

# Teaching in the Internet Environment Against the Background of COVID-19: Integration of Video Content into E-Learning

Tetiana Bilushchak and Ivan Bratus

*Lviv Polytechnic National University, 12, S. Bandery str., Lviv, 79013, Ukraine  
Borys Grinchenko Kyiv University, 18/2, Bulvarno-Kudriavska str., Kyiv, 04053, Ukraine*

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EMAIL: tetiana.m.bilushchak@lpnu.ua (A. 1); kulturolog@gmail.com (A. 2)

ORCID: 0000-0001-5308-1674 (A. 1); 0000-0002-8747-2611 (A. 2)

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# Relevance of the topic

The relevance of the research topic is that radical changes are taking place in the field of education: e-learning is actively used, distance learning technologies are being developed, so the use of state-of-the-art video resources and integration of video content into e-learning will improve the quality of learning, motivation for learning activities due to quarantine restrictions caused by the need to prevent the spread of acute respiratory disease COVID-19 caused by coronavirus SARS-CoV-2.

# The purpose of the study

*The purpose of this study* is to determine the feasibility of integrating video content into e-learning against the background of COVID-19.

*To achieve this purpose one must perform the following tasks:*

- analyze current studies of international and Ukrainian scientists;
- determine the typology of video content and the typology of examples of educational video content;
- determine the feasibility of integrating video content into e-learning against the background of COVID-19 through empirical research;
- build a scheme for choosing the type of educational video content when working on the units of the selected topic of the class.

# Typology of educational video content in e-learning

The integration of video content into e-learning should evoke the effect of the student's presence, be interactive, encourage dialogue and motivate further learning.

After analyzing scientific papers and video content that is available on the Internet, we are going to distinguish the following types of video content for e-learning. Here are the typology and the examples of educational video content.

**Table 1**

Typology and examples of educational video content

Type of video content	Example
video presentation of the course	video recording of the introductory word of a teacher to the discipline; which are presented in the system of distance education for a particular discipline. Answers to the questions: "How to sign up?", "How to view your own achievements and current tasks?", "How to connect to the webinar?", "How to find and download the necessary educational materials?";
video review of educational materials	
video recording of a "live" lecture	video lectures are given directly during lecture classes, they can create the effect of presence for students who watch video lectures;
interactive video lecture	contains tasks for independent work and interactive visual elements (hyperlinks, windows with material, etc.); This type of video lecture is combined with texts, maps or even surveys;
multimedia video lecture	shot in the studio and contains complex special effects: cutting out background, use of 2D and 3D animation, animated slides, screencasts, infographics (diagrams, graphs and histograms);
video demonstration of educational materials	This video contains a demonstration of the experiment, laboratory work, operation of the equipment, software, assembly and disassembly of the equipment. Video can be created from photos of process stages (repair, assembly-disassembly, process of creation of the drawing, figure, etc.) or on the basis of objective video shooting (recording of technological processes);
studio short video lesson	which reveals a very narrow topic (issue);
video lecture-presentation	created as a sequence of slides with audio accompaniment of the material, or a video lecture, which is a direct presentation of the material by the teacher;
video lecture-instruction	video lecture, which aims to provide clear and step-by-step instructions by the teacher for practical, laboratory works or the implementation of certain educational activities;
video lecture-interview	video lecture, in which the material is presented through an interview of the teacher with invited scientists and specialists on specific educational issues
video scribing	a method of narration or explanation, accompanied by a graphic illustration of the main content of what is said. The main purpose of scribing is to help better master the content and remember the meaning of new information by involving visualization. Video scribing can be divided into professional, semi-professional and amateur;
video infographics	graphic visual presentation of data or knowledge designed to quickly and clearly display complex material. The video format of the infographics increases the impact on a person through the use of graphics in motion, as well as by adding music and sound effects. Creating the effect of augmented reality, video infographics is especially used to present a large amount of data with the involvement of the user in active research in obtaining the necessary material;
screencasts	digital video recording of information displayed on a computer screen. Often accompanied by voice comments. Screencasting is actively used in educational processes, it is widely used by pupils/students and teachers of schools, higher educational institutions. Due to the ease of creating such videos, screencasts have acquired various forms of implementation and presentation of the material: picture in picture, only the presented material, "Dumb" screencasts, accelerated screencasts, screencasts as a reference, screencasts with elements of video scribing, etc.

