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QUALITATIVE LEARNING ANALYTICS TO UNDERSTAND THE STUDENTS' SENTIMENTS AND EMOTIONAL PRESENCE IN EDUOPEN

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Summary

What emotional experience can students live in digital mediated learning processes? In this paper we connect Learning analytics and Grounded theory to analyse the emotional presence of students in 11 courses within EduOpen (www.eduopen.org) MOOCs' platform. Namely, we analysed through a bottom up process and Nvivo 11 Plus software the forum dedicated to the students' self-presentation from all of the courses. By going ahead with the analysis, we defined a set of categories composed by a three-levels system. At a more general level we have the macro-dimensions "Sentiment about EduOpen" and "Emotions toward topics". Each of these dimensions is composed by a number of child" categories and subcategories (which are the nodes to Nvivo's language). After defining the entire set of categories and categorizing all the texts (which was a circular process), we run some graphs on Nvivo showing the hierarchical structure of dimensions, the relations among dimensions and sources, and the clusters of dimensions by coding similarity. Results show how some courses are more composed by negative or positive sentiments (both toward the topic or the logistic arrangement of the course) and how the motivations dimension heavily characterizes the broad emotional dimension of students. In an evidence based action-research perspective, these results give interesting suggestions to personalize the learning activities proposed to students by EduOpen.

Theoretical framework

This contribution connects three different fields: the area of learning analytics, the area of education specifically interested in digital mediated learning processes, and the approaches focused on the emotional dimension in learning. Namely, learning analytics is the measurement, collection, analysis and reporting of data about students and the contexts they learn through. The aim of learning analytics is to understand, personalize and optimize learning and the environments in which it occurs. Learning analytics are mainly used in learning contexts mediated by the use of digital environments, since they can produce an amount of data about the traces each student or entire groups of learners leave online, successful activities, difficult experiences, and so on (Rienties & Rivers, 2014). In relation to the field of learning analytics, we stress the emotional dimension of learning as well. Speaking about feelings and emotions from a general and classical perspective, we can think that human beings can feel universal emotions, such as anger, disgust, fear, happiness, sadness, and surprise (Ekman, 1999) or joy-sadness, anger-fear, trust-distrust and surprise-anticipation (Plutchik, 2013). However,

we can refer to emotion and, specifically, to emotions and learning, after answering the question "How can we define and understand emotions at a more specific level?". According to Zembylas (2008), there is no agreement about what an emotion is and is characterized by. Indeed, emotions can be understood at least through three different perspectives: (a) Emotions as private and belonging to an intimate experience, as defined by psychodynamic approaches; (b) Emotions as sociocultural phenomena, as understood by social constructionist approaches; (c) Emotions as described by interactionist approaches, which transcend the dichotomies (e.g. mind/body, individual/social) established in the previous two and aims at bridging their differences. However, even if there is no a common definition of emotions, authors claim that they are not separated from the learning context (Lehman, 2006; Lipman, 1991). Coherently to this, for example, communities of inquiry (Garrison, Anderson, & Archer, 2000) are digital mediated learning experiences characterized by the cognitive presence, the social presence, the teaching presence and the emotional presence (Cleveland-Innes, & Campbell., 2012). This last is understood as the "emotional expression part of being socially present online" (p.272). If we still stay at this general layer, we can connect the interesting about the emotional dimension and the learning analytics by referring to Sentimental analysis, also known as Opinion mining looking for both negative and positive sentiments people have about the digital environment they use. However, this connection does not suggest how we can understand emotions at a more specific level. As for this point, Cleveland-Innes and Campbel (2012) approach the emotional experience of students through Grounded theory, that is by doing a content analysis of texts, looking for contents about emotions and defining a grid of categories through a bottom up process (from the text to the categories).

In this contribution, we connect both learning analytics and grounded theory to analyse the emotional experience of students in an online learning context made by eleven courses. This integrated system allows us exploring sentimental and emotional dimensions at macro-, meso- and micro-levels of the context. At the same time, we also created a three-levels set of categories for the emotional analysis, composed by general dimensions, more specific categories and further subcategories.

