Preferred Information Receiving Channels in Secondary School and University Students

Krunoslav Bedi

School of Civil Engineering, Art and Craft Čakovec

Športska 1, HR-40000 Čakovec, Croatia

krunoslav.bedi@ck.t-com.hr

Nikolina Žajdela Hrustek

Faculty of Organization and Informatics Varaždin

University of Zagreb

Pavlinska 2, HR-42000 Varaždin, Croatia

nikolina.zajdela@foi.hr

Ivan Štedul

Community College of Karlovac

Trg J. J. Strossmayera 9, HR-47000 Karlovac, Croatia

ivan.stedul@vuka.hr

Abstract. *The ICT use simplicity and a relatively quick and simple access to the Internet make the publishing of numerous digital teaching materials possible. It is hard to discuss the individual quality of each of them. However, it is very important, for the purpose of the teaching process, to choose and use multimedia content/materials that are accessible to each and every student. As the preferred information receiving channel(s) depend(s) on many factors, the purpose of this paper is drawing teachers' attention to the complexity and importance of the choice of the most suitable channel for secondary school and university students.*

Keywords. multimedia, preferred information, multimedia channel, multimedia learning

1 Introduction

The term multimedia is frequently encountered nowadays. We can say though that the term is not a novelty as the contemporary IC technologies (ICT) and the delivery of multimedia content (by means of computers, mobile phones, TV, the Internet etc.) are encountered even from the early childhood.

The term multimedia includes the three basic elements: text, picture and sound. Multimedia changes both the way communication teacher/student is effected and the teaching process itself.

Multimedia provides for a message not only to be sent and received easily but to be understood better as well. By means of combining the elements (or by means of using them separately), a student/university student in the teaching process can interactively communicate, convey ideas, messages or contents thus acquiring new knowledge by means of a computer (in a classroom or at home, self-teaching). The evolution of multimedia has made it very possible for learners to become involved in their work. With multimedia technologies, they can create multimedia applications as part of their project requirements. This would make them active participants in their own learning process, instead of just being passive learners of the educational content [10].

The simplicity of the use of ICT and a relatively quick and simple access to the Internet provide for publishing of numerous digital teaching materials. It is hard to discuss particular values of each of them, but it is very important, however, for the teaching process that the choice and use of multimedia materials/content are made in a way that make the materials/content accessible for a student in terms of his/her habits, needs, wishes and the learning style. For the purpose of a research, Hei-Chia developed an asynchronous interaction system, teacher digital assistant (TDA), for teachers to receive responses, recommendations, and modified materials from students at any time [3]. The research in turn showed

how important –and useful- it was for the students/university students to take active part in creating teaching materials (besides other situations) after conferring with the teaching staff who participated in this study, they all agreed that students could make positive contributions to the enhancement of course materials. Statistics also support an interesting finding that some graduate students demonstrated a stronger inclination to modify course materials, undergraduate students, however, preferred giving feedback to directly altering course materials.

They also responded positively to the teaching quality of the courses. The major advantage of this process is that it could embed students' thoughts into the course material to improve the curriculum, which can benefit future students [3]. Many other research showed other methods of surveying opinions of and suggestions from students/university students by means of questionnaires, discussions, forums or by means of "interactive learning" [1], [2], [11], [12], [13]. The changes in the teaching process caused by implementation of ICT require the detection of their specific features and require the application of new methodical and didactic rules, especially if the ICT use in the teaching process implies multimedia content. A multimedia presentation used as a didactical aid performs the following functions: motivational – its aim is to intrigue, evoke interest, willingness and readiness to learn; the cognitive function – it allows the learner to explore reality in a direct way, the forming function facilitates developing cognitive abilities, solving practical and theoretical problems based on one's knowledge and abilities and implementing the knowledge acquired into practical actions; the educational function – facilitates shaping proper attitudes, views and ideas about particular phenomena; the control function – verifying information and ways of thinking, allows for evaluating the level of mastering the knowledge and abilities [14].

A lack of interest or a lack of students/university students' knowledge of using new technologies can be a factor imposing a limit to learning and an obstacle in acquiring longer-lasting knowledge. This is why a significant role in raising motivation in students is played primarily by University teachers/teachers who are to envisage quality multimedia materials taking into consideration the students' suggestions and wishes.

2 Digital learning materials and learning

Learning is a process closely related to the teaching process term and it requires planning. A special role in that is played by the ready-made teaching materials that are more and more frequently accessible in multimedia form and that are – with little adjustments- easily implemented in the teaching process.

