Role and importance of presentation design in learning and in quality of multimedia learning material

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Abstract: - The impact of new technologies, especially ICT, in education is not bypassed. Multimedia has a special role and its positive impact in the process of learning and teaching is not questionable. Today it is common to use multimedia learning materials in education. Unfortunately, many of them are of questionable quality. In research conducted at the Polytechnic in Rijeka (Croatia) quality of multimedia learning materials is evaluated through several parameters of which one is the presentation design. The study confirmed the assumption about the relationship and impact indicators, presentation design and levels of knowledge, although in lesser extent than expected. The research results represent a stimulus for further research to improve the presentation design of multimedia learning materials to maximize the acquired knowledge after the use of such materials.

Key-Words: presentation design, learning, quality, multimedia learning materials

1 Introduction

Learning is a complex process that runs throughout our entire life. It is one of those terms that, regardless to its common usage in everyday life, cannot be easily defined. The majority of authors define learning as changes in behaviour created upon experience. [5] For „behaviourist: Learning is a relatively permanent change in behaviour due to experience. This refers to a change in behaviour, an external change that we can observe, while cognitive scientists believe that: Learning is a relatively permanent change in mental associations due to experience. This definition focuses on a change in mental associations, an internal change that we cannot observe“. [15] There are many different approaches to learning, but none of them can independently explain all modes of learning. Information and communication technology (ICT) and its usage in all segments of life have seminally influenced scientists and their way of thinking about how human mind actually works. Theoreticians of data processing have developed models for

remembering and learning which are based upon computer procedures. The most influenced model of data processing was proposed in 1968 by Atkinson and Shiffrin. [1]
Everybody has, during his education, and later on, an opportunity to detect this specific mode of learning as better than the others. Presently there are many classifications of learning styles, while respective literature combines learning styles with terms as cognitive style of learning, preferred form of instructional message, models of learning styles, aptitude to certain mode of learning etc. Knowing different styles of learning is important so to use them correctly in process of learning. Modern theories of learning perceive learning as "individual trace of meaning and application". [2] Except for individual's style of learning, teaching style used by teachers also influences the final learning outcomes. Teaching style used in experimental part of research can be described as interactive lesson with high level of interactivity between students and learning material that present analysed subject. Creating and presenting learning content through multimedia learning materials demands interdisciplinary approach to learning and teaching.

2 Education and multimedia learning

Influence of new technologies, especially ICT has not outflanked the education. "Formal education corresponds to a systematic, organized education model, structured and administered according to a given set of laws and norms, presenting a rather rigid curriculum in comparison to the objectives, content and methodology."[6] Formal teaching process is a part of formal education and can be observed as field of activities connected to learning and teaching, organised and professionally executed and socially legitimate. Today, a realisation of teaching process can be detected in several forms. Teaching in a traditional sense, in form of a teaching process performed completely by usage of ICT and in a hybrid form of teaching, refers to combination of former two shapes. Fundamental factors of teaching process are student, teacher and learning content that comprise so-called didactical triangle. Usage of ICT in learning process influences all those factors. Multimedia has especially important role and its positive effect in learning and teaching process is beyond question. Term multimedia is extremely frequently used in all segments important to application and usage of ICT. Multimedia means usage of various and different media for purpose of presenting certain content so that it indicates its special features [16]. Media represents form in which certain information can be found. In this aspect, one can differentiate several forms of media, such as text, graphical design, sound, video and animation. Multimedia in learning process enables and supports mutual interaction of all factors in learning process. Still, a question remains how to use multimedia technology in the best possible way, that is, which restrictions and limitations can be detected when using multimedia in learning process and how to decrease them. Since subject of this paper is related to importance of presentational design in learning and evaluating the quality of multimedia learning materials, attention will be given to influence of that specific quality indicator of multimedia learning material over the general evaluation of multimedia learning material. One cannot discuss usage of multimedia learning material, without explanation of term itself. Multimedia learning connotes learning by means of words and pictures. Words can be printed (such as words on screen), or spoken (such as narration). Pictures can be statistical (such as illustrations, graphs, tables, photographs or maps) or dynamic (such as animations, video or interactive illustration). [12] Frequent phenomenon is when usage of multimedia technology in creating the learning content doesn't correspond to a certain pedagogic-psychological knowledge. Researches indicate that many authors of multimedia materials used in education and learning process are not familiar with related researches in psychology and education [14]. Basic principle of the multimedia learning was provided by Mayer: "people better learn when content is presented in text and graphics, instead of text solely". [12] There are different limitations in cognitive process of accepting and processing the received data. Mayer and Moreno defined nine ways to decrease cognitive saturation with analysis of possible scenarios and offered solutions to individual situations.[13] Knowing the basic principles of multimedia learning and possible problems of saturation and solution of such a problem is extremely important in creation of multimedia learning materials and their evaluation. The indicator of presentation design itself represents a basic connection between users of multimedia learning material and content presented by virtue of that material.

