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LEARNING STRATEGIES WHEN USING ONLINE MULTIMEDIA COURSES

Abstract

The study attempts to explain the reasons for the low effectiveness of learning theoretical content when using online multimedia courses. Therefore, a number of observations have been made using big data technology (YouTube Analytics reports) and participant observation. The results of final tests and the quality of completed projects have also been analysed. It has been found that students who have used dynamic multimedia messages since childhood apply specific learning strategies. These activities significantly increase the pace of work and reduce the time spent on learning. In the long term, however, they make students fall behind and lose their creativity.

Keywords: learning strategies, educational process, cognitive preferences, e-learning, educational film, YouTube Analytics.

Introduction

The Department of Media and Information Technology, University of Zielona Gora, offers some e-learning courses, the main elements of which are didactic videos. Due to the specificity of the classes, a significant part of their educational content is prepared and demonstrated using computers. Therefore, a camera is not used during filming. All recordings are made using specialized software. The screen content and the teacher's voice are recorded. In the final editing phase, various multimedia components (films and animations, sounds, text and graphics) are added to the videos. The teaching materials generally present content that helps to acquire procedural knowledge.

Multimedia presentations used in lectures are filmed in the same way. While editing, a voice-over and multimedia components are added. As a result, materials for independent acquisition of declarative knowledge are obtained.

All the videos are published on YouTube. Therefore, the creators gain access to YouTube Analytics tools. This solution allows one to collect detailed information about interactions with video materials. In addition to the number of views and view time, the system records the pauses and scrolling during learning. Based on the information obtained, an audience retention report is generated, offering two types of graphs: relative and absolute audience retention. In both cases, YouTube Analytics enables the simultaneous tracking of the video content and the vertical axis moving along the graphs. This allows one to correlate specific content with audience attention level. This parameter, defined as the absolute audience retention, informs what percentage of the total number of video views is viewing its individual parts. Thus, it may reach values higher than 100%. This happens when scrolling, pauses and re-viewing occur in large numbers. If the absolute retention graph is flattened and indicates a low level of audience engagement, one can use a "more sensitive" solution, that is the relative retention indicator. It informs about the level of audience attention based on the activity of the audience of a given video in relation to all YouTube videos of similar length. This solution helps to determine if content that stimulates attention processes has appeared.

Students do not use YouTube directly as part of the class. All the published videos are posted as part of the courses on a e-learning platform. After logging in, the courses offer access to educational material, electronic tests and surveys, as well as file-sharing tools. These solutions are conducive to monitoring the teaching-learning process and developing research results.

Being aware of threats, the multimedia forms of education were chosen in order to adapt the message to the cognitive preferences of the generation of Internet users (J. Jędryczkowski, 2014, pp. 36-45). Nicholas Car (2013) claims that dynamic multimedia messages viewed since childhood influence the mindset of recipients. Their ability to focus on longer parts of the text disappears. As a consequence, they look for ready solutions, which leads to a disappearance of creativity. However, *Attention spans. Consumer Insights* report, Microsoft Canada (2015), shows that despite losing the ability to focus attention, the use of digital devices improves multitasking skills. Users are extremely efficient in filtering relevant information.

The research conducted since 2016 has revealed students' problems with learning theoretical content (acquisition of declarative knowledge). Students skip or very briefly familiarize themselves with the content of lectures in the form of video. They treat similarly even short theory sections included in didactic videos that shape procedural knowledge. However, it has often been observed that, despite skipping the theoretical introduction to videos that illustrate sequences of procedures, students correctly answer questions on theoretical issues (J. Jędryczkowski, 2016, pp. 11-21). Therefore, it has been assumed that they develop specific learning strategies using video messages. According to Myron H. Dembo (1997,

pp. 93-124), learning strategies are intentional learner behaviours aimed at facilitating the acquisition and processing of information.

Strategies for learning theoretical issues – research results

In the academic year 2018/19 research on strategies for learning theoretical issues and strategies for procedure learning was started. It was to check whether in the situation of external motivation, e.g. in the form of a test, students could effectively use the messages presented in the multimedia form. The method of using a didactic video (15 min) was analysed. The knowledge of the presented content was verified by one multiple choice question in the course final test. The test was made available online only to those logged in to the specified date. It contained 20 questions that had to be answered within 40 minutes.