The research that have been done in this field up to now have been either based on detection of motivation for the use of multimedia content (most frequently submitted via the Internet) or they have pointed to the clearly visible relation among the multimedia content having been used, the subject matter, the learning process and the learning results [4],[6], [7], [9], [10].

Before he/she starts creating multimedia content, a university teacher/teacher should identify the matter his/her students are to acquire (the goals of learning). Next, he/she is to identify which parts of the matter could be a problem as to understanding the matter and how to present them. It is important as well to assess how the teaching materials should be presented via the use of the advanced information technology for the purpose of making learning easier for students; A teacher should as well use previous research and their results for creation of materials that present the same themes and a teacher should think about the activities within the multimedia content to be used for the purpose of motivating students to use the activities while learning. The attention is as well to be paid to designing and presenting the materials so that the target group of students is motivated for using them; Furthermore, a teacher should see if there is a possibility of implementing some real-life examples. Finally, he/she is to assess the extent to which the students will capitalize on the use of this sort of materials as contrasted to the traditional ones. Besides other things, a teacher should take into consideration the appropriate colours, pictures, animations and simulations are appropriate to use and after that the wishes and expectations of the students are to be integrated in the materials [5]. Well-designed multimedia content help university students/students to create mental models that are more accurate and more effective than those created via the traditional textual content. In accordance with a concise study by Shepard, the benefits from well-designed multimedia content are [15]: alternative perspectives, active taking part, quicker learning, keeping and applying knowledge, a simpler way of solving problems and acquisition of decision-making skills, a quicker understanding of a system, encouraging thinking at a higher level, independence and concentration, a control over the rate and sequence of information, access to the support information. Similar benefits were confirmed in a study by Mayer [8]: (a) a multimedia effect—in which students learn more deeply from words and pictures than from words alone—in both book-based and computer-based environments, (b) a coherence effect—in which students learn more deeply when extraneous material is excluded rather than included—in both book-based and computer-based environments, (c) a spatial contiguity effect—in which students learn more deeply when printed words are placed near rather than

far from corresponding pictures—in both book-based and computer-based environments, and (d) a personalization effect—in which students learn more deeply when words are presented in conversational rather than formal style—both in computer-based environments containing spoken words and those using printed words.

The design of high-quality interactive multimedia for learning requires creators to incorporate best practices in education, instructional technology, and human computer interaction to create a useful and effective online learning environment for students [5].

3 Research methods

The recognition of the "preferred channel" provides for a positive learning environment. The proposed research is oriented toward existence, detection, importance and influence of the personal perceptive preferred channel in acquisition of the matter. The research as well investigated the existence and the form of preferred channels via which the students received information.

By means of a survey, the habits related to the use of IT and the preferred learning style were assessed. Tables and graphs were used to show the results. The research was being done via the Internet (i.e. online) in the course of the April of 2010. When investigation into the attitudes of the surveyed was done, Likert's scale was used in which the surveyed expressed their subjective agreement with the respective statements. There were 5 steps (1-I do not agree at all; 2-I do not agree; 3- I do not know; 4-I agree; 5-I definitely agree). The data obtained from the survey were processed and analysed for the purpose of determination of the distribution and the frequency of answers. Minitab software package was used for the data analysis.

The students of School of Civil Engineering, Art and Craft Čakovec and the students of Community College of Karlovac took part in the survey. There was a total of 217 university students and students surveyed. 48.7% of them were females and 51.3% males. The age span of the surveyed was 15 to 22.

4 Research results

The analysis of the preferred information receiving channels in university students and students is quite a voluminous one and therefore only the most important results are presented in further text.

