

# Exploiting multimedia technologies in education, research, and university-community projects

Anca Draghici<sup>1\*</sup>, Valerij Dermal<sup>2</sup>, and Zivile Stankeviciute<sup>3</sup>

<sup>1</sup>Politehnica University of Timisoara, Romania

<sup>2</sup>International School of Social and Business Studies, Slovenia

<sup>3</sup>Kaunas University of Technology, Lithuania

**Abstract.** The pandemic has led to the acceleration of the digital transformation of all university activity. Some users/university staff were better prepared for this, but others need support and training in the development of digital skills. Increasing the efficiency and effectiveness of digitized activities (administrative, educational, research, university marketing, communication, and community involvement, with business or industrial partners) require increasing concerns for the university's human resources to have the necessary knowledge of operation. Moreover, our students are from generation Z, Millennials and can be stimulated in learning, interaction, and communication with the help of digital means, multimedia technologies and social media. We are witnessing a radical change in the way communication takes place in universities and within its extended community, with its various stakeholders. In this dynamic context we have built and present the way to extend the digital/multimedia competencies of university staff (administrative, teaching, research staff, etc.) with the support of an international community associated with the Erasmus+ project: "Multimedia Competencies for University Staff to Empower University - Community Collaborations" (2020-1-RO01-KA203-080399).

## 1 Introduction

Media technology is powerful tool for spreading health and safety, wellness information to the public. It was crucial to the public's response to the Covid-19 pandemic crisis because it acts as a communication hub for the government, medical organizations, and the general population [1]. To manage COVID-19 challenges, multimedia applications as social media platforms have been proved as efficient and effective solutions for communication, for balance our social life at least on-line. The coronavirus has affected all spheres of society, leading to the transformation of human attitudes towards life; the epidemic has influenced human behaviors, leading people to extensive use of social media platforms and other sources deemed trustworthy [1 - 3].

---

\* Corresponding author: [anca.draghici@upt.ro](mailto:anca.draghici@upt.ro)

Social media technologies also assist by delivering the most recent information on health, the spread of viruses, new strains of those viruses, etc. As a result, over the past two years, more people have been using social media platforms to find accurate, up-to-date information, the most recent news regarding precautions against the disease COVID-19, or vaccines [2, 3].

Users are increasingly using media technology platforms to communicate with distant family members, friends, and coworkers because they are seeking reliable and up-to-date information about their health. Additionally, using social networks facilitates finding publicly shared knowledge resources to implement preventative steps [1].

As a result, the health crisis has significantly altered people's prevention behaviors and life patterns to safeguard themselves against the COVID-19 virus globally, and social media has proven to be an effective means of promoting health measures, solutions, with users becoming aware of and adopting preventive measures such as social withdrawal, avoiding social gatherings, washing hands, using protective masks, as well as vaccination [2]. This is the first important "lesson learned" from the health crisis and this type of technologies should be used in the next years for public health communication.

Just for exemplification, the social media pages of the World Health Organization (WHO) have been one of the most attractive and used by people during the last two years [4, 5]. The organization has been confronted with fake news propaganda and antivaccine campaigns as part of the "infodemic" phenomenon. WHO officials noted that although fake news spreads more quickly and easily than a virus, they are more deadly due to the panic they generate and the decline in public psychological health [4-6]. To stop the spread of rumors and false information, WHO agreed to collaborate closely with social media and search engine giants like Facebook, Google, Pinterest, Tencent, Twitter, TikTok, and YouTube later in 2020 [6].

Through its many forms and channels, multimedia technology has been instrumental in fostering healthy habits, boosting exposure to accurate information, and enhancing psychological well-being. Furthermore, multimedia technologies have been considered a BOOM in the last two years (supporting the emerge of creative industries) and providing valuable support for the education system, too. Digital pedagogies and technology have significantly changed how people connect and communicate in all fields of university activities recognizing an unprecedented shift globally, in all universities' education patterns have most occurred.

Digital making-activities, in which students produce digital media and artifacts using digital technologies (as co-creators), has experienced a comeback because of the widespread use of mobile devices, the internet, and collaboration and communication tools. Students apply their knowledge of the subject matter while using technology to share what they have learned through the process of digital creation. Students develop skills and foster a culture of changemakers by fusing active learning with problem-solving through digital creating that is motivated by a common goal for collaboration and communication [7]. As a result, Covid-19's beneficial effects on greater remote employment and online education are expected to endure.

In addition, the difficulties encountered during the pandemic were a lack of rules, guidelines for conducting distant learning, a lack of infrastructure and competences, and security-related issues, too. First and foremost, the higher education institutions' administration and management had to deal with these difficulties by priority; consequently, organizational values change and reposition occurred (the e-learning, on-line education administrator/director/manager has been transformed instantly into *Superman, Superwomen, Hero, Champion of the new university environment*) [8].

In this context, some university staff users were prepared for the new working context, but others need support and additional training for the development of digital, multimedia

skills for using the new software applications (Moodle platform functionalities, Zoom or other platform for virtual communications, social media applications, administrative on-line applications etc.). The educator profession has changed dramatically and instantly!

