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DISTANCE LEARNING - COMMUNICATION QUALITY

UČENJE NA DALJINU I KVALITETA KOMUNIKACIJE

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Abstract

Distance learning and e-learning material application rapidly increases in few years. Ministry of Education and Sport and European Social Fund have financed many projects for e-learning material production in Slovenia lately. As a result we have many more or less quality e-learning materials. Authors analyzed different types of communication in the contemporary publically available e-learning materials for primary schools. Different viewpoints of communication emerged during the analysis: technical communication, didactical communication and visual communication. Most thorough knowledge is in the area of technical communication. But the problems of incompatibility and software settings are present on the daily basis. Didactical communication are presents multilevel problems. The goals of education are to be covered and the form of communication needs to be suitable for learners. Visual communications are the most problematic since there are no clear principles how to assess the quality of visual communications. Jet they are highly important in the distance education and e-learning materials.

Sažetak

Učenje na daljinu i upotreba e-gradiva je u nekoliko zadnjih godina u velikom zamahu. U Sloveniji su Europski socijalni sklad i Ministarstvo za školstvo i sport financirali više projekata radnih grupa i pojedinih autora, u kojima su nastale e-građe različite kvalitete. Autori u prilogu analiziraju različite aspekte komunikacije u suvremenim e-gradivima koje su dostupne korisnicima za obrazovanje po programu osnovne škole. Gradivo je analizirano posebno sa aspekta kvalitete i to: kvaliteta tehničke komunikacije, didaktičke komunikacije i vizualne komunikacije. Rezultati istraživanja ukazuju na to, da dolazi do poteškoća kod tehničke komunikacije zbog različitih sistema kod korisnika, a kao didaktički nedostatak evidentirana je lošija pokrivenost sa obrazovnim ciljevima. Kao problematične su se u velikoj mjeri pokazala vizualna rješenja e-građe.

INTRODUCTION

The term e-learning is used for a mode of contemporary education supported by ICT. E-learning is also known as distance education, computer supported learning, web education, on-line learning, and so on. Recent ICT development has changed many educators' perspective on the efficiency of education. ICT has by some commentators been described as the ultimate educational tool. Distance learning and e-learning materials usage has grown exponentially during the last few years. This type of education definitely has an important role in contemporary education. On the other hand, available e-learning materials are of varying quality.

It is very important in distance education that e-learning materials are designed according to contemporary didactic theory. Depending on the level of education we can rank them from primary school to university level. At the lower levels more attention should to be focused on didactic design.

Quality is influenced by both objective and subjective parameters. With respect to objective parameters, we include different equipment and didactic design. On the other hand, subjective parameters include didactic and methodological principles of application of objective equipment. Objective

parameters can influence subjective parameters. Depending on their relationship, high quality e-learning materials are one foundation for high quality education in face-to-face education and later for individual education. The latest research in this area shows that efficient e-learning does not depend only on ICT quality. Support for e-learning and ICT is also very important. In older educational groups (secondary and vocational education), there is a transition from e-learning to self-learning, according to research performed by the European Center for development of Vocational Training /**1**/.

Development of e-learning materials depends on excellence in expert and didactic viewpoints. The content of materials must be prepared with the goal of motivating students, not frightening them. These materials should be interesting and fun. Pedagogical content and didactic structure should inspire students and apply visual principles that encourage innovation.

QUALITY OF TECHNICAL COMMUNICATION IN DISTANCE LEARNING

In most cases, a customer specifies only technical requirements and omits the creative and/or aesthetic aspects of e-learning materials, even though it is widely known that these aspects significantly affect the quality of e-learning materials. Analyzing the text of public tenders to the Ministry of Education and Sport of the Republic of Slovenia, we can see that they are focused entirely on content and technical aspects. These requirements are mandatory in the development process. School requirements for e-learning materials are based on their curriculums. They are designed to support the study programs of pre-schools, primary schools and high schools. E-learning materials should be applicable to different phases of learning: new knowledge acquisition, knowledge reproduction, knowledge consolidation, knowledge testing or grading, knowledge assessment, knowledge analysis, and knowledge synthesis. Effective e-learning materials must embody didactic concepts that encourage students to engage in self-directed work and provide them constant feedback.

In the design process of screens for e-learning materials, we need to follow certain technical requirements. Each screen should have at least two interactive elements and one multimedia element connected to its content. The requirements for audio and video elements on the screens are also well defined. It is advisable to have audio-video elements lasting 10 seconds for every 5 screens, and audio-video elements lasting 20 seconds for every 10 screens. Interactive elements include markings, selections, movement, and groupings, providing feedback and testing for answers /**2**/. Multimedia elements include sound, pictures, video and animation. Each of these multimedia elements must be related to the content of the e-learning materials. Despite these thorough specifications, we do not believe that they discourage a creative approach, quality of visual elements, or the aesthetic appeal of e-learning materials.

