



**WP4**  
**A5**

## **Serious Game co-design guidelines**

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## Background

In the framework of the **D-ChallengHE** project<sup>1</sup>, *Digital Challenge in Higher Education*, conducted in collaboration between Link Campus University (Rome), Academia (Slovenia), Klaipeda University (Lithuania), The Institute of Education (Romania) and the Hellenic Open University (Greece), teachers and students were involved in a co-design process for the creation of a Serious Game (SG), as part of a work package (WP) dedicated to the development of innovative educational tools. The SG methodology, at the heart of this project, represents a significant evolution from traditional approaches, introducing a playful and interactive dimension that can transform learning into a more dynamic and stimulating experience.

The **D-ChallengHE** project was designed to build a collaborative network among universities, research centers, and stakeholders engaged in the digital transformation of higher education. This project focused on creating more dynamic educational and training programs, supporting the professional growth of academic and administrative staff within higher education institutions, and contributing to the dialogue on modernizing higher education in the digital era across the European Union.

The project aimed to:

- Equipping decision-makers and higher education institutions with valuable insights to inform data-driven intervention strategies.
- Strengthening cooperative networks among diverse educational institutions to promote the European dialogue on the modernization of the higher education sector.
- Fostering a digital culture through a multi-stakeholder approach that acknowledges the systemic complexity introduced by information and communication technology (ICT), covering various social and organisational practices, contexts, and learning models.
- Developing a new pedagogical approach that reflects an innovative vision for European e-learning in higher education, with a strong focus on the quality of online teaching and the essential competencies required for teaching in the digital age.

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<sup>1</sup> Project website: <https://d-challenghe.unilink.it/>



This report, entitled *Serious Game co-design guidelines*, opens with a brief introduction to the concept of serious games, with the aim of contextualising the approach and value of this innovative methodology in the field of education and training. Subsequently, the report is divided into two main sections: an operational section and an experiential section, both fundamental to understanding the creation process and the effectiveness of the serious games developed.

The operational section focuses on the methodology adopted for the creation of the serious game, describing each stage of the process in detail. It starts with the definition of the educational and training objectives that the game intends to pursue, and then moves on to the design of the contents and game dynamics. Finally, the technical steps for the insertion and integration of the materials within the editor are illustrated, ensuring that all elements are coherent and meet the set objectives.

The experiential section gives an overview of the serious games developed by the partnership, providing an in-depth analysis of the results obtained. Through feedback collected via an evaluation questionnaire, the most relevant aspects of the user experience are explored, highlighting strengths, areas for improvement and the overall impact of the serious games on participants' skills and involvement. This experiential analysis makes it possible to gather valuable information for the future optimisation of serious games and the improvement of digital teaching strategies.

## What is a Serious Game?

Serious Games can be defined as *"an interactive virtual experience that aims to achieve predetermined learning objectives through the activation of playful dynamics"*. This definition is in line with those who consider the ludic component an indispensable element of SGs and not an accessory variable. Practice with this type of methodology seems to confirm that this component enhances the learning potential of SGs, making them, so to speak, 'multidimensional' learning tools. The game makes it possible to touch different dimensions of learning transversally. It can generate learning from a knowledge perspective, acting above all on an individual level. Moreover, it has always been recognised as a vehicle for social learning; not by chance, there are numerous examples of SGs aimed at enhancing social skills. Finally, allowing one to freely experience different phenomena, situations, and even 'identities' offers the possibility of critically



reflecting on things, affecting attitudes and frames of reference, thus involving the cultural dimension of learning.

SGs are designed to promote a certain type of experience that, as the game progresses, the player can discover and realise. The scenarios the designer creates are nothing more than 'gyms of possibility', places where, in a protected manner, one can experiment with different identities and enrich one's range of behavioural strategies.

In the design of a good SG there is a strong focus, not only on the content, but also on the graphics, the environments, ensuring the adventure is rich and stimulating. The ability to aesthetically engage the player is not an ancillary fact but a decisive element with respect to the ability to generate engagement to provide a rewarding experience. Within the educational context, SGs integrate two key components: a playful aspect, which motivates them, and a didactic aspect, which directs them towards specific learning objectives.

In an educational world where digital technologies sometimes risk seeming cold and impersonal, the Serious Game approach offers an engaging and rewarding alternative capable of generating motivation and pleasure in learning, as confirmed by neuroscience. In this report, we will describe the methodology used and the results obtained in the WP dedicated to the creation of Serious Games, analysing both the co-design process with students and teachers and the educational spin-offs of this innovative methodology.

In the following pages, we will describe a particular teaching methodology, Serious Game (SG), representing both an evolution and a discontinuity from traditional information technology-based solutions. SGs possess original characteristics that open up interesting perspectives for those involved in learning.



## 1. Operational part

The methodology to be followed for the realisation of Serious Games consists of five points:

- 1. Defining objectives:** First of all, it is essential to establish the learning or training objectives that the Serious Game (SG) intends to achieve. These may include specific skills, concepts or attitudes that players should acquire. Once the learning objectives have been defined, it is important to identify specific behaviours that indicate the possession of skills/skills. These behaviours will be used to create the story 'told' by the Serious Game.
- 2. Definition of the story concept:** Next, the Serious game's setting, characters and narrative model must be defined. Based on these first key points, a summary document of the basic information on the concept of the Serious game to be realised must be drawn up.
- 3. Drafting and validation of the storyboard:** Following a template provided by Entropy, the storyboard of the story is drafted, i.e. the description of the phases of the game with the choices required of the player and the interactions envisaged within the Serious game.
- 4. Inserting the Serious Game into the editor:** After validating the storyboard, the Serious Game can be inserted into the editor.
- 5. Testing and validation of Serious Games:** Once the Serious Game is completed, it is tested, and any corrections or changes are made. Once this review phase is completed, SGs can be made playable.

In the D-ChallengeHE project, a structured methodology for creating SG was developed, involving the partners through training sessions, collaborative design and technical support. Each partner participated in three training sessions lasting approximately three hours, during which the fundamental concepts and tools for designing serious games were introduced. The sessions, recorded and uploaded to Google Drive to allow review of the material, were held on different dates for the various partners, ensuring flexible and continuous participation.





During the first meeting, the partners learned how to define the objectives of the serious game, focusing on the skills to be developed and the behaviours to be observed in the participants to evaluate the game's effectiveness. Each partner was given a specific template to organise and structure this information. In the second session, the storyboard structure was illustrated, providing practical guidance on how to write a coherent and engaging narrative. Again, each partner received a template developed by EKN, consisting of three main sections: a summary of the game, a description of each step and specific details on dialogues and choices available to the player. The third session was devoted to the technical part, with a practical demonstration of how the game editor works and a detailed manual for using the platform.

Once the training phase was completed, each partner started to create their own serious game, directly involving the students in the process. EKN provided constant support, organising short meetings to clarify any doubts. After the storyboards had been validated, the partners uploaded their games to the editor. To facilitate the testing and use of the games, EKN created one game creation account and ten user accounts for the students to play and test the developed content.

The project involved a total of 192 participants and led to the creation of 7 SG, each with specific objectives:

- ***Il Circo Magigalu*** (Italy), to explore managerial skills;
- ***Servizio impeccabile: la missione del cameriere*** (Italy), focused on stress management and emotional awareness;
- ***LEA: Limit-Exercise-Advancement*** (Italy), geared towards human resource management and problem solving.
- ***Serious Game*** (Slovenia) is a game focusing on problem-solving, teamwork and time management, set in the context of a fashion photo shoot.
- ***Soft And Communication Skills*** (Lithuania), to enhance educators' soft skills and communication skills, focusing on adaptability to digital teaching.
- ***Mind Mingle*** (Romania), aimed at developing metacognitive skills and strategic thinking.
- ***European Car Rental Service*** (Greece) aimed to strengthen critical thinking and team collaboration.



At the conclusion, each partner administered two questionnaires - one for teachers and one for students - to collect feedback on the experience. In the specific case of LCU, the students also independently evaluated their own serious game, comparing it with that made by their colleagues.

This methodology contributed to realising an interactive and participative educational experience, promoting transversal skills and fostering an innovative pedagogical approach within the D-ChallengHE project.

## 1.1 Definition of objectives

To make an effective Serious Game, one must first have a clear idea of the objective one wants to achieve. To this end, the following three questions must first be asked in order to design a Serious Game:

- What learning objective do I want to achieve with my participants/students?
- What competences should one have in order to be able to say that they are adequate to...
- What behaviour do you expect to see to be able to say that they have developed those skills?

Example:

- **Objective:** to be a good team leader
- **Skills:** Listening, Negotiation, Organisation
- **Behaviour:** Listening (asking questions to get to know the needs of co-workers, respecting the timing of a conversation, expressing empathy and handling emotional reactions well)

## 1.2 Story-concept definition

After identifying the objectives, we proceed to define the three cornerstones of the Serious Game:

1. **Scenario:** in which environment does the story take place?
2. **Characters:** Who are the actors in Serious Game?
3. **Plot:** How does the story unfold?



The identification of objectives and, subsequently, of scenario, characters and plot is a fundamental step to ensure a correct and effective implementation of the Serious Game. Having these aspects clear from the beginning is necessary to build a coherent and engaging game experience, where each element of the Serious Game contributes to achieving the educational objectives. The scenario provides a context that makes learning more realistic and applicable to concrete situations; the characters allow learners to identify and interact with meaningful roles, fostering empathy and engagement; the storyline guides the educational path, making it dynamic and motivating. This careful planning avoids inconsistencies and ensures the entire experience is structured to maximise learning and keep students' attention.

### 1.3 Storyboard drafting and validation

The **storyboard** of our Serious Game must be written for the plot of the game. At this stage, it is necessary to use a template in which all the steps are described in detail.

<b>TITLE</b>	<i>Here we will define the title of our Serious Game</i>
<b>DESCRIPTION</b>	<i>Brief description of the SG</i>
<b>PLAYER GOAL</b>	<i>Description of the objective of the game on a practical level</i>
<b>MAIN GOAL</b>	<i>Describe here the skills you want to train through the Serious Game. This section will not be visible to the player but will only serve the game designer to keep in mind the goal you want to achieve.</i>

Table 1. First part of the storyboard

In the second part of the template, we will define the number of steps, assigning each one a title and deciding whether to structure them linearly or in parallel. With a linear step, the player will continue the game regardless of the answer given. Conversely, by choosing a parallel step, the player can follow different paths depending on the answer selected, thus requiring branching and additional steps. This aspect will be explored in more detail at a later stage.