Overall, increasing the efficiency and effectiveness of digitized activities (administrative, educational, research, university marketing, communication, and community involvement, with business or industrial partners) require university's human resources management to a quick response in terms of support, mentoring and training for all employees to have the necessary knowledge, skills and competencies for the new operation conditions. Somehow, the universities' administrative staff of universities has been neglected in terms of updating, developing their digital skills, in general and their multimedia skills and competencies, particularly [9]. This phenomenon constituted the first motivation of the research approach presented in this work.

Moreover, today students belong to the generation Z, Millennials (iGen or post-Millennials) and can be stimulated in collaborative, interactive learning activities and communication with the help of digital means, multimedia technologies and social media [10, 11]. To do this there is a strong need for the teaching (and research) staff who that are Baby Boomers, Generations X, Y or Z, to update their digital skills, even modernized them by using multimedia technologies. Different traits of generational cohorts may show themselves in preferred learning approaches [12]. This phenomenon constituted the second motivation of the research approach presented in this work.

Thus, we are witnessing a radical change in the way education and communication takes place in the case of the higher education organizations and within its extended community and with its various stakeholders. In this dynamic context, there have developed an approach to extend the digital/multimedia competencies of university staff (administrative, teaching, research staff, etc.) with the support of an international consortium associated with the Erasmus+ project: "Multimedia Competencies for University Staff to Empower University - Community Collaborations" (2020-1-RO01-KA203-080399).

The research aims to define a strategic approach on how universities can provide multimedia trainings for different staff categories (group of learners) through their own capacities (human resources and technology) and by using MUST training program. The competencies development is planned and expected to be exploited in education, research, academic advertising (university communication processes) and for supporting university-community projects.

## **2 MUST project presentation**

MUST project (<https://mustproject.eu/> a 30-month Erasmus+ project) aims to create a comprehensive and extensive training program for university workers to promote the growth of their multimedia competencies. The goal is to successfully utilize multimedia technology so that university employees may produce more realistic and appealing communication materials for programs including education, research, and university-community collaboration. Additionally, the core of a Vocational Educational Training service offered by universities with the assistance of DigiCoaches will be the MUST training curriculum and the developed Open Educational Resources (OERs) (special trained staff who will support other trainees in exploiting, achieving knowledge in the multimedia field) [9, 13, 14].

MUST project addresses to "open education and innovative practices in a digital era" priority of the Erasmus+ Programme Guide ([15], p. 102), because of the innovative training program developed and based on a blended curriculum; these support the extend of the digital technologies use efficient to better facilitate trainings of new generations of

students or of other users (internals or externals) of the university (e.g., vocational education, life-lifelong learning education) [13, 14].

MUST training program design is related to the The European Framework for the Digital Competence of Educators (DigCompEdu) [16], the European Framework for Digitally Competent Educational Organizations – DigCompOrg [17] and the The Digital Competence Framework for Citizens – DigiComp 2.0 [18]. Additionally, MUST initiative is in line with the goals of the European Education Area, particularly the new European Universities initiative related to education innovation, which supports the notion of giving universities the power to influence how society transitions to the digital age [19]. MUST project targets "Priority 2: Enhancing digital skills and competences for the digital transformation", considering the European Commission's Digital Education Action Plan [10].

Because none of the collaborating universities possesses the necessary knowledge for multimedia trainings for vocational and lifelong trainings, the MUST project is being developed internationally. Thus, the expertise in this field is provided (through incremental process of knowledge and innovation transfer during the project life-cycle implementation) by the non-governmental organization partner from Germany (SoWiBeFo, <https://sowibefo-regensburg.de/>) and a company from Portugal (StoryTellMe, <http://storytellme.eu/en/home/>) [9]. In addition, five universities join MUST consortium: Politehnica University of Timisoara, Romania (<http://www.upt.ro/>); International School of Social and Business Studies, Slovenia (<http://www.mfdps.si/>); Kaunas University of Technology, Lithuania (<http://www.ktu.edu/>); University of Alicante, Spain (<http://www.ua.es>) and South-East European University Tetovo, the Republic of North Macedonia (<http://www.seeu.edu.mk/>).

MUST project objectives are to improve and diversify [9]: (1) “university staff skills in creating and using multimedia technologies effectively (for education, research, university-community projects, advertising, and communication purposes); (2) the services offered to university users and other university staff through the designed training program that empower these users with key skills and the opportunity to develop their multimedia competencies”. The developed MUST training curriculum (see section 3.1) and the created OERs will define the training program (see section 3.2) available on a e-learning platform. These will define a dedicated service offered with the support of DigiCoaches (trainers of trainers from MUST international consortium staff).

### **3 A framework of multimedia skills development**

#### **3.1 Creating the preliminary conditions for MUST training curriculum**

MUST training curriculum is the core of the project main activity and result. This is a result of the consortium activity for mapping multimedia skills development to empower university - community interaction which has two main intellectual outputs: (IO1) Framework for multimedia skills development in universities - Partner institution and (IO2) Strategy for multimedia skills development to empower university - community interaction by each university partner institution [9]. These preliminary studies are open resources available at: <https://mustproject.eu/free-tools/>.