A most important question that assessed the preferred form of via-a-computer information acquisition the students preferred was: "The new information obtained via computer I like the most if it is in the form of "Pictures, diagrams graphs or charts; Instructions in writing; Verbal information. The results are shown in the graph [1].
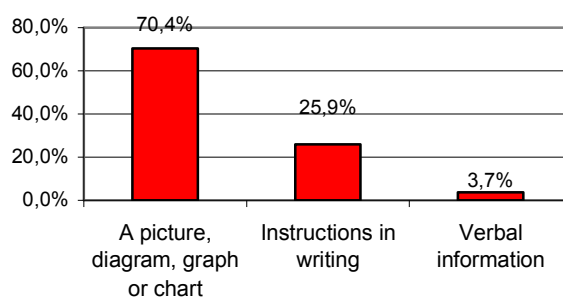
Graph 1. The new information obtained via computer I like the most if it is in the form of
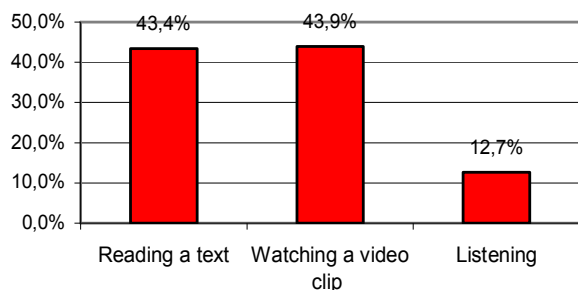
As it can be seen from the graph, 70.4% of the surveyed preferred new information in the form of pictures, diagrams, graphs or charts. 25.9% of them preferred instructions in writing whereas the neglectable 3.7%-rest of the surveyed preferred verbal instructions via a computer the most.

The question that was to assess what forms of computer-presented content are the easiest to remember offered three answers – I see; I hear: I read. The results are shown in the graph 2. Even 78.3% of the surveyed stated they remembered visually acquired content the best whereas 21.7% of the surveyed remembered textual and verbal content the best.
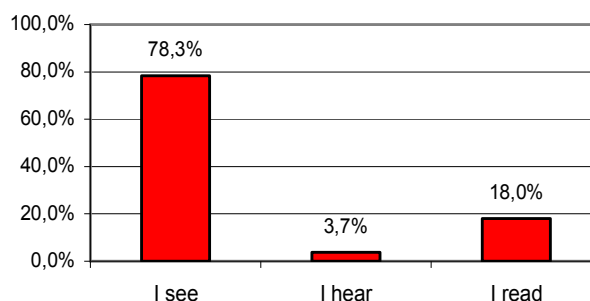
Graph 2. I remember the best what…

The very interesting question aimed at assessing the way in which the surveyed learned in the easiest way was: What is the easiest way of learning for you? The answers yielded the following results: 43.4% of the surveyed answered that hey learned in the easiest way traditionally, i.e. by means of reading texts; Watching video clips is the easiest way of learning for 43.9% of the surveyed whereas listening is the easiest way of learning for 12.7 % of the surveyed. The results are shown in the Graph 3.

Graph 3. The easiest way of learning for me is…

Graph 4. When I am learning, I prefer the Internet contents that contain and emphasise

The same question was as well presented as a Lickert's scale (1-I do not agree at all; 2-I do not agree; 3- I do not know; 4-I agree; 5-I definitely agree) and it was equally important for the surveyed to learn in the easiest way by means of learning and by means of watching video clips. The results are shown in Table 1.
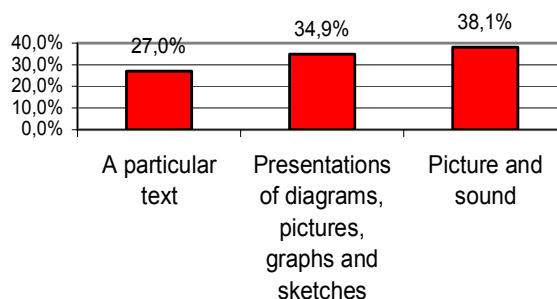
Table 1. The easiest way of learning

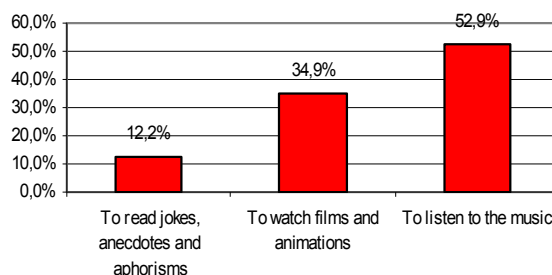| Question:	Importance	
The easiest way of learning for me is…	**Mean value**	**Standard deviation**
Watching video clips	3,49	1,20
Reading texts	3,49	1,35
Listening to lectures	3,32	1,21

Two very interesting questions related to the subjective impression of the surveyed as to the preferred media form of entertaining and educative contents in the Internet. Are these the contents that stress presentations via diagrams, pictures, graphs or educative contents that are presented in picture and sound? The second question assessed the media form of the most interesting entertaining contents in the Internet The surveyed could choose one of the offered three answers as to their preference related to the entertaining Internet contents:

1. reading jokes, anecdotes and aphorisms.
2. films and animations
3. listening to the music

The results are shown in Graph 4 and Graph 5.