At the beginning of the course the students were informed about the course website containing the dates of laboratory classes and lectures along with topics and teaching materials. Entering all the dates made it possible to carry out two analyses. The former covered the period from the beginning of the term to the date of laboratory classes for which the students were supposed to have acquired knowledge presented during the lectures (Table 1). The latter referred to the way the students prepared for the final test (Table 2). This analysis covered the time between the abovementioned laboratory classes and the test days.

The research sample included 70 students (42 full-time students and 28 part-time students). In the 2018/19 summer term, the first video was viewed on YouTube 2282 times and watched for 125 hours. Bearing in mind the need to narrow down the data to the data on viewing the videos only by the students of the University of Zielona Góra, only materials from the course website were suggested in class. As a result, after filtering, data for only the *uz.zgora.pl* domain were obtained. In this domain the video was viewed 77 times and watched for 535 minutes.

Table 1. Using video material while learning for laboratory classes

Number of students	Views	View time in minutes	Average view time	Average percentage viewed
70	26	185	7:06	49%

Source: developed by the author.

Even the preliminary analysis of the collected research material (Table 1) explained the reasons for the lack of knowledge required for the laboratory classes. The video was viewed only 26 times, which was 37% viewership. In fact, this value may have been lower, because while preparing for classes the same students could

have repeatedly viewed the video or its parts. The low average percentage viewed of 49% also indicated a little interest.

At the end of the laboratory classes, the students were reminded that the presented content would be verified in the final test. Therefore, it was assumed that in the period preceding the test the viewership rate would increase. The data on this are presented in Table 2.

Table 2. Using video material to prepare for the final test

Number of students	Views	View time in minutes	Average view time	Average percentage viewed
70	51	350	6:51	45%

Source: developed by the author.

Not more than 51 (73%) students viewed the content of the video before the test. Despite the higher number of views, the average view time (6:51 min) and the average percentage viewed (45%) decreased. This suggests that learning was cursory again.

The average percentage viewed is calculated on the basis on each replay (except pauses and scrolling). This means that some students (those who did well in the test) must have returned to the didactic video several times. Considering the number of correct answers in the test (Table 3), it was found that only 10% of the students effectively used the video materials.

A further analysis was necessary to explain the reasons for such low values. A question was therefore formulated regarding the strategy of organising the learning process. The times when the students watched the video material were analysed. The assumption that a significant proportion of the students, taking advantage of the fact that the test could be taken at home, would try to look for the correct answers only after reading the questions was confirmed.

Table 3. Using video materials at the time of final tests

Students	Number of students	Views	View time in minutes	Average view time	Average percentage viewed	Number of correct answers	Percentage of correct answers
Full-time	42	15	66	4:24	29%	3	7%
Part-time	28	4	46	11:27	76%	4	14%

Source: developed by the author.

During the whole term, the video was viewed 77 times and watched for 535 minutes in the *uz.zgora.pl* domain. Thus, based on the values (Table 3), it was observed that 25% of the views (21% of the time spent on studying) occurred on the dates when the tests were taken. This means that probably a quarter of the students counted on dishonest ways to pass the test. However, given the length of the film (15 minutes) and the time limit for doing the test, it could be assumed that the students were unlikely to watch the video while taking the test. Therefore, it was assumed that the strategy used was to learn "at the last minute". Only for part-time students (Table 3) the average percentage viewed (for up to four people) reached 76%. Although the number of correct answers for this group was only 14%, it is highly probable that the correct answers were given by the students who had watched the video.

Assuming that those who have used dynamic multimedia messages throughout their lives have lost the ability to focus their attention for a longer period of time, it can be presumed that they use a 'profit and loss estimation' strategy. They probably decided that it was not worth analysing the content of the entire video carefully for one question in the test.

Analysing the research material, the question arises how it was possible that some students were able to give correct answers at such low values of average view time and percentage viewed (Table 2). Probably some students took notes that they shared with their friends. The new cognitive competencies of the young generation are also significant. They enable extremely fast selection of relevant content in the mass of information (G. Pfeifer, 2013, pp. 74-75; Microsoft Canada, 2015). This assumption is confirmed by the analysis of two graphs of audience retention. The former is the absolute audience retention graph (Figure 1). It covers the period in which students were preparing for the tests (from mid-December to the test day).

