Advantages and disadvantages the use of ICT in collaboration

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Abstract - The use of information and communication technologies enabled the use of collaboration in accessing the knowledge contents at higher education institutions with a higher quality and in a more elegant way. This paper illustrates existing solutions in computer-supported collaboration approach in all the aspects of communication and collaboration which are supported by the electronic communication.

The goal is to test the functionality of information and communication technologies of the internet services domain when they are used to collaborate, and to compare results obtained by standard (classic) techniques of collaboration with the new techniques which include the internet usage.

I. POSSIBILITIES OF COLLABORATION THROUGH E-LEARNING

E-learning is referred to as a systematic usage of web information and communication technologies to teach or study. Unique and key attributes of these technologies are [1]:

- flexibility gained through the web information and communication technologies
- electronic access to various multimedia
- potentials of the e-learning enabled by the online technologies

A. Flexibility of e-learning

Flexible access to information and resources is the key attribute of the web information and communication technologies. The center of the flexible access concept is grading the user’s characteristics. The goal is to adjust the content which is being accessed and its adopting process to the needs of the actual users, not professors and/or educational organization.

Flexible access to the content and learning resources through the web information and communication technologies in conventional classrooms, reading rooms and communities is a defining characteristic of what is known as distributed learning (Dede, 2000).

In such a context, different forms of computer conference technologies can be used as a support for collaborative queries of students which are not only located in different places, but also in many cases are present at different times (Edelson, Gordin & Pea 1999, Edelson & O’Neill 1994).

Range of online technologies of learning allows students and teachers to engage in synchronous, as well as asynchronous interaction through space and time (Gomez, Gordin & Carlson 1995). With these technologies at hand and with the tele-mentors available, students from different locations can also create, share and master the knowledge content and actual worldwide problems (Edelson, Pea & Gomez 1996, Gordin, Polman & Pea 1994).

B. Electronic access to resources based on hypermedia and multimedia

Web information and technologies of communication make the distribution of the subject’s content possible in various media formats which are not usable within space-and-time limited educational situations, such as classrooms or printed editions (Dede, 2000). This means that applicants in distributed educational circumstances can access various educational sources in a form suitable for their individual learning approach, (Spiro, Feltovich, Jacobson & Coulson 1991) in a time and place they find appropriate (Pea 1994).

Educational sources can include different combinations of display [1]:

- hyperlinked text material, incorporated pictures, charts and animations
- video elaboration of a subject, including interview and panel discussion
- hyperlinked multimedia elements like Quick Time Video, simulations, charts and animations
- “Just in time” approaches to training and assisting through tele-mentors, access to different e-communities etc.

Education software is one of the possible resources for e learning. The software in the educational field represents the intellectual technology and it is called the educational computer software which needs program languages and tools and a specific organization in teaching and learning, which are based on logic and pedagogy [3].

Designing the educational software is an enormous challenge. The ES of a good quality relies on a relationship between a user and the computer. It is very important to include users in designing process of ES, because they do not hesitate to show their feelings or thoughts [2].

C. Potentials of e-learning through online technologies

Researches of studying and teaching suggest that human beings learn most effectively by accomplishing realistic goals which are also the essential motive (Schank, Fano, Jona, & Bell, 1994).

Learning is significantly increased when it is based on solid grounds and placed in an authentic context of a solution of the problem (Barron, Schwartz, Vye, Moore, Petrosino, Zech, Bransford, & The Cognition and

Everyday classroom curriculum, although easily being cost-effective, is greatly limited by the fixed time-line and space, and to the certain amount, limits the studying in the context of reality.

Printed text, although easy to handle, is limited by the inability to include anything but the pictures, text or illustrations. On the other hand, net information and communicating technologies, with their time and space flexibility and the ability to support the multimedia rich by many a source, enable the development of “productive learning environments” (CTGV, 1991). These learning environments are based on the theoretical frame in the context of problem-solving.