Considering the inventory of the existing capacities for multimedia competencies development in the case of MUST universities’ partners and the results of the training needs assessment [13, 14], MUST Framework has been designed. This approach is considered an integrated, holistic one, the result being shown in Fig 1. Basically, MUST Framework was developed by considering the level of competencies development as

suggested by the Individual Competency Index [21]. Further, thanks to the analysis of the training need assessment and the proposed competencies frameworks at the European level the process of specific multimedia competencies development was better understood. Consequently, Fig. 2 summarizes how these competencies can be developed in relation with MUST project's activities implementation.

		Level of development (Individual Competency Index)	Conceptual knowledge	Applied knowledge	Competencies recognition
			0 inexistence	KNOWLEDGE	SKILL and COMPETENCIES
Self-assessment questionnaire	1 Basic	Basic level of conceptual knowledge	Basic level of applied knowledge + simple practical applications	Basic User	
	2 Intermediate	Intermediate level of conceptual knowledge	Intermediate level of applied knowledge + limited use of practical applications	Intermediate User	
	3 Advanced	Advance level of conceptual knowledge	Advance level of applied knowledge + extensive use of practical applications	Advanced User DigiCoach	
	4 Expert	Expert level of conceptual knowledge	Expert level of applied knowledge + practical applications + new developments and innovations	Expert DigiCoach	
Training program structure		Theoretical Units	Applicative Units	To be recognised and validate by MUST consortium	

Fig 1. MUST Framework.

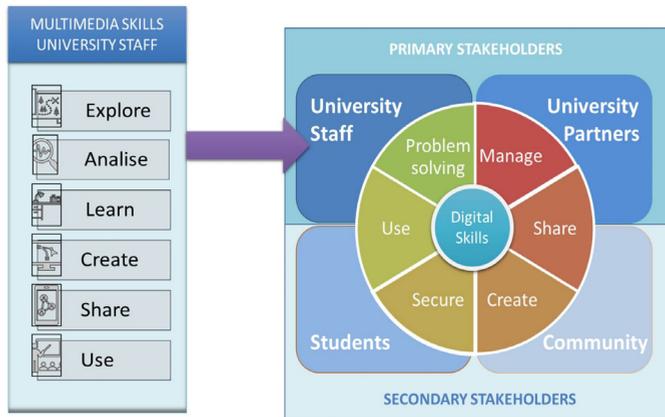


Fig. 2. The approach for the multimedia competencies development related to MUST project.

### 3.2 MUST tools to support the e-learning training program

The preliminary studies (IO1 and IO2) and the approaches presented in Fig. 1 and Fig. 2 have created an extended knowledge and experiences base together with the definition of the strategy for multimedia skills development to empower university - community interaction. The preliminary SWOT analysis, developed in the case of the higher education institutions involved in the project, has created the premises for five different cases of the MUST project implementation. Next to these, have been defined the training program curriculum, the OERs training materials (Table 1, as an agreement between projects partners and by valorizing their expertise in the field of multimedia education and exploitation) and the tools used for making it available to the potential trainees (university staff) as shown in Fig. 3.

**Table 1.** MUST training curriculum (the detailed skill card).

Training Units	Training elements	Performance criteria
<b>1. Relevant Intellectual Property Rights in the Design, Production, and Utilization of Multimedia</b>	1.1 Overview of digital skills in Europe (definitions, terminology, typology, relevant info at the EU level) 1.2 Guidelines for intellectual property rights for multimedia 1.3 Plagiarism prevention and protection of various media – video, audio, music, readings	<ul style="list-style-type: none"> <li>• The trainee will be able to plan and steer proper competence development.</li> <li>• The trainee will know the requirements and options for licensing multimedia works.</li> <li>• The trainee will be able to differentiate anti-plagiarism rule in the academic and original research context vs rules of referencing and reporting.</li> </ul>
<b>2. Planning strategies for multimedia design</b>	2.1 Content marketing 2.2 Digital communication 2.3 Planning & Script Writing for multimedia design 2.4 Story Boarding and timeline for multimedia design 2.5 Online Networking and Communities	<ul style="list-style-type: none"> <li>• The trainee will understand the commonalities and differences of academic publishing, teaching, communication and exploitation of scientific knowledge for the common good.</li> <li>• The trainee will be able to use various communication channels and communication styles for adapted marketing of knowledge content.</li> <li>• The trainee will learn precise pedagogy and process analysis of the content.</li> <li>• The trainee will be able to transform content into consistent and appealing narratives with a logical media production sequence.</li> <li>• The trainee will be able to use online communities in a strategic and effective but non-manipulative way that reaches out to non-traditional audiences while maintaining scientific standards of accuracy and evidence-based information.</li> </ul>
<b>3. Multimedia production techniques</b>	3.1 Audio and video program production 3.2 Web design and publishing 3.3 Libraries of multimedia resources (video, music) 3.4 Interactive materials (videos, text)	<ul style="list-style-type: none"> <li>• The trainee will gain video and audio production basics.</li> <li>• The trainee will learn basic rules and success factors of good web design.</li> <li>• The trainee will be able to recognize digital libraries for the production and sharing of their digital teaching material.</li> <li>• The trainee will learn how to create digital media that invites interactivity and allows for including the expertise and feedback of the users.</li> </ul>

