COGNITIVE ASSESSMENT OF NEW TYPE OF TEACHING VIDEO PERCEPTION BY SECONDARY COMPREHENSIVE SCHOOL STUDENTS

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***Abstract*- From the position of psychophysiology, teaching videos on various topics of biology have been created where specific characteristics of video information perception have been taken into account. Teaching videos were shown to 9-10 grades of secondary comprehensive school students. As a comparator, standard teaching videos on the same subjects were shown to a control group of senior grade students. The success of the video development was assessed directly by test questions and by the degree of synchronization processes of student blinking – a cognitive perception of the video. It emerged that, according to the test and cognitive assessments, the absorbing of the material by the students (both by males and females) increased by more than one and a half compared to the control group. This research confirms the importance of psycho-physiological approach in creation of teaching videos.**

Keywords- Video; Acquisition of Knowledge; Process of Blinking; Senior Grade Students; Psycho-physiological Tests

I. INTRODUCTION

Blinking is one of the most significant visible manifestations of the human central nervous system in its dormant state [1]. Process of scrutiny is constantly accompanied by motion of the eyes from one part of the object to the other. Slight motion of the eye provides continuous shift of images that is required for a stable perception of still objects. Blinking provides instantaneous rest periods for nerves of the retina and also helps to relax the tense muscles which help eyes better focus and improve their alignment. It is well known that in the process of blinking, tear fluid moistures eyes. Eyelids evenly distribute the moisture along the cornea, protecting it from drying out. Blinking protects the eyes from irritants. Reflex arc of the blink reflex includes afferents the first branch of the trigeminal nerve, efferents of the facial nerve, the core of these cranial nerves and neurons reticular formation of the brain stem.

The average duration of a blink is 10-400 ms. Closing the eyes for more than 1000 ms is defined as micro sleep [1].

Micro sleeping can occur any time, anywhere generally without notable prior symptoms. For each individual under constant conditions it is stable enough.

Children do not blink at the same rate as adults: they, on average, blink once or twice a minute [2]. The precise reason for this is unknown, but it is assumed that children do not need the same amount of lubricant for eyes as adults, because their exposed surface of the cornea is less than that of adults. Upon reaching adolescence, the frequency of blinking is usually equivalent to the one observed in adults. There is data showing that women blink nearly twice as much as men. [3]

In general blinking is registered with 2-10 seconds interval. Under laboratory conditions, it was detected that an average number of blinks per minute amounts to 10. However, when the eyes are directed at an object over a long period of time, for example while reading, the rate of blinking is reduced to 3-4 times per minute [4].

Blinking can act as a criterion for the state of the CNS, disease diagnosis, and certain other things. Individual differences in the frequency of blinking are potential source of data for psychophysiology because for men that is indicator depends on the state of «mental stress»: extreme boredom and strong emotions reduce the frequency of blinking while at the optimum voltage this quantity is moderately increasing.

Recently, new data showed [1] that a man can unconsciously control the blinking process while watching a film. As a result, while watching a film for a certain amount of time, most people from the group tested blinked in unison. For example, researchers have found out that synchronous blinking arises when the key scene comes to an end or when the main character disappears from the screen.

It is impossible to focus at all visual information displayed on the screen. We should always ignore some parts of it in order to focus on the other parts. The whole process takes place without the participation of the consciousness, which significantly is free to perform other utilities.

Thus synchronization requires some history on the screen and the cause of synchronization is not in the need of following the plot itself.

These results demonstrate that the perception of video information, at least partially, leads to the synchronization of people's brain activity [1].

Usually, blinking is suppressed during an activity that requires visual attention and is usually carried out immediately before or after the task where the timing of the beginning and end are explicitly defined. While watching the video, blinking normally occurs during the explicit transitions such as a change of scene. However, taking into consideration the fact that the duration of the episodes is usually unpredictable, blinking is observed in the demonstration of the episode at definite intervals, and being withheld not to miss important visual information [1].

II. DESCRIPTION OF RESEARCH

Teaching video has become a very powerful tool in teaching, and most teachers are (or should be) keenly aware of the need to use it in the classroom.

Videos are a source of information, can influence to emotional, intellectual and bring up impacts.

Today it has become obvious that information, which is transferred to the child in school, takes minor place in general information flow in contrast with computer games, cable-TV, movies, music and other products of mass pop-culture. Each student can create for themself a comfortable information environment most likely without educational programs and textbooks.

From the position of psychophysiology, teaching videos on various topics of biology have been created where specific characteristics of video information perception have been taken into account (Fig. 1). Therefore, the basic irregularity of audio, visual and audio-visual information perception and memorization has been taken into consideration [5] as well as a hemispheric asymmetry of the human brain [6].

