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MODERN DIGITAL TECHNIQUES USED IN THE COMMUNICATION OF CAD KNOWLEDGE UNDER THE 2021 PANDEMIC

Abstract: The paper presents aspects related to modern digital techniques used in communicating contemporary education knowledge under the COVID19 pandemic. The actual purpose of the paper is to present the way of working but also to make a comparative study between two modern digital variants of CAD knowledge communication that make use of videobook lectures and laboratory supports. The two digital variants studied in this paper are: knowledge communication using either sites such as https://sites.google.com/ combined https://www.youtube.com/ or Google ClassRoom. All comparisons are based on the actual case study of teaching computer-assisted graphic subjects at "Dunarea de Jos" University of Galati. At the end of the paper are presented the advantages and disadvantages of each variant. The main results of this paper are that the main stages of work are clearly defined in each method chosen, but also the main conclusion, namely that the free version Google ClassRoom, together with the whole suite of related applications, is the best solution, compared to the method of professional presentation sites, for transmitting CAD-type knowledge by using videobooks made at times prior to the onset of the COVID pandemic 19. All these video books have been made during the last 6 years [1].

Key words: CAD, knowledge communication, videobook, educational platform, Google ClassRoom, Microsoft Teams

1. THE STATE OF THE ART BEFORE THE COVID-19 PANDEMIC

The situation of the fulltime education before March 2020 involved the face-to-face teaching, with the possibility of recovering the missed lab activities at a time after the accumulated absences or in the same week with absence but with another group attending the same laboratory activity. In addition, each study program had to present to the ARACIS re-evaluation board a site provided with a user and password that allowed students to access teaching materials in PPT or PDF format. Figure 1 shows the site corresponding to the bachelor's or master's degree programs.

When activating the section "Specialized undergraduate disciplines", the curriculum related to the study program "Dynamic Analysis of Machines and Technological Equipment" in Figure 2 opens, which shows that all disciplines have links for downloading the related teaching materials. One can also download separate chapters that have been published in international conferences [2], [3], [4]. Unlike full-time education, the distance or part-time education required the existence of an online platform dedicated to each subject [5] in order to monitor students' access to courses and laboratories and also to do the midor end-term evaluation.

2. THE TRANSITION TO THE PRESENT MOMENT

The change in the traditional method of knowledge transmission in higher education occurred when the universities had to suspend the face-to-face activities for a certain period of time which resulted in the teaching process disruption. In other words, there were problems such as: full-time students did not have institutional email addresses, did not have accounts created for online course sites, did not commonly use such sites, even if they existed, the sites were not fully updated according to the discipline sheets and the approved exam subjects.





Figure 2 Curriculum with links for each subject.

Figure 1 Traditional site for the disciplines related to the Bachelor's and Master's programs.

The situation of using educational platforms has undergone a radical change since the moment of the national lockdown, when all teaching activities were carried out in the online version. Although there were sites with the necessary teaching materials in all study programs, it should be mentioned that the educational system was not prepared to move from classical blackboard or video projector teaching to the online education that uses specific educational platforms. Each of the above platforms represented a challenge both for most teachers and especially for pupils and students. Resolving all these issues was a difficult process that took place over a period of 2-4 weeks. In a first stage, the archives of all teaching activities were sent by the tutors using the students' private addresses and specialized transfer sites were used as a transfer method, for example wetransfer.com

In parallel with this activity, each teacher used his/her personal account on Google to create virtual classes on Google ClassRoom, or they used Microsoft Teams from private or institutional accounts following the acquisition of a sufficiently large number of educational licenses. All this effort of the teachers to cope with the Covid-19 pandemic exigencies, ie to adapt to an online education significantly different from the part-time education, implied that both the lecture hours and practical applications had to take place according to the displayed schedule and with demonstrable attendance. Starting with the second semester, the university decided that all the online activity should take place on the Microsoft Teams platform, for which there were a very large number of purchased licenses.