4. Tools used in multimedia production	<p>4.1 Designing multimedia</p> <p>4.2 Organizing learning</p> <p>4.3 Finding ideas and discussing knowledge</p> <p>4.4 Organizing, documenting and testing knowledge</p>	<ul style="list-style-type: none"> <li>• The trainee will learn how to design good multimedia material for outreach and appeal.</li> <li>• The trainee will learn good didactics and communication design, as the foundation of digital media use.</li> <li>• The trainee will gain a dynamic observation skill of recent trends, inventions and good practices.</li> <li>• The trainee will have a good understanding of knowledge management and dedicated efforts to ensure that all levels of data, information and knowledge are appropriately organized, shared and tested.</li> </ul>
5. Applicative units (guidelines and demonstrations)	<p>5.1 Applications of multimedia in university education</p> <p>5.2 Applications of multimedia in university research activities</p> <p>5.3 Applications of multimedia in university advertising and communication</p> <p>5.4 Applications of multimedia in university-community projects</p>	<ul style="list-style-type: none"> <li>• Trainees will learn how universities can use multimedia in education processes (teaching, learning, theoretical knowledge and applications, assessment, project development etc.)</li> <li>• Trainees will learn how universities can use multimedia in research and development (for learning by doing actions, scientific demonstrations, projects and results presentation, dissemination and sharing etc.)</li> <li>• Trainees will learn how universities can use multimedia in advertising and communication with their stakeholders (mass media communication, educational offer promotion etc.)</li> <li>• Trainees will learn how universities can use multimedia within community projects</li> </ul>

The tools used in the MUST training program allow trainees to follow five steps:

1. Accessing the project website (<https://mustproject.eu/must-web-portal-and-the-e-learning-platform/>), register and wait for your username and password to have access to the e-learning platform. In the meanwhile, trainee should visit the project website section dedicated to DigiCoaches (<https://mustproject.eu/must-international-consortium/>) to find a tutor in his/her university or nearby;

2. Access MUST e-learning platform (using the credentials trainees receive) and performing the self-assessment test (adaptation of on Bloom's taxonomy [22]), which reveals interest in following the MUST training program and enables the candidate to assess the current level of his/her competences;

3. Provision of feedback per training unit/element, together with suggestions on the units/elements the trainee should focus on;

4. Follow MUST training program (get in contact with other trainees and with DigiCoaches) using the OERs available on the e-learning platform (<https://mustproject.eu/must-web-portal-and-the-e-learning-platform/>). In addition, with the online training available, face-to-face session with demonstrations will be organized and announced to the trainees;

5. Recognition of trainee's competences (based on online tests, assessments, project demonstrations, assignments as upload projects or products developed using the achieved knowledge).

Must on-line learning environment has been designed according to the project requirements and includes many tools for creating different educational channels. The core of the training program are the OERs available on the project's web page

(<https://mustproject.eu/>) as free tools considered guidelines for the multimedia training. Learners can use other sections of the web site for their training interest as: the “News” section (new trainings available and events where DigiCoaches are involved are announced here), the “MUST International Consortium” section for meeting the DigiCoaches registered at the consortium level, the links to the FaceBook page (<https://www.facebook.com/MUSTmultimediacompetencies/>) and the YouTube channel (<https://www.youtube.com/channel/UC5NupddM6vqJmBoZzCHEvVA>). Here all the multimedia resources designed and created by the members of the international consortium are available. Besides some training lessons there are presented examples of good practices from university partners in the project (as a support for the applicative unit of the training program).

MUST e-learning platform (created using the Moodle application) allow trainees to registered (access created via the project web page: <https://mustproject.eu/must-web-portal-and-the-e-learning-platform/>), browse the training resources from the developed portfolio of OERs, do self-assessment and upload their assignments. The training program in described in Table 1 and the portfolio consists of training units and learning elements; for each learning element a set of OERs are available (as text, video lessons, additional references). Trainees can attend the online courses, follow the explanations and do exercises, and meet DigiCoaches online for supporting, discussing the multimedia applications. Additionally, the e-learning platform has portfolio management and skills assessment tools. Trainees can upload documentation of the growth of their competences, and DigiCoaches can examine it.

The MUST consortium partners, with operational administration provided by StoryTellMe Ltd. Portugal, independently and centrally operate the e-learning platform (<http://elearningprojects.eu/course/view.php?id=14>). The partners' personal e-learning environments, however, can accept the learning modules (SCORM modules under the Moodle application). The e-learning courses include a variety of learning tools, including exercises, quizzes, tests, assignments, and other related learner's activities. Different Moodle activities and tools are available for use by DigiCoaches (e.g., assignment, chat, choice, database, feedback, forum, glossary, lesson, external tool, quiz etc.) [23].

## 4 Exploiting multimedia technologies

In the following sections there will be provided arguments and examples of exploiting multimedia technologies in the university. These are based on the different experiences of project partners and most of them are cases of best practices considered in the MUST training program (Unit 5).

### 4.1 Exploiting multimedia technologies in education

Digital media, in generally and particularly multimedia assignments empower students to be co-creators of knowledge (related to education resources) rather than passive consumers of the learning content. Almost all teaching subjects could benefit from the MUST training program and the created open educational resources (OERs). In addition, the new developed skills of the universities teaching staff could better support new students' generations (see Table 2) and promote technology based-learning pedagogy style.