# Scheme for choosing the type of educational video content when working on units of the selected topic of the class



# Integration of YouTube video content into the Moodle e-learning environment

Among various platforms available for the distribution of open access video content, we consider the integration of YouTube into an e-learning platform organized on the basis of the Moodle distance learning platform. Moreover, in order to create a network between teachers of the university department, we consider creating a common channel for communication of all teachers on YouTube video hosting. The student's invitation takes place within a set of educational materials and with the involvement of the relevant teacher of the discipline with the provision of possible access parameters such as: "Open access", "Access by link" or "Restricted access". If the topic of the discipline has several subtopics/sections, you can create playlists, as well as embed video content on Moodle resources with an option to start a video lecture from YouTube in a certain period of time.

# Integration of YouTube video content into the Moodle e-learning environment

This application provides users with a flexible, high-quality tool for distance education using state-of-the-art and reliable, time-tested and effective distance learning environment Moodle. YouTube-Moodle integration provides an effective tool for organizing e-learning, will allow us to create interactive training courses that will be convenient and accessible to individual users and large groups based on the Moodle system:

- ✓ full integration – the student uses a single tool - switching from Moodle course to video content is carried out on YouTube conveniently and effortlessly;
- ✓ easy access system – the user only needs to log in to one environment and he/she gets access to all video content;
- ✓ personal reminders for watching video content – every teacher has can configure group reminders in his/her Moodle calendar in a certain period and set the time of access to video content of the course.



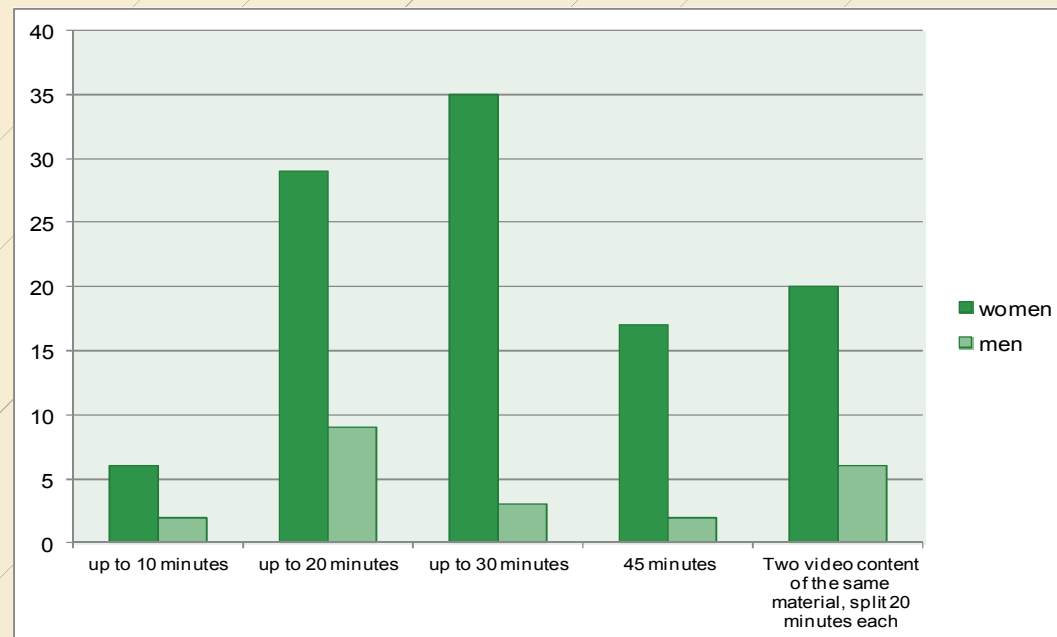
# Comparative analysis of data as a result of the survey