Aims

- To explore the emotional processes experienced by students during the participation in MOOCs proposed by EduOpen.
- To personalize the learning activities, according to students' emotional experience.

Context and data

This research is supported by Unifg Tutoring – UniTutor project and the context of analysis is EduOpen, an international Moodle platform lead by the University of Foggia (IT). We can better describe the context by referring to the macro-, meso- and micro-levels composing it. At a macro level, EduOpen is realized by 17 Italian Universities and several foreign partnerships. It started in 2014 and is an action-research project periodically rearranged thanks to evidence-based methods. Until now, it involved more than 70,300 learners from all over the world and

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proposed 140 courses. Indeed, the activities of EduOpen are online courses loaded on the Moodle based platform. Through a micro perspective, we can describe that each course refers to a specific topic (e.g. math for beginners, animals, English, and so on), and is managed by a university teacher and an online tutor of the EduOpen team. Furthermore, at the end of a course, students receive a participation certification, an open badge or ECTS. More specifically, each course spends three-five weeks and is composed by:

- A self-presentation forum where students usually write down a post about themselves, the place they live, the wishes and expectations they have about the course, and so on;
- A number of MOOCs videotaped by the teacher and related to the topic of the course;
- Another forum where students can ask further explanations to the teacher;
- An evaluation section, where students fill in online tests during or at the end of the course.

At a meso-level, we can say that all of the courses are categorized in different fields (such as, Literature, Science, and so on), in several pathways (an ensemble of courses connected each other by a main theme) and/or in the catalogue that a specific University partner proposes. In this paper, data are characterized by the self-presentation forums of all the courses managed by the University of Foggia (IT). These are 11 courses and have involved 43345 students in total (10,277 of them completed the course they were unrolled in). Therefore, we especially look at the micro-level of each course and at the meso-level of the group of courses proposed by the University of Foggia.

Method of analysis

According to both Grounded Theory and Sentiment analysis approach, we:

1. Created a first general grid of analysis, composed by the two general dimensions "Positive sentiments" and "Negative sentiments" referred to the learning experience in the digital context;
2. Categorization of the texts through qualitative content analysis (Mayring, 1997), by using Nvivo 11 Plus;
3. Generation of further dimensions and their specific categories, emerging from the interaction between grounded approach and theoretical concepts;
4. Team discussion about the building of the grid and the categorization;
5. Checking of the categorization according the team discussion;
6. Analysis of the nodes (the categories to the software) by using Nvivo 11 Plus.

Results

During the analysis, we realized that the first version of the grid needed to be much more enriched. Therefore, we created a double grid, able to grasp three levels of the students' emotional experience in the University of Foggia EduOpen courses. In other words, we defined two general dimensions: (a) "Sentiment about EduOpen", grasping what students felt about

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EduOpen, its services and the arrangement of the courses; (b) "Emotions toward topic", observing the feelings about the topic of the specific course students participated in. That is, the first dimension is about the feelings toward the digital environment, the concept of EduOpen, the arrangement of the environment. The second one refers to the feelings about the topic of the specific course. Furthermore, as Figure 1 and Figure 2 show, the category "Sentiment analysis" is composed by two more specific categories: "Negative sentiments" and "Positive sentiments". These, in turn, are composed by other two subcategories for each (moderately/very negative; moderately/very positive). The figure shows the hierarchical relation among "parents" categories and "child" ones too, as elaborated through Nvivo.

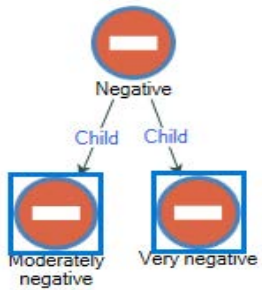

Figure 1. Negative sentiments to EduOpen child graph.
Negative sentiments have the two children nodes "Moderately negative" and "Very negative"

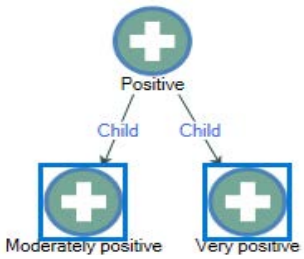

Figure 2. Positive sentiments to EduOpen child graph.
Positive sentiments have the two children nodes "Moderately positive" and "Very positive"