**Table 2.** How MUST training program targets generations teaching style?

Generation	University staff employees		Students	
	Baby Boomers	Generation X (Gen X)	Generation Y (Gen Y, Millennials)	Generation Z (Gen Z, iGen, post-Millennials)
Birth years	1946–1964	1965–1980	1981–1996	1997–2012
Adequate, preferred learning style	Face-to-face communication Hard copy reading materials	Active engagement Open discussion	<i>Technology-based learning</i>	Interactive apps Websites YouTube videos Online tutoring and coaching using multimedia apps
Effective teaching methods	Verbal instruction Open discussion Question-and-answer sessions	Interactive social learning Teach-back method	<i>Technology-based learning</i>	Digital infographics Interactive apps Online tutoring and coaching using multimedia apps

**Table 3.** Examples of using multimedia technologies in education by MUST consortium partners.

Partner	Examples
ISSBS, Slovenia	<ul style="list-style-type: none"> <li>Course Human Capital Management, lesson Transfer of training: <a href="https://youtu.be/zyhugi3FIks">https://youtu.be/zyhugi3FIks</a></li> <li>Course Knowledge Management Systems, lesson Knowledge and Intellectual Capital: <a href="https://youtu.be/M-S4dE5Zj_o">https://youtu.be/M-S4dE5Zj_o</a></li> </ul>
KTU, Lithuania	<ul style="list-style-type: none"> <li>KTU infrastructure presentation, <a href="https://www.youtube.com/user/ktuvideo/playlists">https://www.youtube.com/user/ktuvideo/playlists</a></li> </ul>
UA, Spain	<ul style="list-style-type: none"> <li>Triage project (VR): <a href="https://web.ua.es/es/proyectovr-triage/proyecto-triage-realidad-virtual.html">https://web.ua.es/es/proyectovr-triage/proyecto-triage-realidad-virtual.html</a></li> <li>Formative Training Pills, <a href="https://si.ua.es/es/puas/presentacion-pildoras-formativas-universidad-de-alicante-pua.html">https://si.ua.es/es/puas/presentacion-pildoras-formativas-universidad-de-alicante-pua.html</a></li> </ul>
SEEU, Noth Macedonia	<ul style="list-style-type: none"> <li>Training for students access to educational resources : <a href="https://youtu.be/exkzYDYmDyY">https://youtu.be/exkzYDYmDyY</a></li> <li>Marketing Management lecture: <a href="https://youtu.be/EsaVx9E4sAA">https://youtu.be/EsaVx9E4sAA</a></li> </ul>
UPT, Romania	<ul style="list-style-type: none"> <li>Training program on how to use Moodle app for supporting online education via the Virtual Campus of UPT: <a href="https://www.youtube.com/playlist?list=PLFHoDIU-4IR3tlFe7dJTBhW8VO3kXbzCS">https://www.youtube.com/playlist?list=PLFHoDIU-4IR3tlFe7dJTBhW8VO3kXbzCS</a></li> <li>Existing internal tutorials (for students and tutors) on how to use the Virtula Campus of the university</li> <li>UniCampus is an initiative of the ID / IFR and eLearning Center (CeL) of the Politehnica University of Timișoara (UPT) to develop the first MOOC (Massive Open Online Courses) in Romania: <a href="https://unicampus.ro/">https://unicampus.ro/</a></li> <li>Collection of Open Education Resources: <a href="https://elearning.upt.ro/en/open/">https://elearning.upt.ro/en/open/</a></li> </ul>
Storytelling, Portugal	<ul style="list-style-type: none"> <li>Movies made by students at Universidade Lusofona, <a href="https://lsf.ulusofona.pt/">https://lsf.ulusofona.pt/</a></li> <li>Academia de código, teaches online students to code in several programming languages, <a href="https://www.academiadecodigo.org/">https://www.academiadecodigo.org/</a></li> <li>SWitCH is a programme to acquire IT skills, <a href="https://portotechhub.com/switch/">https://portotechhub.com/switch/</a></li> </ul>

As a preliminary conclusion of exploiting the multimedia technologies in education, MUST consortium members have concluded that these positively affect students' motivation for learning during the different study subjects (see the examples in Table 3) develop independence actions in finding answers in the context of different "To Do" tasks. By using multimedia resources and invite students to co-create educational resources and present their achievements (their cases studies and problem solved), there have been discovered that these allow them freedom in acting and organizing their educational activities to achieve the best results in a short time.

Examples of multimedia technologies used in education have been provided by the different universities involved in the MUST project, as could be seen on MUST YouTube channel: <https://www.youtube.com/channel/UC5NupddM6vqJmBoZzCHEvVA/videos>.

Furthermore, the use of multimedia technologies in the education process allows forming learners' motivation gradually. Thus, students can build an individual educational trajectory for their skills and competencies development. As a result of using multimedia technologies and applications in education, students develop their digital and technological competencies and consequently, their professional skills. Multimedia allows students to be engaged in more realistic learning experiences and enable them to repeat the educational content, materials passed, to perform any learning tasks with quick or even instant results and comments of the teacher. Similar findings have been discussed by the studies [24, 25].

