MicroWeave-TEX
Sustainable solutions in the textile industry to reduce the release of microplastics/synthetic fibres

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Sustainable solutions in the textile industry to reduce the release of microplastics/synthetic fibres

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WP 2- Educator's Hub

T2.5 Development of a methodology on how to build Escape rooms in class to teach about sustainability in textiles and release of microplastics

UNIVERSITAT POLITÈCNICA DE VALÈNCIA
Politechnika Łódzka
idec
ktu kaunas university of technology

Applicant Organisation: Universitat Politècnica de València (UPV) - Spain

Partners:

- Politechnika Lodzka (YTV) - Poland
- Aintek Symvouloi Epicheiriseon Efarmoges Ypsilis Technologias Ekpaidefsi Anonymi Etaireia (IDEC) – Greece
- Kauno Technologijos Universitetas (KTU) - Lithuania
- Panepistimio Dytikis Attikis (UNIWA) - Greece

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1. Introduction to the methodology

1.1. Context and educational need

The transition towards more sustainable production and consumption models is one of the main challenges facing the textile sector. Issues such as the release of microplastics during the use and washing of synthetic garments, the end-of-life management of textile products and the environmental impact of industrial processes require a systemic and multidisciplinary understanding.

However, these issues are highly complex in conceptual terms. They involve technical knowledge (materials, textile structures, dyeing and finishing processes), environmental understanding (life cycle, pollution, circular economy) and critical analysis of production models and consumption habits. In many educational contexts, these topics are taught using traditional expository approaches, although there has also been a shift towards methodologies such as Problem-Based Learning (PBL) and Guided Inquiry, as they allow teachers to work with real problems and promote active student participation. However, these can lead to confusion or superficial learning if they are not well guided by the teacher [1].

Various studies on educational Escape Rooms indicate that these environments encourage participation, motivation and active learning when they are properly designed [2]. Likewise, the literature on the design of educational Escape Rooms highlights the importance of structured planning to ensure that the playful experience is aligned with the pedagogical objectives [3].

1.2. Pedagogical justification

The Escape Room methodology is based on principles of active learning, experiential learning, challenge-based learning, and collaborative work. The educational Escape Room is not conceived as an isolated or purely recreational activity, but rather as a structured learning environment in which:

- Students apply knowledge to solve contextualised problems.
- Teamwork becomes a functional requirement for progress.
- Time pressure simulates real-life decision-making scenarios.
- Solving the final challenge involves integrating the content studied.

Existing research indicates that the success of educational escape rooms depends on the alignment between learning objectives, game mechanics, and challenge design. It

also highlights the importance of key phases such as the final debriefing to consolidate learning and connect the experience with the curriculum content.

On the other hand, the design process requires rigorous planning that includes defining objectives, constructing a coherent narrative, developing puzzles appropriate to the students' level, and pre-testing the activity. This methodology integrates these recommendations into a clear and replicable model.

1.3. Objectives of the methodology

The overall objective of this methodology is to provide higher education teachers, although it may also be useful for different educational levels, with a structured tool for designing and implementing educational Escape Rooms that facilitate the teaching of complex content.

The specific objectives are:

- Translate technical concepts related to sustainability and microplastics into playable and understandable challenges.
- Promote a systemic understanding of environmental problems linked to the textile sector.
- Foster cross-cutting skills such as teamwork, critical thinking, decision-making and problem-solving.
- Provide a practical guide that reduces the barrier to entry for teachers with no previous experience in game design.
- Ensure alignment between the gaming experience and learning outcomes.
- Facilitate the adaptability of the methodology to other disciplines and educational contexts.

1.4. Target audience

The Escape Room methodology is designed to be used by:

- Vocational training and higher education teachers in the fields of textiles, design, engineering, sustainability, or environmental sciences.
- Secondary school teachers who work with content related to the environment, materials, or the circular economy.
- Trainers in non-formal education or continuing education programmes.
- Educational institutions interested in incorporating active and innovative methodologies.

It has been developed with an inclusive and accessible approach, so it does not require prior knowledge of gamification or Escape Room design. The guide provides practical tools, examples and templates that enable its progressive implementation.