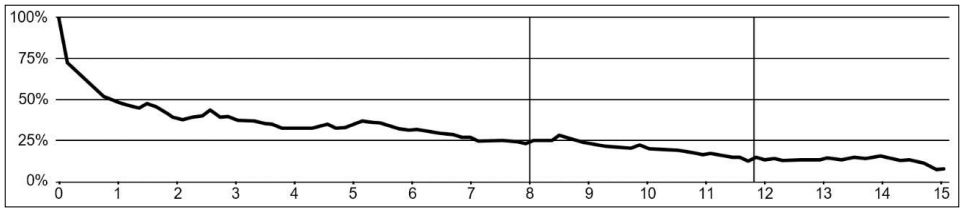

Figure 1. Absolute audience retention while learning theoretical content
Source: developed by the author.

Three areas corresponding to different content have been marked on the graph. The lecture was run for the first eight minutes, then two types of applications of the discussed theory were pointed out (the second type after the eleventh

minute). Unfortunately, the report of this type did not record an increase in interest corresponding to the emergence of subsequent issues. For this reason, a "more sensitive" report of relative audience retention was used (Figure 2).

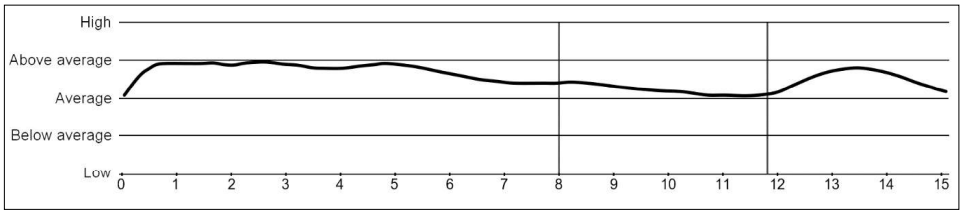

Figure 2. Relative audience retention while learning theoretical content
Source: developed by the author.

In this case, it is clearly seen that the material viewed was analysed. The content included in each of the three analysed segments was not omitted. This means that even though the average percentage viewed was low, the viewers were able to find key information by scrolling the video. These strategy types are valuable from the point of view of active functioning in social media. Unfortunately, in a situation where it was necessary to carefully analyse the educational material they proved to be little effective.

Strategies for learning procedures – research results

Students who use video courses correctly perform tasks that require knowledge of the presented procedures. Unfortunately, their projects are usually copies of the solutions viewed. They do not use tips on other uses of the procedures they learn. Therefore, questions about their method of constructing procedural knowledge arose. Attempts were made to explain whether students knew the purpose and sense of the actions taken.

YouTube Analytics provide very precise information on interactions with video material, but they do not allow one to determine if and in what order parts of the video were viewed. Moreover, they do not inform how quickly viewers find content in which they are interested. Therefore, obtaining answers to the research questions required observation during classes on which students prepared individual projects. In a group of 15 students, the 24 minute video was watched for 402 minutes, which meant that each student became familiar with over 100% of its content. This was recorded in graph 3, in which values close to 200% appeared. It was therefore concluded that the most important parts of the video were watched several times.

The course of their work is illustrated by YouTube Analytics attention graphs (Figure 3 and 4), on which points informing about the presentation of subsequent issues within the video are marked. At the beginning of the video there was a revision of issues presented in previous classes (from the beginning to point A). The (A-B) section explained the aim of the actions and presented the necessary definitions. The project involved two practical tasks. The first was presented in the (B-E) section and the second in the (E-F) section.

The observations showed that the students did not use the video in a linear manner. They immediately began scrolling. After a dozen seconds, they found the presentation of the final results of the first task (D-E section). Having viewed the content of this section thoroughly (high values in both graphs), they started to create their own projects. For this they used the material from the beginning of the video to point A and the (B-C) section. They had already known the procedures presented at the beginning (up to point A), hence the low values in the absolute audience retention graph (Figure 3). Almost nobody watched the theoretical part of the video (A-B section).

The need to perform the sequence of new procedures precisely (B-C section) forced numerous interactions with the video material. This fact is illustrated by high values in the relative audience graph (Figure 4).

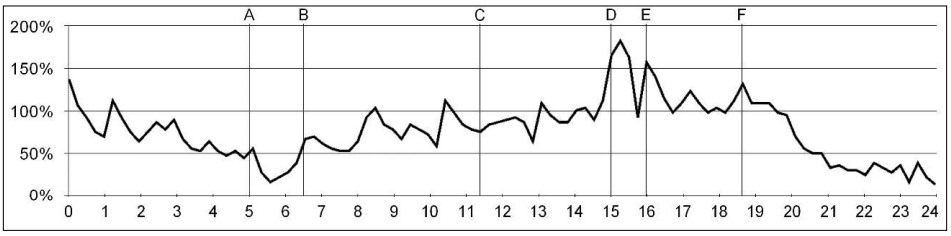

Figure 3. Absolute audience retention while learning procedures
Source: developed by the author.