**TIPS: To avoid 'boring' the player, thus making the Serious Game an anti-productive tool, we suggest a maximum of 15 steps.**

STEP N	TITLE	LINEAR	PARALLEL
STEP 1	<i>Insert a title summarising what happens in this step</i>		
STEP ...			

Table 2. Second part of the storyboard

For each step, the scenario, avatars, and any attachments to be displayed must then be chosen. By 'scenario', we mean the location where the avatar, or more simply the background image of the step, will be placed. You can decide between the images already loaded in the editor or decide to load one. You will also have to define the avatar that will appear on the screen. This can be chosen from one of those already loaded in the editor or, alternatively, you can decide not to insert an avatar for that step. At each step, you can also decide to add a series of internal attachments, such as images, PDFs, videos, Wordwall links, etc. Their viewing can be made compulsory or not, affecting the continuation of the game. If it is made mandatory, the player can only continue if the attachment is opened.

STEP	SCENARIO	AVATAR	Attachments (PDF, audio, video, etc..)
STEP 1	<i>Library room</i>	<i>Kate</i>	<i>www.youtube.com</i>
STEP ...			

Table 3. Third part of the storyboard



After defining the Serious Game outline, the storyboard's last part is dedicated to the **final feedback**. In fact, it is necessary to write a short text that will be returned to the player at the end of the game. The feedback will be of two types: negative, if the player does not score enough to win; positive, if he manages to exceed the threshold of 75% of correct answers.

<i>Negative End</i>	<i>Positive End</i>
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Table 4. Positive and negative ends in the storyboard

After this initial framework, it will be necessary to describe each step in detail. After the previously assigned title, it will be necessary to write the text that we want our avatar to pronounce. Each text will be displayed on the screen, and it is mandatory to generate the audio. In the "player" line, you must write the answers from which the player can choose. Alternatively, you can decide to have the player answer through images. To make an effective Serious Game, it is important to pay close attention to this phase. The questions and answers should be related to the skills that are to be trained, and in writing the answers, one should try to make it as less obvious as possible which answer is correct and which is incorrect. Each answer must be given a score that will influence the game's outcome. Scores are awarded on a scale of 0 to 10, and it is mandatory to enter a 0-point answer. In the "go to" line, the step the player will reach after giving a given answer must be entered. As already mentioned, you can continue in a 'linear' or 'parallel' manner in this step. In the case of the linear step, regardless of the answer, the player will go to the next step (e.g. 2A). If instead you choose the parallel step, you can decide to land the player in a different step (e.g. 2B). This choice is particularly useful when, from the answer given by the player, it is clear that there is a need to deepen some aspects of the topic addressed or even just to avoid making the player repeat the same game over and over again. Finally, for each answer chosen by the player, it can be decided to give feedback on the answer given.

<b>STEP</b>	<b>STEP N 1</b> <i>Title</i>		
<b>AVATAR</b>	<i>Avatar</i> <i>Speech</i>		
<b>PLAYER</b>	<b>1.1</b> <i>First answer</i>	<b>1.2</b> <i>Second answer</i>	<b>1.3</b> <i>Third answer</i>
<b>SCORE</b>	0	5	10
<b>GO TO</b>	<i>Step number</i>	<i>Step number</i>	<i>Step number</i>
<b>FEEDBACK</b>			

Table 5. Step description in the storyboard

After carefully reviewing the storyboard, the Serious Game is finally ready to be entered into the editor!

## 1.4 Upload the Serious Game in the editor

The **ECORE** editor<sup>2</sup>, developed by Entropy, guarantees ease of use and can be used by educators, trainers, teachers, guidance practitioners and other learning professionals. The interface is simple and intuitive. Below is a brief introduction on how to insert the Serious Game into the editor.

### Editor step 1/2

The first part of the editor for creating and editing the game consists of **five parts**:

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<sup>2</sup> <https://ecore.sgameup.com/>

## 1. General Data

Language, title, description, purpose

Language: Italiano

Title: This Game's title

Description: This Game's description

Game goal: The scope of the whole game

+ Add Game Goal

Figure 1. General data in the editor

The language chosen is important as this will be the language of the speech synthesis in the second step of the editor.

## 2. Credits

The Description field can be used to enter 'credits' relating to the game, such as the name of the author, co-author and so on. Simply enter a text at the end of the description in the format:

```
<credits>Chief Engineer: Mario Rossi</credits>  
<credits>Tech Supervisor: Sergio Bianchi</credits>
```

The credits will be visible in the dashboard, on the player's start screen and in the debrief.

## 3. The game cover

The cover image is automatically updated using the scenario and avatar of the game's first scene (1A). You only need to edit these two elements to change it. It will, therefore, not be present when you first access the editor.

## 4. Fonts

You can choose the font used within the comic strip (balloon) in the game. It is important to note that this choice only has an effect within the comic strip and nowhere else in the game.

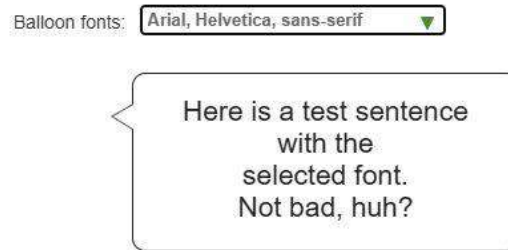


Figure 2. Balloon fonts

## 5. Debrief scores

You can choose to show or not show scores on the final results page. We recommend always choosing 'show'.

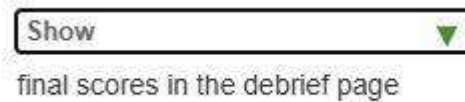


Figure 3. Debrief

## Editor step 2/2

From an editor's point of view, the game consists of several STEPs, i.e. game phases. Each step can have up to four alternative scenes. In each of these, there is the avatar's question, possible answers from the player, and possible feedback from the avatar for the single answer. The possible answers cause the player to make a path through the steps and scenes through subsequent choices. Each answer directs the player to a specific scene of the next step.

The editor consists of three basic zones:



The left side (L) through which:

- click to select the scene to be edited on the right-hand side
- add or remove new scenes within the single-step
- add a whole step

The right-hand side (R) relates to the individual scene and through which to set:

- the scenario used in the scene
- avatar used in the scene
- the avatar question
- possible answers
- the scores of the individual answers
- the addressing of each individual response to a specific scene of the next game phase (step)

The third area is dedicated to reporting shortcomings, editing comments and publishing the game.



Figure 4. Left and right part of the editor

### Insertion/removal of a scene

ZONE L - Using the [+] and [-] icons next to each step line, new scenes can be added or removed to the step. The maximum number of scenes per step is 4. Of course, no scenes can be added to the first step.

Please note: if a scene is deleted after the requested confirmation, the deletion will be final.

### Insertion/removal of a step

ZONE L - Using the buttons in the figure, entire steps can be added or removed. The minimum number of steps that must be present in the game is 3.

The maximum number of steps allowed is 20.



Figure 5. How to add or remove a step

Attention: the deletion of a step includes all scenes in it.

### The negative and positive end

ZONE L - At the end of zone L, we find the two final scenes relating to the two possible conclusions of the game: winner and loser

### The choice of scenery

By clicking on the select "select scenery" highlighted in the figure, it is possible to select the scenery to be used in the current scene.



Figure 6. How to select the scenario

## Avatar choice

Simply use the 'Select avatar' select to choose an avatar from those present. If you prefer not to use any character, simply select "No Avatar" from this selection.

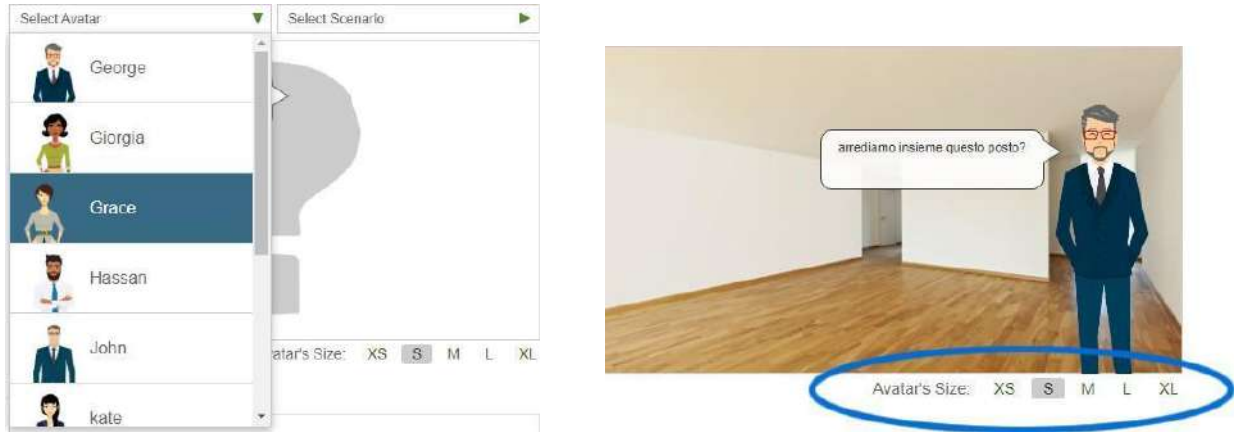


Figure 7. Avatars

The character is available in five sizes that can be selected at the bottom of the preview painting. The character and the comic can be repositioned in the scene by dragging and dropping them.

## Avatar Sentence Box

It contains the text that will appear in the character's comic strip. The avatar's joke text is limited to 800 characters. However, the system warns if these limits are exceeded.