## 4.2 Exploiting multimedia technologies in research

Particular attention has been given to the extensive use of multimedia resources in promoting research results and projects. The idea has arisen during the pandemic period and thus, MUST training program have been of great support for universities research staff (master and PhD students but also other type of researchers). A synthesis of the advantages and utility of using multimedia for research projects and results communication is given in Table 4. Also, examples are provided by the different universities involved in the MUST project, as presented on the MUST YouTube channel: <https://www.youtube.com/channel/UC5NupddM6vqJmBoZzCHEvVA/videos>.

**Table 4.** Examples of using multimedia technologies in research provided by MUST consortium

Use cases	Utility and advantages	Examples
Virtual conferences with videos for paper presentations (online or hybrid style)	<ul style="list-style-type: none"> <li>• Save budget by using the great opportunity to invite prestigious speakers in the plenary section;</li> <li>• Save time for presentation is shorter (3-5 min) but the time for Q&amp;A and debates is longer (usually 15 min instead of 5 min);</li> <li>• Researcher's scientific argumentation is more focus on relevant, important aspects;</li> <li>• On-line proceedings (e.g., e-books) could easily provide links to the videos and thus being more interactive, useful for young researchers.</li> </ul>	<ul style="list-style-type: none"> <li>• MakeLearn &amp; TIIM 2020, <a href="https://toknowpress.net/proceedings/978-961-6914-26-0/">https://toknowpress.net/proceedings/978-961-6914-26-0/</a>; <a href="https://dermol.si/virtual-conference-makelearn-2020/">https://dermol.si/virtual-conference-makelearn-2020/</a></li> <li>• MakeLearn &amp; TIIM 2021, <a href="https://toknowpress.net/proceedings/978-961-6914-27-7/">https://toknowpress.net/proceedings/978-961-6914-27-7/</a></li> <li>• MakeLearn &amp; TIIM 2022, <a href="https://toknowpress.net/proceedings/978-961-6914-29-1/">https://toknowpress.net/proceedings/978-961-6914-29-1/</a></li> <li>• ErgoWork 2020, <a href="http://www.mpt.upt.ro/cercetare/conferinta/ergowork/your-virtual-presentation.html">http://www.mpt.upt.ro/cercetare/conferinta/ergowork/your-virtual-presentation.html</a></li> <li>• ErgoWork 2021, <a href="http://www.mpt.upt.ro/cercetare/conferinta/ergowork.html">http://www.mpt.upt.ro/cercetare/conferinta/ergowork.html</a></li> </ul>

Universities research centers activities	<ul style="list-style-type: none"> <li>• Promotion of the activities and research results;</li> <li>• Promotion of research groups and scientists;</li> <li>• Record training sessions of young scientists or project meetings.</li> </ul>	<ul style="list-style-type: none"> <li>• University of Alicante, Sistemas de Información y Recursos Humanos en las Organizaciones (SIRHO), <a href="https://cvnet.cpd.ua.es/curriculum-breve/grp/es/sistemas-de-informacion-y-recursos-humanos-en-las-organizaciones-(sirho)/432#infraestructura">https://cvnet.cpd.ua.es/curriculum-breve/grp/es/sistemas-de-informacion-y-recursos-humanos-en-las-organizaciones-(sirho)/432#infraestructura</a></li> <li>• Politehnica University of Timisoara, Research Center for Engineering and Management (RCEM), <a href="http://www.mpt.upt.ro/eng/research/research-center/scientific-manifestations.html">http://www.mpt.upt.ro/eng/research/research-center/scientific-manifestations.html</a></li> <li>• Southeast European University Tetovo, North Macedonia, Max van der Stoel Institute, <a href="https://www.seeu.edu.mk/en/research/mvdsi">https://www.seeu.edu.mk/en/research/mvdsi</a></li> </ul>
Virtual exhibitions of project presentations Celebrations of community event	<ul style="list-style-type: none"> <li>• Dynamic overview of the projects presentation with significant details about partners and results;</li> <li>• Promote international or national partnerships.</li> </ul>	<ul style="list-style-type: none"> <li>• MakeLearn &amp; TIIM 2020: <a href="https://youtu.be/qPmeeXOK7DM">https://youtu.be/qPmeeXOK7DM</a></li> <li>• TeachSUS project presentation: <a href="https://youtu.be/GUV2vVGkM64">https://youtu.be/GUV2vVGkM64</a></li> <li>• MUST project presentation: <a href="https://youtu.be/n-YPh9bzc24">https://youtu.be/n-YPh9bzc24</a></li> <li>• MakeLearn 10 years, <a href="https://youtu.be/x9i8LPKOOTI">https://youtu.be/x9i8LPKOOTI</a></li> </ul>

### 4.3 Multimedia in university – community projects

The post-pandemic society (and communities) in which the university evolves, faces a variety of phenomena considered risky, such as discrimination, inequality, and segregation due to the social, economic, and political changes that have taken place in the last two years. For example, the phenomenon of fake news and the pro- or anti-vaccination dispute have divided society, the phenomenon of bullying and lack of education and that of burnout in hospitals or educational institutions, unemployment in the hospitality industry, etc., have brought social-political debates to the stage (including from the media) controversial actors.