The dimension "Emotions to topic" was at the end shaped by a complex structure of categories. At a middle level, we grasped the three categories "Motivations", "Negative sentiments" and "Positive sentiments" (not to be confused with the two namesake categories "Positive" and "Negative sentiments" about the digital experience in EduOpen already described). "Motivations" refers to a category exploring a more cognitive dimension, even implying the students' expectations about the contents of the course and the reason why they are going to attend the course. Indeed, it is composed by seven specific or "child" categories. "Negative sentiments" is about the feelings students have against the content of the course and is composed by five specific or "child" categories. "Positive sentiments" is about the good feelings students have toward the content proposed by the course and is shaped by five specific or "child" categories. In Table 1, we describe all the categories composing "Emotions to topic" (a graph like Figure 1 and 2 would be more impressive, but we think the table is more effective).

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Table 1: Macro-, meso- and micro-level categories of "Emotions to topic"

Macro level category	Meso level category	Micro level category (and eventual description)
Emotions to topic	Motivations	Deepen knowledge (to go in depth in the topic the course refers to)
		Home learning (participate because you can attend the course staying at home)
		Innovative methods (to be tried)
		Mind training
		Old knowledge renewal
		Practical effects (in daily job activities)
		Support to learning (of other contemporary learning experiences)
	Negative sentiments	Disorientation
		Fear
		Feeling in trouble
		Nostalgia (about past learning experiences on the same topic)
		Sense of unfinished
	Positive sentiments	Discovery and curiosity
		Enthusiasm
		Feel interest
		Hope (to better understand the contents in opposition to past experiences)
		Passion

After creating the final grid of analysis by making the categorization, we checked them (the grid and the first categorization) by a team discussion, until we reached a total agreement about both. At the end, we analysed the nodes and their relationships with the sources (the texts of the forum) by elaborating some graphs through Nvivo 11 Plus. The following graphs (Figure 3, 4, 5, 6) and their respective descriptions show the analysis we made, which we will go back to in the conclusions as well. Figure 3 suggests that, in the general dimension "Sentiment to EduOpen", the category "Positive sentiments" is much more prominent than the which one about negative sentiments. Furthermore, the moderately positive sentiments are more present in the texts than the high positive ones. Figure 4, instead, shows what are the relations between nodes and sources. As it is visible, in eight forums referring to the respecting courses (Biochemical pills, Math for absolute beginners, Law history and philosophy, Animals, Knowing History, History of Italian literature, Course of general mathematics, Tourism marketing through digital media) students express both positive and negative sentiments about the structure of the course and/or EduOpen as a learning experience. Furthermore, in the document of "Pedagogy and education, basic concept" course there are just positive sentiments' references; whereas, in the course about Physics and Basic general pathology there are no sentiment expressions.

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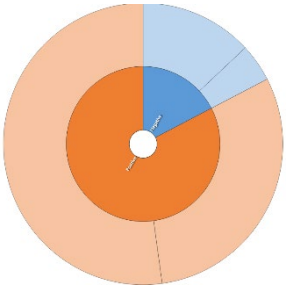

Figure 3. "Sentiment to EduOpen" hierarchical graph.
Dark orange section represents Positive sentiments in total, whereas the dark blue one represents Negative sentiments. The smallest light orange section is about the highly positive sentiments; the smallest light blue sections is about the highly negative sentiments.

