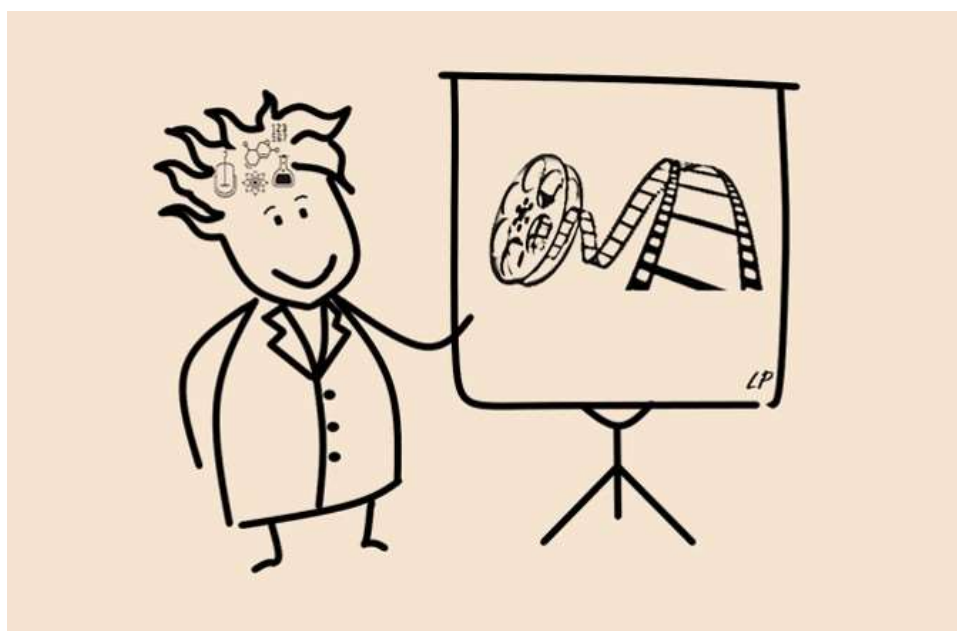




Universidade do Minho

How to Communicate Science in 5P Online course integrated in the SmartArt project



Team UMinho:

Armando Venâncio
Diogo Cunha
José Alberto Lencastre
Lígia Rodrigues
Luciana Peixoto
Mariana Henriques
Maria Olívia Pereira
Sílvia Araújo

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Introduction

"Everything should be made as simple as possible, but not simpler" - Einstein

Communication is the main tool through which a teacher conquers his target audience, be it the management bodies of a company, society, or the promotion of a product or a service. Communication is thus used to arouse the interlocutor's attention and is the key to transmitting clean, clear and concise information.

The digital age has completely changed the communication paradigm. If a few years ago we only used PowerPoint to show results, present works, communicate with society, today the general public is more demanding, and more difficult to capture/involve. Social networks have become privileged vehicles for transmitting fundamental information, using short videos, animations and graphic images. If, on the one hand, these advances are good for the globalization of information, on the other hand, they can bring serious obstacles to those who are not prepared for this new way of communicating.

Science communication emerges as a transversal competence that Higher Education students, whether in the areas of Science, Engineering, or even linguistics, must acquire in their formative years, contributing to their professional success in the future, as well as enable them to become more active in the Society.

General objectives:

The online course "How to Communicate Science in 5P" aims to promote in the educational community of UMinho, the awareness of the importance of science communication, in a society increasingly dependent on science and technology, and arises from the need to provide our students with the most varied digital and communication skills, while promoting active and collaborative learning among peers. It is also intended to promote the interaction, involvement, participation and collaboration of students, in the development of contents in the inverted classroom model, through the elaboration of short videos - pitches with the explanation in a simple and dynamic way, of complex concepts. These concepts are related to the learning objectives of the most varied CUs, also contributing to the improvement and quality of learning.

Workload:

Each Module - 1 hour of study and 1 to 2 hours of collaborative work.

