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Project Acronym: PAFSE

Project title: Partnerships for Science Education

3D ANIMATION TO ADDRESS PANDEMIC CHALLENGES

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Context and relevance for public health education

3D animation can be a useful resource to study typical objects that otherwise could not be visually perceived. 3D animations can be a dynamic way of creating a visual explanation of things based on different media (i.e., multimedia contents) that could be difficult for students to understand or build a mental model of, with only text or still imagery content.

The use of 3D animations in medical education is becoming increasingly popular. Indeed, animations are an efficient way to present complex information, reducing time spent reading textbooks. Thus, in the educational contexts, animations can help students learn more efficiently, retain and better understand information. In addition to improving the learning experience, medical education is a highly important and necessary endeavor, as it can directly affect the lives of patients. These videos can be useful in emergency care instructions and provide information about how to administer CPR to a patient, or help in forensic reconstructions; a doctor might explain a medical term to a patient in a friendly way, and they can also help patients understand complex procedures.

Highly engaging educational content is becoming essential to improving the overall learning experience. A plethora of data exists that confirms what many health care professionals know intuitively: that multimedia content, including 3D animation education, is superior to text-based or static image education content. When culturally suitable images and language are added, the efficacy is increased and the outcomes improve.

This scenario supports science and ICT teachers in exploring 3D animation. The learning experience supports youths in understanding how Art and Technology may contribute to have high-quality 3D models useful for public health purposes.

Estimated Duration

7 classes of 40-45 minutes (lesson 1 – lesson 7)
4 sessions of 40-45 minutes for supplementary learning activities and school project (session 8 – session 11)

Prerequisite knowledge and skills

Basic ICT notions

Classroom organization requirements

ICT classroom with access to computers.

To carry out the research project, students will work in groups of 4 or 5 elements. It is necessary to have a computer/tablet with internet access.

Content glossary

2D Animation. 2D, or two-dimensional animation, is a combination of artistic technique and media design that creates the illusion of movement in a two-dimensional environment. By sequencing individual drawings together over time, characters, backgrounds, objects, and effects look as if they are moving. This is commonly done for animated movies and television, but it is also seen in video games, websites, mobile apps, and advertisements.

3D Animation. 3D animation is a graphic technique that utilizes motion in order to bring characters, objects, props, and more to life, placing them into a digital environment. 3D animation has become

widely used: gaming, TV shows, movies, corporate ad campaigns, architectural modeling, medical research. 3D animations are used across many industries and for diverse purposes.

3D Environment. 3D environment is the generation of realistic computer-controlled digital settings for games, film, architectural renderings, and advertising using specialized computer software.

Animation Parameters. Animation Parameters are variables that are defined within an Animator Controller that can be accessed and assigned values from scripts. This is how a script can control or affect the flow of the state machine.

Augmented Reality. Augmented reality (AR) is the integration of digital information with the user's environment in real time. Unlike virtual reality (VR), which creates a totally artificial environment, AR users experience a real-world environment with generated perceptual information overlaid on top of it.

Camera Angles. Is the direction in which the camera is pointed in relation to the action being recorded.

Collaboration. A recognized relationship among different sectors or groups, which have been formed to take action on an issue in a way that is more effective or sustainable than might be achieved by the public health sector acting alone.

Equity/equitable. Equity means fairness. Equity in health means that peoples' needs guide the distribution of opportunities for well-being. Inequities occur as a consequence of differences in opportunity, which result, for example in unequal access to health services, nutritious food or adequate housing. In such cases, inequalities in health status arise as a consequence of inequities in opportunities in life.

Health. A state of complete physical, social and mental well-being, and not merely the absence of disease or infirmity.

Multimedia Contents. Multimedia refers to various types of media content, used together. Multimedia content includes text, graphic image files, audio files, video clips.

Public health. An organized activity of society to promote, protect, improve, and – when necessary – restore the health of individuals, specified groups, or the entire population. It is a combination of sciences,

Rendering Process. 3D rendering is the process of using a computer to generate a 2D image from a digital three-dimensional scene. To generate an image, specific methodologies and special software and hardware are used.