3. MODERN DIGITAL TECHNIQUES FOR CAD KNOWLEDGE COMMUNICATION

The three digital versions approached in this paper are: knowledge communication using either sites of the type https://www.youtube.com/ and https://sites.google.com/, or licensed Microsoft Teams or free Google ClassRoom, with the additional comparative study of Microsoft Forms and Google Forms. All the comparisons made are based on a real case study of teaching computer-assisted graphic disciplines at the "Dunarea de Jos" University of Galati. At the end of the advantages and disadvantages of each variant are presented, including those related to specific questionnaire applications used to verify theoretical knowledge. The basic results of this paper are that the main stages of work within each chosen method are clearly defined, along with the main conclusion, namely that the licensed Microsoft Teams used at university level together with the whole set of related applications, is the best solution for transmitting CAD-type knowledge by using videobooks [6] made at times before the Covid-19 pandemic.

3.1 Method of individual professional presentation sites combined with Youtube

This method is based on the use of modern and free tools currently available on the Internet, namely the sites https://www.youtube.com/ or https://sites.google.com/ where each teacher could organize his/her teaching materials related to the taught subjects during the transition period. The essential difference between the two tools mentioned above is that the first allows the use only of video files as teaching materials while the second allows a wide range of files such as PDF, PPT, etc. Here are the stages of making the site https://sites.google.com/view/adrian-mihai-

goanta/pagina-de-pornire which was created for the transition period mentioned above:







Figure 4 Presentation film and generation of the site subpage.

- 1. Preparation of materials to be downloaded on the site: photos, logo, contact details, films made, personal logo, examples of video courses such as videobook, curriculum vitae, list of published papers, photographs with diploma projects and tutorial activities.
- 2. Accessing the https://sites.google.com/new and create a new site with the "Create a new site" button.
- 3. Post on youtube in a personal account of the film needed for the Home section of the personal site (Figure 3).
- 4. Adding the visual identity elements to the Home section: logo and personal photo.
- 5. Generating, with the publishing tools on the right side of the figure below, all subpages of the type: contact, courses taught, curriculum vitae, list of papers, tutoring, and diploma projects (Figure 4).
- 6. Adding to the "Contact" section the following information: work address, telephone, WEB address, facebook address, e-mail address, faculty logo.
- Adding to the "Teaching Courses" section three subpages with the related disciplines: Technical Drawing and Infographics III - Autodesk Inventor 2020, PAC I - Solid Edge 2019, PAC II - NX Siemens 2020. I inserted the logos of the software used with the "Images" button. In each subpage access buttons were created for the courses and video laboratories (Figure 5) posted on Youtube.



Figure 5 Exemplification of laboratory access buttons.

- 8. In order to provide feedback from students in the "Teaching Courses" section, we also added a questionnaire form (Figure 6) with three possible answers to the question "The most interesting course was".
- 9. For the Curriculum Vitae section and the List of papers, first the two documents were uploaded on ClassRoom (Google Drive) then I created some links to the aforementioned documents using the "Text that can be restricted" command.

10. For the "Tutoring" and "Diploma Projects" section I added (Figure 7) a portfolio of photos using the "Insert Images" command.

Please answer the question below:	
The most interesting course was:	
O DTI II - Autodesk Inventor 2020	
O PAC I - Solid Edge 2019	
O PAC II - NX Siemens 2020	
Altele:	

Figure 6 The questionnaire form with three possible answers.

3.2 Method of CAD knowledge transfer using the Google ClassRoom platform

In the above mentioned context, some of the teachers who teach subjects making an intensive use of IT have moved on their own initiative to use the Google ClassRoom platform. This choice was imposed by the urgency of the moment to be able to carry out online courses without losing continuity in activity while recovering the periods lost in one of the next holidays.



Figure 7 Example of a diploma project from the specific portfolio.

The university later acquired licenses for Office 365 for both students and teachers, which provided free JOURNAL OF INDUSTRIAL DESIGN AND ENGINEERING GRAPHICS 29 access to Microsoft Teams. At this starting point it was found that ClassRoom offered the same facilities for free yahoo, gmail, etc. accounts as well as for those with institutional addresses, while Microsoft Teams had additional facilities for licensed accounts of institutions compared to the free ones. The steps taken to organize and carry out the online course in Technical Drawing and Infographics III on the Google ClassRoom platform are the following:

- 1. Creating a new discipline on Google ClassRoom;
- 2. Entering students' e-mail addresses and defining the virtual classroom;
- 3. Introduction of teachers related to applications and management;
- 4. Adding courses and applications (seminar, laboratory, project) with the related topics in chronological order each week;
- 5. Adding announcements in the information flow;
- 6. Management of tests / homework, their evaluation and individual communication of results;
- 7. Scheduling the exam and sending the invitation to ZOOM to explain how the exam will take place;
- 8. Correction of works and communication of final results;
- 9. Free storage management.



