Popular Science Videos: Past, Present And Potential Future Implications

INTRODUCTION

Online video sharing has grown exponentially in the past two decades, allowing for more and more knowledge to be passed on, including through popular science videos (León & Bourk, 2018). According to the Cambridge Dictionary (2022), popular science is "science presented in a way that is interesting and understandable to people who are not experts". As the dictionary Le Petit Robert (2022) explains, "popular science is about adapting a range of technical, scientific knowledge to make them accessible to a non-specialist reader".

The transmission of science to a wider audience started in 1665 with the publication of the first academic journal, *Le Journal des Savants*, which targeted scientists but also any literate person who was curious about science (Vittu, 2013). The concept of popularizing science emerged during the 19th century with the publication of books describing scientific issues relatively simply without demonstrating all of the scientific data (Holmes, 2014). One famous example of such a book is Darwin's *On the Origin of Species*.

Therefore, how did we get from the first scientific prints to widely accessible knowledge online through video medium, and how is it expected to evolve?

To answer this question, literature will be reviewed first about how popular science started in the video format, second about the current state of the art, and last about which notions and elements can be expected to grow in the future regarding popular science video-making and sharing.

HOW DID POPULAR SCIENCE DEVELOP INTO VIDEOS?

The video form for popularizing science came during the second half of the 20th century, along with audiovisual technical developments, and was first widely used to train soldiers during the Second World War. In the '60s and '70s, educational videos came into use in classrooms. In the following decades, it came into people's homes with the development of television and VHS, and later on DVDs, and finally the Internet and the Web (Moussiades *et al*., 2017).

Sartori (2000) characterized the visual culture that has developed since television as the *homo videns* era, *the seeing man* era. In contrast to the writing-based culture humans had known before television, people live nowadays in a world where

images have become a main part of communication, with the Web accentuating this feature. At first, the Web only supported written forms of knowledge sharing such as blogs and Wikis (Leaver & Peaty, 2023). In the early days of the Web, it was very difficult to share and watch moving pictures on the Internet; it required very technical skills. In 2005, three former PayPal employees (Hosch, 2023) found an easier way to do that by compressing the videos and presenting the video so that one click would play it. This brought a new dimension to knowledge-sharing, which was typically done by traditional media and institutions in a 'one-to-many' way, and could now be done from peer-to-peer, in a 'one-to-one" manner (Leaver & Peaty, 2023). Another added value to this innovation was that it could be conversational with interaction through comments, creating a participatory culture (León & Bourk, 2018).

Of course, traditional media caught on to the potential of YouTube and other video-sharing platforms, as they developed into commercial platforms — advertisers can place ads before, during or after videos, especially the most popular ones. Television networks thus started sharing professionally produced content on these platforms where the content was amateur. This, combined with the democratization of audiovisual tools, has contributed to an increase in the quality and professionalism of video content creators (León & Bourk, 2018).

HOW ARE POPULAR SCIENCE VIDEOS NOWADAYS?

Online video sharing has grown exponentially since the creation of YouTube (León & Bourk, 2018). In 2009 alone, the number of videos uploaded on YouTube in 60 days equalled the amount of audiovisual content that would have been broadcasted for 60 years by NBC, BCS, and ABC combined (Figueiredo *et al*., 2011). However, as León and Bourke (2018) state: "To a certain extent, the communication of science across the Internet replicates what happened with television when it first emerged". Nevertheless, social media, in general, has become a main information channel (Cevik *et al*., 2016), and even surpassed television on that matter, becoming an essential tool to communicate scientific information to the public (León & Bourk, 2018). According to Rode (2016), people do not only rely on the Internet to find information in a private context but also in a professional one; employees rely on social media to acquire knowledge.

In contrast to television, there is "no editorial selection and quality assessment taking place" on social media, allowing inaccurate and harmful information to be

shared (Allgaier, 2018). A good way to be sure of the accuracy of the popularized science one is exposed to is to see whether or not sources are cited and check the summary or overview of these sources (Wallington, 2021).

The form of knowledge transmission, whether it is written or put into a video form, is being done using specific writing techniques that differentiate it from scientific papers. Of course, the topic is explained in detail but specific elements, such as the detail of calculations and the methodology, are kept concise. Calculations and methodology do not matter much to the audience, it is a means to the findings. The audience is rather interested in the latter, being informed straight to the point. Findings are thus the focus of popular science and may be illustrated by images. Moreover, the topic is not niche, but rather wide, potentially interesting to a wide audience (Debret, 2020). Moreover, images can help explain concepts that are difficult to "understand in the written medium" (Korakakis *et al*., 2009), and they can transmit emotions that engage the audience in the video and also to comment and share (Berger, 2016). However, not all images can be as efficient, depending on which emotion they carry (León & Bourk, 2018).