Research. Activities designed to develop or contribute to knowledge, e.g., theories, principles, relationships, or the information on which these are based. Research may be conducted simply by observation and inference, or by using experiment, in which the researcher alters or manipulates conditions in order to observe and study the consequences of doing so.

Rigging Process. Rigging is a technique used in skeletal animation for representing a 3D character model using a series of interconnected digital bones. Specifically, rigging refers to the process of creating the bone structure of a 3D model. This bone structure is used to manipulate the 3D model like a puppet for animation.

Skinning Process. Skinning is the process of binding the actual 3D mesh to the joint setup created. This means that the joints will have influence on the vertices of the model and move them accordingly.

Special VFX. Visual effects (VFX) is a term used to describe imagery created, manipulated, or enhanced for any film, or other moving media that doesn't take place during live-action shooting. VFX often

involves the integration between actual footage and this manipulated imagery to create realistic looking environments for the context.

Storyboard. A storyboard is a visual representation of a film sequence and breaks down the action into individual panels. It is a series of ordered drawings, with camera direction, dialogue, or other pertinent details. It sketches out how a video will unfold, shot by shot.

Video Editing. Video editing is the process of manipulating and rearranging video shots to create a new work. Editing is usually considered to be one part of the post production process — other post-production tasks include titling, color correction, sound mixing, etc.

Virtual Reality. Virtual reality is the use of computer technology to create simulated environments. Virtual reality places the user inside a three-dimensional experience and, instead of viewing a screen in front of them, users are immersed in and interact with 3D worlds by using special equipment.

Pedagogical glossary

Active Learning. A teaching and learning approach that "engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. It emphasizes higher-order thinking and often involves group work".

Brainstorming: An instructional technique with several variations, that might take place within small group or with the entire class. During brainstorming all students shortly express their ideas or concepts which are relevant to a given guiding question or central term. Criticism on the ideas is absent during brainstorming and its aim is the production of a lot and divergent ideas.

Collaborative Learning. An umbrella term that covers many different methods in which students work together to solve a problem, complete a task, or create a product. Collaborative learning is founded in the concept that learning and knowledge building is social and requires active engagement from students.

Critical Thinking. The mental processes used when evaluating information that has been put forth as true. Consists of reflection, examination, and formation of judgement. Information is gathered through communication, experience, reasoning and observation. While based in values of intellect, critical thinking goes beyond subject/matter division.

Debate Technique. A verbal technique used with the purpose of involving a group in a certain theme that will be exposed. This technique consists of dividing two or more subgroups in which each one participates in the discussion of a general theme and in the construction of a "general commitment" of all.

Information. Facts, ideas, concepts and data that have been recorded, analyzed, and organized in a way that facilitates interpretation and subsequent action.

Group Work. Deepens knowledge, develops research and problem-solving skills; develops attitudes of participation, cooperation, creativity and collaboration; develops teamwork attitudes, social skills and knowledge.

Inquiry based learning. By the term inquiry-based learning we refer to the engagement of students in learning activities during which they practice several scientific inquiry skills. Students make use of these skills in order to answer to scientific questions either posed by the students themselves or by the teacher, by the handling of authentic data, either experimentally collected by themselves or given already collected. Some common inquiry skills include constructing and using models, carrying out experiments,

data collection and organization, variable handling, data driven conclusion making and communicating over scientific issues.

Knowledge. A familiarity, awareness or understanding of someone or something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering, or learning.

Pedagogical Techniques. Essential resources that the teacher uses to enhance the pedagogical relationship between the students and the teacher in order to ensure learning. Different forms of application to achieve the objectives of a class.

Project based learning. Project based learning is an instructional model of active learning. It has several forms, during which students work in groups on the development of projects, which often refer to authentic problems or situations approaching real life conditions. Project based learning includes the phases of project initiation, project development and project presentation.