The main goal of this approach is to create the common learning environment which enables the supported research by the users and the professors, which enables them to understand both the type of the problems encountered by the experts in the different fields, and the knowledge used as the problem-solving tool by them. As a result, the combination of the theoretical frame and different skills enable the realization of the applied knowledge concept.

For the user, the projecting of the theoretical determinants into the concrete examples in practice is of the utmost importance, so as to recognize the learning results of the certain topic content, when the real environment is simulated. If the “testing” of the obtained theoretical knowledge is enabled for the user through the collaboration and during the learning process itself by problem solving which correspond the topic content in reality, the defined learning goals are that much more expected to be reached.

The experts are known to be acknowledged with the endemic nature of their disciplines. That being said, the constant access to the numerous resources and experiences, including the simulation of the circumstances which are not easy to be grasped in real time, is necessary. The on-line educational technologies are the ones which have the ability of preserving and distributing these types of learning materials [1].

II. CONTEMPORARY TRENDS

The use of the term e-learning is rapidly increasing, excluding the classical, printed material based, open and distant learning. It can be proved that the appearance of the e-learning is directly connected with the development and access to the information and infrastructure of the communication technologies. Without the access of the information and communication technologies to the infrastructure, the ability of the educational activities to survive in the e-environment is endangered.

Besides the accessibility of the information and communication technologies, the computer literacy is also important when considering the implementation of the e-learning. The educational institutions often consider that supplying the computer and internet centre with the no charge access for their students, ensures the full accessibility to the on-line topics contents and communication, especially for those who lack access from home.

This logic is threatened by the fact that the students who start to use information and communication technologies in the later stages (considering the beginning of their studies), do not possess the adequate level of abilities and skills to use the on-line technologies.

If the students are mostly the dialup users, the “requirements” of the content distributed on-line, are to be considered. Due to this, the contemporary practice of e-learning, as the first stage of this concept implementation, includes the research of the use of the information and communication technologies, by the student.

The main reasons why the educational institutions invest in e-learning, [1]:

- The increase of the accessibility, as well as the cost cut of the information and communication technologies;
- The ICT capacity supports and enriches the classical educational practices through learning based upon the resources and synchronized and desynchronized communication;
- The ability of communication and collaboration with more people than it would be possible within a classroom;
- The need for the flexible access to distant learning possibilities, such as the home, workplace and a conventional educational institutions;
- The demand of the isolated and independent users for the alternative access and educational services;
- The belief of many educational institutions that the applying of the information and communication technologies enable the increase of the share on the growing competitive education market;
- The need amongst the educational institutions to be recognized as the up-to-date ones (with the integration of the ICT) so as to attract the attention of the parents, users…
- The belief and the expectance that the on-line learning will cut costs and increase the productivity and efficiency of the educational institution.

The main obstacles for the use of the e-learning within the educational institutions, [1]:

- Motivating the teachers to integrate the ICT in their curricula;
- The user response question;
- The problem of the financial planning of the ICT resources for the e-learning.

III. CONTEMPORARY PRACTICE

There is a wide range in the quality of various e-learning and teaching courses. A few years back, a group of experienced educators from University of British Columbia in Canada has researched Web-based courses (Boshier, Mohapi, Moulton, Qayyam, Sadownik, & Wilson, 1997). The research was focused on the attractiveness and validation comparison of “stand alone” web-based courses. These researches define a “stand alone” course as “a course that can include bonus material, and which could be completed without face to face interaction with an instructor” (Boshier et. al., 1997, p. 327). They have found that only a few examined
courses have offered a bundle of interactive possibilities and a chance for collaborative studying.

Many of the courses seemed to be too preoccupied with goal declarations, outcome assessments and hierarchical order of the content, as opposite to the focus on building a rich environment for learning a subject at hand. The researchers have come to a conclusion that the greater challenge for the web-based courses builders is conceptual, rather than technological. They suggest that the course creators should focus on making their courses "more attractive, approachable and more interactive" (Boshier et. al., 1997, p. 348).