Figure 8 Creating a new virtual classroom.

As shown in Figure 8, in this stage steps 1 and 2 are taken from left to right. Basically, the teacher chooses the option "Create a course", confirm that the rules of confidentiality and security have been read, after which the sections "Course Name", "Section", "Course Subject" and "Virtual Room" are completed.



Figure 9a Inviting teachers.

In Figures 9a and 9b, by pressing button 2, the windows are illustrated where the teachers collaborating to the course, teachers form the management of the department or faculty and the students of the related group are added. In the next stage the course, applications and topics for each week are added, as shown in Figura 10a and Figura 10b, by pressing button + creator. After all the course materials and applications were uploaded to the platform, a dialogue was held with the students in the "Information Flow" section of the virtual classroom, through which additional explanations were given regarding the way of working or carrying out the entire teaching activity.

invite	students		
Invitat https://	ion link classroom.google.com/c/NTUxNTE0MTMwMDha?	cjc=tj.	D
calca	n		
SEARCH	H RESULTS		
	2017 L Saligny Marius CALCAN calcan.r@gmail.com		
0	2017 L Ghica Cristian CALCAN calcancristi@yahoo.com		

Figure 9b Inviting students.

Thus Figure 11 exemplifies shows a way of individual communication with only one student regarding the grade given and the observations made.

+	creator
Ê	Theme
Ê	Questionnaire topic
2	Question
	Material
ţ1	Reuse the post
⊞	Торіс

Figure 10a Adding courses.

It must be said from the beginning that the online exams require, like in the face-to-face situation, a short

time for the teacher to further explain certain individual topics and the student to ask questions leading to a full understanding of the subject's requirement.

+	creator				
Ê	Theme				
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	Material				
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Fig	ure 10b Adding	g applications an	d topics		
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LABORATORY	WEEK 3/4 - DTI III 🔋 5	May 10, 2020, 11	80 /10 Completed la
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LABORATORY	WEEK 9/10 - DTI III 👔 4	May 3, 2020, 11:	100 /10 Completed la
LABORATORY	WEEK 7/8 - DTI III 🗮 1 🕕 3	30 apr. 2020, 23:	70 /10
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Figure 11 Individual communication.

Figure 12 shows that almost all the 15 GB were used for 4 graphics disciplines that involve video books, namely AutoCAD, Autodesk Inventor Pro, Solid Edge, NX Siemens.



Figure 12 Space consumed on Google Drive.

This communication takes place when using the Google ClassRoom platform by ZOOM platform, which based on an invitation, sent as in Figure 13 allows realtime communication between the teacher and the students participating in the exam. It should also be mentioned that the method of video books used in the formation of graphic skills by using CAD software, is a large consumer of disk space.

DTI III EXAM - 07.06.2020 10 o'clock

Date Posted: May 23, 2020 (Published on June 7, 2020)	14
INSTRUCTIONS:	1
 Starting with the announced time we will have a meeting on zoom in order to available how to work in the avam 	taugi
2. In order to promote the discipline, the following conditions must be met: a) the	
exam must be marked with a grade higher than 5 b) the laboratory works must also	
have a media classroom higher than 5.	
 Each participant in the exam will have an individual subject as under normal examination conditions 	
4. I need the group leader to consult you and return the attached file (no later than 2	
days before in the classroom) so that the masters who want the morning to be	
marked in blue and the afternoon ones in color Red.	
 For less than 50% of laboratories taught, the average calculated by the classroom is reduced by 2 points. 	
6. The subjects are transmitted during the ZOOM session !!	
ZOOM meeting coordinates	
Adrian Mihai GOANTA is inviting you to a scheduled Zoom meeting.	
Topic: EXAMEN DTI III - 07.06.2020 ORA 10 SAU 17	
Time: Jun 7, 2020 10:00 AM Bucharest	
Join Zoom Meeting	
https://zoom.us/i/991189420792pwd=di9ydVpjZUNMMicvM0iSb0NRa2tPQT09	
11- 17- 10 001 1001 0070	

Figure 13 Invitation to exam on ZOOM.