Skill. The ability to carry out a task with pre-determined results often within a given amount of time, energy, or both. Skills can often be divided into domain general and domain-specific skills.

Sources: EuroHealthNet; Learn.org; Techtarget; Studiobinder; Mediacollege; Conceptartempire; Unity3d

Indicative literature

- Richard Williams, "O Kit de Sobrevivência do Animador"
- Isaac Kerlow, "The Art of 3D Computer Animation and Effects"
- Allan Brito, "Blender 2.8 - Guia Rápido"

Competences / Learning Goals

Key Competences
STEM / 3D Animation / Innovation

Knowledge
3D animation concepts:

- ✓ 3D animations' technical principles and workflows.
- ✓ Tools for creating 3D animations.
- ✓ Shortcuts for fast animations.

Knowledge – outcome assessment:
1. Understands the importance of 3D animations to address public health.
2. Understands the 3D animation technical principles and workflows.
3. Recognizes software basic features regarding rendering.
4. Is able to understand the importance of 3D animations to address pandemic challenges.

Skills (abilities/competences):
General: 3D animation basics, Imagination, Creativity
Specific:

- ✓ Animation of 3D elements by combining process knowledge, computational design tools and application requirements.
- ✓ Technical usage of 3D animation software.

Skills – outcome assessment:

1. Recognizes appropriate proficiencies necessary for 3D animation.
2. Is able to understand the virtual environment.
3. Is able to identify the differences of multiple 3D animation software.
4. Can animate specific 3D objects.
5. Recognizes that 3D animation can improve public health.

Affective /Attitudes/Behaviour (*beliefs)*

✓ Make use of intellectual curiosity to solve problems.
✓ Using creativity skills on new technologies in the development process of the solution.
✓ Using imagination for designing real tools and materials.

Affective, Attitudes and behavior - outcome assessment:

1. Believes that is important to create awareness on how 3D animation can help the community.
2. Has intention to continue extending the skills and knowledge regarding 3D animation.
3. Is aware of the democratization of 3D animation for public health.
4. Attitude towards 3D animation.
5. Believes that is important to improve one's own personal capabilities.

Learning goals and outcomes

✓ Uses online tools to 3D animation.
✓ Analyzes models.
✓ Identifies 3D environments and basic features.
✓ Animates basic elements in a 3D environment.
✓ Exports animations.

Assessment methods

✓ Outcome assessment
  o Qualitative - project: creation of a 3D animation within a STEM context.
  o Quantitative – questionnaire - – impact assessment in terms of students' knowledge, skills, attitudes and behaviors

✓ Process assessment - assessment of the teaching-learning sequence – observation grid: reaching the target audience, and extent; implementation of the scenario as planned; run of the learning scenario as expected/organizational issues to be solved; duration of the teaching-learning sequence; number of people exposed; score for likeability – students ("how fun was it to do"/ how fun would be to do again/ how could it be better).

Content (relevant to learning goals & research topics)

STEM content

▪ Animations in 3D environment
▪ Animate 3D objects. Basic animation programs.

Non-STEM content

▪ Brainstorming on 3D animation approaches.
▪ Group and public debates.

Digital learning objects

- 3D animation basic features: RIGGING and SKINNING (video and tutorial).
- 3D animation basic features: ANIMATION PARAMETERS (video and tutorial).
- 3D animation basic features: CAMERA ANGLES and TECHNIQUES (video and tutorial).
- 3D modelling software basic features: EXPORTING/RENDERING (video tutorial).
- Questionnaire – quantitative assessment of learnings.

Digital educational resources

- Introduction of 3D animation (video and PowerPoint).
- Pedagogical glossary for technical terms and definitions (infographic).
- 3D animation and approaches (video).
- Impact of 3D Animation on STEM (infographic).
- Key principles for 3D animation (video).
- Principles for 3D animation (PowerPoint).
- Show different basic objects to animate in 3D (infographic).
- Techniques for moving a 3D camera (video).