These phenomena and changes have generated the loss of common values, changes in the way individuals interact and come together, and new practices related to participation and decision-making at the organizational level, but especially at the community level, of society. The evolution of contemporary societies is accompanied by a series of complex changes, which transform the physical environment in which we live and the one in which we work. The new transformation processes, the new modes of interaction (with a hybrid or online dominance), the new types of challenges/community projects and the new roles that the university must assume within them profoundly transform its mission. The university as a nest of innovation and knowledge development (“as voice of the city!”) must be strongly connected with these changes that offer new opportunities for innovation and transfer of knowledge and know-how, to establish itself as a mediator and improver of the processes of division of highly diversified and complex societies.

Furthermore, universities can expand their influence, intervention and social responsibility, affirming that education and academic research can contribute to remedying social inequality, disintegration, segregation or other negative phenomena that may manifest. This can be achieved through exploration projects and involvement in finding

new effective solutions to current social problems, concrete actions that contribute to a stronger connection of the university to their local and regional context (working with real projects designed to solve problems real and with real people, establishing links between the academic, business, or industrial environment, with practice and the reality of life). Thus, the role of multimedia applications in this context of university-community projects is decisive in ensuring their success. This topic is strongly connected with private-public partnerships promotion as can be seen in Table 5.

**Table 5.** Examples of using multimedia technologies in university – community projects.

The context of use	Utility and advantages	Examples
Projects within the local community	<ul style="list-style-type: none"> <li>• Support the dialogue between local and national educational stakeholders during the pandemic period (training, consulting and solutions);</li> <li>• Involve universities in their alumni activities</li> <li>• Promote suitability practices locally</li> <li>• Dialogue of university involvement in solving local problems</li> <li>• Promote and support the European Cultural Capital of Timisoara, Romania and Kaunas, Lithuania</li> </ul>	<ul style="list-style-type: none"> <li>• Online Corona Dialogues, North Macedonia, <a href="https://youtu.be/ctA3UyMJ8A">https://youtu.be/ctA3UyMJ8A</a></li> <li>• ISSBS Alumni cases, Slovenia, <a href="https://youtu.be/TDK1o6nO6YM">https://youtu.be/TDK1o6nO6YM</a></li> <li>• Together online, Webinars, Timisoara, Romania,</li> <li>• PoliBike Challenge 2022, Timisoara, Romania, <a href="https://elearning.upt.ro/en/comunitate/noutati-comunitate/de-la-educatia-in-campus-la-cea-online/">https://elearning.upt.ro/en/comunitate/noutati-comunitate/de-la-educatia-in-campus-la-cea-online/</a></li> <li>• <a href="https://youtu.be/PI0eByK7KDM">https://youtu.be/PI0eByK7KDM</a></li> <li>• Tech Talks // Life around Tech, Timisoara, Romania, <a href="https://youtu.be/5ha1PWMW2Pg">https://youtu.be/5ha1PWMW2Pg</a></li> </ul>
University international activity	<ul style="list-style-type: none"> <li>• Promotion flexibility in education, multiculturalism and international studies;</li> <li>• Promote the Erasmus+ mobilities experiences, advantages and students' achievements.</li> </ul>	<ul style="list-style-type: none"> <li>• International students in Kaunas, Lithuania, <a href="https://youtu.be/cJ781yIsBhQ">https://youtu.be/cJ781yIsBhQ</a></li> <li>• Interview with Lea Wachter, Erasmus + student from Germany, <a href="https://youtu.be/WwXZlVn2bPI">https://youtu.be/WwXZlVn2bPI</a></li> </ul>
University prestige, events and own community achievements	<ul style="list-style-type: none"> <li>• YouTube channel of the university</li> </ul>	<ul style="list-style-type: none"> <li>• Politehnica University of Timisoara, Romania, <a href="https://www.youtube.com/user/UPTimisoara/featured">https://www.youtube.com/user/UPTimisoara/featured</a></li> <li>• University of Alicante, Spain, <a href="https://www.youtube.com/c/UaEsAlicante">https://www.youtube.com/c/UaEsAlicante</a></li> <li>• ISSBS Slovenia, <a href="https://www.youtube.com/channel/UCCjvAleKGNkveJXI04EhYg">https://www.youtube.com/channel/UCCjvAleKGNkveJXI04EhYg</a></li> <li>• Southeast European University Tetovo, North Macedonia, <a href="https://www.youtube.com/user/SeeuWeb">https://www.youtube.com/user/SeeuWeb</a></li> <li>• Kaunas University of Technology, Lithuania, <a href="https://www.youtube.com/user/ktuvideo">https://www.youtube.com/user/ktuvideo</a></li> </ul>

## 5 Conclusions and final remarks

The Covid-19 pandemic crisis has changed the way we approach the learning process. In this context learning, unlearning, and relearning have been usual actions of university staff (teaching and research but also, administrative staff due to the new online applications they need to use); the dramatically changes in the way university education is provided and the acceleration of the digital transformation have introduced new learning challenges for all categories of teaching staff (they need to quick learn and adapt to the on-line education, extending their knowledge with new on-line pedagogies, mentoring and coaching).

Competencies building needs to be strengthened through multimedia technology training programs. Thus, MUST project and the developed training program become a necessity for university staff in different countries (and has been demonstrated from the two-years project implementation, at least for the five universities from Romania, Spain, Lithuania, North Macedonia, and Slovenia in the MUST consortium). Strengthening multimedia skills and competencies is a necessity in the actual higher education conditions where hybrid learning has replaced the traditional face-to-face teaching-learning process.

