat may support this kind of communication. If the progress of ideas slows down, it is suitable to select the discussion forum.
- 3 Tutor transforms brainstorming and starts discussion group. In this type of communication, students have time to ponder on the answers. Students generate ideas further until the time expires.

3.5 Playing Roles

Playing roles is method, which allows students to try new ways of behaviour in new situations. This training method is the most useful method for acquiring skills in human relations or for changing attitudes. Playing roles develops ability of empathy. This remains the well-known play of children when they are playing

roles of adults. Adults also play the roles in theatres, cinemas etc. Playing of roles consists of three phases: development, playing and assessment.

In the above-mentioned pedagogical process tutor assigns a definite goal and the task of students is to play them in order to achieve the defined goal. Students have to learn the role, they have some time to make familiar with the role. That is why they utilise intensively communication tools as chat, discussion groups in order to improve the performance. The roles have to be carefully prepared. Scenario contains information about the time and relations of unique persons and instructions for students. The most important part is the assessment, which has to take two or three times more time than playing. Participants discuss the results in this phase.

3.6 Virtual Laboratory

Virtual laboratory is screen oriented on-line simulator, which is a means for students to test and watch the results.

Virtual laboratory allows experimentations without danger of making damages in the equipment or injuries. Virtual laboratories allow experiments, which are not possible to realise in actual environment.

Virtual laboratories are used for:

- the training of students for real laboratories
- instead of real laboratories
- the abstract experiments (e.g. to experiment with the orbit of the planets, reproduce genetical experiments)
- exploring new principles, trends, relations.

In order to make maximum profit from experiments, conditions may be modified and simulated. Virtual laboratories may also simulate results, e.g. students may explore effects of various extensions in microscope or telescope, different wavelengths, etc.

3.7 Presentation Sequences

Presentation sequences are developed to support resume flow of information in the given topic. Every student goes through the topic, he/she is physically passive but mentally active during this phase. Presentation sequences ensure high quality explanations of the given topic for all students.

Examples on presentation sequences:

- 1 Introduction – explanation of the topic relevancy

- 2 Topic of the presentation – there may be several topics. Every topic provides one concept, answer only to one or the execution of only one point of the programme.
- 3 Summary – repetition of all points of the presentation topic
- 4 Test – final test for all students

Variations of presentation sequences:

- **Slide-show.** This utilises essentially voice.
- **Videosequence.** Given sequence has to be short (less than 5 minutes) or to divide into short sequences. Every student has right to control the movement of sequences and to reply them.
- **Book.** This is linear sequence essentially, like classical book.

3.8 Practical Exercises

Given method is utilised in teaching foreign languages, symbols, emblems, logos, punctuation and grammar and for teaching syntax of programming languages. Tutor explains students the topic at the beginning and then students solve repeatedly the task and deliver the results. At the end students repeat eventually apply the acquired knowledge in real situations. Several tips for this method: To solve as many as possible tasks, to raise the complexity of tasks, assign complex problems. Application of this method in isolation does not suffice and it is necessary to combine it with other educational activities.

3.9 Searching on the Internet

This method trains searching sources on the Internet. Students collect during this process all kinds of information independently on the quality and then provide selection. This method is used during the searching of quotations on research work or a concrete www page, which has to be found according to the defined criteria. This method teaches students to find, assess and select sources of information on Internet.

4 Virtual Class

Portal eEDUSER provides support for all activities, which are exercised in a virtual class.

Virtual class is, in the eEDUSER system, is defined as the entity that associates course with one or more students and one or more lectors on purpose of reaching

some educational goal(s) (realization of course) (Fig. 5). Virtual class uses the services of the portal to reach this goal.

Virtual class in the eEDUSER system (Fig. 5) provides e-learning environment for the realization of the educational activities. This environment is personified and provides the following services:

- **Educational resources** (Resources)
- **evaluation** (Assignments, tests, grade book)
- **supplement environment** (Announcement, Document manager, Students, FAQ, References)
- **collaboration environment** (discussion forum, chat, ipCommunicator, Mailing list videoconference...)

Educational sources. This section provides students and lectors with the study materials. Courses are created from these sources and the parameters are set (*sequencing, access time*). The number of educational sources in a course is unlimited.