Furthermore, despite to the growing acknowledgement of the importance and function of the curriculum in teaching and learning, the teachers have not been able to use all the possibilities available by the alternative technologies in learning. This is proven by the alternative websites of the university courses which contain just a bit more than a timetable, a short review of the course content, a Power Point presentation of notes made by the teacher and sometimes, an example of the exam [1].

Instead of using the unique possibilities of the information and communication technologies, such practice gives away an "education is equal to the information flow" model, which is common for a classic classroom practice. Disregarding the abilities of the means of transmission, the nature of the subject’s content and the applicants’ needs, a great portion of the teaching practice continues to be led by the teacher and to be transmission oriented. The flow is rarely stopped to explain why the teaching is done in such a way and why the learning is being supported, and how the approach to the subject is based on the hard educational principles of cognizance and learning.

This type of teaching practice led to great frustrations for the applicants/students and the teachers, many of which have become rather skeptical about the advantages of the new learning technologies, such as e-learning and learning from a distance (Kirkwood, 2000; Rumble, 2000).

This is a classical problem of the curriculum. It is connected with the curriculum and subjects experts’ failure to design such an educational and learning plan which would suit the type of subjects and the applicants/students’ needs the best, whilst considering the limitations of the certain learning environments. Despite this, examples of the good teaching practice can be found. Those are the levels where the teaching experiences are carefully formed so as to support the development of the clearly determined learning results, in the aspect of the applicants/students’ needs, applicants/students’ competence and the nature of the educational context.

Information and communication technologies alone have a small impact on the educational and learning quality; they offer the vast possibilities to design the educational environments rich with learning resources. They are merely the “means” for the educational exchange and cannot significantly improve the teaching and learning processes by themselves. In spite of this, in the race for the acceptance of e-learning, many a teacher cannot do more than set up the course program and Power Point presentations of their lectures on the website of the course. This does not differ a lot from photocopying such a material and distributing it during the class. Whilst setting up the course program and scripts of lessons on the web is a very useful use of such a technology, there is a lot more to be offered by the information and communication technologies, in the sense of the support to teaching and learning.

In order to make a complete use of possibilities offered by these technologies, the utmost attention must be paid when pedagogy of the transaction of learning and teaching is considered. This relates to the “plan” of the teaching and learning environment, which amongst else, includes considering how the subject is to be presented, the work that is to be done by the students, how the learning process is to be supported, how the learning is to be evaluated, and how the feedback is to be obtained [1].

There is no lack of advice so as to how to plan the rich e-learning environment, in order to enable the designing of the best learning technologies used (v. Burhess & Robertson, 1999; French, Hale, Johnson & Farr, 1999.). The variable needs of education and training in higher education, lead to considering the classical approaches to teaching and learning. This, amongst else, enables the teacher’s role to change into the “side guide”. This includes the change of the nature of learning from “teacher-guided” to “student-oriented” or “student-centered”. Information and communication technologies have a significant role in the support of such announcing changes in the nature of teaching and studying.

French, Hale, Johnson & Farr (1999) suggest the three types of use of the information and communication technologies so as to support the “self-oriented” and “student-oriented” learning environment. Those are:

- **Increased teaching** based upon the premises that a teacher can increase the teaching practice by supporting it with one or more aspects of the activity based upon the information and communication technologies. Enlarged classrooms can use it all, starting from Web so as to distribute information about the courses, till the e-mail communication for discussion between the applicants/students and the teachers and among the applicants/students, and collaboration among the applicants/students using the computers;

- **Virtual learning** applies to the teaching and learning processes using internet, without any personal contact among the students. In this way the internet replaces the standard lectures, creating the new possibilities for the “self-oriented” and more flexible learning;

- **Progressive appliance** is related to the process of information and communication technology appliance, based upon the progressive teaching and learning technology, as the applicants/students’ confidence is being developed when the use of technology and its advantages is considered. The concept of the progressive appliance of technology is based upon the “right-on-time” term of learning, which represents the process of the education approach possibilities at the time when the applicant/student wants to learn something.
Collaboration is a structured, repetitive process in which two or more people work together to achieve a common goal – in most cases intellectual labor of creative nature – by knowledge sharing, learning and achieving consensus. Collaboration does not demand leadership, and can even yield better results through decentralization and egalitarianism.