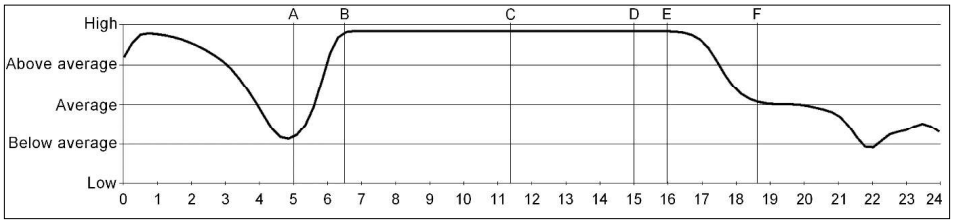

Figure 4. Relative audience retention while learning procedures
Source: developed by the author.

No new procedures were introduced in the (C-D) section, but their practical application in a new situation required a thorough understanding of the instructions. As a result, maximum values appeared in the relative audience retention graph.

The second task was a continuation of the first task and required the use of completely new procedures. The complexity of the presented operations and the need to perform a number of complex operations forced a high level of attention in both graphs (E-F). From point F, various ways of testing the finished project were presented. Most students viewed only the first of them (90 seconds) and stopped using the video material.

Taking into account the fact that all the tasks were completed correctly, it should be stated that the students had high competencies regarding the selection of multimedia content. They could strongly focus their attention for a short time to use the necessary information effectively. Unfortunately, this only happened in a situation of strong motivation. Their work was task oriented. They showed no interest in the context of the actions taken.

The video material mainly illustrated the implementation of procedures. However, it contained a theoretical section explaining the purpose and meaning of the actions taken (A to B section lasting 89 seconds). This content was omitted by the students, which was expressed in very low values in both graphs. The strategy of starting work from learning about its final effect allowed the students to reduce working time by omitting a number of theoretical issues and comments. Unfortunately, in this way the students just copied the presented solutions. The reproductive nature of the students' activities and the total omission of theoretical issues were confirmed by another observation. Nearly half of the students did not use headphones. This means that the procedures observed were just copied without understanding.

At the end of the class, using a written form, the students' knowledge on the purpose of the actions taken, the definitions discussed and other uses of the procedures were tested. It turned out that despite deliberately avoiding the theoretical content, the students reconstructed declarative knowledge by analysing the sequence of procedures. They learned the purpose of practical activities discussed in the theoretical part of the video by familiarizing themselves first with the final effect of practical activities. They formulated rules and definitions on their own, observing the order and correctness of the presented sequence of procedures. These abilities proved their adaptation to the use of multimedia information sources. Unfortunately, the declarative knowledge obtained in this way was fragmentary.

Conclusion

The analysis of learning strategies using online multimedia courses has helped to explain the reasons for the low effectiveness of learning theoretical content. The ability to immediately find any information using a smartphone makes students treat it as an extension of their own memory, eliminating the need to remember (M. Spitzer, 2015, pp. 18-20). As a result, they avoid learning theories, which leads to gaps in their knowledge and makes them fall behind. This, in turn, makes them unable to understand subsequent material. It has been discovered that the students use the "profit and loss estimation" strategy. If the workload is disproportionate, e.g. to the number of points they can get on the test, then omit extensive parts of the theory. Loss of the ability to focus their attention and the need for constant stimulation through new stimuli mean that the educational content is learned in parts because of scrolling. Even when they were under strong external motivation, no systematic learning was observed. The phenomenon of studying just before a test is common.

The students have also developed specific strategies for using materials illustrating procedures. They typically omit the theoretical introduction to practical issues. They reconstruct the aim and sense of practical actions discussed there by familiarizing themselves first with the final result of the presented procedures. In a similar way, they reconstruct the general assumptions of definitions and theorems. If learning to use procedures requires their simultaneous application in practice, the students' projects are copies of the solutions presented. These strategies significantly increase the pace of work and reduce the time spent on studying. However, their effectiveness is apparent. The students fall behind, gaps in their knowledge appear and they lose creativity. Given the quality of the teaching-learning process, it seems that the only effective solution in this situation is a systematic control and assessment of the students' knowledge of theoretical issues, especially before starting practical projects.

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