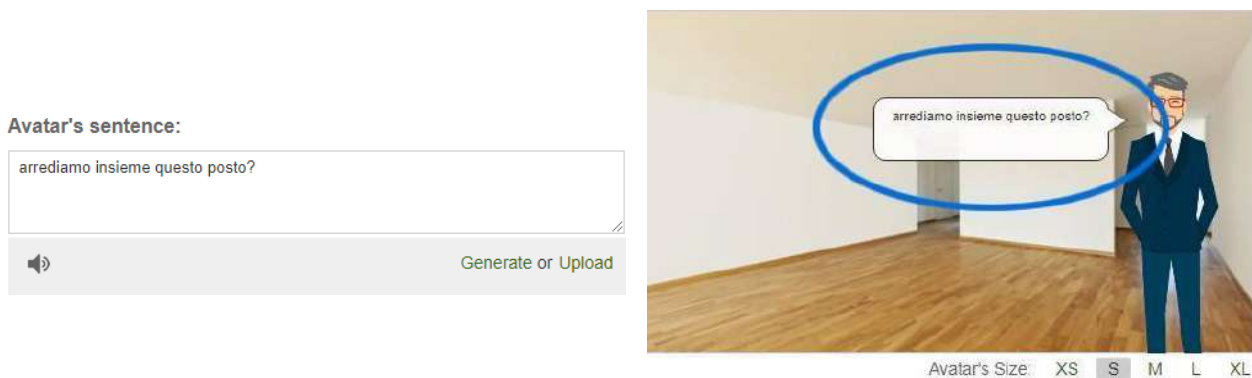


Figure 8. Avatar's sentence

## Audio Avatar Sentence Box

Via the 'generate' and 'upload' links, you can generate the synthetic voice related to the sentence or upload an audio file in Mp3 format related to the sentence. Note that each avatar has its own voice.



Figure 9. Avatar's sentence - audio generation

Once the audio has been generated or loaded, it can be played back or removed using the buttons in the figure.

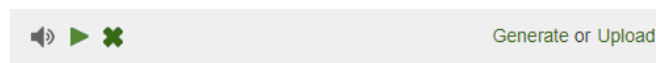


Figure 10. Listen or delete Avatar's audio

## Player's Answer Box – Text

It contains the possible answers that the player may choose, their score in the 'score' column and, in the 'go to' column, which scene of the next step the player will be directed to if they choose that answer. The player's textual answers have a limit of **255 characters**. However, the system warns when these limits are exceeded. A minimum of three answers must be set, but it is possible to set a fourth. At least one answer must have a score of 0 (zero).



Figure 11. Scores

The address of each response to one of the alternative scenes can be chosen from the 'go to' section.

Player's Answers:		Score:	Go to:
<input checked="" type="radio"/> Textual <input type="radio"/> By images			
Resp1	Answer one (which sends to 2A)	0	2A
Resp2	Answer two (which sends to 2A)	2	2A 2B 2C
Resp3	Answer three (which sends to 2B)	7	2B

+ Add feedback    + Add an answer

Figure 12. Player's answers

Thumbnails of the scenes involved (zone L) show the links constructed in real-time

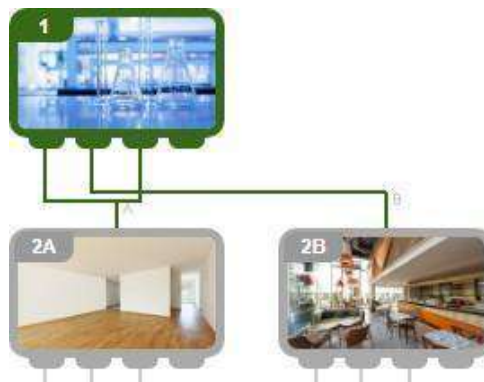


Figure 13. Steps connection

### Player's Answer Box – Images

The types of answers allowed are not only textual but also by images. In this case, simply click on 'by images'.

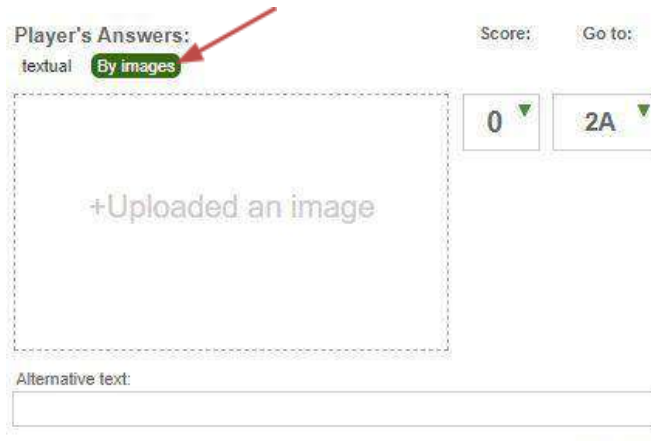


Figure 14. Player's answers - images

Then, by clicking 'uploaded an image,' it is possible to choose, one at a time, which images to include from the possible answers.

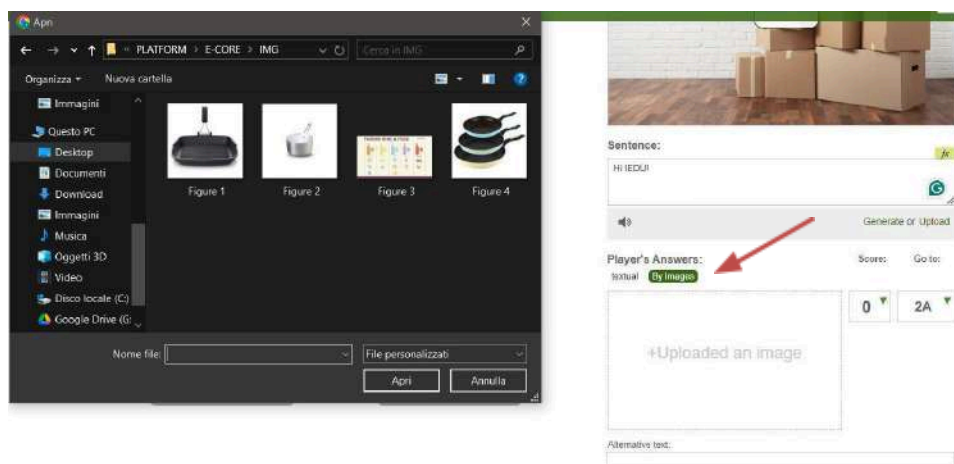


Figure 15. Player's answers - images upload

Once the images have been uploaded, a short description can be entered in the 'alternative text' box.

## Serious Game co-design: guidelines

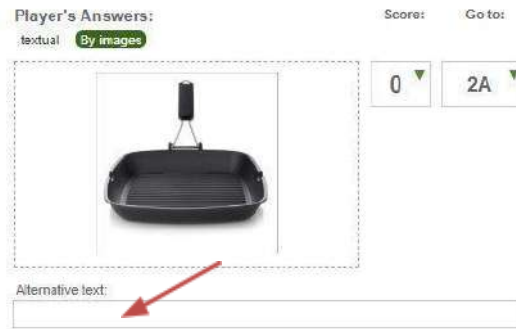


Figure 16. Player's answers - alternative text

During the game, images will be displayed as follows:

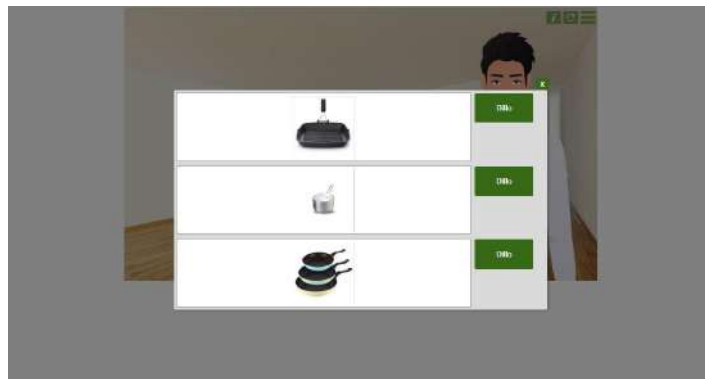


Figure 17. Player's answers - images display

## Equation editor

The 'equation editor' function allows the insertion of complex mathematical equations and formulas within the avatar's question and the player's possible answers. To use this function, click on the yellow symbol at the top right  $fx$ . This will open a popup where you can choose between Greek letters, operators, symbols, and functions.

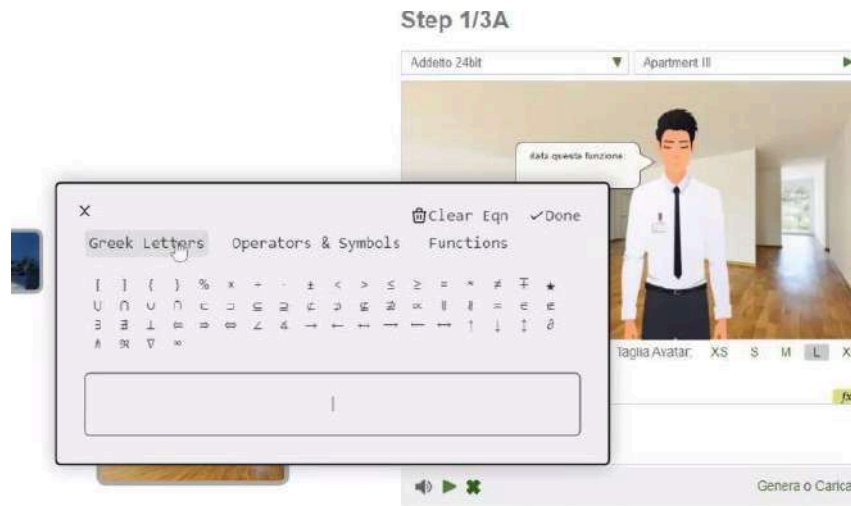


Figure 18. Equation editor

Once the function has been entered, clicking the done button will cause it to appear within the text area.



Figure 19. Equation editor display

When generating the audio automatically, the formula is skipped as the speech synthesis cannot yet read the formula. If the text contains only and exclusively the formula, the system will provide a default phrase, 'here is the equation'.



## Avatar's feedback

For each answer, it is also possible to define an avatar feedback. Note that the avatar will be the same as the step being edited and will have its own voice, it is not possible to upload a pre-recorded audio.