MODULE 0 | Introduction to Science Communication in 5P

Recently there has been an increase in the Society's interest in basic concepts of Science, namely Bioengineering and Biotechnology. In addition to the need for knowledge about advances in Science and Biotechnology. The current pandemic conjecture has also led to the need for a very rapid adaptation of traditional and face-to-face teaching to the online model and more recently to the hybrid model, where capturing the attention of listeners, whether students or "stakeholders", was and is a constant challenge.

Methodology for Science Communication in 5 steps

Module 0, the introductory module of the How to Communicate Science in 5 P course, aims to present a methodology for the development of a science communication resource, be it video, animation, infographic or informative text.

We propose a methodology in five steps (5 P) of active co-construction of the respective multimodal science communication, using different digital tools:





Watch a presentation video



<http://ceh.ilch.uminho.pt/portlingue/wp-content/uploads/2022/01/introdução-en.mp4>

CHALLENGE

- See an example of a Science Communication video (“bacterial infection”) and make a critical analysis;
- Identify the target audience of this video;
- Did you identify a term that you are not familiar with? Could this term be replaced by another? Which one?



<https://bit.ly/2WAREWH>



Quizz

Question 1: Complete the sentence to create a beautiful adage: Communicating Science...?

Question 2: What are the main characteristics of a good Science Communication resource?

Question 3: Science Communication is done through (choose the correct option(s))

- Scientific articles
- Scientific poster
- Oral Communications at specialty congresses
- Publications on social networks
- Short videos
- Games with scientific concepts
- Scientific illustrations

Question 4: If I have to do a Science Communication, what steps do I need to take?

Question 5: In three adjectives, indicate how Science Communication should be.



Resources: Bibliography, websites, computer applications

Gascoigne. T., *et al.* (eds) (2020). *Communicating Science. A Global Perspective*. Australia: ANU Press. DOI: 10.22459/CS.2020

<https://bit.ly/2VjUvCu>

M Mota, CM Sá, C Guerra - Revista Lusófona de Educação (2021) A banda desenhada na comunicação e educação em ciência: uma revisão sistemática da literatura. *Revista Lusófona de Educação*. v. 51 n. 51

<https://bit.ly/3lfnNNT>

Ferreira, M. F., Silva-Lopes, B., Granado, A., Freitas, H., & Loureiro, J. (2021). Audio-visual tools in science communication: the video abstract in Ecology and Environmental Sciences. *Frontiers in Communication*, 6, 1-12. [596248]. <https://doi.org/10.3389/fcomm.2021.596248>

sites:

<http://scicom.pt/>

<https://padlet.com/docenciamaisimpacto/85sgzpzp4wjd7rj3>

<https://www.publico.pt/comunicacao-de-ciencia>

Prioritizing



MÓDULO 1 - PRIORIZE

Adapt the content to the target audience

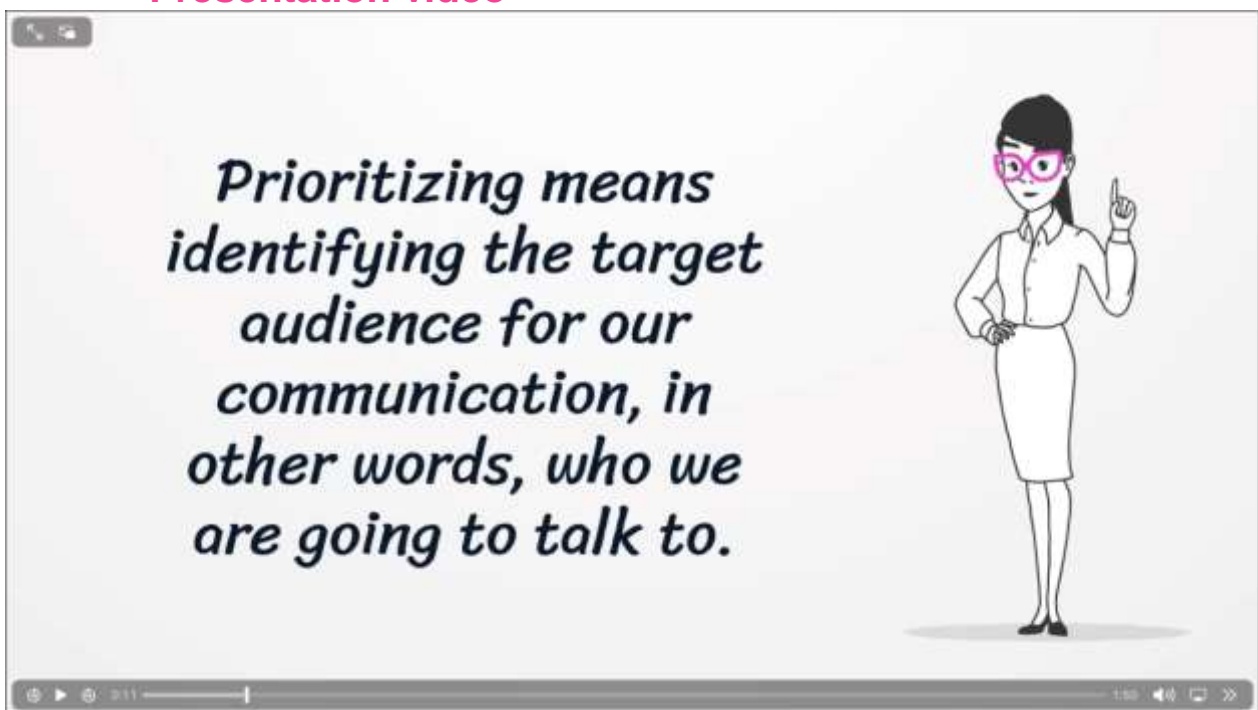
Science communication has been searching for the best strategies to achieve its goals. Thus, different concepts focused on different audiences have emerged. The need to adapt this communication to the target audience is of crucial importance if we want to achieve success in transmitting a message.

Objectives

This first module aims to alert to the importance of adapting the content and language of communication according to the intended target audience and the scientific content to be communicated. It is intended to identify different types of audiences and select the most effective strategies for capturing our target audience.



Presentation video



<http://ceh.ilch.uminho.pt/portlingue/wp-content/uploads/2022/01/priorizar-en-1.mp4>

Challenge

Choose a scientific concept and explain it to different audiences (your explanation cannot be longer than 50 words):

- children from 5 to 8 years old;
- young people from 16 to 18 years old;
- non-specialist adults;

Quizz

Question 1: Is making a communication for the student public the same as making a communication for the scientific public?

- Yes
- No

Question 2: If I had to explain the concept of “genetic material” to children, which term(s) you would not use:

- Genetic information
- Gene
- Genome
- Chromosome
- Cell
- Parental Features
- Game

Question 3: If I had to explain the concept of a “biological reactor” to the public in general, what comparison would you use?

Question 4: Is it easier to make a science communication for children?

- A. True
- B. False



Resources: Bibliography, websites, computer applications

M. L. Valença (2015). *Comunicação Pública de Ciência – Um Guia para Cientistas*. Tese de Mestrado ITQB/UNL

Oliveira. R. Percepção e política na divulgação científica: em busca de um público-alvo. *ClimaCom* [online], Campinas , ano. 4, n. 9, Ago. 2017 . Available from: <http://climacom.mudancasclimaticas.net.br/?p=7288>

Searching



MODULE 2 | SEARCH

Defining the subject of the communication and the research criteria

When we propose to communicate about a scientific topic or concept, we must deepen our knowledge on this subject. The bibliographical research should be limited to the chosen topic and the sources of information must be reliable. Only with in-depth knowledge of a subject can we succeed in conveying a message.

Objective

This second module intends for trainees to reflect on what scientific theme/concept they want to communicate. To this end, it is important that they: (i) recognize the importance of good bibliographic research, (ii) recognize the different search engines and sources of bibliographic research and (iii) reflect on issues related to scientific and academic integrity and ownership intellectual.

RESEARCHING WHAT?

Finding keywords and search terms
Keywords

>

Choose where to look for the information you want >
Resources



presentation video



<http://ceh.ilch.uminho.pt/portlingue/wp-content/uploads/2022/01/priorizar-en-1.mp4>



Challenge

- Choose a scientific concept and gather some scientific information about that concept.
- Think of a question whose answer is scientific knowledge about the concept.
- Think about what message should be conveyed about the chosen concept and how they would like to convey that message.