4. RESULTS OBTAINED

Considering the fact that due to the very short time available, the method of the personal professional presentation site was made only for demonstration purpose without leading to downloading of all subjects of the 2nd semester of the academic year 2020-2021 or to the completion of teaching situations. For this reason, below are given some of the results obtained on the Google ClassRoom platform. Figure 14 shows a unitary, synthetic image of all teaching activities carried out on the Google ClassRoom platform for the 2nd semester of the 2020 academic year and Figure 15 respectively show the complete package of courses in Technical Drawing and Infographics II.

5. CONCLUSIONS

If we are to make a comparison between the two methods, we can say that both allow the transmission of CAD knowledge through modern digital methods, are up to date and represent alternative solutions to "face to face" communication. I further summarize the most important conclusions to be drawn from the comparison of the two methods presented in the paper:

- 1. Even if the method of personal presentation sites combined with Youtube transmits course-type information as accurately as the second method, the one that uses Google ClassRoom offers some additional information regarding the results obtained by students and the easy management of the types of activities grouped on categories of courses and applications corresponding to each discipline.
- 2. Google ClassRoom in combination with ZOOM, both in their free version, creates a package of applications that corresponds to the current needs of online teaching activities.
- 3. The combination of ClassRoom & ZOOM allows the explanation of the exam topics .

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Professional Practice 3 An II Sem. 1 AACDMET Master	14.59	Design practice	Elaboration of dissert	SCSS 2020 - ENGINE : Student Scientific Circles Seesion 2020	SCSS 2020 - MECHA : Student Scientific Circles Session
الامر		~ □	~ □	~	~
		Figure 14 Synthesis of	f all teaching activities car	ried out on the platform	

Watch carefully!	:	INCREASE WORK !	:
COURSE - CHAPTER 14 - DTI III - WEEK 14	Posting date: 15 apr. 2020	LABORATORY WEEK 13/14 - DTI III	Deadline: May 30, 2020, 11:5
COURSE - CHAPTER 13 - DTI III - WEEK 13	Posting date: 15 apr. 2020	LABORATORY WEEK 11/12 - DTI III	Deadline: May 17, 2020, 11:5
COURSE - CHAPTER 11 - DTI III - WEEK 1	Posting date: 15 apr. 2020	LABORATORY WEEK 9/10 - DTI III	Deadline: May 3, 2020, 11:59
COURSE - CHAPTER 12 - DTI III - WEEK 12	Last edited: 15 Apr. 2020	LABORATORY WEEK 7/8 - DTI III	Deadline: Apr 30 2020, 23:59
COURSE - CHAPTER 10 - DTI III - WEEK 10	Last edited: 15 Apr. 2020	LABORATORY WEEK 5/6 - DTI III	Deadline: Apr 30 2020, 23:59
COURSE - CHAPTER 9 - DTI III - WEEK 9	Last edited: 15 Apr. 2020	LABORATORY WEEK 3/4 - DTI III	Deadline: May 10, 2020, 11:5
Show r	more	Sho	ow more

Figure 15 Complete package of courses uploaded on ClassRoom

- 4. ClassRoom keeps, until the moment of deletion by the owner, the didactic situation of each student, moreover it automatically calculates the average of the class topics, showing the result in a centralizing window at group level.
- 5. ClassRoom can be used in combination with other applications in Google Suite, for example Google Forms to assess theoretical knowledge based on multiple choice tests.
- 6. Since both variants are free they are limited in terms of allocated space. Thus, for four subjects using video books, the entire 15 GB space offered free of charge by Google or Youtube was consumed.
- 7. To supplement the space in both variants, a new account was created for which an additional 15 GB was received.
- 8. Finally, I can say that the Google ClassRoom method is superior to the one that uses professional presentation sites offered by https://sites.google.com/

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