Furthermore, although the MicroWeave-TEX project takes sustainability and microplastics in textiles as a case study, the methodological structure is transferable to any discipline involving complex or interdisciplinary concepts.

2. General structure of the Escape Room

2.1. Design principles

The methodology is based on a series of principles that ensure that the educational Escape Room functions as a rigorous pedagogical tool and not merely as a recreational activity. These principles ensure consistency, conceptual progression, and effectiveness in learning complex content such as sustainability and microplastics in textiles.

2.1.1. Alignment between learning objectives and game dynamics

The central principle of the design is that progress in the game depends directly on the participants' understanding and application of prior knowledge. The team cannot 'win' solely through intuition or trial and error; they must analyse information, interpret data or apply technical concepts to solve the challenges. This ensures that achieving the narrative objective necessarily involves the acquisition of specific knowledge [4].

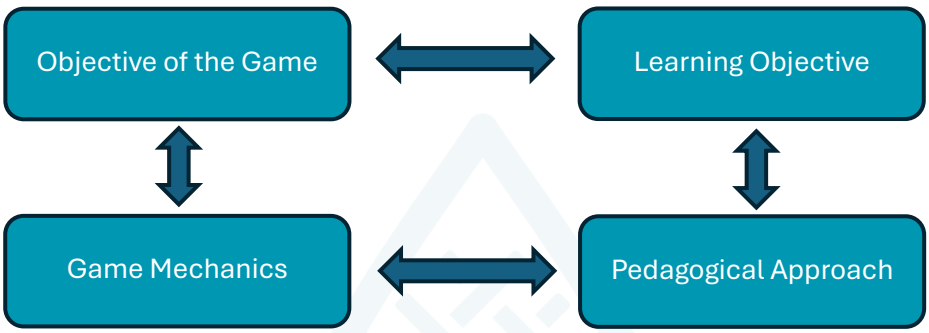

Figure 1. Relationship between recreational and educational components in the design of an educational escape room [4].

2.1.2. Contextualised problem

The Escape Room is based on a realistic and meaningful problem linked to the textile and environmental field. Contextualisation is key to promoting meaningful learning, as it allows students to understand the relevance of the content and place it in a specific

professional or social framework. Sustainability and microplastics are presented as real challenges that require analysis, decision-making and critical thinking.

2.1.3. Progressive and guided structure

Although the methodology promotes active exploration, the journey must be carefully structured. The challenges are organised in such a way that there is a clear conceptual progression: from the identification of the problem to the final integration of knowledge. This structure avoids misinterpretations and facilitates the understanding of complex phenomena involving multiple scientific variables.

2.1.4. Collaborative dynamics and active participation

The design of the challenges should encourage the active participation of all team members. The tasks are designed to require different skills: data analysis, logical reasoning, visual interpretation, decision-making, etc. Participants must coordinate their skills to solve the puzzles in the shortest possible time and achieve the goal of 'escaping' [2]. The solution will depend on cooperation and not on the individual performance of a single student.

2.1.5. Balance between challenge and support

An essential element is maintaining an appropriate level of difficulty. If the challenges are too simple, engagement is lost; if they are too complex, frustration is generated. For this reason, the methodology incorporates a support system or clues that allow the difficulty to be adjusted without eliminating the cognitive challenge. This balance promotes concentration, engagement and a sense of achievement.

2.1.6. Integration of final reflection

Learning is not limited to the moment of play. The experience is completed with a structured reflection phase that allows concepts to be consolidated, possible misunderstandings to be corrected and the activity to be linked to the curriculum content. This phase is essential for transforming the playful experience into deep learning.

2.2. Essential components of the educational Escape Room

For the Escape Room to function as a structured and effective teaching tool, it must be designed based on a series of clearly defined components. These elements are not accessories, but rather constitute the didactic architecture that guarantees coherence, conceptual progression, and meaningful learning.

2.2.1. Contextualised initial problem

The experience begins with the presentation of an authentic and relevant problem. In the case of this methodology, the starting point is linked to situations related to sustainability and microplastics in textiles, such as:

- Detecting microfibres in water samples from textile industry discharges.
- Assessing the environmental impact of a textile production chain.
- Identifying materials responsible for polluting a specific body of water.
- The need to redesign a textile product to reduce its environmental impact.