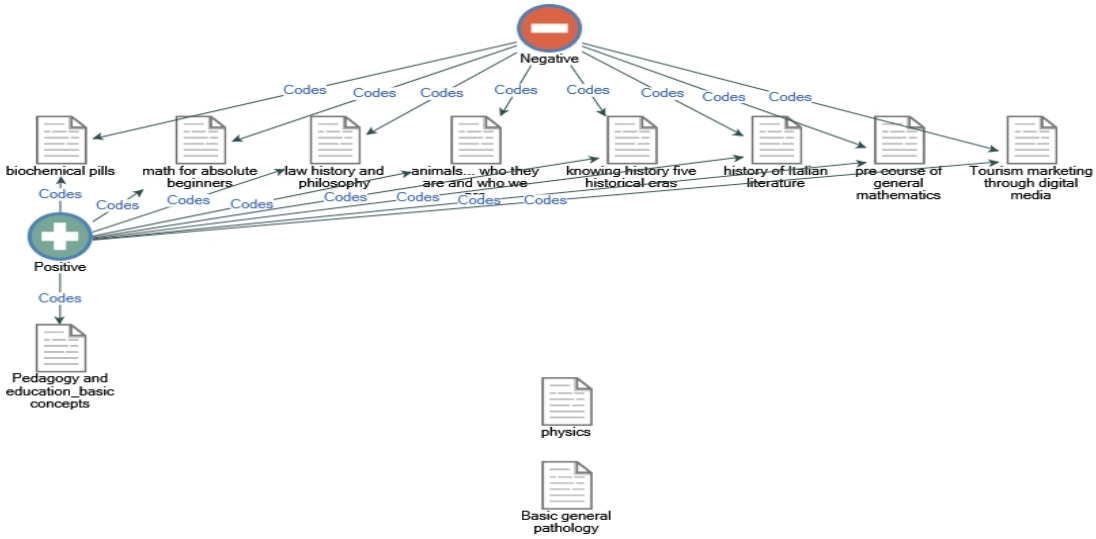

Figure 4. "Sentiment to EduOpen - sources" project map.
The red circle represents Negative sentiments; the green circle represents Positive sentiments. Arrows show the relation between each dimension and the forum of the specific course, that is if there are coded units of the text by using the dimensions.

What about the macro-dimension "Emotions to topic"? Figure 5 shows that the "Motivation" meso-category is the richest one, followed by "Positive sentiments" and then by "Negative sentiments", suggesting that the more cognitive aspects have a higher incidence in the texts.

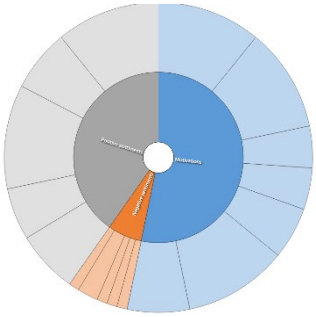

Figure 5. "Emotions to topic" hierarchical graph.
The blue section is about Motivations, the grey section is about Positive sentiments and the orange section is about negative sentiments toward the topic.

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Figure 6, instead, describes the connections between codes and sources. As it can be seen, the category "Motivation" is related to all of the sources, whereas the category "Positive sentiments" is used on all of the courses' texts except than in "Physics". Negative sentiments are involved in just three sources (Math for absolute beginners, Law History, Pedagogy and Education. Basic concepts).