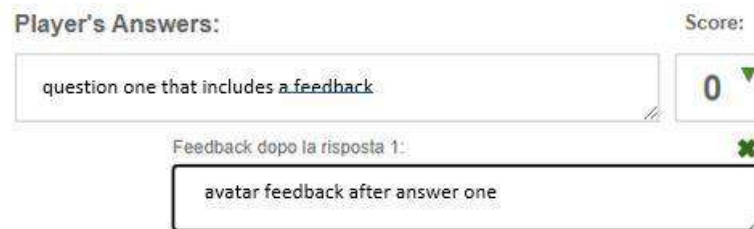


Figure 20. Avatar's feedback

## Attachments box

Manages attachments to the step in editing. There are two types of attachments:

- **Mandatory attachments:** if the player does not view the attachments, he cannot access the next step of the game.
- **Optional attachments:** The user can access the next step even if he does not view the attachments. The type can be changed via the 'change' button



Figure 21. Attachements

The game allows the user to view internally without opening a new page or tab:

- images in the most common formats: png, jpg
- videos in the most popular formats: mp4, ogg, webm



## Serious Game co-design: guidelines

- PDF documents
- YouTube videos
- Kaltura videos
- links to the game wordwall

### Score and Qualitative comments

Qualitative comments are shown to the user in the debrief according to the interval in which the game result falls in percentage terms.

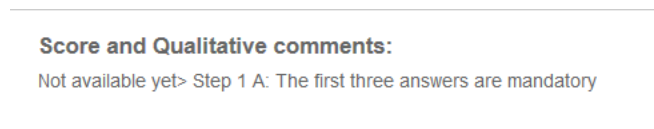


Figure 22. Score and Qualitative comments

If there is missing data, the platform indicates the first missing data. By clicking on the 'small pencil' symbol, the quality comment for each of the eight steps must be entered.

In the 8 intervals, the first 4 - from 0 to 50%- in red colour gradations and the second - from 50% to 100% in green colour gradations. The red areas delineate the losing interval, and the green the winning one.

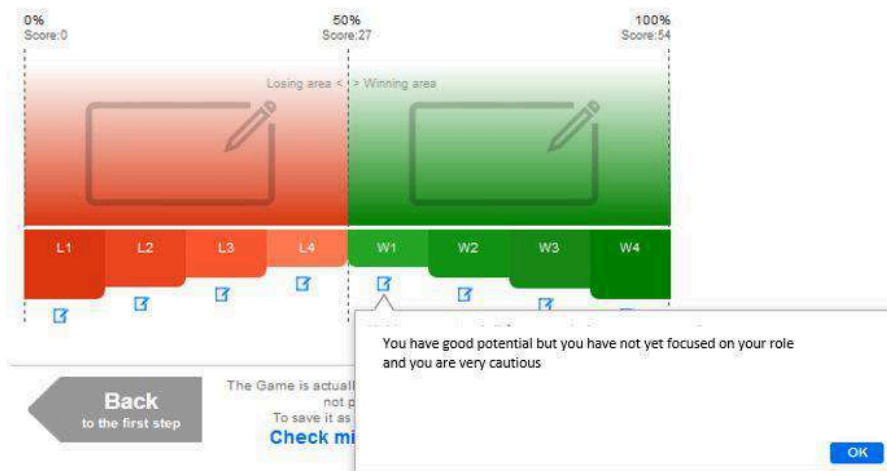


Figure 23. Final evaluation

## Final console

The final console that closes the page for the second step of the editor appears automatically during compilation only when there is sufficient data. The console allows you to check for missing values by clicking "Check missing values".



Figure 24. Final consolle

If the data are appropriate, it will be possible:

- Carrying out a game test
- Make the game **playable** and thus assignable in groups.

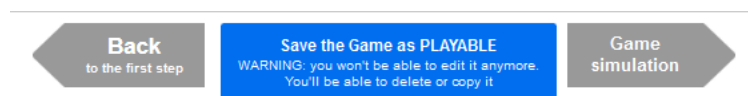


Figure 25. Check of the game

**ATTENTION: once the game is designated as PLAYABLE, editing it will no longer be possible.** It will still be possible to create a copy of the game in the draft and edit it from there, publishing it again once the changes are complete.

## Scenario

The 'scenarios' section allows you to view the scenarios on the platform, upload a new scenario, and use the scenario in a specific scene of a game.



## Serious Game co-design: guidelines

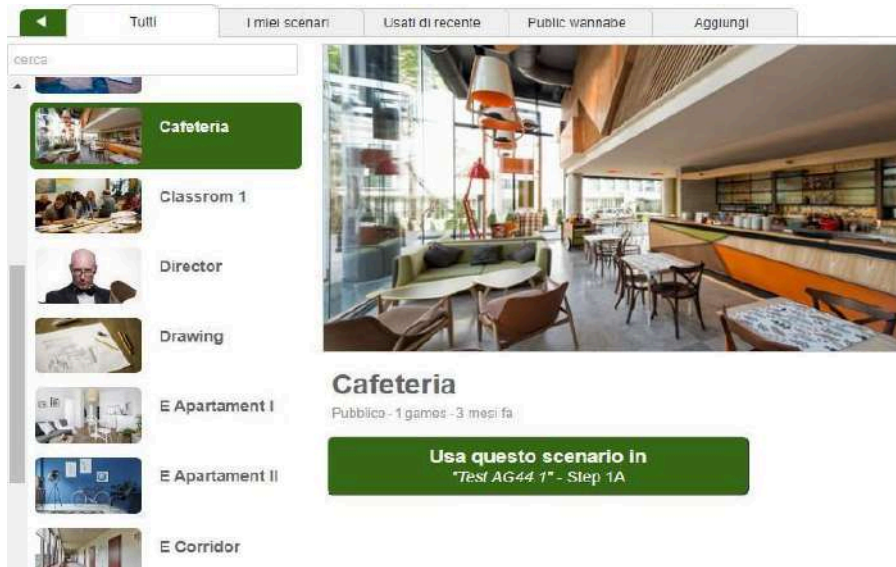


Figure 26. Scenario

Each scenario can be in private mode and thus only usable by the user who uploaded it, or public mode and therefore usable by all users. When a scenario is uploaded, it is always in private mode. The 'add' button allows you to upload and crop an image to use as a scenario.

Please note: the minimum required size in pixels is 1024x576

## 2. Experiential part

For the D-ChallengHE project, each partner was assigned the task of creating a Serious Game, focusing in particular on *soft skills*. From November 2023 to February 2024, Entropy trained teachers and tutors who created 7 Serious Games with their students.

### 2.1 Partners

#### Link Campus University (Italy - A)

**Link Campus University**<sup>3</sup> (LCU) has been active since 1999 as the Italian branch of the University of Malta. Its mission is to promote research, study and training activities, to develop and disseminate knowledge in the fields of economics, international and political relations, business organisation, communication, law and other socio-economic, artistic, cultural, environmental and health-related disciplines.

LCU collaborates with public and private institutions, transferring know-how and technological expertise, and hosts various research centres divided into thematic areas, covering various disciplines. Among these, **DITES**<sup>4</sup> (Digital Technologies, Education & Society) is active in research on digital technologies for education, work inclusion, cultural heritage, edutainment and digital curation pathways, collaborating with national and international universities and research centres.

#### Academia (Slovenia - P1)

**Academia Ltd.**<sup>5</sup> is a short-cycle higher education institution operating as a private non-profit organisation in Slovenia for over 25 years. Based in Maribor, Academia offers accredited programmes in commerce, accounting, tourism, multimedia production, information technology, civil and mechanical engineering, and security engineering. It hosts over 400 adult students annually and ensures high standards through teaching practices, including recorded lectures, fieldwork, workshops, and internships in local companies.

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<sup>3</sup> Link Campus University website: <https://www.unilink.it/>

<sup>4</sup> DITES research centre website: <https://dites.unilink.it/>

<sup>5</sup> Academia Maribor website: <https://www.academia.si/en>

## Serious Game co-design: guidelines

The institute regularly participates in Erasmus+ projects and other EU programmes and offers expertise in the management and implementation of innovative educational processes, especially in online and remote modes, reinforced during the pandemic.

### Klaipeda University (Lithuania - P2)

**Klaipeda University**<sup>6</sup> (KU) offers bachelor's, master's, and doctoral programmes in social sciences and humanities, health sciences, life sciences, and technological sciences, and it has participated in various national and international projects. Through close cooperation with employers, KU constantly adapts its study programmes to meet market needs.

Acknowledged as a national university and one of Lithuania's leading higher education institutions, KU is affiliated with various regional and European unions and is a member of the EU Conexus alliance dedicated to sustainable global coastal development.

KU is well equipped to support interdisciplinary research projects, especially in digital education, sustainable development and information and communication technologies, thanks to its advanced infrastructure and Centre for Distance Learning. The university has a long track record in European programmes such as Erasmus+, Interreg and Horizon 2020, carrying out innovative research and project activities in partnership with numerous institutions across Europe.

### Hellenic Open University (Greece- P3)

The **Hellenic Open University**<sup>7</sup> (HOU) is the only Greek state university offering formal and non-formal education for lifelong learning, both at undergraduate and postgraduate level, with more than 40,000 students across the country. HOU's teaching methodology combines distance learning with adult education principles, supported by digital materials, virtual meetings and online training platforms and tools.

Through the research group **DAISSy**<sup>8</sup> (Dynamic Ambient Intelligent Sociotechnical Systems), HOU promotes digital inclusion and citizenship skills, develops online learning platforms, MOOCs and 3D environments, and supports the integration of European standards (such as e-CF and DigComp). DAISSy has participated in more than 35 national

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<sup>6</sup> Klaipeda University website: <https://www.ku.lt/en/>

<sup>7</sup> Hellenic Open University website: <https://www.eap.gr/en/>

<sup>8</sup> DAISSy research group: <https://cop.daissy.eu/>

## Serious Game co-design: guidelines

and European projects, with a long track record in curriculum design, online learning materials and platform development, and course quality.

### Institute for Education (Romania - P4)

**The Institute for Education**<sup>9</sup> is a non-governmental organisation founded in 2009 to promote innovation in education and educational research, offering high-quality programmes, projects and activities. Since 2010, the Institute has focused on integrating new technologies in education, contributing to projects of national relevance such as eTwinning, with over 33.000 teachers involved in Romania, and iTeach, a platform with over 26.000 teachers.

The Institute's main educational innovation activity is reflected in the iTeach.ro platform, a programme that aims to improve the quality of computer-assisted education by providing theoretical support, good practices and updates on significant initiatives in eLearning. The Institute also runs DigitalEdu.ro, a portal with over 6,000 digital educational resources and ideas for online education, including materials for special education. The Institute has also developed a platform for continuous teacher training, which has offered over 20 free courses since 2010, attracting more than 50,000 enrolments.