Quizz

Question 1: If I wanted to carry out a bibliographic research on a certain scientific subject, I would only use a search engine.

- Truth
- False

Question 2: If I see an interesting explanation on the internet about a certain subject, I can use it without citing the source, as it is available online.

- Truth
- False

Question 3: If you need to use an image that you do not own, it must come from a non-copyrighted image bank.

- Truth
- False

Question 4: If in a video you want to use background music, it can be of any musician, singer or composer, having his authorship is already recognized

- Truth
- False



Resources: Bibliography, websites, computer applications

There are several scientific repositories where you can search for reliable:

sources: Google Scholar: <https://scholar.google.com>

Elsevier: <https://www.elsevier.com/>

Microsoft Academic:

<https://academic.microsoft.com/> Google Books:

<https://books.google.com/>

Open Library: <https://openlibrary.org/>

Planning



MODULE 3 | PLANING

Select and organize the information from the documentary research

The mind map consists of a diagram, usually in the form of a tree, which facilitates the conceptual representation of the contents and their hierarchical relationships (Buzan & Buzan, 1993). This visual representation, on the one hand, enables the schematic organization of readings and, on the other, constitutes in itself as an idea-generating principle and guide in the organization of thinking.

Objective

In this third module, students are invited to prepare a mental map in order to systematize the main ideas resulting from the previous stage, mobilizing map creation tools. Next, we briefly present the basic mind mapping technique that we propose to help students actively process the information collected in the previous step.

TO PLAN WHAT ?

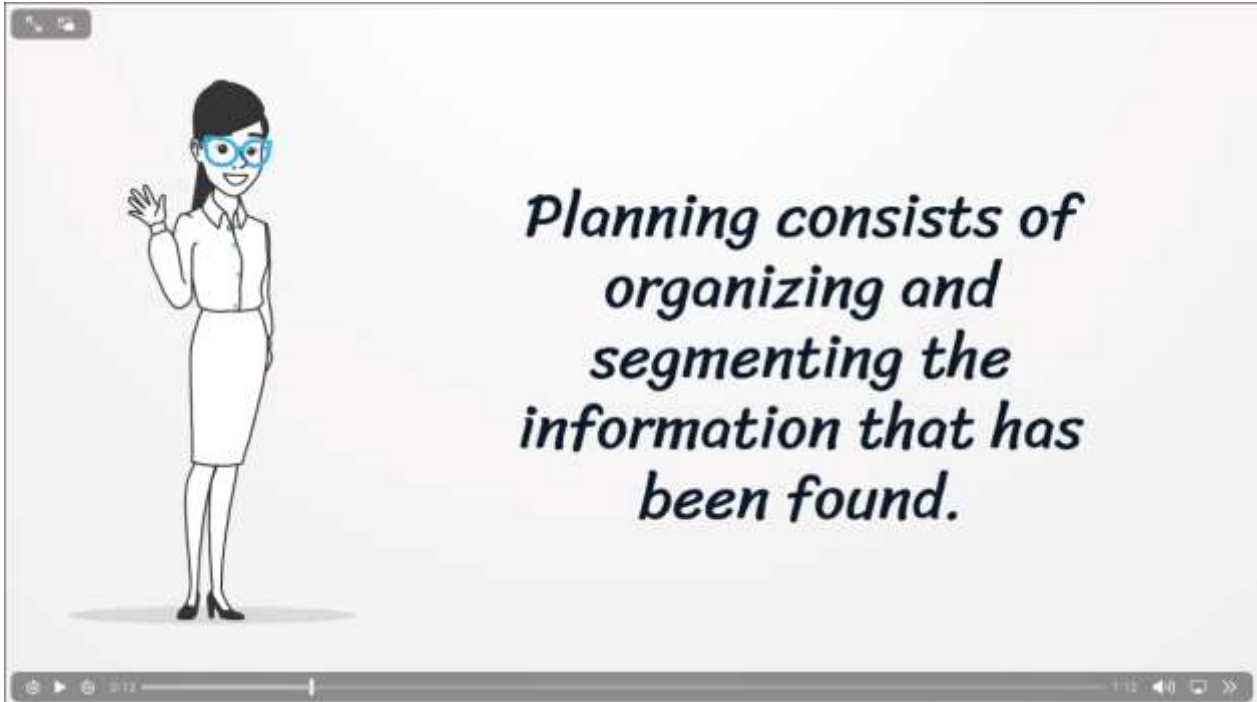
Finding the key words and relating them to each other.