From the content creators' standpoint, it is important to take into account the way information is transmitted to their audience, including the writing techniques mentioned above and the use of images to support or complement the auditory information. The aim is to create content that is complete, yet as light as possible to not overload the audience cognitively. Furthermore, depending on the format of the popular science video, the creators should evaluate which digital media platform is more appropriate for the video's diffusion (Federer, 2020).

One can learn about any topic they want and tailor the learning to their way of being, such as the specific way they want to learn something and at which time.

HOW ARE POPULAR SCIENCE VIDEOS EXPECTED TO EVOLVE IN THE FUTURE?

This new, simple, and visual approach to sharing knowledge allows one to learn in a multidisciplinary and personal manner. One can learn about any topic they want and tailor the learning to their way of being, such as the specific way one wants to learn something and at which time (Redman, 2018).

Still according to Redman (2018), we are now at a crossroads where digital media and education are interconnected. However, the way they both are perceived clashes: education is linear—one starts a course to obtain a diploma, while digital

media is “circularly connected” (Poerksen, 2004), meaning that it does not have a beginning to start from and an end to finish at but is rather a large set of interconnected information that can be taken in any order one would like. It is thus important to consider this circular-linear disparity when increasingly incorporating digital media in education (Redman, 2018).

With the growth of social media, the improvement of visual communication techniques, and the ‘weaponization of information’, scientific institutions have the potential to widely spread accurate scientific information to the public. Moreover, scientific and journalistic educational institutions need to work in a closer relationship to better prepare the next generation of popular science writers (León & Bourk, 2018).

In regard to the ‘weaponization of information’, which describes “a message or content piece that is designed to affect the recipient's perception about something or someone in a way that is not warranted”, scientific institutions will need to be aware of social engineering done in the weaponized information design, such as the use of cognitive biases (Wigmore, 2017), to efficiently counter them when explaining topics to the public. Moreover, scientific institutions will need to find the right balance between entertainment, which is essential for scientific knowledge dissemination, and rigour to popularize scientific knowledge. The more a topic is popular, the more it will experience a polarization of opinions and a lack of rigour. The social debate about said topic is the reason for this phenomenon, combined with the ‘weaponization of information’ (León & Bourk, 2018).

Another aspect on which popular science has to work on is the fact that science and scientists may have a negative reputation, which is based on the cognitive bias of exposition: scientist characters in movies are usually presented as smart yet crazy or diabolical people. Online video can, on the one hand, help improve the view of this stereotype, and on the other hand, once the stereotype is broken, attract people who are biased about science (León & Bourk, 2018). It is also realistic to imagine that in several years, popular science videos will evolve to be “non-linear, multimedia, interactive; hybrid, inter-platform, convergent, virtual, immersive, 360-degrees, transmedia or something different that is still to come” (Nash *et al*, 2014). This evolution has already started in some specific educational institutions to train medical personnel without needing patients or physical material to practice with (Ang, 2023), and it is expected to be democratized to the public in the coming years (León & Bourk, 2018).

Along with the technological development of means to share knowledge, Redman (2018) proposes a *Ripples model* which is a new way to approach learning in a non-linear, "learner-centred, life-reconnected, and inquiry-based" way. Learning is not only reserved for schooling but also life in general; we ought to learn about a wide range of topics to improve as humans. The aim of this *Ripples model* is to provoke 'epistemological curiosity', which makes one want to learn about new topics and acquire new knowledge (Litman, 2012). The *Ripples model* uses multimodality and remixability to reach this goal: not only does it take into account traditional learning material, but it also encompasses "actions, experiences, observations, conceptions, techniques, materials, tools, expressions and representations" from our surroundings (Redman, 2018). This model combined with the development of multimedia tools for learning could become the future of popularizing information, offering a more personal, existential way of learning.

CONCLUSION

In this paper, the evolution of popular science has been discussed. It has developed into different forms over the years, including the video form with the rise of online video-sharing platforms. This has allowed for knowledge to be shared differently than through traditional educational institutions. The access and the form in which popular science can be communicated to a wider audience will keep evolving with technological advancements. It can also be expected for popular science to be increasingly incorporated into individuals' learning cycles.

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