This problem acts as a central theme throughout the activity; it is not merely a narrative device, but rather a conceptual framework that guides the resolution of challenges and gives meaning to each test performed by the participants.

A good initial problem must meet three conditions:

- It must be realistic and professionally relevant.
- It must require analysis and decision-making.
- It must allow for the integration of different scientific or technical concepts.

2.2.2. Immersive and coherent narrative

The narrative of a story based on the initial problem provides cohesion to the experience. It is not limited to an attractive introduction but establishes a common thread that connects all the challenges until the Escape Room is completed.

An effective narrative:

- Maintains consistency with the problem posed.
- Justifies each challenge within the story.
- Creates urgency and a sense of mission.
- Encourages the emotional involvement of the students.

For example, participants can take on the role of a team of environmental researchers, textile innovation technicians, or sustainability consultants. This role assignment reinforces engagement and places the activity in a professional setting.

Narrative coherence is essential to prevent challenges from being perceived as isolated exercises with no connection to each other or as mere laboratory exercises; immersive narrative brings unity, purpose, and meaning to each challenge.

2.2.3. Challenge structure and conceptual progression

Challenges are the functional core of the Escape Room. They must be designed in such a way that there is a clear progression from basic understanding of the problem to its final resolution.

There are different possible organisational structures, defined as [5]:

- **Open structure:** participants can solve different challenges at the same time, and all of them will lead to the final solution. This method has the disadvantage of preventing the creation of a staggered difficulty experience, i.e. the game becoming more challenging as more previous challenges are overcome.
- **Sequential structure:** each challenge unlocks the next one. This is particularly useful when the content requires orderly conceptual progression. This method works in small game rooms or when the whole team is required to work together.
- **Path-based structure:** this is the most common organisational method. It consists of several routes with different sequenced challenges that lead to the final solution. Each challenge is necessary to solve the next ones. This structure has the advantage that team members can organise themselves and solve different challenges at the same time. The game can be designed with simpler challenges at the beginning, which can become more complicated as participants gain confidence and familiarity with the methodology.
- **Pyramid structure:** this is a hybrid method that combines the advantages of the path-based structure, which can be solved simultaneously by different team members. Once these challenges have been overcome, they converge in a sequential phase of the game, which increases the difficulty of the game. This structure requires careful planning to ensure that all initial paths are balanced in difficulty and that the final convergence is coherent and meaningful.