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<sup>9</sup> Institute for Education website: <https://iedu.ro/>



## 2.2 The Serious Game realised by the consortium

### 2.2.1 Link Campus University

#### *Il Circo Magigalu*

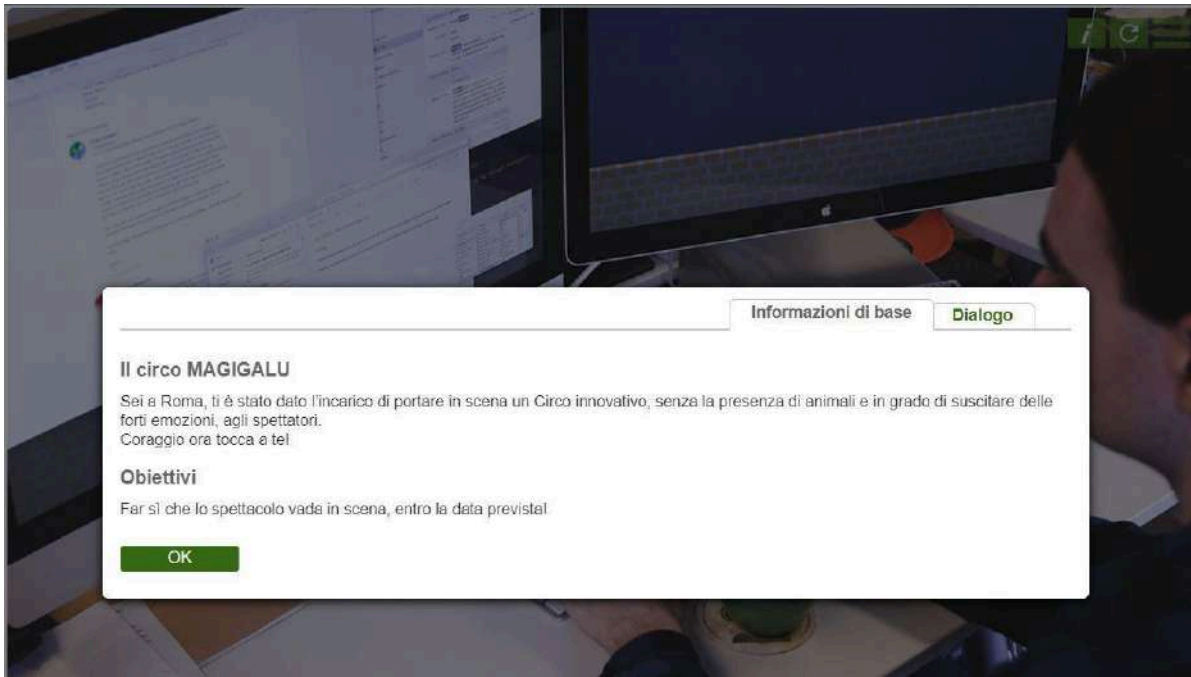


Figure 27. SG: Il circo MAGIGALU

*You are in Rome, and you've been tasked with bringing an innovative circus to the stage without animals that can evoke strong emotions in the audience. Be bold—now it's your turn!*

The goal was to analyse the competencies essential for a managerial role, including building effective relationships within and outside the organisation. Additionally, the aim was to assess skills in managing stress and resolving issues, fostering a motivational and stimulating work environment, and serving as a trusted reference point for employees. Finally, the objective was to evaluate the capability to take decisive control in challenging situations.



### Servizio impeccabile: la missione del cameriere



Figure 28. SG: Servizio impeccabile: la missione del cameriere

*You are a waiter hired by an event organisation and you are at a corporate conference. A dinner will be served at the end of the event, which will take place in a prestigious banquet hall. During the dinner, you must pay attention to the customers' requests and coordinate with the kitchen staff.*

The goal was to develop key skills in managing stress, fostering emotional awareness, enhancing adaptability, and strengthening coordination abilities. These competencies aim to support individuals in effectively navigating various challenges and working collaboratively in dynamic environments.

### LEA: Limit – Exercise – Advancement

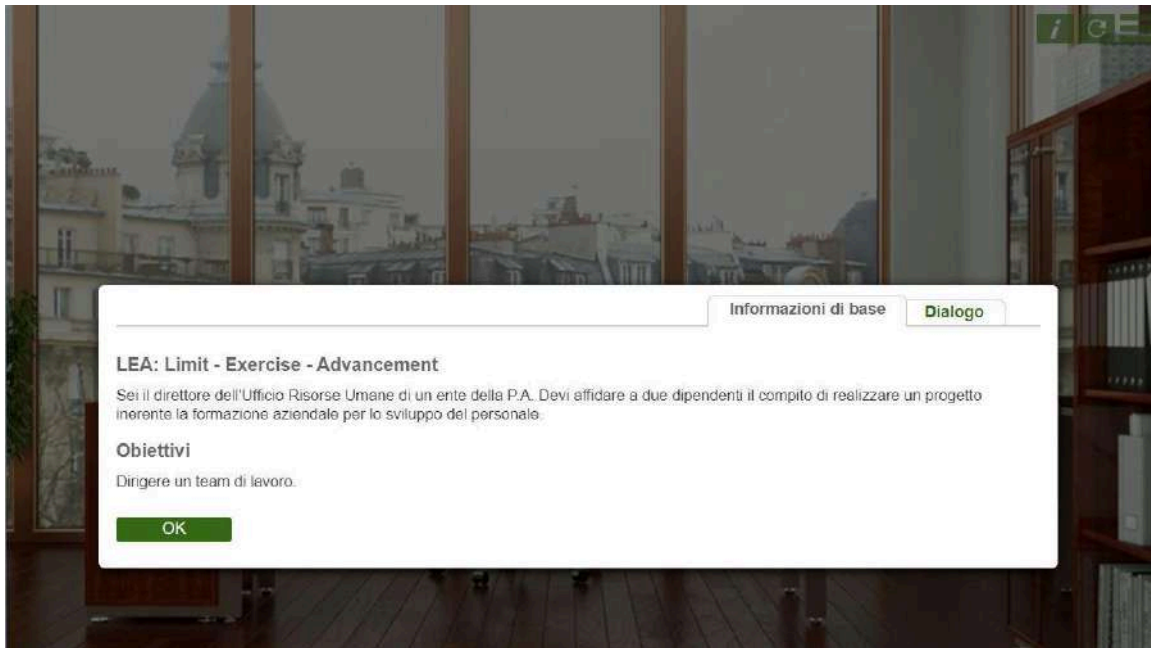


Figure 29. SG: LEA: Limit - Exercise - Advancement

*You are the Director of the Human Resources Department of a public administration entity. You need to assign two employees to create a project related to corporate training for staff development.*

The main goal was to develop key competencies in the following areas: Human Resource Management, effective leadership and communication, conflict management and resolution, team building and teamwork, decision-making and problem-solving, stress resilience and flexibility.

## 2.2.2 Academia

### Serious Game

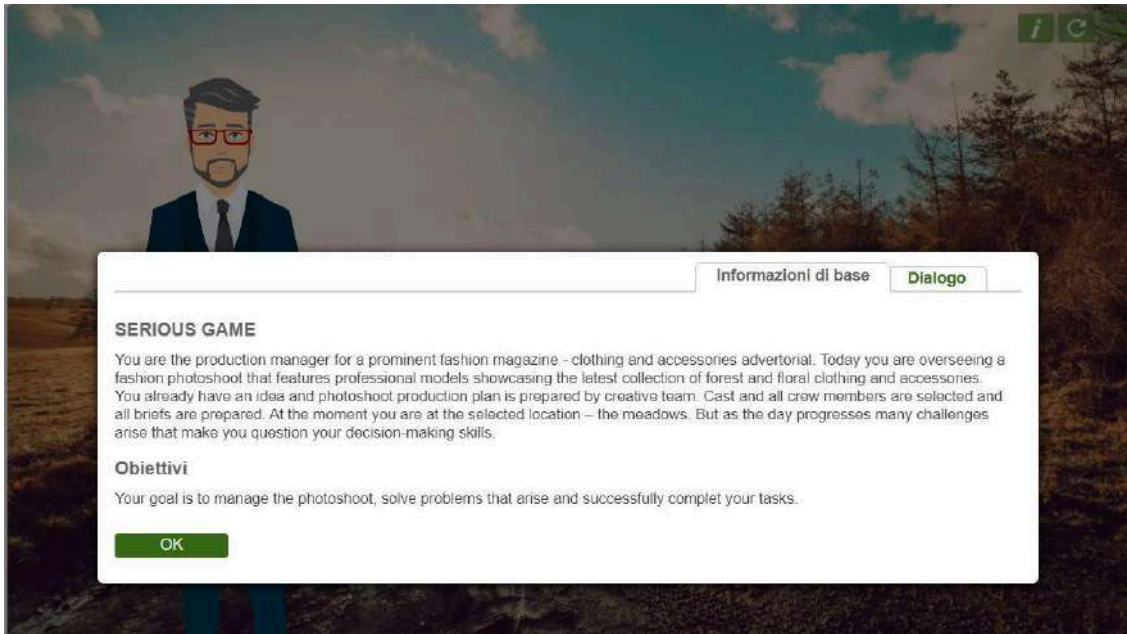


Figure 30. SG: SERIOUS GAME (Academia - Slovenia)

*You are the production manager for a prominent fashion magazine - clothing and accessories advertorial. Today you are overseeing a fashion photoshoot that features professional models showcasing the latest collection of forest and floral clothing and accessories. You already have an idea and photoshoot production plan is prepared by creative team. Cast and all crew members are selected and all briefs are prepared. At the moment you are at the selected location – the meadows. But as the day progresses many challenges arise that make you question your decision-making skills.*

The aim was to enable players to build essential skills in problem-solving, teamwork, communication, and time management by successfully navigating the challenges of a fashion photoshoot. Through this experience, players had to show their abilities in communication, organisation, and effective problem-solving.