**Table 2**

Data after processing of two comparative conditions of data about intervals of video content watching by surveyed male and female respondents

The best time frame for mastering the educational topic in the time of the quarantine during COVID-19 pandemic		
Time intervals	Females	Males
up to 10 minutes	5	2
up to 20 minutes	28	8
up to 30 minutes	34	3
45 minutes	16	2
Two video content of the same material, split 20 minutes each	19	5

# The results obtained after processing two comparative conditions for the surveyed data intervals of video content watching



# Comparative analysis of data as a result of the survey

Having a set of the most optimal time intervals of video content watching obtained as a result of the survey for mastering the educational topic in the period of the quarantine during the COVID-19 pandemic, we construct 5th degree approximation polynomials using a least-squares approach with  $n = 5$  – answer options

$$f_{sex}(A_1, \dots, A_5) = \sum_{i=1}^n \left[ \Phi(x_i) - \sum_{l=0}^5 A_l x_i^{5-l} \right]^2 \xrightarrow{\{A_l\} \in R} \min, \quad (1)$$

where  $\Delta T_i$  – time interval,  $\Phi(\Delta T_i)$  – value for a certain consecutive interval,  $A_l$  – coefficients of the 5th degree polynomial from the set of real numbers,  
Based on formula (1) we get a general form of the approximation function:

$$f_{sex}(\Delta T) = A_0(\Delta T)^5 + A_1(\Delta T)^4 + A_2(\Delta T)^3 + A_3(\Delta T)^2 + A_4(\Delta T) + A_5, \quad (2)$$

# Comparative analysis of data as a result of the survey<sup>(4)</sup>

We construct approximation functions using (2) for specific values that we received as a result of processing data obtained from people:

## •female

$$f_W(\Delta T) = 1.8359 \cdot 10^{-6}(\Delta T)^5 - 5.85979 \cdot 10^{-5}(\Delta T)^4 - 6.75979 \cdot 10^{-5}(\Delta T)^3 + 3.00701 \cdot 10^{-1}(\Delta T)^2 - 1.6927(\Delta T) - 3.3085 \cdot 10^{-12} \quad (3)$$

## •male

$$f_M(\Delta T) = -7.2037 \cdot 10^{-6}(\Delta T)^5 + 0.00085787(\Delta T)^4 - 0.035963(\Delta T)^3 + 0.606435(\Delta T)^2 - 3.05389(\Delta T) + 3.41938 \cdot 10^{-12} \quad (4)$$

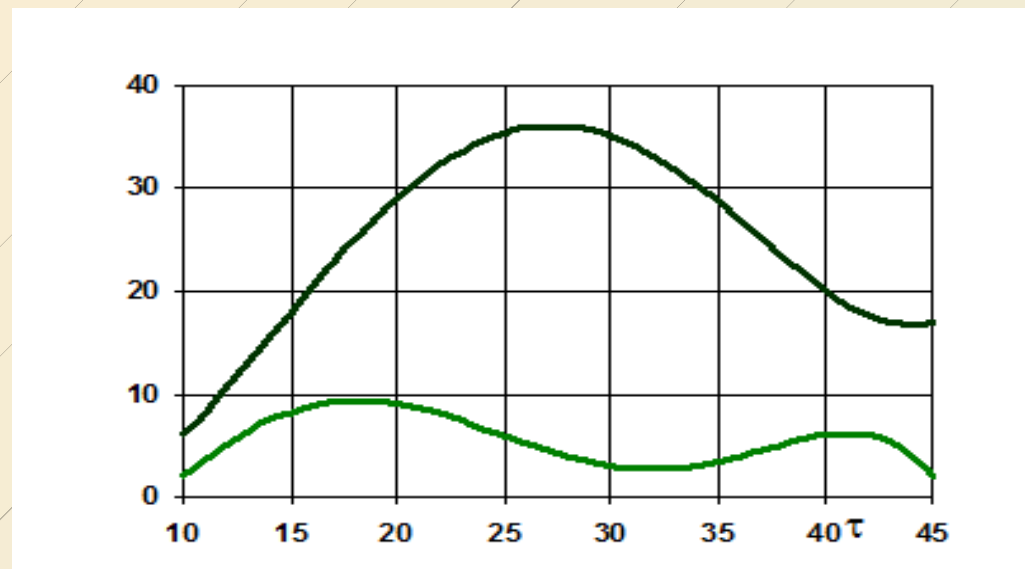
# Comparative analysis of data as a result of the survey