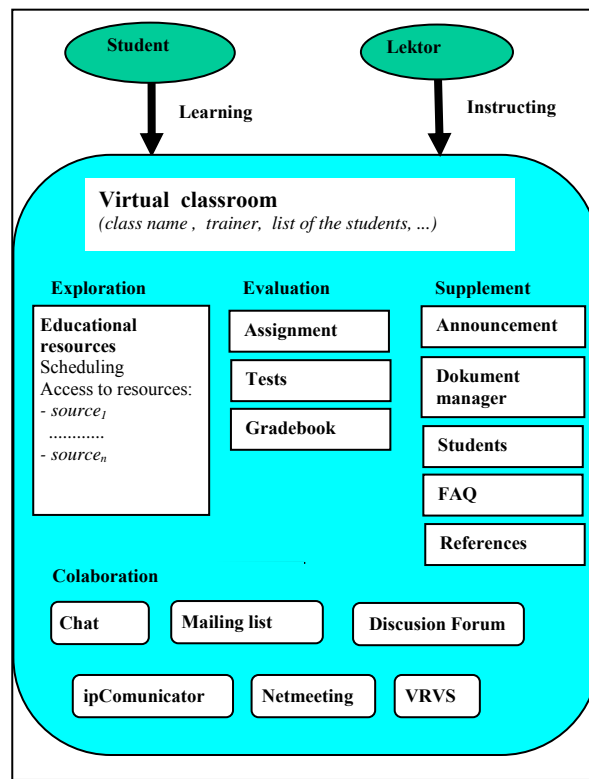


Figure 5
Architecture of the virtual class

Evaluation

Assignment/Tests. This section enables students to pass tests or assignments. Lector may change the tests' parameters.

Gradebook. Students may view their results here. Lector assigns marking.

Lector may also see the results of his/her students in the class

Supplement environment

This virtual class provides the following supporting tools:

Document manager. This tool (Fig. 6) helps in document exchange. Every course has its own directory for uploading documents.

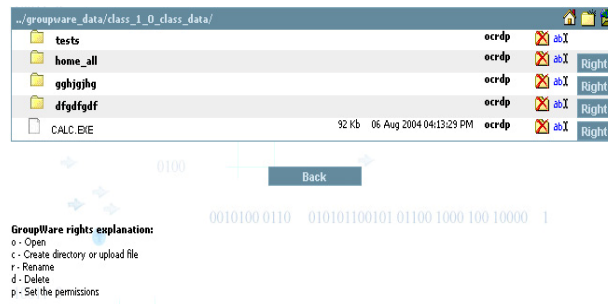


Figure 6
Document manager

This tool maintains the directory structure on the server and has integrated support for setting access rights to selected items.

Every class contains a „Tests” directory, which serves for test purposes.

Announcement. Place messages for students.

Students. This part contains list of students who are in virtual classes. It shows the login of the student, his/her communication activities (chat, ipCommunicator).

FAQ. This part contains frequently asked questions. Students may put questions and get answers.

References. Contains references on interesting sources. Lector may maintain them. (*with short messages*), which are available for students.

Collaboration environment

The eEDUSER portal provides the following communication platforms:

Discussion forum

Every course has its own discussion forum with classical structure. Lector is moderates this forum, i.e. creates threads and edits them. Students may also contribute to the forum.

Chat

Every course has its own chat room. It is used also for brainstorming etc.

Mailing list

Mailing list enables e-mail communication between students in the virtual class

ipCommunicator

This tool was developed specifically for eEDUSER (Fig. 7) and enables communication through audio and video.

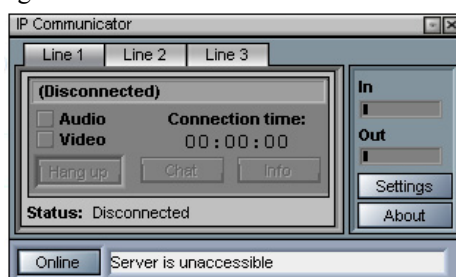


Figure 7
ipCommunicator

Communicator does not require any special installation. After switching on and clicking on the student's icon, the connection is established. The application consists of 2 parts: client and server. Clients connect to the server through TCP/IP protocol, which enables connectivity to private networks (cca 5kb/s – audio and cca 20kb/s audio video). It enables dial-up connection to the Internet too.

Conclusion

Experiences gained from the utilization of the ICT in education show that e-learning methods and tools cannot be applied for all educational problems. The role of the tutor will increase because he/she has to control efficiently the education. The communication means will enhance the efficiency of remote control.

eEduser is one attempt to enhance the communication between tutors and students and in this way to support the education without borders.

References

- [1] Jakab František, Sivý Igor, Bučko Marian: Koncept portálu umožňujúceho poskytovanie progresívnych e-learningových služieb, Vzdelávanie bez hraníc, BELCOM 05, Trendy v e-learningu, Praha, 21.- 22. Februára 2005, Praha, ČVUT Praha, Fakulta stavební, 2005, pp. 20-27, 80-01-03203-5
- [2] Jakab, F.; Fedak, V., Genčí, J., Sivý, I. " Efficient e-learning services. Proc. of CBLIS 2005, Seventh Int. Conference on Computer Based Learning in Science, 2-6 July 2005, Zilina, Slovakia, 10 p, in printing
- [3] Project "eEDUSER". www.eeduser.com