## 2.2.3 Klaipeda University

### Soft and Communication Skills

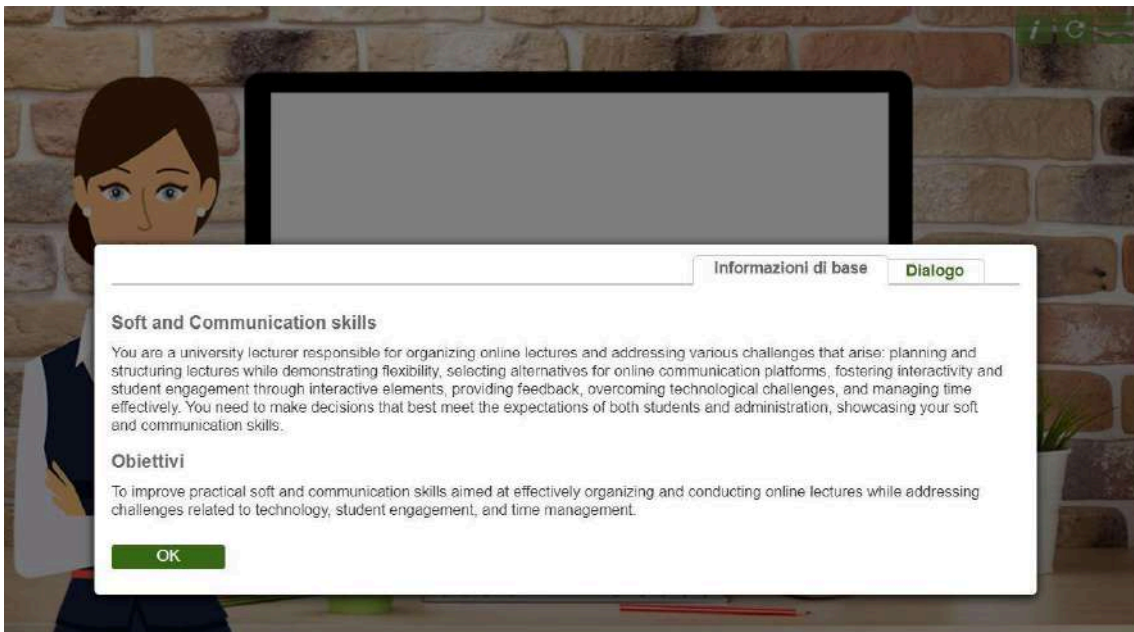


Figure 31. SG: Soft and Communication skills (Klaipeda University - Lithuania)

*You are a university lecturer responsible for organising online lectures and addressing various challenges that arise: planning and structuring lectures while demonstrating flexibility, selecting alternatives for online communication platforms, fostering interactivity and student engagement through interactive elements, providing feedback, overcoming technological challenges, and managing time effectively. You need to make decisions that best meet the expectations of both students and administration, showcasing your soft and communication skills.*

This game aimed to strengthen educators' soft skills and communication abilities, including empathy and supportive interaction, to enhance their effectiveness in digital teaching. It also aimed to develop educators' adaptability and resilience, equipping them to navigate and thrive in the virtual learning environment.

## 2.2.4 The Institute of Education

### *Mind Mingle*



Figure 32. SG: Mind mingle (The Institute for Education - Romania)

*You are invited on an exciting adventure to boost your thinking skills through a series of whimsical puzzles! Join our playful journey where every challenge is a step towards becoming a puzzle-solving wizard with an ENCHANTED MIND!*

The game aimed to cultivate players' metacognitive skills, encouraging them to reflect on and assess their thinking as they approached each task. The game sought to build strategic metacognitive competencies, guiding players to tackle challenges with purposeful planning and flexibility. Additionally, it aimed to enhance self-reflective abilities, helping players to understand and evaluate their thought processes, thereby fostering greater self-awareness and informed decision-making throughout their experience.

## 2.2.5 Hellenic Open University

### European Car Rental Service

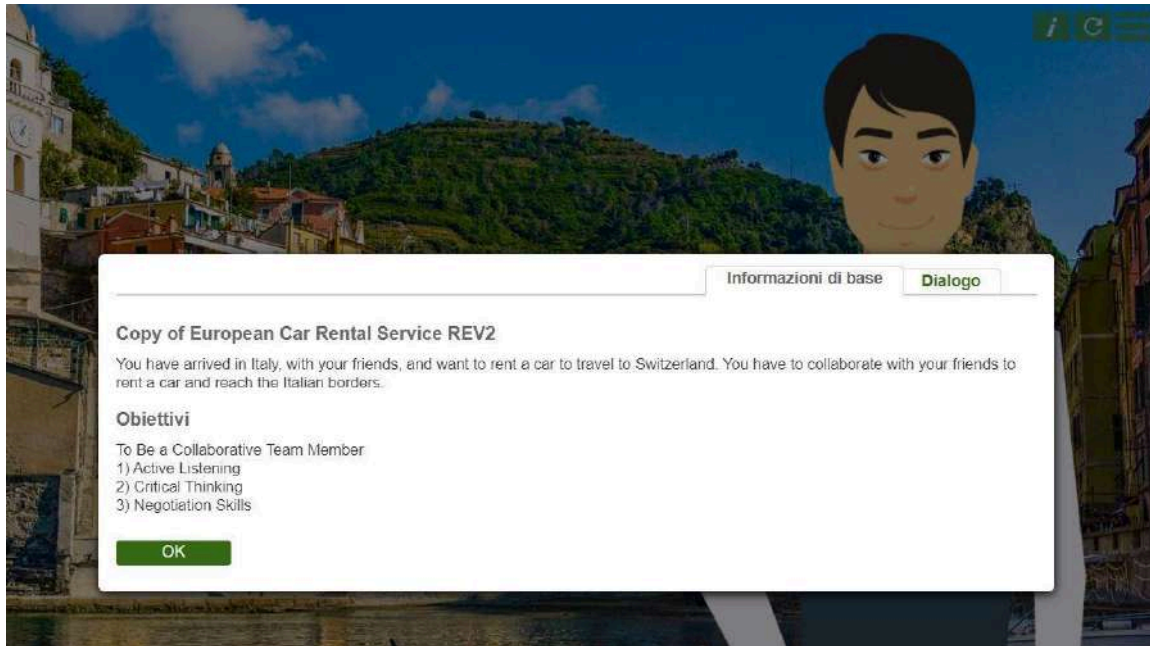


Figure 33. SG: European Car Rental Service (Hellenic open university - Greece)

*You have arrived in Italy, with your friends, and want to rent a car to travel to Switzerland. You have to collaborate with your friends to rent a car and reach the Italian borders.*

The game aimed to develop players' abilities to be effective, collaborative team members. Through the game, players learned to practice active listening, ensuring they fully understood and valued their teammates' perspectives. They also strengthened their critical thinking skills, enabling them to analyse situations thoughtfully and contribute meaningfully to group discussions. Additionally, the game focused on building negotiation skills, allowing players to navigate diverse opinions and work toward agreements that benefited the entire team.

## 2.3 Evaluation questionnaires

In the light of the SGs carried out, two questionnaires were created, one for teachers/tutors and one for students, in which they were asked for feedback on this methodology.

### 2.3.1 Questionnaire for teachers/tutor

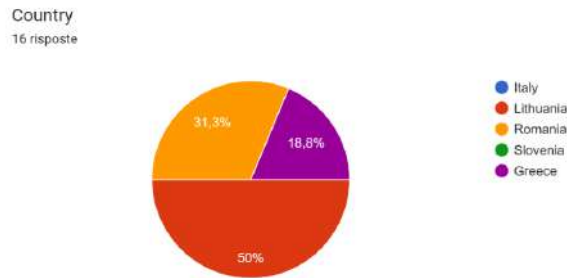


Figure 34. Questionnaire for teachers - Country

The questionnaire provided to the activity teachers and tutors received a total of 16 responses and addressed the following areas:

## 1. Methodology

### 1. How much do you think gamification methodology enhances students' learning?

62.5% gave the highest score (5), indicating that gamification is seen as an effective learning tool. 37.5% of the teachers gave a score of 4, still confirming a positive evaluation.

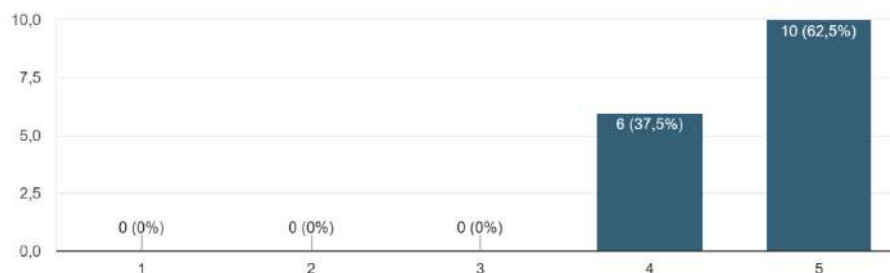


Figure 35. Questionnaire for teachers - Answers question 1

## 2. How much do you think gamification methodology develops students' soft skills?

More than half of the teachers (56.25%) consider gamification to impact students' soft skills development positively. In comparison, 37.5% gave it a score of 4, and only one teacher rated the effectiveness at 3.

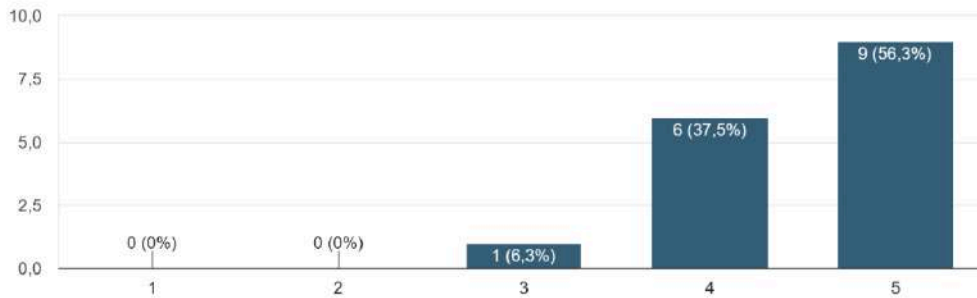


Figure 36. Questionnaire for teachers - Answers question 2

## 3. How much do you think gamification methodology develops students' digital skills?

68.75% of teachers rate the impact of gamification on digital competences with a 5, followed by 18.75% with a score of 4. Only 12.5% of teachers give a score of 3.