Available resources (link):
Photodentro Repository (http://photodentro.pafse.eu)

Teaching – Learning activities (lesson plan/ learning trajectory)

Principal target:
ICT classes.
8th grade (+/- 14 years old students).
ICT teachers integrate other colleagues in the enactment of the scenario (e.g., ICT, visual education, science and English teachers), as it aims to be interdisciplinary.

Lesson 1: Introduction of 3D animation

The teaching-learning script starts with a question "what is a 3D animation"?

➢ group discussion around the question "What is a 3D animation?"

Students are divided into groups and asked to share their thoughts on what 3D animation means. This activity will contribute to reveal the students' initial ideas of the topic, helping teachers understand their skills and knowledge on the subject. Also, this activity should be presented to the students as a theoretical background of the 3D animation and its practical applications, and will be important for teachers to introduce the subject on what involves 3D animation and the current limitations of scientific evidence. Examples: level of skill required for professional and complex animations, 3D animations can be more limiting regarding styles and shapes than 2D ones in some situations, the resource consumption of the rendering process.

➢ digital educational resource: pedagogical glossary for technical terms and definitions
➢ digital educational resource: 3d animation introduction (PowerPoint)

Introduction of 3D animations using a PowerPoint presentation with several examples in different fields of study: Architectural 3D Animations; 3D Character Animation; 3D Graphics; 3D Product Visualizations; Website 3D Animated Intros. Furthermore, several videos made with 3D objects in 3D environments will be presented.

Lesson 2: The democratization of 3D animation

➤ brainstorming on the question "what can 3D animations represent"?

Students are asked to search on GOOGLE, in groups, key definitions of a 3D animation and in which situations it can be used. Each group should produce at least three different sentences and examples; read them and select the main keywords for sharing, regarding the areas of expertise where 3D animations can be used. Then, they go to the flipchart or whiteboard and write the main keywords. The next step is a video presentation about the different types of animations. After, a discussion is mandatory about their previous definitions and keywords and their recent new knowledge about the topic learned. After a short conversation about the previous lesson, 3D animation and approaches are presented to be discussed. Also, this activity is important to provide awareness on public health challenges, their impact on STEM and their interactive parameters with specific examples, presenting ideas on how to tackle these issues resorting to 3D animation.

Lesson 3: The key principals of 3D animation

➤ digital educational resource: Key principles for 3D animation (video)

The principles for 3D animation will be presented: from concept and storyboards, compositing and special VFX, to editing and final output. Simple exercises will be done, and replicated by the students, demonstrating the steps for creating an animation.

➤ debate: "How can we 3D animate this object? E.g., a car engine."

The aim is to show different basic objects and discuss and reveal which basic elements can be used to animate the objects shown.

Lesson 4: 3D animation basic features: RIGGING AND SKINNING

The teaching-learning script starts with the presentation of the what is the animation rigging process, providing an individual hands-on approach.

➤ learning object: 3D animation tutorial about rigging (video tutorial)

A step-by-step video on how to complete the rigging process will be shown. And after, individually, students will replicate the basic functionality in the computer.

➤ learning object: 3D animation tutorial about skinning (video tutorial)

After a first approach on object rigging, a simple step-by-step tutorial will be provided explaining the skinning process and students will autonomously and individually do it.

➤ debate around the questions
    "What does rigging do?"
    "Why is the process of rigging important?"
    "How can we complete the skinning process?"

Lesson 5: 3D animation basic features: ANIMATION PARAMETERS

Students are introduced to parameters in 3D animation.

➤ learning object: types of parameters (video tutorial)
➤ learning object: tutorial (step by step)
➤ group work (the availability of laptops or tablets for group work is required)

Students are organized in groups (1 group – 1 Animation) and invited to create simple daily objects animation. After, they will present their work to the colleagues.

Lesson 6: 3D animation basic features: CAMERA ANGLES AND TECHNIQUES
Students are introduced to camera angles and techniques in 3D animation.