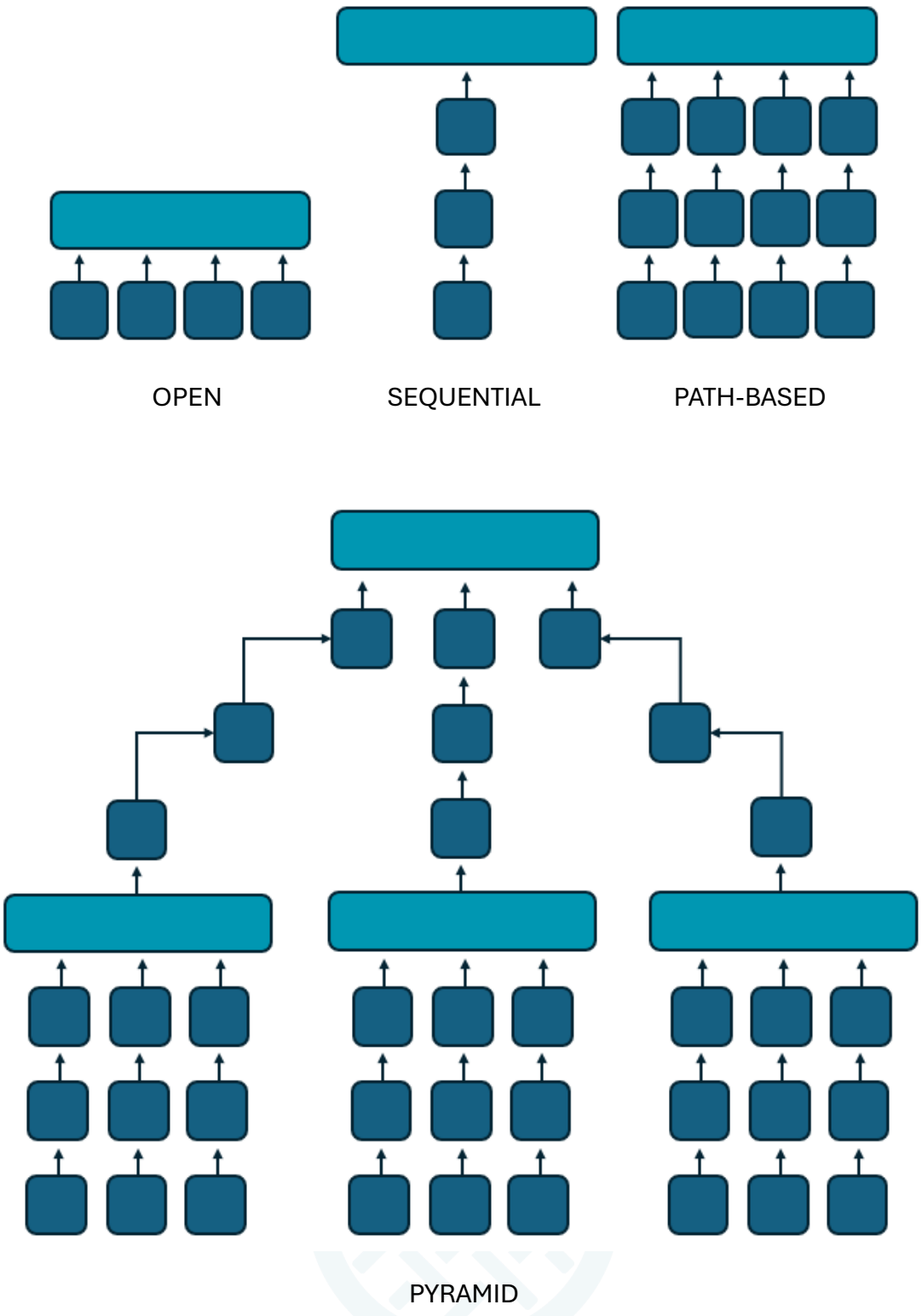

Figure 2. Types of challenge structures in an educational escape room: open, sequential, path-based, and pyramidal [2].

2.2.4. Types of challenges

Challenges are at the heart of the educational escape room experience. Each challenge should be designed so that solving it depends on applying knowledge, analysing information and collaborating with team members. In this regard, it is important to combine different types of challenges that stimulate a variety of cognitive and practical skills.

Below are some of the most commonly used types of challenges in educational Escape Rooms [6]:

Table 1. Types of challenges in an educational Escape Room.

Type of challenge	Description	Educational value
Searching for objects or clues	Participants must locate objects, clues, or hidden information within the physical or digital environment.	Encourages observation, exploration of the environment, and attention to detail.
Identification or classification	Students must identify materials, elements, or concepts correctly among several options.	Supports the application of theoretical knowledge and the ability to distinguish relevant information.
Data interpretation	Involves analyzing graphs, tables, experimental results, or scientific information in order to obtain an answer.	Develops analytical skills, critical thinking, and the interpretation of results.
Problem solving	A situation or challenge is presented that requires applying knowledge or performing calculations to progress in the game.	Promotes logical reasoning and the practical application of academic content.
Codes and ciphers	Participants must decipher messages using keys, codes, or symbol substitutions.	Stimulates logical thinking, puzzle solving, and cooperation among team members.
Assembly or construction	Teams must assemble pieces, reconstruct objects, or complete physical or digital structures.	Encourages spatial reasoning and coordination among participants.
Decision making	The group must choose between different options based on the information obtained during the game.	Develops argumentation skills, critical thinking, and analysis of consequences.

Although the types of challenges described above can be applied to a wide variety of disciplines, it is important to note that the specific design of the challenges must always be adapted to the learning objectives of the subject or educational context in which the Escape Room is implemented. In this way, the challenges can be geared towards the application of specific knowledge, the use of techniques specific to the area of study, or the analysis of relevant issues within the disciplinary field.