Distance education is also subject to technical constraints. Even these constraints are two sided. One side is capability and the other side is financial. In the design process, we need to take into account both sides. The results should yield an optimal solution for the user. If we had known that in 2006 all of our students would have high speed internet access, then we could have prepared the multimedia learning material according to these facts. But if the research does not indicate the speed of the "high speed" download, it would be very unreasonable to prepare learning materials in accordance with maximum technical feasibility.

We also need to take into account the psychological effect of the technical constraints. It is evident that the response time needs to be fast. But what is fast, or what is fast enough? Research in the working environment and internet environments yields different results. Users perceive a response time of 0.1 seconds as instant response; a response time of 1 second as uninterrupted; and an interval of between 8 to 10 seconds as the upper limit of uninterrupted attention - before the user starts doing something else /**3**/ .

In the internet environment we can expect different responses. It would be very unwise to prepare such large files for download that we cannot achieve almost instant response.

In our case, we have not experienced communication problems. Our servers suit our needs and demands perfectly. Table 1 shows users of our e-learning materials over a 6- month period. From the table and the graph, we can see that we have more guests than regular users accessing our e-learning materials. This is not uncommon behavior among web users. Many users are repelled by the fact that they need to sign-up anywhere. The policy of opening our materials to the general web public was the right one. But the latest results show a trend towards an increasing number of regular users.

Table 1: Numbers of users of our learning materials

Period ending (Month)	Guest	Users	Teachers	All
1.4.2011	1122	33	0	1155
1.3.2011	639	6	0	645
1.2.2011	1011	27	0	1038
1.1.2011	536	54	8	598
1.12.2010	1269	55	14	1338
1.11.2010	807	126	9	942
1.10.2010	732	6	10	748
1.9.2010	1245	71	5	1321
1.8.2010	169	26	12	207
1.7.2010	972	129	5	1106
1.6.2010	1185	114	38	1337
1.5.2010	1550	90	0	1640
1.4.2010	2413	58	38	2509
1.3.2010	186	129	4	319
1.2.2010	367	314	1	682
1.1.2010	248	52	10	310
1.12.2009	490	99	31	620
1.11.2009	293	414	51	758
1.10.2009	299	25	19	343
1.9.2009	116	22	32	170
1.8.2009	53	4	9	66
1.7.2009	331	246	69	646
1.6.2009	804	287	72	1163
1.5.2009	533	148	113	794
1.4.2009	1088	140	65	1293
1.3.2009	677	119	43	839
1.2.2009	962	208	46	1216
1.1.2009	680	227	66	973
1.12.2008	2672	1582	229	4483
1.11.2008	0	374	187	561

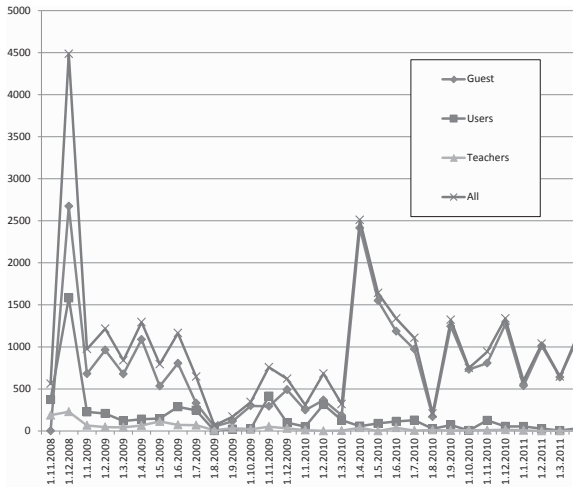

Figure 1: Graph of number of users of our learning materials

QUALITY OF DIDACTIC COMMUNICATION IN DISTANCE EDUCATION

E-learning materials that can be found as free learning materials on the web are considered as a part of the media or web social system. Individual decentralized systems are connected to the broad media system. This broad system combines the functions of publication, presentation, communication and information systems. The user is able to share his equipment with the system through various interfaces. This enables him to attain valid contact with the cyber-environment. Only when this system gives feedback to the user, does the user become a social member of the web /**4**/. E-learning materials must satisfy minimal technical, expert, and pedagogical - didactical requirements in order to become part of the web social system. Learning using e-learning materials should provide students with the required knowledge. For optimized retention of knowledge, e-learning materials need to be carefully didactically designed. Knowledge is a system or logical overview of educational topics incorporating both facts and generalizations. It requires an efficient structure and a systematic approach to the division of e-learning topics.