**Table 3**  
Approximated data on the surveyed respondents

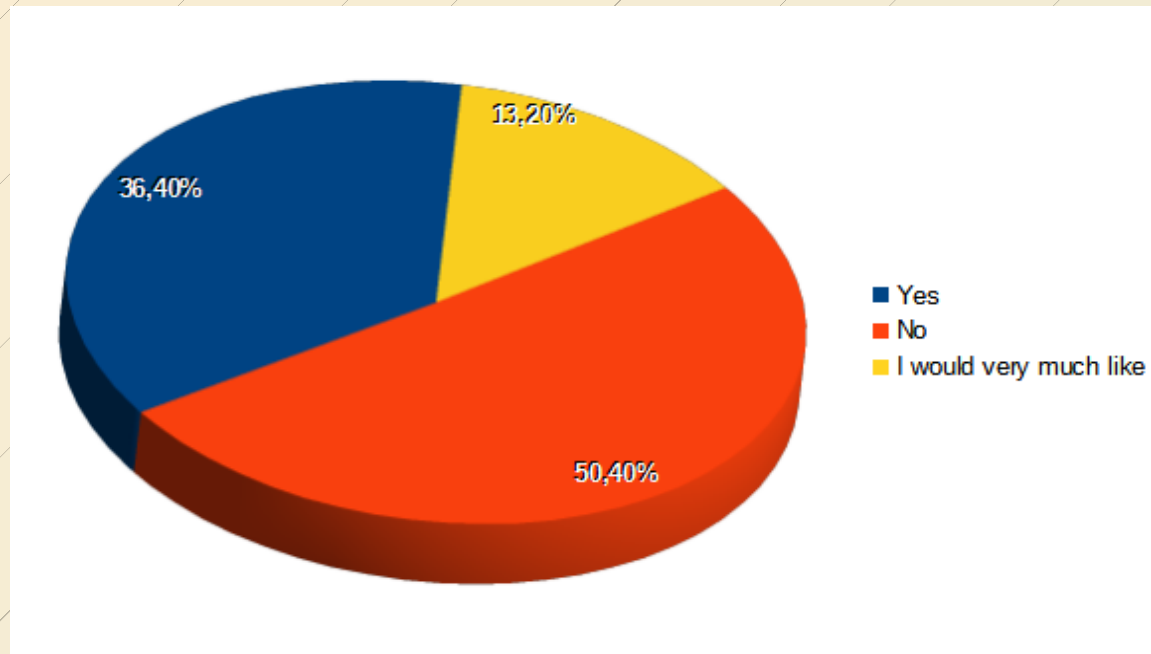
$\Delta T$	Women	Men
10	6	2
11	8,230974	3,578461
12	10,58234	5,026496
13	13,01206	6,299904
14	15,47937	7,367161
15	17,94494	8,208333
16	20,37111	8,813995
17	22,72215	9,18414
18	24,96441	9,327104
19	27,0666	9,258472
20	29	9
21	30,73865	8,578528
22	32,25959	8,024896
23	33,5431	7,37286
24	34,57289	6,658005
25	35,33631	5,916667
26	35,82463	5,184839
27	36,03319	4,497096
28	35,96166	3,885504
29	35,61428	3,378539
30	35	3
31	34,1328	2,767928
32	33,03183	2,693518
33	31,7217	2,780037
34	30,23262	3,021739
35	28,60069	3,402778
36	26,86811	3,896128
37	25,08334	4,462496
38	23,3014	5,049237
39	21,58404	5,589272
40	20	6
41	18,62517	6,182217
42	17,54287	6,019029
43	16,84404	5,374771
44	16,62746	4,093916
45	17	2