In the case of this proposal, the examples of challenges have been designed around the field of chemistry applied to sustainable textiles and the reduction of microplastics, with the aim of enabling students to analyse materials, interpret experimental data, and reflect on possible strategies for reducing the environmental impact of textile products. Below are some examples of challenges that could be incorporated into an educational Escape Room focused on this topic.

Table 2. Types of challenges in a textile Escape Room.

Type of challenge	Description	Educational value
Identification of textile materials	Students must identify different types of fibers or materials based on clues, labels, or observable characteristics.	Differentiate natural and synthetic fibers in order to analyze their potential for microplastic generation.
Analysis of samples or experimental data	Interpretation of experimental results, data tables, or graphs.	Analyze results from microfiber filtration or microplastic concentrations in water samples.
Use of instrumental techniques	Participants use laboratory instruments or tools to obtain the information needed to solve the challenge.	Observation of fibers through microscopy or analysis of particles in samples.
Interpretation of scientific information	Students must read, interpret, or relate information from articles, technical sheets, or reports.	Analyze data on microfiber release during washing or the environmental impact of different textiles.
Chemical or environmental problem solving	Challenges that require applying chemical or scientific principles in order to progress.	Determine which processes or materials generate lower environmental impact.
Sustainable decision making	The team must choose between different alternatives based on environmental or technical criteria.	Select materials or production processes that reduce the generation of microplastics.

2.3. Team size

Team size is a key element in the design of an educational escape room, as it directly influences active participation, communication, internal organisation and the achievement of learning objectives.

Studies conducted in educational contexts show that the most common range is between 3 and 6 participants per team [2]. This size is considered optimal because it allows tasks to be distributed, maintains a high level of individual involvement and encourages collaboration among team members. One of the main reasons for limiting the number of participants is to avoid so-called 'free-riding', i.e. situations in which some students participate minimally while others take on most of the work.

Teams with more than six members may require more time to complete the challenges because they may experience greater difficulties in communication and coordination. In fact, no team with more than six participants managed to finish within the allotted time due to losses in organisation and decision-making.

When the Escape Room includes individual assessment, an even smaller size is recommended, between 4 and 5 participants, to ensure that each student has real opportunities to demonstrate skills and apply the content [2].

From a methodological point of view, the size of the team should be defined based on:

- The complexity of the challenges.
- The structure of the game (sequential, path-based or pyramidal).
- The type of assessment planned.
- The physical space available.
- The time allocated to the activity.

In conclusion, an appropriate team size design not only improves the dynamics of the game, but is also a structural condition for ensuring active learning, effective collaboration and efficient time management.

2.4. Playing time

Playing time is a key structural element in the design of an educational Escape Room. The time limitation not only adds dynamism and urgency to the experience, but also directly influences team organisation, decision-making and the achievement of learning objectives.

Effective playing time, i.e. the time devoted exclusively to solving challenges, not including initial instructions or debriefing, ranges from 20 to 120 minutes, with 60 minutes being the most common duration and the median identified in different educational contexts. This value remains constant in both formal and informal education [2].

In many cases, the choice of playing time is not based on specific pedagogical criteria, but rather responds to the usual practice of recreational escape rooms or the standard duration of class sessions. However, from an educational perspective, the duration should be defined according to specific teaching variables:

- Complexity of the content.
- Number and type of challenges.
- Level of the students.
- Team size.

- Learning objectives.
- Type of assessment planned.

In certain disciplines, such as the medical field, time constraints also have an explicit educational value, as working under pressure is an important professional skill. In other contexts, time constraints mainly contribute to social interdependence and group coordination, as they force team members to collaborate effectively to complete all challenges within the set time frame [6].

However, in educational settings, it is essential that the time allocated is realistic. If most teams fail to complete the activity, negative effects such as frustration, cognitive abandonment, or trial-and-error behaviour without reflection may occur. Some studies indicate that when no team managed to escape, students expressed dissatisfaction and questioned the educational value of the experience.

For this reason, prior testing of the Escape Room is essential to adjust the duration of the game to an achievable but challenging level. A proper design must balance [7]:

- Sense of urgency.
- Feasibility of success.
- Conceptual depth.
- Positive learning experience.