3 Multimedia learning material

Universities and higher education institutions define a procedure of categorisation and approval of learning contents, that is, learning material that

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supports learning plan and programme. Learning content within a formal higher education in the Republic of Croatia has been approved by the Ministry of Science, Sports and Education. Today, teachers and students can find content for learning/teaching very often in a digital form of different media, and on the Internet. Digital learning content has been recognized as lucrative business by many, while some authors, without considering copyrights, approved its usage. Digitalisation of learning content in Croatia isn't so far standardised so it doesn't guarantee a quality, though most of Croatian Universities have their own internal recommendations for preparing learning contents in a digital form. Special emphasis has been given to usage of multimedia technology in a creation and development of learning materials. Multimedia learning materials are educational materials in a digital form, tools for learning content that are a subject of learning, which presentation is made by a combination of two or more digital media, such as text, picture, sound, video and animation. [16] The process of creating multimedia learning material has to unite methodical and didactical regulations of shaping such materials, as well the rules which define usage of multimedia technology and respective restrictions.

4 Quality of multimedia learning material and its indicators

Quality of multimedia learning material can be doubtful and it represents a limitation in usage, but latest researches have proved that quality of multimedia learning material positively influences the level of adopted knowledge. [8; 9] A concept quality is used presently in all aspects of life, but still, only few individuals can explain what quality truly is. There are many definitions of quality, and according to ISO 8420:1994 it stands for: "A group of characteristics and features of a product, process or services that refer to possibility of satisfying determined or indirectly expressed needs".[10] So, if this general definition of quality is to be applied upon definition of quality of multimedia learning material it could be said: Quality of multimedia learning materials is a group of characteristics and features that refer to satisfying needs of students and teachers. "Measuring the quality is possible by different instruments, but the objectivity of most of them is doubtful". [14] Usually certain instruments for evaluation of quality of such materials, observe quality through indicators connected to technical standards of multimedia technology used in a creation of multimedia learning materials. [3] One of the instruments which have consolidated methodical-didactic indicators, in combination with indicators related to technical standards of multimedia technology, is *Learning Object Review Instrument* (LORI). [11] Specific purpose of this instrument is that teachers use it in evaluation of multimedia learning sources. Multimedia learning materials are multimedia learning sources used in a teaching process. Indicators which describe quality of multimedia learning materials are: a quality of contents, a balance of learning goals, feedback information and adjustments, a motivation, presentational design, interactivity, re-usage, accessibility and adherence to the international standards and specifications. Authors of LORI instruments recommend a presentation of the results as an average grade (1 – 5) of individual quality indicators, that is, the complete average grade of all evaluated indicators in educational system of the Republic of Croatia. This paper puts a focus on the indicator of presentational design and its role in evaluation of quality of multimedia learning material, so attention has also been given to particles which determined that quality indicator. Indicator *presentation design* represents a quality of a visual design and it encompasses a visual design of all forms of media that represent the contents. Highly qualitative presentation means a harmonisation with principles of multimedia learning, that is, principles of decreasing the cognitive surplus. Evaluation of quality of multimedia learning material was executed by users themselves – the students. Still, their competencies aren't sufficient for evaluation of all indicators and their particles in LORI instrument, so the appropriate questionnaire has been introduced. Indicator of a presentation design has been evaluated by particles: interface is "a user friendly", usage of colours and fonts is possible.