Collaboration methods of a certain structure encourage the introspection of behavior and communication. These methods have a specific goal to increase the success rate of teams involved in a collaborative problem solving. Forms, columns, tables and charts are useful in these situations to objectively document personal attributes with the purpose to argument the achievement in current and future projects.

Fast-paced changes of contemporary society and communication networks have brought changes in the level of decision making. At the same time, the complexity of the world as it is demands a high level of specialization of the people who are making the decisions. Because of that, there is a need to create teams of specialists which carry out the complex tasks. From that aspect, the information and communication technologies play a key role when the simplicity of collaboration between the groups and individuals is being considered. E-mail, fax, Voice mail, audio and video-conferences, chat-rooms, common documents and virtual work places can enable successful collaborations [1].

Tools most often used for collaboration are divided into fields, and are given in the form of a table. Those are:
- Collaborative environments
- Collaborative tools
- On-line digital boards for the collaborative work

V. THE RESEARCH

The web sites of all the state-owned and representative private-owned Faculties in the Republic of Serbia have been included in the research. The data gathering in the research was realized by the non-standardized research of the web sites of the higher education institutions. The obtained data were processed by using the statistical methods. The presented sample is in the category of the intended ones.

The sites of the state-owned Belgrade University, the University of Novi Sad, the University of Kragujevac, the University of Nis and the University of Pristina were included in the research, which made the total of 80 universities. Beside the state-owned, the research has also covered the following private-owned universities: the Educons University of Sremska Kamenica, the International University of Novi Pazar, the Megatrend University, the Singedunum University, the Pan European University Apeiron in Belgrade, the Alfa University of Belgrade, the Union University, and the Metropolitan University, which made the total of the 62 universities.

While visiting the sites of the universities mentioned above, the search through the student's forums and discussion groups was done also, so as to obtain the more detailed information which is not immediately available on the official sites of the certain universities. This research had a special focus on the presence of the e-learning portals, Web mails, and the use of the Forum by the students [1].

The research has made the following data available, presented in the table below:

<table>
<thead>
<tr>
<th>The presence of the services / The university type</th>
<th>Web mail</th>
<th>Forum</th>
<th>e-learning portal</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE STATE-OWNED UNIVERSITY</td>
<td>52</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>THE PRIVATE-OWNED UNIVERSITY</td>
<td>53</td>
<td>19</td>
<td>31</td>
</tr>
<tr>
<td>Not present</td>
<td>37</td>
<td>119</td>
<td>96</td>
</tr>
</tbody>
</table>

Based on the analysis, the statistical processing and the data comparison, the following outcomes have been found.

A. The comparison of the available Web mails on the state-owned and private-owned universities in Serbia

Webmail is an internet application which enables the access to the e-mail box, and does not require installation or feature adjustment, such as seen at traditional e-mail clients (Outlook, Outlook Express, Thunderbird etc.). All of the functions enabled by the classical e-mail client, are also available when Webmail is used-sending, receiving and reading the messages with attachments, contacts saving in the address book, adding the signature to the out coming messages, the print out of the e-mail, etc.

The messages read by using the Webmail remain saved in the box until deleted or downloaded onto the computer by the e-mail client. E-mail messages are available at any time and any place, accessible from any on-line computer. The e-mail can be received or sent from home, from your friend’s place, cyber café, while traveling, etc.

