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ScienceDirect

Procedia - Social and Behavioral Sciences 171 (2015) 340 – 349

Procedia
Social and Behavioral Sciences

ICEEPSY 2014

Type of visualization and quality of digestion of educational information by students

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Abstract

The article describes the results of the research in correlation between the types of multimedia presentations and the quality of digestion of educational information by students. We found out the specifics of the impact of visual information type (text, scheme, and comics) on the quality of forming the knowledge system of students using e-learning tools. The results obtained clarify the psychological mechanisms of digesting information in e-learning and can make the learning process more effective.

Peer-review under responsibility of the Organizing Committee of ICEEPSY 2014.

Keywords: e-learning; electronic visual row; digestion of educational information

1. Introduction

The digestion of educational information is based on understanding the relationships between concepts, the ability to make judgments and conclusions, and also understanding the scope of application of new knowledge, abilities and skills (Holodnaia, 2004; Cañas & Carff, 2005; Novak & Cañas, 2006).The initial stages of the comprehension process become apparent during the perception of the material. Therefore, it is important to pay attention to the fact in what form (Rubinshtein, 2005) educational material is shown and how it can facilitate subsequent information processing and incorporate it in the knowledge structure.

At the next stage obtained information is structured in the process of knowledge formation, which stresses the importance of the development of intellectual operations system simultaneously with the system of knowledge in

Peer-review under responsibility of the Organizing Committee of ICEEPSY 2014.
doi:10.1016/j.sbspro.2015.01.131

learning. Processing of new information occurs with the use of the following operations: comprehension, application, analysis, synthesis and evaluation (Bloom & Krathwohl, 1956). The quality of applying these operations to the new material by students can be an indicator of their digestion of this material.

Another way of assessing the degree of formedness of knowledge system is concept maps (Novak & Gowin, 1984). Concept maps are graphical two-dimensional presentation of knowledge, including concepts connected by arcs (or straight lines), which reflect the relationships and interactions between pairs of concepts (Cañas & Hill, et al., 2004). Concept maps are an effective means of presentation and visualization of knowledge, as well as the method of estimation of students' knowledge (Novak & Cañas, 2006; Cañas, Carff, Hill, et al., 2005; Cañas, 2003). Studies in this area allow to conclude that concept maps, drawn by students, can help the teacher to identify misunderstanding or misconception of the topic, can reveal changes in the knowledge structure and the level of its digestion (Ross & Munby, 1991; Roth & Roychoudhury, 1993; McClure, Sonak, & Suen, 1999; Wallace & Mintzes, 1990; Kilic, Kaya, & Dogan, 2004).

2. Problem Statement

During the current decade computer and multimedia technologies have been increasingly used in the classroom in the course of the educational process. This significantly increases the proportion of electronic visualization in education. Studies in this area suggest that the transition to e-learning tools is ambiguously related to the quality of digestion of educational information (Gilmanov, 2012) and requires consideration of the peculiarities of perception and digestion of information presented in electronic form. Various forms of visualization are actively used in modern multimedia presentations: schemes, texts, images, illustrations, animation, and video.

The level of digestion of educational information may vary significantly depending on the type of electronic visual row. Electronic visual row is serial data in the form of illustrations, symbolical and graphic presentation – both static, and dynamic (animation or a video series) which is stored in a digital form and is shown on the computer screen or by means of information technologies (Kostromina & Gnedykh, 2012, p. 292).

In addition to the perception properties and ergonomics of the conditions under which visual aids are presented, it is important to focus on psychological characteristics of students which are essential in the process of information digestion: motivation of learning, thinking style, self-organization, etc. (Darinskaya L. & Rozum S., 2014; Iskra N. & Moskvicheva N., 2014). Thus, there are a number of matters to be solved in the problem field of variety of visual information, electronic systems used in training and individuality of students.

3. Research Questions: What type of visualization in a multimedia presentation (text, scheme, and comics) is most effective for teaching students? Is there any difference in levels of information digestion depending on the type of visualization and satisfaction of students by the form of presentation in e-learning?

4. Purpose of the Study: The purpose of the study is to reveal the specificity of influence of the form (text, scheme or comics) of presentation of visual information on the quality of forming the knowledge system of students using e-learning tools.

5. Research Methods

5.1. Participants: The study involved 166 students of 3rd, 4th and 5th year of the faculty of applied mathematics and control processes, St. Petersburg State University, 76 of them were female students and 90 male students, at the age of 19 - 23, the mean age being 21.06 years.

5.2. Research Methods and Instruments: At the first stage of the research we created lectures with multimedia presentation of educational information in three forms – «text», «scheme», «comics» - on the three subjects «Abilities», «Temperament» and «Character». Presentations were designed in a single style: black letters on white