➢ learning object: camera settings (video tutorial)

Students are shown the different settings to mimic real camera features, as focal length, depth of field, etc.

➢ learning object: techniques (step-by-step tutorial)

Other options for moving a 3D camera are similar to those in movie making, including truck, dolly, motion blur, orbit and pan.

➢ group work (the availability of laptops or tablets for group work is required)

Lesson 7: 3D animation basic features: EXPORTING/RENDERING

To finalize the first complete exercise in 3D animation environment, students will learn what is the process of EXPOR/RENDER, which differs from the normal process regarding 3D modelling.

➢ digital educational resource: 3D ANIMATION EXPOR/RENDER (manual)
➢ Quantitative assessment - questionnaire
➢ Presentation and Activity in groups (also works as qualitative assessment):
Students must present their animated objects and for each presentation, in groups, the other students need to identify which features used or which other solutions maybe used to improve to animation presented.

Lesson 7-forward:

After building and presenting their work, students are challenged to model other 3D objects in groupwork. This is the **School Project** described below.

Supplementary educational activities

Lesson 8, devoted to the preparation of the school project, includes:

1. Teleconference with STEM professionals (e.g., Engineers, Designers Medical Doctors, or researchers of PAFSE consortium):
Students make questions to experts with a particular focus on: a) future academic choices and career paths; b) identifying new professions in new fields of industry 4.0.

2. Visit to FABLAB:
Students make questions to experts with a particular focus on tools to create 3D animations. These activities are relevant for students' connections with possible STEM curriculums and careers. Students are shown the working environment and dynamic of a FABLAB.

School Research Project

Topics

▪ Importance of 3D animation.
▪ Technical features and principles of 3D animation.
▪ Possible applications of 3D animation in public health topic.

Research management, design and administration

Challenge: To animate an 3D object to address communicable diseases challenges

Method: Lesson 8 to 11 will be dedicated to the school research project. Students are organized in groups; each group addresses 1 object based on the daily pandemic challenges lived. The project challenges each group of students to: 1) identify and represent their progress in the form of essay responses and using Likert scales to show their improvement from the first lesson to the last; 2) animate and present an object with what they have learned throughout the teaching-learning sequences and the ideas that emerged during the teleconference with experts. A competition and reward for the best 3D objects will take place.

Teaching-learning process milestones:

1. Students will be able to propose solutions for 3D animation of basic objects.
2. Students will be able to communicate the findings, motivations and limitations of various 3D animations considered in the work process.
3. Students will be able to identify and communicate the importance of 3D animation to address pandemic challenges but also the role Innovation.
4. Students will be able to use technical argumentation to justify policy choices.

Teaching-learning process for school project (summary):

1. Development of materials (videos, tutorials, pictures).
2. 3D animation objects.
3. Presentation of the 3D animations in open schooling event.

Organization of the open schooling event:
1. Each project output (3D animation) is presented by the students in a community setting (e.g., exposition center, municipality, garden, museum, science fair) in a 3D prepared environment (all apparatus included).
2. Students will prepare a pitch on how 3D animation can address pandemic challenges. Technical speeches to motivate peers to new technologies and environments.
3. Students, parents, school community and relevant local stakeholders attend the event and are introduced on the topic on how 3D animation can be used to address pandemic challenges. Furthermore, the scenario has a multidisciplinary approach, such as in art, design, engineering and mathematics.

Data Analysis and Reporting
- Content Analysis.
- Presentation formats.
- Report writing.
- Development of presentation.

Target Audience for Recommendations

School community and local stakeholders: students, parents, municipalities, designers, engineers, and local enterprises.

Public Debate and Recommendations (based on research results)
Presentation of the 3D animations produced by students in a community setting and dissemination of evidence recommendations via social, community and conventional media.