Graph 5. As to entertaining contents, I prefer…

For assessing the importance of a way of acquisition of new contents, a Lickert's scale was used. In fact, the distribution of preference among the ways of acquisition of new contents was assessed, namely watching, talking, thinking, reading and listening. There were 5 answer steps (1-I do not agree at all; 2-I do not agree; 3- I do not know; 4-I agree; 5-I definitely agree). It turned out that it was helpful for the surveyed if the new contents were acquired visually as 36.5% of the surveyed definitely agreed that visual knowledge acquisition was helpful. The least importance was given to auditive acquisition of new contents, only 17.5% of the surveyed definitely agreed that listening is helpful to them. Table 2. shows the importance of the individual media channels for acquisition of new contents.

Table 2. The importance of the individual media channels for acquisition of new contents

Question:	Importance	
When I am learning something new	**Mean value**	**Standard deviation**
It is helpful to watch something about that	3,82	1,02
It is helpful to talk about that	3,79	1,14
It is helpful to think about that	3,69	1,12
It is helpful to read	3,51	1,23
It is helpful to listen about that	3,47	1,08

Table 3. Quantitative analysis of secondary school students' preferences as to multimedia contents

School of Civil Engineering, Art and Craft Čakovec			
Average mark	Variance coefficient	Variance	Standard deviation
I learn easiest through reading			
3.39	40.09	1.85	1.36
I will most likely remember some Internet contents if I have read it			
3,18	39.72	1.59	1.26
I memorize what I see (in the computer screen) the best			
4,23	23.52	0.99	0.99
While learning, I prefer contents that are accompanied with images and sound			
3,80	33.62	1.64	1.28
Listening to a lecture is the best way of learning for me			
3,24	34.79	1.27	1.13
When I learn something, it is helpful if I read about it			
3,44	37.66	1.68	1.30
I memorize what I hear (via computer) the best			
2,94	39.31	1.34	1.16
I learn via watching a video recording the best			
3,52	34.05	1.44	1.20
I will most likely remember some Internet contents if I have seen it accompanied with sound			
3,68	34.50	1.61	1.27
While learning, I prefer Internet contents that contain and stress a particular text			
3,44	34.01	1.37	1.17

Table 4. Quantitative analysis of university students' preferences as to multimedia contents

Community College of Karlovac			
Average mark	Variance coefficient	Variance	Standard deviation
I learn easiest through reading a text			
3.45	32,57	1,27	1,13
I will most likely remember some Internet contents if I have read it as a text			
3,36	28,42	1,07	1,03
I memorize what I see (in the computer screen) the best			
3,64	26,93	0,96	0,98
While learning, I prefer Internet contents that I see via images accompanied with sound			
3,20	31,19	1,00	1,00
Listening to a lecture is the best way of learning for me			
3,38	31,14	1,11	1,05
When I learn something, it is helpful if I read about it			
3,04	32,00	0,94	0,97
I memorize what I hear (via computer) the best			
3,42	30,4	1,08	1,04
I learn via watching a video recording the best			
3,02	31,27	0,89	0,94
I will most likely remember some Internet contents if I have seen it accompanied with sound			
3,56	32,45	1,34	1,16
While learning, I prefer Internet contents that contain and stress a particular text			
3,53	26,4	0,87	0,93

When the obtained results for students and university students are assessed separately, it can be seen that the variance coefficient in students is larger in students than in university students in the majority of cases. It can thus be concluded that students are not levelled as to their preferences and that it is therefore harder to suit the learning contents for them.

5 Conclusion

In the contemporary teaching process, there is a trend of searching for some new and better solutions for learning and teaching that are aimed at enhancing the efficiency of the teaching process. This is why the most important segment of multimedia in the teaching process is focused on in this research – the preferred channels that constitute the foundations of multimedia. By means of detection of the preferred channels, further choice and use of multimedia are defined.

Besides research into motivation, learning problems and the needs of the students, it is as well important to point out the importance of recognition of the previous experience of the students as to the very process of learning. Lack of recognition of the individual style of learning (i.e. of the preferred learning style) could lead to poor understanding and consequently to poor learning in students.

Based on the data gathered and analysed, the conclusion is that it is desirable nowadays to combine textual learning contents with visual and sound elements. The preferred information "lies" in the forms of diagrams, graphs and images combined with sounds /multimedia/.

The obtained data will serve in the future for the purpose of defining explicit rules and procedures for creating multimedia documents and for possible proposals for designing multimedia network teaching materials.

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