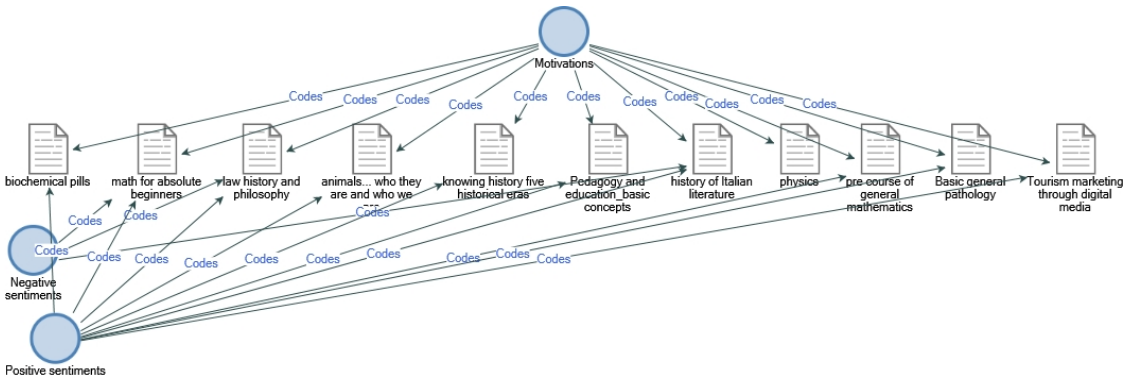

Figure 6. "Emotions to topic - sources" project map

With further analysis, the figures of them are not showed here because of the small space, we clusterized both sources and codes by coding similarity. As results, it emerged that "Motivation" and "Positive emotions" are more similar categories, and that "Physics" and "Basic genetic pathology" are the most distant sources form the others. These further results obtained by the cluster analysis mainly confirm the previous ones.

Conclusions and implications

In this contribution, we made a sentimental analysis in terms of both negative and positive opinions students have about the learning experience they are going to attend or just began on EduOpen. We also realized a more specific emotional analysis about the feelings learners have for the specific topic of the course they choose. We used a grounded theory approach to grasp the set of dimensions, categories and subcategories about emotions arising from the texts through a bottom up research process. According to the main results, the emerging set of categories is a very complex one and is composed by some clusters of similarity coding. By looking at the hierarchical graph about sentimental analysis, we can see that in general positive sentiments characterize the learners' perception about the experience in EduOpen. At the same time, the meso-dimension "Motivations" has a prominent space in the hierarchical graph about the emotions connected to the topic of the course. By going in depth in the categories, there emerges that some of them are about intrinsic motivations (e.g. to deepen the student's knowledge) and others are about external ones (e.g. To have a support for the university exams). However, cluster analysis shows that this last category is quite similar to category "Positive feelings" in terms of coding similarity. It seems, therefore, that students attending the courses have different motivations to participate in them, but they also feel positive emotions related to such a participation. Particularly interesting are the courses "Pedagogy and education" and "Physics". The first one, indeed, does not have negative references in the dimension "Sentiment analysis", whereas the second one is coded just by using the category "Motivation".

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Furthermore, there are three courses having references about negative sentiments related to the topic. We find all these results very much interesting for different reasons. Far from generalize a so specific study, we do claim that the entire set of categories shows how complex is the emotional experience of students. This is not just due to the number of categories shaping the set, but also to the three levels characterizing it, the relationships among them and the contextualized value they have in the different educational experiences. These results can have implications in the arrangement of the activities and in the personalization of the learning process, since an organization taking care of the specific emotions students feel can make the learning aims more effective. At the same time, further more specific analysis can give justice to the complexity of the students' emotional presence. Indeed, next studies will analyse the possible statistical correlation in the relations codes-dimensions and codes-sources, and the direction of such relations. Furthermore, we will analyse the forums of other EduOpen courses in order to broader the study to the macro entire context of EduOpen, and to create methodological tools connecting the usual learning analytics' quantitative perspective and the qualitative dimension shaping the emotional experience of students.

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VIDEO ABSTRACTS FOR SCIENTIFIC EDUCATION

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Introduction

Current research results are traditionally published in the form of conference proceedings or journal articles. These papers are often difficult to find or hidden behind the paywalls of commercial publishers and they are generally written in a scientific jargon, which is difficult to understand for the general public or even for scientists who are not from the same discipline. Science videos have an enormous capacity to bridge the communication divide between research and society. Due to low-barrier access, it allows researchers to communicate their research more effectively and open. "Web video opens a new form of public intellectualism to scholars looking to participate in an increasingly visual culture" (Young, 2008; p.1). A video forum has the potential to make the knowledge gained from scientific communication more useful and richer than before by giving viewers a deeper understanding of the experiential aspects (such as background, methods, and results) of the published contributions (Löwgren, 2011). This is also reflected in the fact that "Science and Technology" is the second most relevant topic on YouTube (Erviti & León, 2014), including channels from institutes like CERN with 84.000 subscribers and from NASA.gov with 139.000 subscribers (data retrieved from YouTube on January 31st, 2018.).