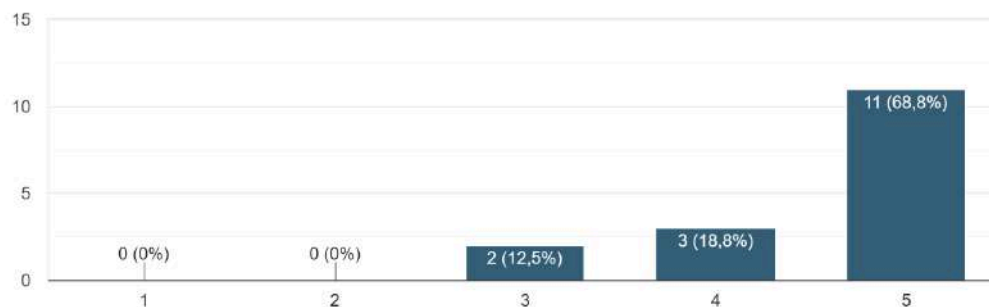


Figure 37. Questionnaire for teachers - Answers question 3



## 2. Self-assessment

### 1. How useful do you think the gamification training course was in improving your teaching skills?

The majority of the teachers (68.8%) gave a score of 5, highlighting their high perception of the usefulness of training to improve their teaching skills. A further 25% gave a score of 4, while only one teacher gave a score of 3.

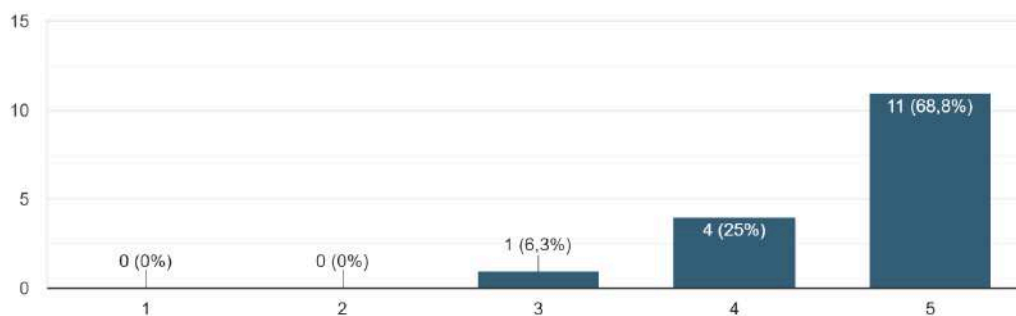


Figure 38. Questionnaire for teachers - Answers question 4

### 2. How satisfied are you with the support and resources provided during the training course?

93.8% of the teachers gave the highest score (5) to the quality of the support and resources received, indicating broad satisfaction.

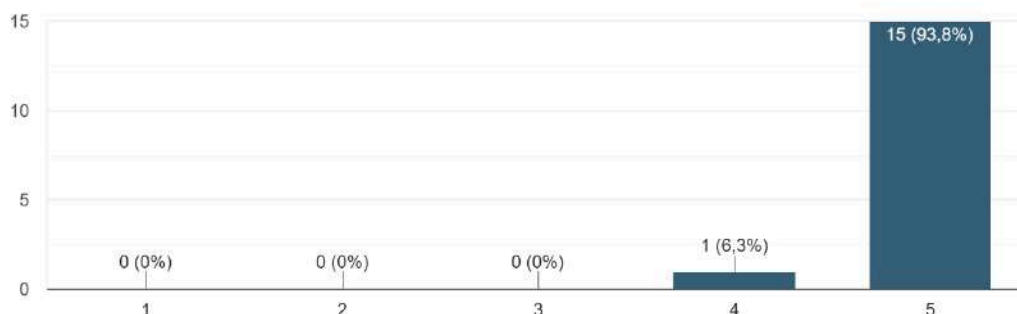


Figure 39. Questionnaire for teachers - Answers question 5

### 3. How much do you think your students benefited from learning through the gamification methodology?

The teachers split evenly, with 50% rating the benefits as "very" high (score 5) and the other 50% rating them as "high" (score 4).

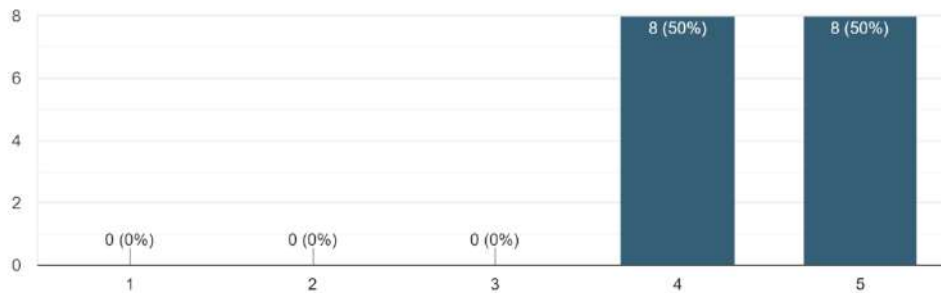


Figure 40. Questionnaire for teachers - Answers question 6

## 3. Feedbacks

### 1. Can you describe any significant challenges or successes during the development phase?

From the responses, an overall positive experience emerged in the project development phase, enriched by challenges and significant achievements. Although some teachers initially found the creation of the game complex, many later found that the process was intuitive. The tools were easy to use, as highlighted by those who stated: *"It seemed that it will be very complicated to create a game at first, but it appeared quite intuitive, and the tool was easy to use"*.

A key element was the balance between educational content and engaging gameplay, which was often successfully achieved. One participant pointed out: *"One of the most significant challenges we encountered was the act of balancing educational content with engaging gameplay. Ensuring that the game was both informative and enjoyable required close collaboration between content experts and game designers."*

### 2. Which aspects of the training course did you find most useful and why?

Analysis of the responses reveals many aspects considered particularly useful by participants, with a strong emphasis on practicality and immediate application. A recurring theme was the usefulness of the *"practical sessions and real-life case studies"*, which allowed participants to immediately apply what they were learning and see how concepts translated into concrete scenarios. This practicality made learning *"The most useful aspects of the training course were the hands-on activities and real-world case studies. These elements allowed for the practical application of concepts, making the learning more tangible and directly relevant to real-life scenarios. Additionally, the interactive discussions helped clarify complex topics, reinforcing understanding through collaboration and shared perspectives"*, facilitating the understanding of the content.

The methodology was particularly appreciated for its concreteness, with several participants describing it as *"concrete methodology"*. Interactive work, such as *"practical sessions, brainstorming, and discussions"*, was also useful, providing an opportunity for comparison and feedback between colleagues.

Furthermore, some participants emphasised the value of cross-cultural collaboration and different perspectives: *"The most valuable aspect of the training course was the cross-cultural collaboration and the methodologies for integrating different perspectives into the development process. Given the multinational nature of the partnership, understanding how to effectively communicate and leverage the strengths of each partner was crucial. This knowledge was instrumental in ensuring that the final product reflected a truly European perspective, enriched by the diverse insights, specificities and expertise"*.

### 3. Are there any suggestions or improvements you would like to propose for future editions of the training course?

From the answers to the question on possible improvements, largely positive feedback emerges, with some suggestions for enriching future course editions. Many participants were satisfied with the experience, describing it as *"comprehensive, well-structured, and highly relevant to the actual and most urgent common educational needs"*.

## Serious Game co-design: guidelines

Among the suggestions, some teachers propose to *"include more hands-on workshops"* and to add interactive elements such as live simulations or role-playing scenarios to further engage students in the learning process. Others recommend further adaptation of the course to the new generation, making it *"more 'gamified' for the current generation"*. Finally, some suggest providing follow-up sessions or ongoing support to enable participants to apply the acquired skills in the long term and reinforce the impact of the course.

The adoption of gamification was generally well received, with positive feedback on its effectiveness and impact on students. Teachers see this methodology as promising to improve student engagement and skills and seem willing to integrate gamification into other future teaching activities.

### 2.3.2 Questionnaire for Students

The questionnaire given to the students received a total of 48 responses.

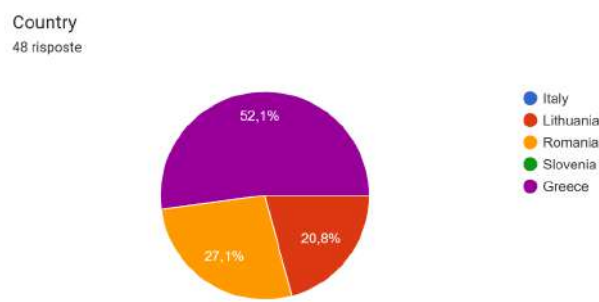


Figure 41. Questionnaire for students- Country

#### 1. Do you feel that you have learned more about the topics covered through gamification than through traditional methods?

95.8% of the students (46 out of 48) stated that they learned better through gamification than traditional methods.

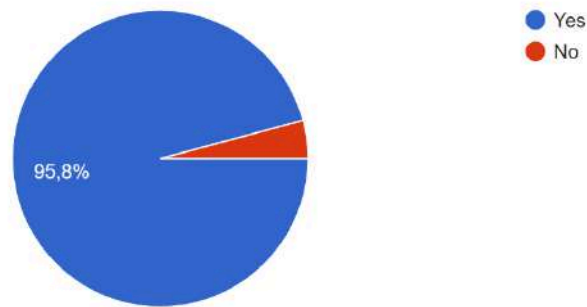


Figure 42. Questionnaire for students- Answer question 1

## 2. Do you think the use of gamification made the lessons more engaging?

95.8% of the students felt that gamification made lessons more engaging, with only 4.2% finding no difference.

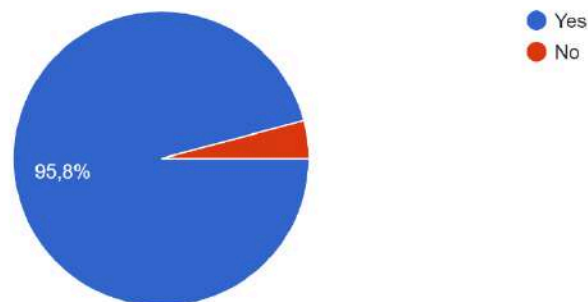


Figure 43. Questionnaire for students- Answer question 2

## 3. Would you recommend the use of gamification for other study topics?

The majority of students (93.8%) would recommend the use of gamification for other subjects.