Main Partner responsible: INESC-TEC

Assessment Questionnaire- Knowledge, Skills, Beliefs, attitudes and behavior

Scenario topic: 3D ANIMATION

Knowledge	
1. Understands the importance of 3D animations to address public health	**Question 1.1:** Which of the following sentences is NOT true? A) 3D animations are a useful resource to help raise awareness on appropriate behaviors during the pandemic, such as teaching how to put the mask and disinfect our hands often. B) 3D animations can make a person more aware of the environment and the community. C) 3D animations play an important role in increasing the digital footprint. **Question 1.2:** Which of the following sentences is NOT true? A) 3D animations represent a paradigm shift in public awareness. B) 3D animations are able to provide a model to improve the community's understanding on different abstract concepts. C) All of the above. **Question 1.3:** Which of the following applications of 3D animation regarding heath purposes is correct? A) Perform safer and more efficient diagnosis and treatments. B) Make treatment processes slower. C) Hamper the communication between professionals and patients. **Question 1.4:** Which of the following sentences is correct? A) 3D animation does not allow to create complex scenarios. B) 3D animation cannot portray the right scaling of objects. C) 3D animation is useful for virtual surgical planning. **Question 1.5**: Which public health emergencies can 3D animation be useful for? A) Create replicas of organs and skeleton parts for education purposes. B) Plan surgeries. C) All of the above.
2. Understands the 3D animation technical principles and workflows.	**Question 2.1:** How many axes can we manipulate in a 3D animation? A) 1. B) 2. C) 3. **Question 2.2:** What is the coordinate system used in the 3D animation software? A) Polar coordinate system. B) Cartesian coordinate system. C) Cylindrical and spherical coordinate system.

	Question 2.3: Where is the timeline usually displayed? A) At the top. B) At the right sidebar. C) At the bottom. **Question 2.4:** What is a 3D Viewport? A) It is the area showing objects in rendering-device-specific coordinates, in which the objects of interest are going to be animated and rendered. B) It is a collection of settings that determine model display. C) It is the setup that is required to change the settings of the animation. **Question 2.5:** What areas of interest are visible in the workspace? A) The viewport and the properties editor. B) The system's preferences and settings. C) All of the above.
3. Recognizes software basic features regarding rendering.	**Question 3.1**: What is the goal of the animation render process? A) To replace real objects with digital information. B) To create objects that will be displayed in the metaverse. C) To animate digital objects as closer to reality as possible. **Question 3.2**: Is it possible to render only a portion of the animation? A) Yes, by choosing the animation section option. B) Yes, by choosing the crop image area option. C) No. **Question 3.3**: Which of the following daily activities can be improved by 3D animation? A) An architect showing a realistic design of a building. B) A mechanic engineer explaining how a specific motor part works. C) All of the above.
4. Is able to understand the importance of 3D animations to address pandemic challenges.	**Question 4.1**: Which of the following sentences is NOT true? A) The role of 3D animation in the hospital environment provides custom-made animations of equipment's specifications and medical procedure's processes to facilitate the learning curve. B) 3D animation helps show custom-made solutions that would otherwise be very expensive to prototype. C) All of the above. **Question 4.2**: Which of the following sentences represent an advantage of 3D animation in public health? A) 3D animation offers a way to create detailed spatial representations, achieved quickly and at little cost, and increases resource mapping more effortless. B) 3D animation helps the designers and end users visualize requirements, but it reduces accuracy.