Fig. 1. The frame of a video clip in the light of psycho-physiological aspects of video data perception

Accordingly, the video shown to the students was divided into zones of perception for the right and left sides. In which connection, everything affecting II signalling system in this or that way was shown on the right, and transferred accordingly, mainly to the left hemisphere of the brain, affecting imagery information on the left. The video was made taking into account the psychophysiology of colour perception, so that colours did not cause rapid habituation and did not persistently draw attention [7].

Finally, the time limits of the student's visual information processing were taken into account [8]. 9-10 grade students focus their attention on average for a quarter of an hour. For this reason, we showed them 10-12-minute videos being specifically designed according to the above mentioned criteria as well as standard ones.

Specially created videos were shown to the students of 9-10 grades of a secondary comprehensive school. To compare the results, the standard videos on the same subjects were shown to the control group of senior grade students.

III. SIMULATION RESULTS

As shown in Fig. 2, while testing, the frequency of participants blinking in both groups has been found as 8.9 ± 0.7 times / min (n = 26). While watching standard video lessons, the frequency of blinking actually ($p < 0.05$) decreased to 5.1 ± 0.8 times / min (n = 12). When viewing a specially designed video on the same subjects that took into account the psycho-physiological aspects of video information perception, the frequency of blinking decreased to 2.8 ± 0.7 times / min (n = 14), which was actually ($p < 0.05$) different from the testing values obtained in another group of students.

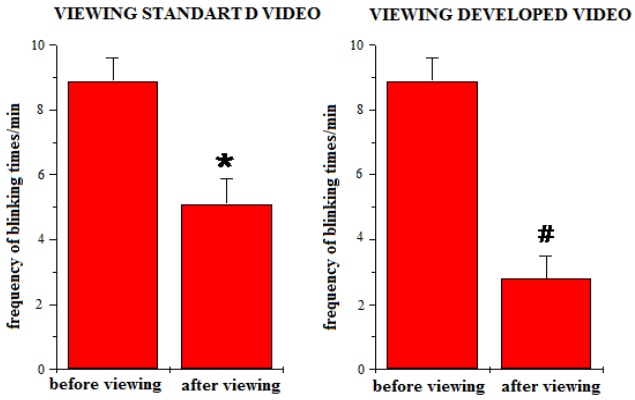

Fig. 2. The frequency of blinking while testing (n = 26), when viewing standard video lessons (n = 12), and specially designed video clips on the same subjects considering the psycho-physiological aspects of video data perception (n = 14).

* - $P < 0.05$ compared to testing.

- $P < 0.05$ compared to testing and with the frequency of blinking after watching the video tutorials

No significant gender differences ($p > 0,05$) in the frequency of blinking of boys and girls in the control group as well as in the experimental one were found.

Timing of blinking was assessed by using an original computer programme, which was created in the medium of 'Lab View 7.0'. This programme tracks the movement of the eyelid during the capture of video images by students while they view the videos. It was discovered that spontaneous blinking of the students was highly synchronized when they were watching specially tailored

videos that took into account the psycho-physiological aspects but were not clearly linked to changes in the episodes. Synchronized blinking occurred during a scene that required less attention, for example, at the end of an activity, during the absence of a presenter, during prolonged exposure or at the recurrence of a similar scene.

So, the information aroused proof interest in the whole group. And some of the same scenes caused similar response from all the respondents. This allows assessing the impact of whole video and its individual parts. In the future it will allow in structuring teaching materials so that students can learn a large amount of data without the loss of quality. In addition, the video is excellent source of figurative information, which allows a much fuller mastering of the topic, imagine investigated phenomenon.

In contrast, such a synchronized blinking was not observed when senior grade students watched the controlled teaching video, the production of which did not include psycho physiological features of information perception.

It turns out that every student noticed something interesting only for him in the video and the material learned unevenly in the group. Those students who are less focus on the controlled teaching video as a result may not fully understand the topic. That's why this study is interesting not only for psychophysiology, but also for practical pedagogy.

Thus the account of the psychophysiological features of the impact of teaching videos for students (ability to manage the attention of each student and group, to influence the volume of long-term memory and increase the strength of remembering, have an emotional impact for students and increase learning motivation, etc.) contribute to the intensification of the educational process.

IV. CONCLUSIONS

The success of the absorbing of the video material for verification of the earlier analyzed cognitive assessment of perception of video information was also evaluated by direct test questions. It was found out that, according to a test assessment, the absorbing of the material within the specially tailored video by students (both boys and girls) increased by 26 ± 5% (n = 14) compared to the control group which had normative video tutorials.

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