In the case of complex content such as sustainability and microplastics in textiles, an approximate duration of 45 to 60 minutes of effective play, supplemented by additional time for introduction and debriefing, is usually appropriate in university or vocational training contexts. This allows intensity to be maintained without compromising subsequent reflection.

Ultimately, the duration of the Escape Room should not be defined solely by tradition or logistical convenience, but as a strategic pedagogical decision that directly influences the quality of learning.

2.5. Use of digital technology

The incorporation of digital technology into educational Escape Rooms greatly expands their pedagogical and methodological possibilities. Digitisation not only allows for diversification in the types of challenges, but also facilitates scalability, adaptation to different educational contexts, and implementation in hybrid or completely online modalities.

In recent years, the development of interactive environments, multimedia creation platforms, and automatic validation tools has favoured the evolution of the traditional

Escape Room, based exclusively on physical elements, towards digital and hybrid models that combine analogue and technological resources.

Digital technology can fulfil different functions within the structure of the educational Escape Room:

- **Reinforcement of narrative immersion:** Digital resources enrich the narrative through introductory videos, simulated audio, encrypted messages, fictitious emails, or interactive virtual environments. These elements add realism, increase emotional involvement and promote a sense of authenticity in the problem posed.
- **Automation and structuring of progress:** Digital platforms allow for the design of automatic challenge unlocking systems, answer validation forms and integrated timers. They also make it possible to record answers, resolution times and interaction patterns, which can provide valuable information for formative assessment.
- **Integration of data analysis and simulation:** One of the main added values of digital technology is the ability to work with interactive data. Students can analyse dynamic graphs, compare simulated scenarios, or manipulate variables in real time to observe changes in results.
- **Adaptability and accessibility:** Digital or hybrid Escape Rooms are more easily transferable between institutions. They do not require complex physical infrastructure and can be adapted to different educational levels with minimal modifications to the content.

Various platforms can be used to design digital or hybrid escape rooms, facilitating the creation of interactive environments without the need for advanced programming knowledge. Tools such as Genially or H5P allow you to structure sequential challenges, integrate automatic answer validation, and add multimedia elements. Platforms such as Thinglink or Canva enable the creation of interactive images and scenarios, while QR code generators, encryption, or online timers can be incorporated to reinforce the dynamics of the game.

Likewise, learning environments such as Moodle or Google Classroom allow the Escape Room to be integrated into the institutional educational ecosystem, facilitating monitoring and evaluation. The choice of platform should be based on pedagogical criteria, accessibility, ease of use and compatibility with the infrastructure available in each centre.

3. Roles during the Escape Room

The implementation of an educational Escape Room requires a clear definition of responsibilities to ensure pedagogical consistency, organisational fluidity and quality in the learning experience. Although in many educational contexts the same person may assume several roles, differentiating them conceptually allows the activity to be designed with greater rigour and foresight.

The roles can be organised into three main stages: preliminary design, activity development and post-activity evaluation.

3.1. Roles in the design phase

- **Educational designer.** Responsible for the conceptualisation and didactic architecture of the Escape Room. Their functions include:
  - Defining the central problem and learning objectives.
  - Designing the narrative.
  - Structuring the challenges and the route (sequential, path-based or pyramidal).
  - Ensuring alignment between game mechanics and curriculum content.
  - Determining the system of clues, duration and evaluation.

- **Logistics coordinator.** Responsible for operational planning:
  - Organising groups.
  - Time management.
  - Preparing the physical or digital space.
  - Reviewing materials and devices.
  - Management of consent forms or questionnaires, if applicable.

3.2. Roles during the Escape Room

- **Game Manager.** This is the main moderator of the activity. Their functions are essential during the Escape Room and are as follows:
  - Introducing the narrative context.
  - Explaining rules and objectives.
  - Supervising the activity.
  - Managing time.
  - Providing clues strategically.
  - Resolving technical issues.
  - Maintaining momentum and motivation.

They must have in-depth knowledge of each challenge and anticipate possible difficulties. Their intervention must be balanced: sufficient to avoid blockages, but without undermining the team's autonomy.