Online videos are a valuable information and learning resource for education and knowledge transfer, for the reflection of learning content or for knowledge verification (Zorn et al., 2013). Online videos are available regardless of location and time and can be accessed at any time as soon as there is a need for information. The user can adapt the speed of the information acquisition individually according to specific needs, repeat the content as often as required, skip irrelevant content and also breaks can be determined individually (Arnold et al., 2015; Börner, Schaarschmidt, Meschzan, & Frin, 2016; Kinash, Knight, & McLeal, 2015; Tillmann, Bremer, & Krömker, 2012; Tillmann, Niemeyer, & Krömker, 2014). Moreover, videos transport information both verbally and visually. In this way different learning types can equally benefit from videos and language barriers can be bridged. Further, they also enable authenticity and a feeling of proximity and personalisation to be conveyed (Lackner, 2014; Tillmann et al., 2014; van der Meij & van der Meij, 2015; Zorn et al., 2013).

This paper explores how particularly the genre of video abstracts can foster the scientific education and how scientists can be supported in communicating their research via videos. This includes the production as well as the publishing process, including thoughts on accessibility, citability and reusability of videos via online platforms, which are suitable for scientific work.

Video Abstracts and Scientific Education

A wide range of formats of audiovisual media are being used in the area of research such as visualisations of simulations and models, recordings of experiments and technical procedures, recordings of conference talks, lectures and workshops. Especially short science videos (SSV) also called video abstracts have grown in popularity over the last decade (van Edig, 2016). A video abstract is the motion picture equivalent of a written abstract and can be defined as "peer-to-peer video summaries, three to five-minute-long versions of academic papers" (Berkowitz, 2013; p.1) that "describe dynamic phenomena which are simply too complicated, too complex, too unusual, too full of information to do in words and two-dimensional pictures" (Whitesides, 2011; min.0:54). Video abstracts can also help to communicate "the background of a study, methods used, study results and potential implications through the use of images, audio, video clips, and texts" (Spicer, 2014; p.3). "In just a few minutes of video you can present the motivation behind the research contained in your article as well as some of your ideas on the topic. You can also discuss the history of your area of research or your ideas on where this field is heading" (Kuemmerle, 2009). Video abstracts also have an impact on the usage of an article. Spicer (2014) showed in a study on the basis of the "New Journal of Physics" (published by IOP Science) that articles with a video were more likely to be downloaded than those which do not. "Of the top 25 articles with the highest usage, 36% had a corresponding video abstract" (Spicer, 2014; p.9). A video abstract is a useful tool to convert video views into online article downloads – especially if they are published in open access journals (Watkins, 2016).

Especially when it comes to keeping up with the growing amount of interdisciplinary research, short science videos are a very helpful tool to gain an overview on research from outside of one's discipline (van Norden, 2015). "We see younger researchers using video abstracts to scan literature quickly," says Cameron Macdonald, executive director of the Ottawa-based publisher Canadian Science Publishing (formerly NRC Research Press). Another benefit of creating a video abstract is to rethink one's research results in another format. For this purpose, Dr. Whitesides of Harvard has all his students prepare three-minute, abstract-style oral summaries of their latest research (Whitesides, 2011). Short science videos also have a great potential to communicate science to wide audiences, which would otherwise hardly learn from the valuable research that is done. As an example Steve Maguire, a chemistry researcher and host of the YouTube channel "ScienceIsnotScary" explains everyday science in understandable terms (https://www.youtube.com/user/ScienceIsnotScary). In his short science videos, he demonstrates, that you don't need to be a scientist to understand science.

This leads to the question of how scientists can be supported and learn how to communicate their research to a wider audience, so that people from inside and outside their field can be educated, informed and inspired.

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How to produce a Scientific Video Abstract?

The publisher Wiley has recognized the potential of video abstracts and developed a business model in partnership with Research Square (https://www.researchsquare.com/videos/wiley) that aims to outline the key findings of a published article in a dynamic video. Some authors also team up with filming companies in order to have a professional result. However, in most cases, video abstracts are produced on a low budget and in a relatively short period of time by the scientists themselves. This has become easy with direct access to production technology on smartphones and freely available editing tools. Authors can choose from a wide range of stylistic options: from simple whiteboard drawings and stop motion pictures to screen recordings, documentary scenes, interviews, slide shows and "talking heads".