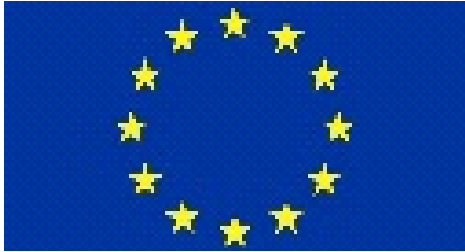|	
	C) 3D animation only reduces costs. **Question 4.3**: Which of the following sentences is NOT true, regarding 3D animations during a pandemic? A) 3D animation is a powerful tool for providing a visual aid about the virus and help educate the communities. B) 3D animation can help people visualize the virus and help objectify a pandemic, from animating the virus itself, to how it spreads, how it functions, etc. C) 3D animation is not suitable to express something abstract in a concrete form. **Question 4.4**: In what situations can 3D animation help address pandemic challenges? A) Create 3D medical animations to explain what a pandemic is, rates of infection and ways to protect against infections. B) Help demonstrate the biology and mechanism of action (MoA) that viruses use to infect and destroy human cells. C) All of the above.
SKILLS	
1. Recognizes appropriate proficiencies necessary for 3D animation.	**Question 1.1:** Which of the following responsibilities is NOT required to be a 3D animator? A) To animate 3D objects based on provided specifications. B) To calculate effort estimations of the objects. C) To refine, optimize or correct 3D models. **Question 1.2:** Which of the following skills is NOT needed for 3D animation? A) Knowledge of coding. B) An eye for detail and good visualization skills. C) Knowledge of 3D animation tools such as 3DS Max, Maya, Zbrush, Blender. **Question 1.3:** Which of the following is NOT a type of object that can be animated? A) Engineering parts. B) Organic objects. C) None of the above. **Question 1.4:** Which of the following is NOT a benefit of 3D animation? A) Produce realistic objects' animations that can be solid to a spectator. B) Create scenes for a fraction of the cost compared to traditional recording methods. C) Provide simple views of objects with low detail.

2. Is able to understand the virtual environment.	**Question 2.1:** I feel able to understand the coordinate system used in 3D animation software. 1) definitely true... 5) definitively false. **Question 2.2:** I feel able to navigate the software interface and choose the right tools for the work. 1) definitely true... 5) definitively false. **Question 2.3:** I feel able to adopt 3D animation to help people visualize abstract concepts. 1) definitely true... 5) definitively false. **Question 2.4:** Which dimensions of spatial context can be considered when animating 3D objects? A) Spatial context focused specifically on object properties, object relationships and perception of space. B) Comparison of 2D and 3D map variants. C) The cost of the 3D object's materials and components. **Question 2.5:** What types of virtual environments are most used to create immersive 3D experiences? A) Virtual reality and mixed reality. B) 2D Videos. C) Social media accounts. **Question 2.6:** Which of the following is NOT a feature of a 3D animation environment? A) Create a virtual habitat. B) Have a figurative appearance. C) Create a persona.
3. Is able to identify the differences of multiple 3D animation software.	**Question 3.1:** I feel able to identify the differences in the layout / options of distinctive 3D animation software. 1) strongly disagree… 5) strongly agree. **Question 3.2:** I feel able to work with / use different 3D animation software. 1) strongly disagree… 5) strongly agree **Question 3.3:** I feel able to identify the main limitations, as well as advantages of each distinctive animation software. 1) strongly disagree… 5) strongly agree. **Question 3.4:** Which of the following 3D animation software is more adequate for video game character design? A) Maya. B) Solidworks. C) ZBrush. **Question 3.5:** Which of the following 3D animation software is more adequate for prototypes' animations?

	A) Blender. B) Solid Edge. C) All of the above.
4. Can animate specific 3D objects.	**Question 4.1:** I feel able to create a 3D animation from scratch. 1) definitely true... 5) definitively false. **Question 4.2:** I feel able to modify the camera's properties for rendering an animation. 1) definitely true... 5) definitively false. **Question 4.3:** I feel able to animate low poly objects, as well as more complex meshes. 1) definitely true... 5) definitively false. **Question 4.4:** I feel able to determine / alter the lighting setup for 3D animation. 1) definitely true... 5) definitively false **Question 4.5:** I feel able to animate a whole set / scenery involving different 3D elements. 1) definitely true... 5) definitively false. **Question 4.6:** Which of the following stages is in the correct order? A) 1. Rigging & skinning, 2. Rendering, 3. Compositing & VFX. B) 1. Animation, 2. Rendering, 3. Compositing & VFX. C) 1. Rendering, 2. Animation, 3. Rigging & skinning. **Question 4.7:** Which of the following features is not required for 3D animation? A) Cameras. B) Lighting. C) Vectors.
5. Recognizes that 3D animation can improve public health.	**Question 5.1:** I feel able to create 3D animations that can help educate my community on specific subjects. 1) strongly disagree… 5) strongly agree. **Question 5.2:** I feel able to animate daily objects that can improve the community's quality of life. 1) strongly disagree… 5) strongly agree. **Question 5.3:** I feel able to create complex animations for my school to help ensure better teaching environments. 1) strongly disagree… 5) strongly agree.