Didactic communication

Distance learning is like any learning process. It gives information, receives data and encourages the search for learning materials. A communication link between the learning material and the students needs to be established. The role of the teacher is transferred to the e-learning materials. Student's feedback is most important for effective didactic communication, as it adjusts the clarity of the messages. In distance learning, the learning stages need to be small. Communicational feedback is replaced by control questions or elements of the programmed learning units. Communication is a transfer of data between sender and receiver. The sender of the data wants to achieve mutual understanding, while the receiver tries to understand the data and fulfill the common intent. From the intent perspective, communication can be divided into general and special purpose communication /**5**/. General purpose communication involves the transmission of data, but special purpose communication is the achievement of specific goals (personal, group or social). Communication is therefore established in order to achieve the special purpose. Thus, distance education is communicational interaction between learning materials and students. The intent of this communication is shown in the desire of the sender (the author of the e-learning materials) for the

receiver (the group of students) to achieve specific goals (knowledge and values). In the design of didactic communication for distance learning, we need to take into account the communicational models which indirectly study the information carrier and internal system structure in order to explain the connection between sender and receiver. The content of the communication needs inter-subject purpose – i.e., to be relevant to the students. In this respect, all interests are equal. Only on the basis of democratic consensus can some interests be preferred /**6**/. An additional requirement needs to be fulfilled in distance education. The receiver (the student) must not only get the data but needs to be influenced by the received data according to the purpose of the transmitted message. Messages can be divided into four different aspects /**7**/:

1. content;
2. personal (self discovery in the message);
3. interpersonal (the relation between content and the recipient of the message); and
4. influential (influence on the recipient).

Communication quality

A communication channel is the medium for transmitting messages. In distance education, visual and audio communication channels are predominantly used. Communication is subject to the communicational noise /**8**/, the level of which does not depend on the number of communication channels used. Communicational noise (error transmissions, faults or breakdowns) are constraints on the efficiency of data transmission. It causes entropy in the system, leading to loss of content - information.

Communication semantics and pragmatics

A higher level of communication in distance learning can be achieved only when both communication partners (sender and receiver) have mutual experiences. In such a case, they use a common language, and have compatible values and a shared metric system. Communications are subject to a minimum level of the knowledge of individual experience of the recipient of e-learning materials. "Such values imply empathic skills of both communicators are the basis for the understanding" /**9**/. In the design of distance education learning materials, shared knowledge of a sufficient number of mutual signs assures efficient communication. Redundancy is common in distance education, and the designer needs to find the right level of data/ information for maximum understanding. E-learning materials must be prepared appropriately to the students' age and understanding. The number of mutual signs in the content viewpoint can be increased by the use of multiple communicational channels.

New trends in communications

Contemporary World trends promote a counselor type of e-learning. In such a system, the mentor supports her students in direct communication and interaction. Direct communication decreases the feeling of alienation which can be present in a web environment. Mentors fulfill students' need for social interaction since students know that they have communication with a living person. /**10**/. From educational theory, we know that mentor-based education is more successful than other types of instruction. A modicum of the desired personal interaction in the educational process can be achieved through the use of contemporary ICT, which is capable of including more students into the teaching relationship than older forms of instruction. Contemporary ICT can also overcome geographical distances. Recent research has shown that suitably trained mentors have positive effects on the quality and efficiency of distance learning /**11**/.

Communication in e-learning materials in Slovenia

An analysis of Slovenian primary school e-learning materials shows many drawbacks from a didactic viewpoint. Even if the didactic structure of the e-learning materials is suitable to the level of the students, the materials often do not employ different communication channels. Information feedback is not exploited sufficiently, and the language (particularly the number of mutually understood signs) is questionable. Authors of e-learning materials can minimize this shortcoming by increasing the number of communication channels. In addition, e-learning materials must be designed according to the relevant curriculum and catalogues of knowledge. They must cover most of the predefined goals and steer users to further research for additional learning materials. Some learning materials are insufficient, even in the matter of fulfilling the didactic goals. Examination of several widely used e-learning packages shows that some of these materials cannot be applied to different phases of education. Most authors agree with these observations, but they rarely use them for testing and knowledge evaluating purposes. Only on rare occasions do we find materials that cover all of the required aspects. E-learning material should encourage students to do active work and test their knowledge. Standard tests would provide authors with much needed user feedback.

THE QUALITY OF VISUAL COMMUNICATION IN DISTANCE EDUCATION

E-learning materials are designed to activate audio, haptic and visual senses. Videos are important because e-learning materials are very capable of transferring visual information. E-learning material use attracts visual perceptions, requires organized observations, as well as mental, emotional and other activities. Multimedia elements add broad sensations, as well as having educational, cultural, technical and social functions. They provide higher educational effectiveness in both horizontal space and vertical depth /**12**/. These are the reasons why each screen of e-learning materials needs to be technically, graphically, aesthetically and creatively designed. Creatively designed e-learning materials must have the following attributes: practical value, novelty, and appropriateness. The **practical value** of e-learning materials is assessed from the pedagogical and didactic standpoint. The **novelty** of e-learning materials means that compared to other types of learning material, they can be exciting and motivating. **Appropriateness** or suitableness means that e-learning materials are focused on the skills that need to be developed.
Authors of e-learning materials need to answer these substantial questions:

- What is the overall e-learning material structure?
- Are the contents presented clearly, logically, and correctly?
- How can the users see information flow between different screens?
- Does concept allow intuitive usage?
- Which media are used for visualization of the learning topics?