![Chart 1](image)

Chart 1. The presentation of the use of the Web mail

Based on this chart, it can be concluded that this service is mostly used at the PRIVATE-OWNED UNIVERSITIES, with 37.32%, (on the 53 faculties), while its use at the STATE-OWNED UNIVERSITIES comes up to the 36.62% (on the 52 faculties). 26.06% of the universities do not use this service.
B. The comparison of the available students’ forums on the state-owned and private-owned universities in Serbia

The chart 2 shows the availability of the students’ forums

<table>
<thead>
<tr>
<th>Forum</th>
<th>State-Owned University</th>
<th>Private-Owned University</th>
<th>Not Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>83.80%</td>
<td>2.82%</td>
<td>13.38%</td>
</tr>
</tbody>
</table>

Chart 2. The presentation of the comparison of the availability of the students’ forums

Based on the chart it can be concluded that this service is more used at the PRIVATE-OWNED UNIVERSITIES, with 13.38% (on the 19 faculties), whilst on the STATE-OWNED UNIVERSITIES, it is use comes up to only 2.82% (at only 4 faculties). On the 83.8% of the universities, this service is not being used.

With the growing influence of the use of the social networks, the interest for the use of this service fades. It can be concluded by visiting the certain forums which exist, but are not used by the students and include many obsolete topics.

C. The comparison of the presence of the e-learning portals on the state-owned and private-owned universities in Serbia

This service is more used at the PRIVATE-OWNED UNIVERSITIES with 21.83%, which makes 31 faculties, while at the STATE-OWNED UNIVERSITIES it comes up to the 10.56% (15 faculties). At the 67.61% of the faculties, this type of communication and collaboration is not present.

<table>
<thead>
<tr>
<th>e-learning portal</th>
<th>State-Owned University</th>
<th>Private-Owned University</th>
<th>Not Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>67.61%</td>
<td>21.83%</td>
<td>10.56%</td>
</tr>
</tbody>
</table>

Chart 3. The presentation of the comparison of the presence of the e-learning portals

VI. CONCLUSION

The electronic communication makes the material available instantly; the great quantities of the material are not being printed which saves paper, as well as the delivery costs.

Because of the power to illustrate many educational concepts, multimedia contents are being integrated into e-learning, more and more. Pictures, charts, audio, video, animations and simulations are being included in academic e-learning, as well as in the corporate training. The examples include diagrams which illustrate some processes. Some applicants need to see and hear an experiment in order to understand it, and get an idea about it.

Multimedia in e-learning can be used by applicants of any age category. Younger applicants will be drawn by learning material with enhanced sound, music and animations, because those things make learning fun. For older ones, who are use to study from their own notes, video, documentary movies, simulations and animations can help in communication and making the concepts stronger.

Educators should know how to optimize the contents, so that learning and communication material can be delivered without encumbering the applicants.

Positive aspects of using the internet in communication and collaboration, as well in e-learning are:

- Improved access to information and knowledge, updated information, abundance of referential material, easy access to documents, more time spent on learning and less on searching;
- Easiness of communication, interaction between applicants, interactivities, online discussions and forums;
- Flexibility, multiple choices, options, possibility of many things being done, expansion of possibilities and points of view, diversity;
- Increased role of applicants in learning, independence, motivation and greater interest of applicants, students;
- Ability to display visual, sound and other media;
- Increased feasibility of e-learning, anyone - anywhere can be reached;
- The pressure from colleagues to overcome the classrooms;

Collaborative and cooperative e-learning is enabled by grouping the users and allowing them to use the electronic communication and collaboration, but it should be kept in mind to form the groups from users with similar learning styles, expectations, foreknowledge etc.

The most significant advantage of the computer communication and collaboration is the fact that no one is demanded to physically be present; the one actually does not leave the one’s computer. The users can choose their time for communication and collaboration more freely with their peers or teachers.

Instead of attending the lectures and occasionally answering the teacher’s questions, the access to knowledge content is available in numerous ways – listening, watching and reading, along with completing tasks and tests. When the teacher’s full support is added, it is clear how the real skills are acquired. Access to the knowledge content is conducted from home or work, in real time over the internet, working with the teachers and colleagues is more active by asking questions, chatting, having the discussions on forums made for applicants,
teachers and consultants, giving ideas, examples, advice etc.

The outcome of the research results is that the internet was being used the most by persons with higher education diploma, and the least by persons with less than secondary school diploma, which adds additional weight to the conclusion about the significance of communication and collaboration available on faculty websites of the Serbian Universities.

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