Table 3 shows the data on the surveyed male and female respondents approximated by functions  $f_w(\Delta T)$  and  $f_M(\Delta T)$ , according to formulas (3), (4), respectively (4)

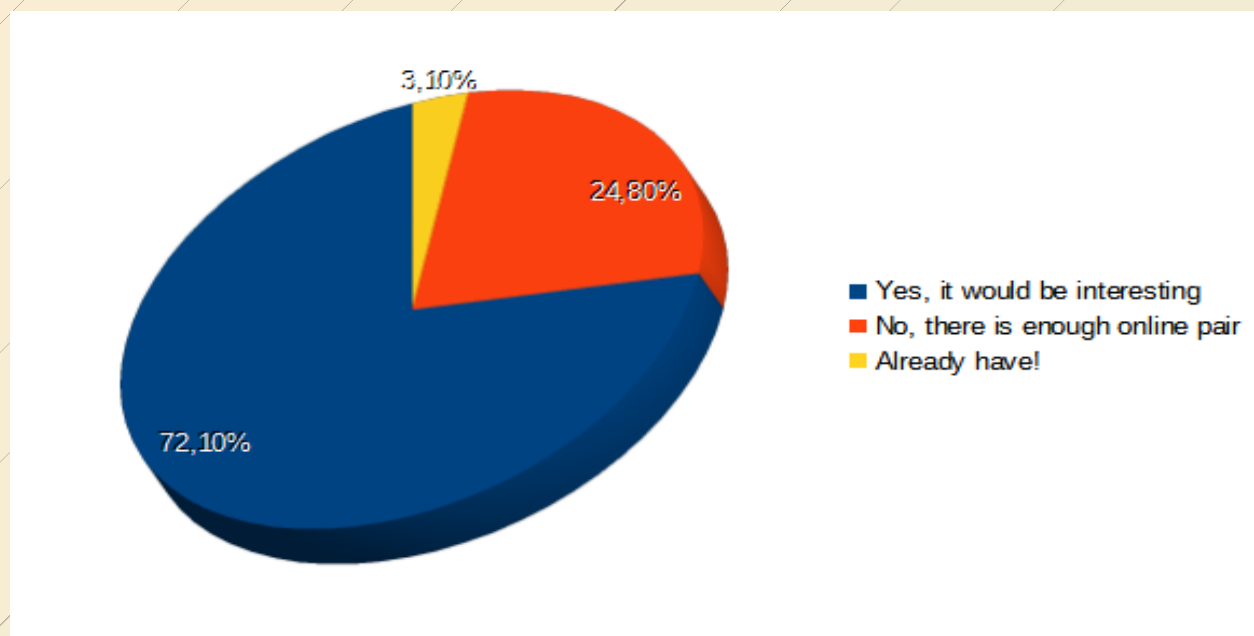
# Approximation functions $f_W(\Delta T)$ and $f_M(\Delta T)$



# Priority of studying the disciplines as accompanied with materials with video content posted on the Moodle platform during distance learning caused by Covid-19