Figure 1. Screenshot of the video abstract "How dog brains process speech" (source: How dogs brain process speech https://youtu.be/N9QQxa6eLPc)

This technology facilitates the production of a video abstract, which aims to transform the background and findings of a study into something comprehensible and attractive for everyone. Most commonly the authors avoid scientific jargon wherever possible. With the on-camera and documentary style video about research on dog brains, which was developed by Dr. Andics and his team in 2016, it could be demonstrated that it is possible to transmit a complex scientific message in a simple audiovisual format that reaches more than 400,000 viewers on YouTube. Cell Press authors often use the whiteboard drawing technique, which allows to create a step-by-step and easy to follow video. A good example of this is a video with the catchy title "The MutAnts are here", which explains new results on the social life of ants in a very vivid manner (The MutAnts are here https://youtu.be/M476cn6X5zM). Paul Young's (Department of Mathematics, College of Charleston) series of video abstracts for the Journal of Number Theory is an example of how to create a calm and laid back atmosphere when talking about a complex topic. He usually sits outdoors in front of the camera wearing a soccer t-shirt and gives a summary of his paper (Symmetries of Bernoulli polynomial series and Arakawa-Kaneko zeta functions https://www.youtube.com/watch?v=0vQqfgrkX2k).

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More and more libraries, universities, researchers and even filmmakers are offering online guidelines and tutorials to help scientists communicate their research to fellow scientists or the general public. The Science Out of the Box series by Johns Hopkins University gives examples on how to explain academic principles by the means of video (http://www.hopkinsmedicine.org/research/advancements-in-research/out-of-the-box.html). The Observatory for Scientific Communication of the University Pompeu Fabra (Spain), teaming up with the Spanish Foundation for Science and Technology, published a guide on how to produce scientific videos (http://asecic.org/wp-content/uploads/2013/09/video-cientifico1.pdf, in Spanish). Impact story, which is a website that helps researchers go beyond citation rates to measure the impact of their contribution, offers a five-step process and several examples for creating effective research videos (http://blog.impactstory.org/impact-challenge-video-abstract). Karen McKee, also known as "The Science Videographer" is a retired botanist and oceanographer who has a blog and several tutorials on sharing scientific research through video (http://thescientistvideographer.com/wordpress).

Besides online programs there are also classroom workshops available. The Centre for Science Communication and the UNESCO Chair for Multimedia in Education (Eötvös Loránd University of Sciences, Budapest, Hungary offers a one-semester course specifically dedicated to teaching science communicators how to make scientific video abstracts (http://ttk.elte.hu/Faculty_of_Science). Libraries are also a valuable partner when it comes to promoting media literacy and supporting of scientific work (Plank, Molnár, & Marín-Arraiza, 2017). The Technical University of Denmark offers a workshop for its researchers to encourage them to produce video abstracts and increase the visibility of their publications (http://www.bibliotek.dtu.dk/english/nyheder/2016/10/videoabstracts?id=4325fe2c-0b5a-48be-af6f-e8b33967636d). Professional filmmakers from Filmjungle.eu (http://filmjungle.eu) teamed up with the German National Library for Science and Technology to conduct workshops on the production of video abstracts (http://blogs.tib.eu/wp/videoabstracts/about-the-workshop). The workshop includes the following steps: analysing elements and techniques used in popular video abstracts, writing a script, producing the video, editing the material, sharing and publishing a video including topics like open licences such as Creative Commons (https://creativecommons.org). The evaluation of the workshop confirmed the assumption that a professional guidance and an interactive concept enables scientists and PhD students to acquire all skills necessary to create a short science video – regardless of the topic or the author's experience in filmmaking – within a single day, using smartphones and freely available software (Plank et al., 2017).

Where to publish a Scientific Video Abstract?