Designing a mind map.





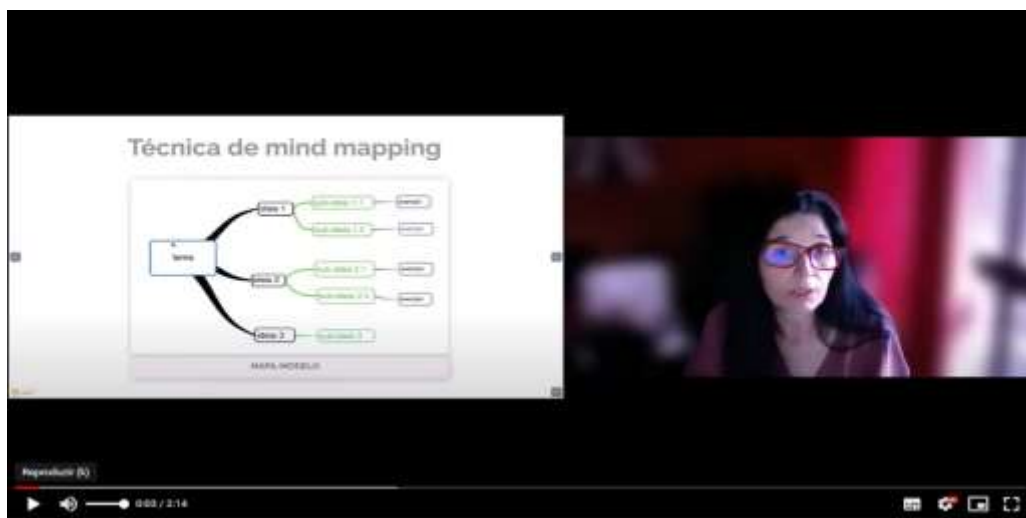
Presentation video



<http://ceh.ilch.uminho.pt/portlingue/wp-content/uploads/2022/01/planificar-en-1.mp4>



Presentation vídeo | Mind mapping technique



<https://bit.ly/37avYCS>



Challenge

- Select three scientific articles on the web that are related to the concept to be addressed;
- Initiate a brainstorming stage with group colleagues to extract the most relevant ideas;
- Organize these ideas into a mind map using the technique presented.

 **Quizz**

1. What is the main objective of the mind mapping technique?
2. What are the three aspects to take into account when creating a mind map?
3. Which of these tools allows you to create mind maps:
 - Google
 - Padlet
 - Powtoon

4. How many levels of information segmentation can the mind map contain:
 - 1 level
 - 2 levels
 - 3 levels

**Resources: Bibliography, websites, computer applications**

Buzan, T & Buzan, B. (1993). *The Mind Map Book*. London, England: BBC Books.

Tools for mind mapping:

GitMind: <https://gitmind.com/>

Coogle: <https://coggle.it/>

MindMup: <https://www.mindmup.com/>

Personalizing



MODULE 4 | PERSONALIZE

Developing a narrative using storytelling

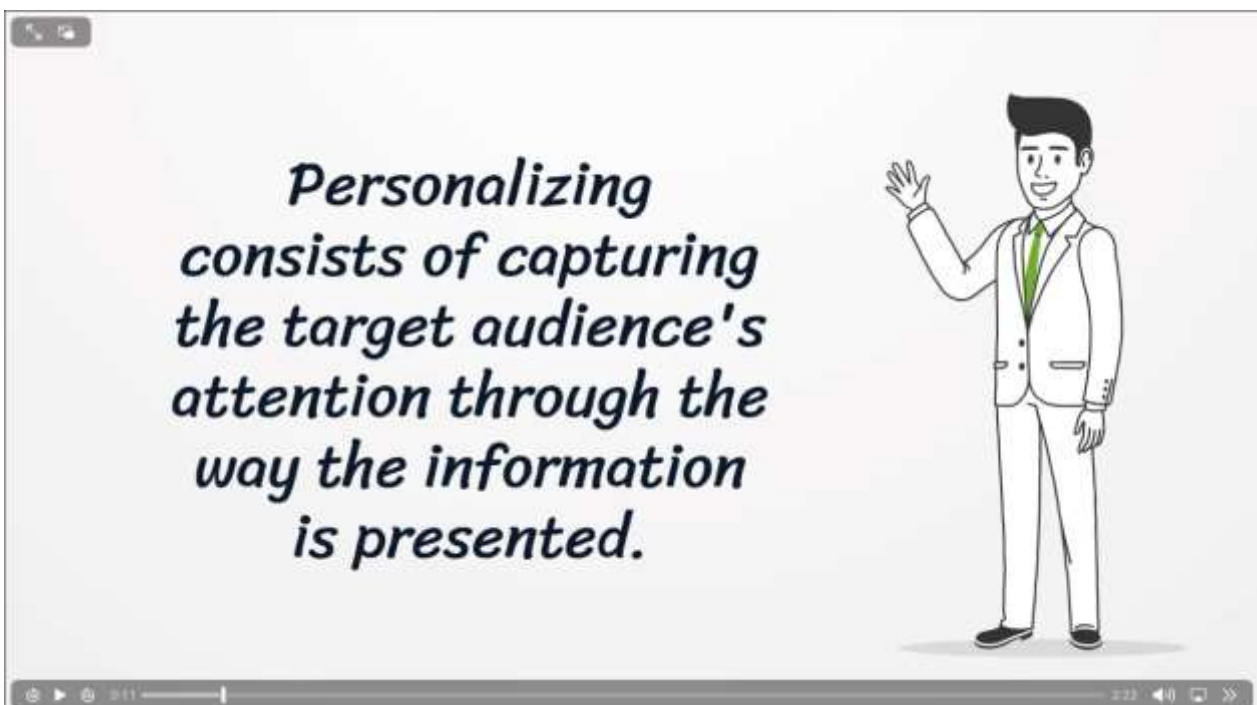
Storytelling is a media production in which the multimedia potential is used to tell short stories of 3 to 5 minutes, combining the word, narration, still image, music or sound effect. The process requires mastery of research, writing, information selection and organisation, image recording, audio recording and editing of the whole set (Lencastre, Bento, & Magalhães, 2016), which can be done with a smartphone or tablet, as they are true multimedia tools.

Objectives

Module 4 aims to present the concept of storytelling as a process for creating a multimodal narrative related to a science communication resource, using digital tools (such as a smartphone or a tablet).



Presentation video



<http://ceh.ilch.uminho.pt/portlingue/wp-content/uploads/2022/01/personalizar-en-1.mp4>



Presentation video

In the “game” theme, the terms gamification and game-based learning are sometimes used synonymously. However, there are distinct differences between the two concepts. While game-based learning integrates (even) games into the process for the student to work on a specific skill or achieve a learning objective, gamification uses game elements in non-play activities to motivate and engage students in problem solving (Lencastre, Bento, İlin, & Milios, 2021). In essence, the learning experience itself is transformed into an educational game using a narrative, missions, goals, point systems, levels, and rewards. These game elements are all integrated to help the student achieve learning goals.



<https://bit.ly/3rF76fM>



Challenge

- Choose a scientific concept and gather some scientific information about that concept.
- Think of a narrative to approach the concept. Work the narrative in the game's logic, with missions, goals, levels, point systems and rewards.
- Think of a set of 3 tasks to fulfill this narrative.
- Define 3 gamification elements that can be used to involve the student in the tasks.



Quizz

Question 1: What is gamification?

Question 2: Are gamification and game-based learning the same?

Question 3: What is meant by “narrative” in game logic?

Question 4: Indicate three game elements that can be used in gamification.