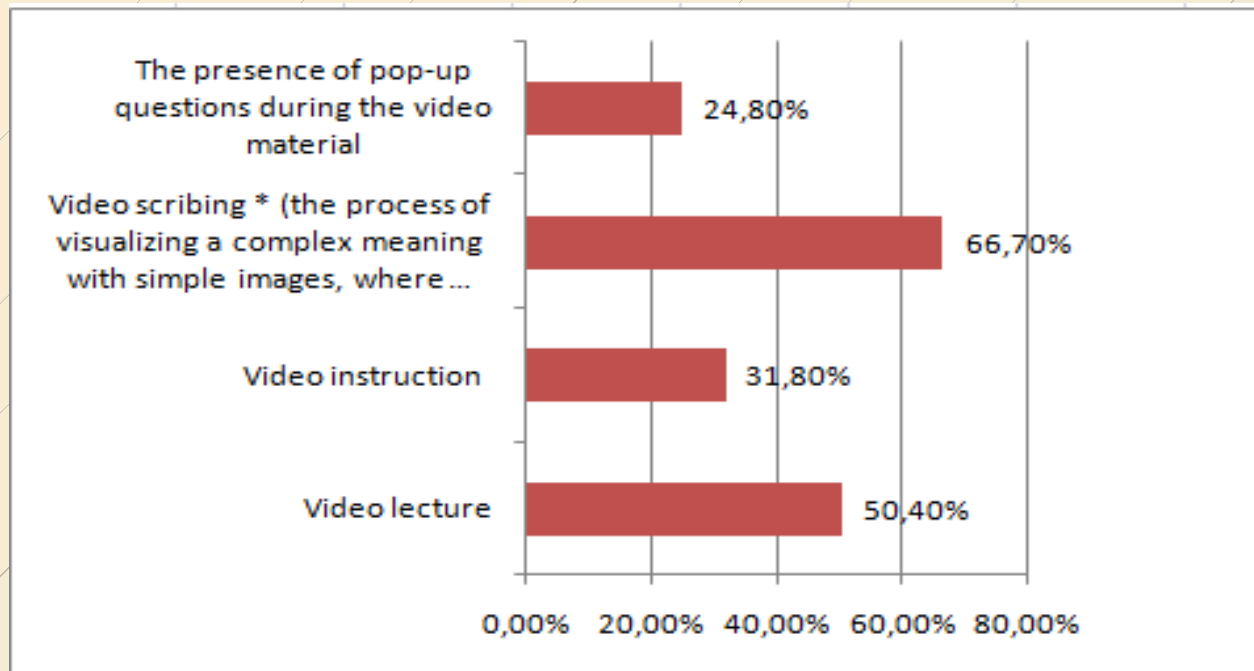


## Priority of studying topics with the help of video content created by the teacher of the discipline





# Priority of receiving information in video content of a certain type



# Conclusion

To understand the quality of integration of video content into e-learning against the background of COVID-19 in academic disciplines by students, we have conducted an empirical study based on various courses in "Information, Library and Archival Science" at the Lviv Polytechnic National University and "Graphic Design" at the Borys Grinchenko Kyiv University. The sample is 129 respondents. The results of the study showed that there is quite a large number of students (72,1%) who expressed a desire to study the topics of the disciplines using video content created by the teacher and only a small number (3,1%) said that they already have the video format of studying topics on the disciplines created by the teacher, and some students (24,8%) found that online class is enough to study the topic during the pandemic. During the analysis of respondents' answers it was also found that 36,4% of students confirmed that during distance learning caused by Covid-19, studying disciplines was accompanied by materials with video content, which are posted on the Moodle platform, and 50,4% of respondents answered that during distance learning on the Moodle platform studying disciplines was not accompanied by materials with video content. In particular, 13,2% of respondents expressed a desire to obtain information through video content posted on the Moodle platform when studying materials on disciplines.

Among the advantages of using video content during the study of the discipline, respondents indicated an option to stop the lecture/laboratory work to comprehend the information obtained (72,1%); Use the "go back" function to listen to the material again 79,8%. Within the research we have also obtained data from the development of two comparative conditions for the surveyed data of video content watching intervals, namely by article and the desired time for video content watching. According to the approximation functions, it has been determined which time intervals male and female respondents may prefer.

Thank you for attention

tetiana.m.bilushchak@lpnu.ua