With the increasing number of scientists creating short videos in a non-commercial style, the question of how to publish them effectively becomes more and more important. YouTube and Vimeo are the big players in this field. Cell Press was among the first publishers to realize the potential of video abstracts and launched a video portal back in 2009 to share video abstracts which were published on YouTube. From there the videos were linked and embedded in the Cell Press Video platform, which allowed for a better curation of the videos

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(http://www.cell.com/video). Now the channel features 400+ videos and viewing figures are over 100K and rising. A large number of scientific publishers like Copernicus Publications, IOP Science, Elsevier, Wiley and Taylor&Francis are offering an option for submitting video abstracts and link them to the article. Each publisher or journal that accepts video abstracts has technical guidelines posted online that specify file formats and other key technical information and often also tips for the production. There is also a number of open access portals like the free platform WeShareScience (http://wesharescience.com), which provides a place to publish, share, discuss, and create video abstracts. Videos on the site are searchable, organized by discipline, and there is an advanced search feature that allows you to search in the transcripts of the videos. The open-access video journal Latest Thinking (https://lt.org) offers video abstracts that are on average 10 minutes long and feature five chapters (research question, method, findings, relevance, outlook). Latest Thinking produces the abstracts in collaboration with the researchers and publishes them under a CC-BY 4.0 license. Repositories like Figshare (https://figshare.com) and Zenodo (https://zenodo.org) also support the publication of video as a research output. Videos are provided with a Digital Object Identifier (DOI), descriptive metadata, and retrieved authors' information from the Open Researcher and Contributor ID (ORCID). Publishers such as BioMed Central rely on Figshare for trustable video publishing.

However, when reliability matters, like in educational settings, YouTube might not be the best choice. Despite being an easy-to-use medium, there is no guarantee of long-term accessibility or preservation of the videos. Links to videos might not be stable and back-linking to the respective articles or other resources might not work anymore after a while. Libraries have always been an excellent partner when it comes to making knowledge available, accessible and searchable for the long term. Libraries can support the increased production and use of videos by offering reliable infrastructures and new services. An example of these services is the web-based AV portal (https://av.tib.eu) of the German National Library of Science and Technology. It is an open platform for sharing scientific videos predominantly from the fields of technology, architecture, chemistry, computer science, mathematics and physics. The platform currently provides approximately 13.000 videos under CC licences (January, 2018). All videos are allocated with Digital Object Identifiers (DOI) for easy and reliable citation. The portal's special feature are the semantic analysis tools, which enable to retrieve videos even if the search term is not in the metadata but in the spoken text, text overlays or images (Hentschel, Blümel, & Sack, 2013; Strobel & Marín-Arraiza, 2015; Waitelonis, Plank, & Sack, 2016). The portal is suitable for the support of active reception and learning processes, because it has a large number of interaction elements so that content and presentation sequence of videos can be individually controlled (Saurbier, 2017). The visual table of contents provides additional interaction possibilities for browsing, relevant segments can be easily identified within a video, accessed directly and viewed in any desired selection and order. Besides, many videos are linked to additional material – e.g. conference proceedings, data sets or presentations – which can be used as additional educational resource. A short video shows the main features of the portal (https://av.tib.eu/media/21256).

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Conclusions

Initiatives to use videos for educational purposes have become increasingly popular in the current decade. Learners in both formal and informal contexts are part of a visual culture, which transforms videos into an appropriate tool for science communication and interpretation. In fact, a large number of YouTube users visit the platform to gather information about science and technology. As Young (2008) pointed out, that scholars need to participate in this increasingly visual culture and take advantage of the potential of videos for knowledge dissemination and transfer. On the other hand, educators and learners profit from the visualization of complex scientific experiments.

This paper presents video abstracts as a point of convergence between scientific communities, educators and learners. By means of different video techniques, scholars can communicate the results and the background of their study in a short video. Usually, the type of language is also simplified to address a wider audience. However, filming a video abstract does not appeal to many scientists due to the apparent difficulty of the task and the lack of academic recognition (Lê et al., 2015). Hence media literacy training initiatives as well as reliable services and infrastructures that are suitable for scientific work are needed. In this paper an approach was introduced that showed how different stakeholders like scientists, filmmakers and librarians can cooperate in order to foster science education beyond the ivory tower.

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