The already created educational resources and systems (as Learning Management Systems, LMS) are considered valuable development for supporting the modern educational process. The presented examples and cases of multimedia technologies use could offer inspiration to other university staff and students for creating more realistic images of their professional activities and promote their results (dissemination activities).

This article content is related to the activities done during the implementation of MUST project: “Multimedia Competencies for University Staff to Empower University - Community Collaborations” (Erasmus+ 2020-1-RO01-KA203-080399) which is founded with support of the European Commission. This article and the communication reflect the views only of the authors, and the Commission cannot be held responsible for any use, which may be made of the information contained therein.

## References

1. Y. Zhou, A. Draghici, J. Abbas, R. Mubeen, M.E. Boatca, M.A. Front. Psychiatry, **1732**, (2021)
2. H. Al-Dmour, A. Salman, M. Abuhashesh, R. Al-Dmour, J Med Internet Res, **22** (8), e19996. (2020)
3. D.R. Garfin, Stress & Health, **36** (4), 555–559. (2020)
4. World Health Organization. WHO Director-General’s opening remarks at the media briefing on COVID-19—11 March 2020. Retrieved from: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020> (Access 12-07-2022).
5. N. Mheidly, J. Fares, J Public Health, **41** (4), 410-420, (2020).
6. S. Pichai, COVID-19: How we’re continuing to help. Google’s response to COVID-19, (May 2020). Retrieved from: <https://blog.google/inside-google/company-announcements/covid-19-how-were-continuing-to-help/> (Access 12-07-2022).
7. E. Whewell, H. Caldwell, M. Frydenberg, D. Andone, Educ Inf Technol, **27**, 6691-6713 (2022)
8. V. Jusas, R. Butkiene, A. Venčkauskas, R. Burbaite, D. Gudoniene, Š. Grigaliūnas, D. Andone, D., Sustainability, **13** (9), 4751, (2021)
9. MUST project - Multimedia Competencies for University Staff to Empower University - Community Collaborations, an Erasmus+ project, 2020-1-RO01-KA203-080399, Annex II - project description with available public data from: <https://mustproject.eu/> (Access 20-07-2022).
10. A. Szymkowiak, B. Melović, M. Dabić, K. Jeganathan, G.S. Kundi, Technology in Society, **65**, 101565, (2021)
11. A. Serbanescu, *Social Media, Technology, and New Generations: Digital Millennial Generation and Generation Z*, **4**, 61-78 (2022)

12. D.N.P. Ginny Moore, S. Parker, D.N.P. Lindsey Baksh, Generational learning preferences. *Am J Nurs Sci*, **16** (12), 33-36, 2021
13. A. Draghici, N. Mirea, N., N. Trunk Șirca, V. Dermol, S. Espinosa, A. Rutelione, A., ... & D. Fatol, D. *Proceedings 15th International Technology, Education and Development Conference INTED2021*, 978-987, IATED (2021)
14. A. Draghici, MATEC Web of Conferences **343**, 11016, EDP Sciences, (2021)
15. European Commission, Erasmus+ Programme Guide 2019 Retrieved from: [https://erasmus-plus.ec.europa.eu/sites/default/files/erasmus-plus-programme-guide-2019\\_en\\_1.pdf](https://erasmus-plus.ec.europa.eu/sites/default/files/erasmus-plus-programme-guide-2019_en_1.pdf) (Access 12-07-2022)
16. European Commission, The European Framework for the Digital Competence of Educators (DigCompEdu). Retrieved from: [https://joint-research-centre.ec.europa.eu/digcompedu\\_en](https://joint-research-centre.ec.europa.eu/digcompedu_en) (Access 13-07-2022)
17. European Commission, European Framework for Digitally Competent Educational Organisations – DigCompOrg. Retrieved from: [https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg\\_en](https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg_en) (Access 12-07-2022)
18. Standard EN **31006** (2022)
19. European Commission, European Education Area, European Universities initiative. Retrieved from: <https://education.ec.europa.eu/education-levels/higher-education/about-higher-education> (Access 12-07-2022)
20. European Commission, European Education Area, Digital Education Action Plan (2021-2027). Retrieved from: <https://education.ec.europa.eu/focus-topics/digital-education/action-plan> (Access 12-07-2022)
21. ICI, Individual Competency Index, Retrieved from: <https://www.bimframework.info/2014/03/individual-competency-index.html> (Access 12-04-2021)
22. Iowa State University, Revised Bloom's Taxonomy. Retrieved from: <https://www.celt.iastate.edu/instructional-strategies/effective-teaching-practices/revised-blooms-taxonomy/> (Access 12-04-2021)
23. R. Sathian, How to Create an Activity in Moodle the Smart Way! (2016) Retrieved from: <https://edwiser.org/blog/create-activity-moodle/> (Access 22-07-2022)
24. O.I. Vaganova, N.P. Bakharev, J.A. Kulagina, A.V. Lapshova, I.K. Kirillova, I. K., *Rev Amazon investig*, **9** (26), 391-398 (2020)
25. J. Reyna, *Res. Learn. Technol*, **29** (2021)