Question 5: What does positive competitiveness consist of?



Resources: Bibliography, websites, computer applications

- Lencastre, J. A., Bento, M., İlin, G., & Milios, P. (2021). Starting the Game: an introduction to Gamification. In José Alberto Lencastre et al. (eds), *Gaming in Action*, (pp. 5-14). Istanbul: ÖzKaracan.
Please use this identifier to cite or link to this item:
<http://hdl.handle.net/1822/73539>
- Lencastre, J. A., Spânu, P., İlin, G. Milios, P., & Bento, M. (2021). *Gaming in Action*. Istanbul: ÖzKaracan.
Please use this identifier to cite or link to this item:
<http://hdl.handle.net/1822/73540>
- İlin, G., & Lencastre, J. A. (2021). A Brief Surf on the Net for Gamification Research. In José Alberto Lencastre et al. (Des), *Gaming in Action*, (pp. 15-33). Istanbul: ÖzKaracan.
- Please use this identifier to cite or link to this item:
<http://hdl.handle.net/1822/73541>
- Barradas, R., & Lencastre, J. A. (2021). Gamification and game-based learning: strategies to promote positive competitiveness in the teaching and learning processes. In José Alberto Lencastre et al. (eds), *Gaming in Action*, (pp. 51-75). Istanbul: ÖzKaracan.
- Please use this identifier to cite or link to this item:
<http://hdl.handle.net/1822/73542>



Challenge

- View storytelling videos.
- Design a multimodal narrative relating to a science communication resource.
- Create digital storytelling using digital tools (such as a smartphone or tablet).
- Publish the storytelling on the online platform.

Quiz

Question 1: Storytelling is one of the earliest forms of folk art:

- True
- False

Question 2: The student should not insert himself into the narrative when telling the story:

- True
- False

Question 3: Should a narrative be invented:

- True
- False

Question 4: Storytelling promotes the use of student creativity:

- True
- False

Question 5: When designing a narrative, should the student be encouraged to tell the story in sequential order:


- True
- False



Resources: Bibliography, websites, computer applications

- Lencastre, J. A., Bento, M., & Magalhães, C. (2016). Mobile Learning: potencial de inovação pedagógica. In Tânia Maria Hetkowski & Maria Altina Ramos (orgs.), *Tecnologias e processos inovadores na educação* (pp. 159-176). Curitiba: Editora CRV.

Producing



MÓDULO 5 | PRODUCING

Creation of a multimodal Science Communication output

This module aims at the creation of the audiovisual pitch using both filming (with the smartphone) and animated video tools.

Objective

This module aims to provide technical recommendations and digital tools for creating a pitch in audiovisual format. If they intend to use a cell phone to film, students need to pay attention to several logistical aspects (avoid scenarios with windows or strong lighting from behind, a noisy place, etc.). If opting for an animated video, students need to explore the features available in animated videos.



Presentation video



<http://ceh.ilch.uminho.pt/portlingue/wp-content/uploads/2022/01/produzir-en-1.mp4>



<https://www.youtube.com/watch?v=SWPDYhtX96Y>

Challenge

- Convert the first two scenes of your storyboard into an animated image;
- Record and edit the audio referring to these two scenes using an audio editor;
- Import and synchronize the audio with the animated images created in the initial stage;

Quiz

Question 1: What is the best video orientation before starting to produce?

- Horizontal for media such as websites, youtube or television;
- Vertical for social media like Instagram or other 100% mobile supports.

Question 2: Which of this software for Android or IOS allows you to edit video, join multiple recordings, add narration, background music, text and effects?

- VLLo
- Powtoon
- Moovly

Question 3: How to ensure cell phone stabilization before starting shooting?

Question 4: Vocal qualities (tone, rhythm and prosody) are part of:

- verbal communication
- nonverbal communication

Question 5: Do you want to film your pitch or present it as an animated video? Justify the choice.



Resources: Bibliography, websites, computer applications

Animated video creation tools

- Animoto: <https://animoto.com/>
- Powtoon: <https://www.powtoon.com/>
- Moovly: <https://www.moovly.com/>