	Question 5.4: Which of the following scenarios can take advantage of 3D animation? A) Zoom in on a molecular level. B) Deconstruct a medical device to show how it works from the inside. C) All of the above. **Question 5.5:** Which of the following objects can be animated in order to show how they work to the community? A) Face shields and protective eyewear. B) Specimen collectors and ventilators. C) All of the above.
Beliefs, attitudes and behavior	Include: There are no correct or incorrect answers; we are only interested in knowing your perspective.
1. Believes that is important to create awareness on how 3D animation can help the community.	**Question 1.1:** The animation of 3D objects of my own can contribute to the global society's awareness about the importance of this field. 1) Extremely unlikely... 5) Extremely likely. **Question 1.2:** I am able to explain to my family and friends the importance of 3D animation. 1) strongly disagree… 5) strongly agree. **Question 1.3:** I think society still does not fully understand the importance of 3D animation. 1) strongly disagree… 5) strongly agree. **Question 1.4:** I feel 3D animation has great potential for changing the mindsets of the communities. 1) strongly disagree… 5) strongly agree. **Question 1.5:** I believe that 3D animation is important / useful in our daily lives. 1) strongly disagree… 5) strongly agree **Question 1.6:** I feel that the free use and dynamization of 3D animations in my community can be extremely important for educating the public on specific behaviours and decisions. 1) strongly disagree… 5) strongly agree.
2. Has intention to continue extending the skills and knowledge regarding 3D animation	**Question 2.1:** I feel that the 3D animation process is pleasant and exciting. 1) strongly disagree… 5) strongly agree. **Question 2.2:** I feel that the 3D animation is easy to accomplish. 1) strongly disagree… 5) strongly agree. **Question 2.3:** I feel highly motivated to pursue a career in this field of expertise.

	1) strongly disagree… 5) strongly agree. **Question 2.4:** I feel curiosity to know more about 3D animation and improve my skills. 1) Extremely unlikely... 5) Extremely likely.
3. Is aware of the democratization of 3D animation for public health.	**Question 3.1:** I feel that the massification of 3D animation is beneficial for society, specifically regarding public health. 1) strongly disagree… 5) strongly agree. **Question 3.2:** I feel highly motivated to start contributing with my own 3D animations and share them with others with an open-source agreement. 1) Extremely unlikely... 5) Extremely likely. **Question 3.3:** I agree with the dissemination of 3D animations, free of royalties, to the empowerment of society regarding a better / smarter response of the health market in public health emergencies (like a pandemic). 1) strongly disagree… 5) strongly agree. **Question 3.4:** I agree that 3D animation can help people visualize abstract concepts (like viruses) and help objectify a pandemic, from animating the virus itself, to how it spreads, how it functions, etc. 1) strongly disagree… 5) strongly agree.
4. Attitude towards 3D animation.	**Question 4.1:** For me, the process of 3D animation is: pleasant :_____:_____:_____:_____:_____: unpleasant good :_____:_____:_____:_____:_____: bad worthless :_____:_____:_____:_____:_____: valuable enjoyable :_____:_____:_____:_____:_____: unenjoyable
5. Believes that is important to improve one's own personal capabilities.	**Question 5.1:** I feel 3D animation helps me expand my knowledge of art. 1) strongly disagree… 5) strongly agree. **Question 5.2:** I feel 3D animation helps me to develop my creativity. 1) strongly disagree… 5) strongly agree. **Question 5.3:** I feel 3D animation helps me lose my fear of making mistakes. 1) strongly disagree… 5) strongly agree.

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