5 Research

Within the context of multimedia learning and quality of multimedia learning material, research problem has been defined: is the general grade of quality of multimedia learning material influenced by evaluation of presentation design of the multimedia learning material?

The research was conducted by students at Polytechnic of Rijeka who attended course Graphics, Text, Multimedia at Undergraduate Professional Study of Information Science. Totally 105 male students participated in the pool, or 74.5% of the examinees, while female students presented

only 25.5 % or total number or 36. The majority of examinees graduated in the quadrennial high school programme (professional or comprehensive programme), attended the Information Science lectures – 94.3% or 133 students, while only 5.7% of them, that is 8 examinees, haven't attended lectures in Information Science during their high school education. Experience in usage of multimedia has 72.3% of examinees or 102 students while 27.7% or 39 students do not have such experience.

Research has been conducted within course Graphics, Text, Multimedia to which purposes a special multimedia learning material has been prepared which has analysed two subjects in two qualitatively different versions. Themes that have been processed in the multimedia learning materials are: "Colours and usage of colours on the Internet" (Colour 1-weak quality, Colour 2-better quality) and "Usage of graphics on the Internet" (Graphics 1-weaker quality, Graphics 2-better quality). Among students, the preferred learning style has also been analysed according to VARK categorisation of the learning styles. Multimedia learning materials have been available to students through LMS Moodle as a regular segment of lectures on the Graphics, Text, Design course. Learning has been organised in two information cabinets parallel, on the same day. Each student used the multimedia learning material of better and worse quality, but for a different subject. Students have been split to two groups: C1_G2 group which used the multimedia learning material Colour 1 and Graphics 2 and the second group C2_G1 which used the multimedia learning material subject to Colour 2 and Graphics 1, all of which was aimed at decreasing eventual influence of attractiveness of a certain topic. Students have been introduced to the research connected to the usage of multimedia learning materials, with purpose of increasing the quality of learning process on the same course. Students have evaluated the multimedia learning material which they have been using by virtue of pool available as the web questionnaire implemented in LMS Moodle.

6 Research results

In order to evaluate importance and significance of the presentation design, as one of the quality indicators, according to the general evaluation of quality of multimedia learning material, the strength of connection has been analysed as well as regression analysis of those two variables. Research problem can be observed through detection of question whether evaluation of presentational design of multimedia learning material can indicate a general grade of multimedia learning material's quality. Students-users have evaluated quality of the used multimedia learning material according to described indicators and have given a general quality evaluation for individual multimedia learning material. The value of Cronbach's alpha coefficient used in this research indicates the high level of its reliability (0.8885).

The results of their evaluation have been presented in Table 1.

Table 1: Average grades of the presentation design of multimedia learning materials: Colour 1, Colour 2, Graphics 1, Graphics 2 and their general grades of the multimedia learning material

Multimedia learning material	Grade of the presentation design of the multimedia learning material	General grade of the quality of the multimedia learning material
Colour 1	3.846	3.985
Colour 2	4.317	4.314
Graphics 1	3.632	3.457
Graphics 2	4.461	4.169

Positive connection between grade of presentation design and general average grade of quality of multimedia learning material has been detected in the multimedia learning material Colour 1, Colour 2 and Graphics 1 while multimedia learning material Graphics 2 doesn't record a statistically significant connection between these two variables. Results of their connection have been presented in Table 2.