## Serious Game co-design: guidelines

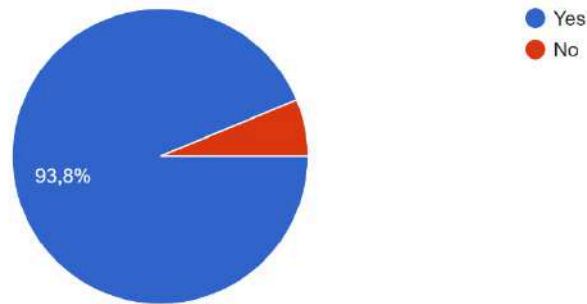


Figure 44. Questionnaire for students- Answer question 3

### 4. Do you think the use of gamification has improved your digital skills? (level of agreement on a scale from 1 to 5)

More than half of the students (52.1%) gave the highest score of 5 to improving their digital skills, followed by 37.5% with a score of 4.

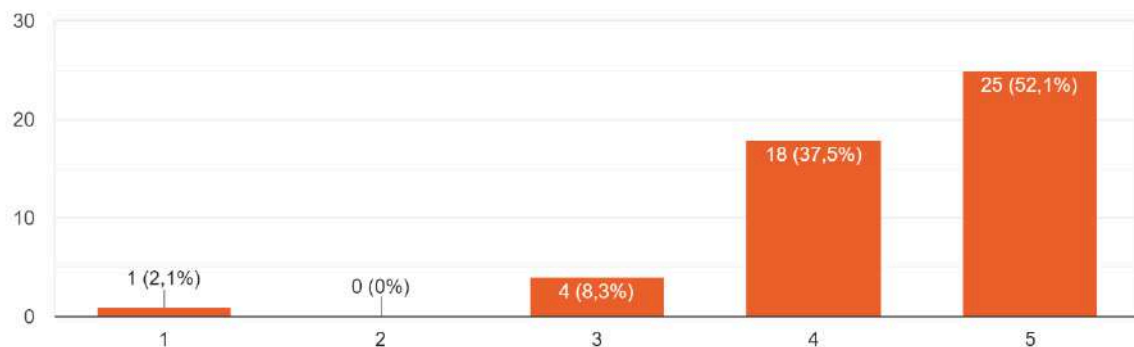


Figure 45. Questionnaire for students- Answer question 4

### 5. Do you think that gamification manages to communicate information better than traditional methods? (Indicate your level of agreement on a scale from 1 to 5)

60.4% of the students believe that gamification communicates information better than traditional methods (score 5), and a further 20.8% give it a 4.

## Serious Game co-design: guidelines

48 risposte

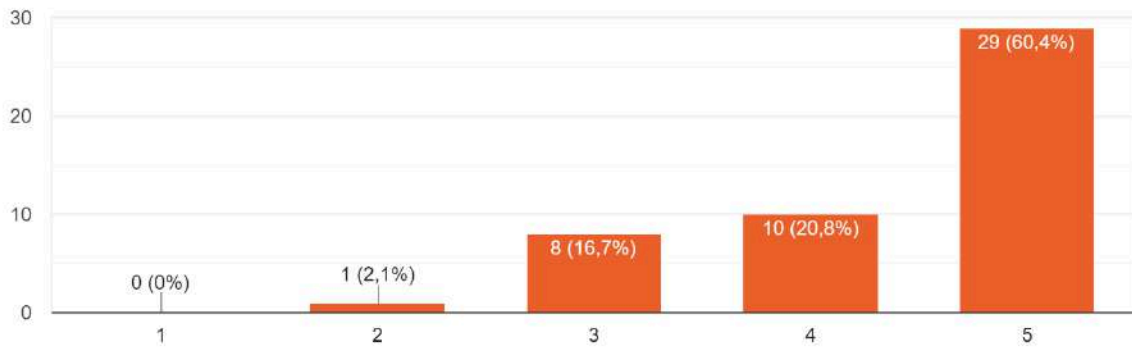


Figure 46. Questionnaire for students- Answer question 5

### 6. Do you think that gamification manages to communicate content better than traditional methods? (Indicate your level of agreement on a scale from 1 to 5)

48 risposte

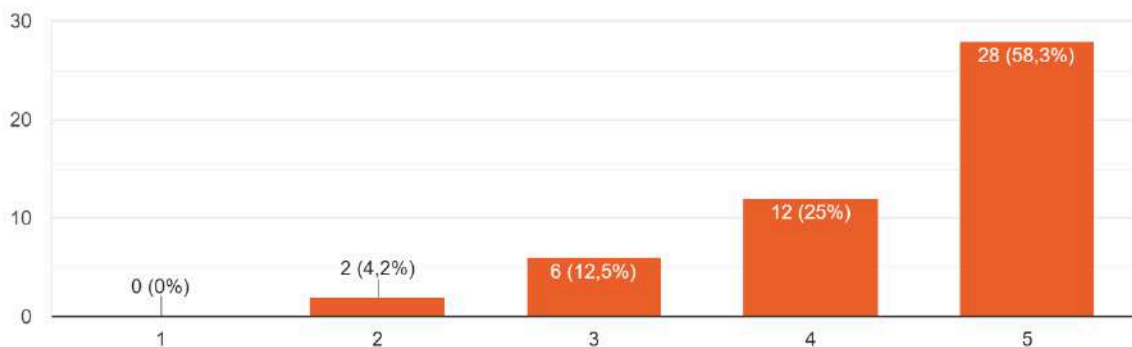


Figure 47. Questionnaire for students- Answer question 6

58.3% of the students rated gamification as very effective (score 5) in communicating content, followed by 25% who gave it a 4. A smaller group, 12.5%, rated it a 3, while only 4.2% gave it a 2.

### 7. Briefly describe what you liked most and least about this activity

## Serious Game co-design: guidelines

From the responses to the question, a strong appreciation emerges for using Serious games, seen as tools that make learning more engaging, hands-on and interactive. Many students emphasise how this approach allows them to apply knowledge in concrete situations, receive immediate feedback, and face motivating challenges that facilitate understanding of concepts.

Another positive aspect, often mentioned, is the customisation of the learning path. Serious games offer the possibility of personal progress, focusing on areas of greatest need. This element contributed to a *"positive and less stressful learning environment compared to traditional methods"*, with an experience perceived as dynamic and socially interactive, allowing for autonomous exploration of solutions.

Regarding the less welcome aspects, some students noted that Serious games can sometimes require significant time and resources and may be less accessible to everyone. Others expressed that there might be a risk of focusing more on the game than on the educational content.

*"What I Liked Most: Serious games make learning engaging and interactive, offering practical application, immediate feedback, and opportunities for collaboration. They help keep students motivated and involved. What I Liked Least: They can be time-consuming to implement, may not be accessible to all students, risk becoming more about entertainment than education, and sometimes have a limited focus that doesn't cover broader learning needs."*

### 2.3.3 Evaluation and Questionnaire Link Campus University

As for Link Campus University, instead of just one Serious Game, three were made. The 12 participants, divided into three groups, were asked to fill in an ad hoc questionnaire at the end of the activity. In the questionnaire, they were asked to self-evaluate their own serious game and evaluate the one made by their colleagues. For each Serious game, they were asked to indicate their level of agreement with the following statements:

- The educational objectives of the game are clear and well-defined.
- The content of the game is relevant and accurate concerning the educational objectives.
- The graphic design and aesthetics of the game are appropriate and attractive.
- The difficulty level of the game is appropriate for the target audience.
- The game is addictive and keeps the player's interest.





## Serious Game co-design: guidelines

- The game provides useful formative feedback to the player.
- This game is appropriately challenging for me (neither too complicated nor too simple).
- I am satisfied with what I learnt from the game.
- What aspect of the game are you most satisfied with?
- What aspect of the game needs improvement?
- Have you received feedback from others? If yes, what were the most important suggestions received?
- Overall rating on a scale of 1 to 10

**LEA: Limit - Exercise - Advance** received an average overall score of 9.17 out of 10, indicating high satisfaction among students. The educational objectives were considered clear and well-defined, with relevant content aligned with students' expectations. Many appreciated the game's interactivity, which kept their interest and involved them in activities that made learning more hands-on and fun. The difficulty level was also rated positively, which was appropriate for the target audience. Some suggestions for improvement concern the graphic aspect, which could be further optimised to enhance the visual experience. Overall, 'LEA' proved to be an effective and well-balanced learning experience.

The Serious game **Il Circo Magigalu** scored an average of 8.83 out of 10, showing good student acceptance. The educational objectives were clear, while the content was rated as accurate and relevant. The most appreciated aspect was the creative design of the game, which allowed complex concepts to be explored in a dynamic and challenging way. However, some students suggested that the game's pacing could be improved to maintain constant attention. The graphics were appreciated, but suggestions were made for further aesthetic refinement. "Il Circo Magigalu" therefore pleased the students, proving to be innovative and engaging.

**Servizio Impeccabile – la missione del cameriere** received an average of 8.67 out of 10, with generally positive feedback but with some room for improvement. The students appreciated the consistency of the educational objectives and the appropriateness of the content, finding the game interesting and stimulating. The value of interactivity, which fostered collaborative learning and teamwork, was highlighted. However, the graphical aspect was reported to be improved to make the experience more visually appealing.

## Serious Game co-design: guidelines

Overall, 'Servizio Impeccabile' was well received, proving to be a valuable and enjoyable educational experience.

### 3. Final consideration

An analysis of the questionnaires administered to teachers and students reveals a very positive evaluation of gamification, which was considered effective in promoting engagement, improving learning and developing transversal and digital skills. However, some differences in perception emerged:

- **Students** showed a particular enthusiasm for gamification, believing that it improves their understanding of the content and increases their emotional involvement in the lessons.
- **Teachers** appreciated this innovative approach while recognising the challenges in adapting content and using technology. Some feel the need for additional training support to exploit the full potential of gamification.

The introduction of Serious Games in the educational context of the D-ChallengHE project therefore, proved to be an enriching learning experience for both students and teachers. Students find SG a very engaging tool with practical implications that greatly facilitate understanding the content. This approach made it possible to develop transversal and digital skills, making learning more dynamic and interactive than traditional methods.

Serious Games have thus proven to be innovative and versatile tools, capable of transforming learning into an engaging and multidimensional experience with interesting development prospects for the future of education.