Aesthetics of e-learning materials

An aesthetic approach to e-learning materials design is especially important in the area of visualization. The attractiveness of e-learning materials and their visual quality are a matter of graphic design. Authors should critically evaluate concepts of each visual project. Graphic design starts with selection of pictures and illustrations, includes the development of pictures, movies and animations, and encapsulates the design of interfaces and navigation tools [HYPERLINK \l "Kir04" 11]. In computer interfaces this means extremely close attention to how individual screens are interconnected in order to maintain and enhance the integrity of information /**13**/. The problems of design concepts in e-learning materials can be found in the literature. Regarding creative approach, Jackson and Messnick /**14**/ assessed the issue from two perspectives:

- The product's own aesthetic achievement; and
- aesthetic reactions to the product.

Observing the relationship between the designer's vision of the product and users' aesthetic reactions to it, we can see that extraordinary design (in our case computer screens) evoke aesthetic surprise. The pleasure resulting from the sight of a vividly designed computer screen is an appropriate learning goal if their aesthetic reaction results in increased attention from the students. An appropriate level of transformation means that the screen presents lesson materials in different ways and triggers the stimulation of curiosity. Condensation is the top criterion that gives pleasure to the observer /**15**/. Creatively designed products are evaluated from different perspectives based on /**16**/ :

- novelty (personal or social),
- amount of information presented,
- size,
- new implications,
- astonishment, and
- direct or indirect social - economic - scientific - information value.

Introductory and intermediate sequences should confront students with text and visual data in the presentation of the content. The student has no influence on the content, but he or she can select the order in which the information is presented. In this case, we are referring to concept of receptive identification /**17**/. This is a marginal event, but it can be intensified with content identification. It provides a perception of common sense in the content, and motivates the student to extended research. Intermediate control questions and answers have a reward effect and boost motivation.

The role of graphic design in e-learning

Graphic design concepts must be included in the production of all learning materials and should be included at the earliest stages in the production of e-learning materials. For each e-learning screen, a process of analysis and criticism must be performed throughout the development process. It is not just a matter of screen design and placement of controls, but also of visualization of knowledge. It is not important which area of expertise the e-learning materials cover. In natural science courses it is often forgotten that it is not a lecture about nature; it is a lecture about what people know about nature. Therefore, historical dependence on basic comprehension metaphors between graphic constructs and model constructions are often barely considered and poorly explained /**18**/. Even for

basic learning materials, a thorough knowledge of graphic design is required.

Aesthetic deficiencies

Some of the deficiencies of aesthetics we have observed in the production of e-learning materials include:

- Overall presentation - The computer screen must satisfy the basic principles of graphic design: distribution of graphics elements, color schemes, clarity, and visibility.
- Multi perceptiveness – poorly designed and placed navigation buttons, pictures, and text shades on the screen can be very disturbing.
- Element distribution - too many elements (text, photos, and colour schemes) on the screen have a repelling effect on students. In most cases this is caused by an excessive amount of text.
- Text fonts - We have observed many faults in selection of font faces. The text was not readable. The effect (bold, italic, underline, and color) was so extensively used that the screen was not big enough to handle it all.
- Photos and images - In many cases the photos needed additional editing. Originals can be of low aesthetic value. Photos are in many cases taken by the authors of the learning materials. Authors are often not professional photographers and their photos are of questionable quality. The same problem applies to video. It is important to remove unnecessary distractions from visual materials and to select the most appropriate technology to suit the basic principles of quality.
- Additional graphics elements, such as sketches and animations should also follow the rules of proper graphic design.

CONCLUSION

Authors and developers of e-learning materials must remember that ICT is just a tool. The basic principle of education is still transfer of knowledge. E-learning materials are just one example of support material in the education process, but they can help promote self-learning at all levels of education. They activate several senses (sight, sound, and touch) and can offer pleasure to all learners with the basic goal of effectively increasing both quality and quantity of knowledge in both dimensions (horizontally and vertically). Technology enables easy manipulation (touch) and quality sound (hearing), but we must not forget the importance of the overall visual impression (sight) of the e-learning materials. The aesthetic dimension of e-learning materials can make the difference between useful and boring lessons. Therefore, the principles of graphic design in the development of e-learning materials is not just for aesthetic pleasure, but also for the integrity and control of information flow that e-learning is all about.

Notes

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