Table 2. Connection between evaluation of the presentation design and the general average evaluation of the quality of multimedia learning material

Pairs of variables	Correlation coefficient	Sig.
Grade of presentation design Colour 1 *Grade of quality of multimedia learning material Colour 1*	.303	.011

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Grade of presentation design Colour 2 *Grade of quality of multimedia learning material Colour 2*	.473**	.000
Grade of presentation design Graphics 1 *Grade of quality of multimedia learning material Graphics 1*	.398**	.001
Grade of presentation design Graphics 2 *Grade of quality of multimedia learning material Graphics 2*	.132	.271

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Hence, pairs of variables in the multimedia learning material Colour 1, Colour 2 and Graphics 1 can be analysed through the influence that grade variable of the presentational design has over the grade variable of quality. The undertaken regression analysis considers an independent variable of presentational design's grade and dependent variable of a general grade of quality of multimedia learning material. The results are presented in Table 3.

Table 3. Results of regression analysis for variables "Grade of presentation design" and "Grade of quality of multimedia learning material"

Pairs of variables	a	b
Grade of presentation design Colour 1 *Grade of quality of multimedia learning material Colour 1*	2.418	.303
Grade of presentation design Colour 2 *Grade of quality of multimedia learning material Colour 2*	1.519	.473
Grade of presentation design Graphics 1 *Grade of quality of multimedia learning material Graphics 1*	1.763	.398

Conclusions are based upon the interpretation of value regression coefficient's value (b). In the learning material of less quality (Colour 1, Graphics 1) changes of presentation design's grades have less influence over the modification of grade of multimedia learning material's quality. This influence is greater within the multimedia learning material of a greater quality (Colour 2).

For instance:

- Increasing the grade of presentation design of multimedia learning material Colour 1 for one level would lead to the increase of grade of multimedia learning material quality for 0.303, that is, for 1/3;
- Increasing the grade of presentation design of multimedia learning material Colour 2 for one grade would lead to the increase of grade of multimedia learning material quality for 0.475, that is, almost a half of the grade;
- Increasing the grade of presentation design of multimedia learning material Graphics 1 for one would lead to the increase of grade of multimedia learning material for 0.398, that is, almost more than 1/3.

Upon these results a conclusion can be made that changes of grades for presentation design lead to the bigger changes in the complete grade of multimedia learning material quality, while changes in grade of presentation design of a less qualitative multimedia learning material lead to smaller changes of the complete grade of multimedia learning material than excepted. Though this is not a big sample and very specific research method has been used, the results indicate attractiveness of topic and can be used as stimulation for further researches of same area.

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7 Conclusion

Development of qualitative multimedia learning material demands a serious approach and is not simple. Usage of qualitative multimedia learning material in the learning process is more than desirable. Taking account of the analysis of former researches, and this research as well, the following indicators of quality for multimedia learning material have been defined by LORI. Still, since evaluation of multimedia learning material was executed by students-users who are not competent for evaluation of all indicators, those were reduced to the following; quality of content, presentational design's interactivity, adoption to usage with special emphasis to presentation design which represents a limitation of the research. Statistically important and positive connection has been defined between grades of presentation design for multimedia learning material and grade of multimedia learning material quality in three of totally four evaluated multimedia learning material. Hence, the better the students have graded design of multimedia learning material the complete grade of the same should also become higher. To define the level in which students' grade of the presentational design for multimedia learning material has anticipated the grade of multimedia learning material's quality, a regression analysis has been conducted. Research results imply that positive changes in grades of presentational design for multimedia learning material lead to the positive changes of quality grade for multimedia learning material, especially in case of more qualitative multimedia learning material.

Finally, the authors hope this paper will help to detect problems immanent to the practical work and connect it with the problems of presentational design. The research should also motivate additional analysis and re-questioning through new researches that should all serve as introduction to the issue of managing the quality of multimedia learning material and researching the quality indicators for such learning material.

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