- **Confederate.** This is a figure who participates as an "actor" within the Escape Room, forming part of the narrative. Unlike the Game Manager, they do not act from outside the game, but from within the scenario.
  They can perform functions such as:
  - Playing a key character (e.g. investigator, technician, client, manager, etc.).
  - Introducing critical information at specific moments.
  - Generating decision-making situations.
  - Raising ethical or professional dilemmas.
  - Increasing the realism of the experience.

  In educational contexts, the confederate can be used to simulate complex professional scenarios or to encourage certain group dynamics. Their use must be carefully planned so as not to alter the pedagogical coherence.

- **Internal roles of the students.** To encourage balanced participation and avoid 'free riding,' it is advisable to assign roles within the student team itself, such as:
  - Group coordinator.
  - Time manager.
  - Data analyst.
  - Communications manager.
  - Secretary or information recorder.

  The assignment of these roles can be defined at the beginning of the activity or left open, depending on the desired learning outcomes. In certain contexts, establishing formal roles promotes organisation, individual responsibility and equity in participation. However, in other cases, allowing roles to emerge spontaneously can enhance autonomy, natural leadership and the identification of individual strengths within the group.
  The decision to structure roles or not should therefore respond to a clear pedagogical intention aligned with the competencies to be developed.

3.3. Roles in the evaluation and monitoring phase

- **Evaluator.** In experiences where the aim is to analyse the pedagogical impact, there may be a person responsible for:
  - Recording the time taken to complete each challenge and the entire game.
  - Noting requests for clues.
  - Observing group dynamics and individual strengths.

- Identifying recurring difficulties.
- Collecting evidence of learning.

The evaluator's role is essential for improving future implementations.

- **Data manager.** In teaching innovation or research projects, a specific role may be necessary to:
  - Collect questionnaires.
  - Analyse results.
  - Manage recordings or evidence.
  - Ensure data protection.
  - Prepare impact reports.

In short, the correct distribution of responsibilities is a key structural element for the educational Escape Room to function as a rigorous and replicable teaching strategy, and not just as a one-off activity to stimulate interest.

4. Assessment and debriefing

Assessment in an educational Escape Room should be understood as a broad process that goes beyond checking whether or not the team manages to complete the activity within the allotted time. In this type of methodology, the educational value lies both in the final result and in the way in which the students participate, organise themselves, make decisions, interpret information and collaborate with the rest of the team.

Therefore, the assessment must consider at least two complementary dimensions. On the one hand, the observation of performance during the activity, carried out by the teacher or facilitator. On the other hand, a subsequent phase of guided reflection or debriefing, aimed at reconstructing what happened, identifying successes and difficulties, and connecting the experience with the content and skills worked on.

4.1. Teacher assessment during the Escape Room

During the activity, teachers can play an active observer role, gathering evidence on how each team is functioning and on each student's performance. This observation allows them to assess not only the resolution of challenges, but also aspects related to collaborative learning, autonomy, and the application of knowledge in context.

Teacher assessment should focus particularly on the process. In an educational Escape Room, the team that finishes first is not always the one that learns best, nor does a group that does not complete the challenge necessarily fail to develop relevant skills. For this

reason, it is advisable to use structured observation tools, such as rubrics, which allow performance to be assessed more objectively and systematically.

Among the aspects that can be observed are communication between team members, balanced participation, leadership skills, time management, problem solving, strategic use of clues and the quality of reasoning used to advance through the challenges. This observation can be carried out globally by teams or, when the size of the group and conditions allow, also incorporating individual nuances.

Annex A. Team assessment rubric and *Annex B. Individual assessment rubric* present the assessment rubrics proposed for this activity. Annex A corresponds to the team performance assessment rubric, while Annex B contains the individual assessment rubric for each member. Both rubrics use a scale of 1 to 5, where 1 corresponds to a very low level of performance and 5 to an excellent level.

4.2. Debriefing and final reflection

The debriefing is an essential phase of the educational Escape Room. It should not be understood as an informal closing or a simple final conversation, but as the moment when the experience is transformed into conscious learning. It is the space in which students can reconstruct what happened, analyse their decisions, verbalise difficulties and connect the dynamics of the game with the content worked on.

In active methodologies such as this, students can live the experience with great intensity, focused on solving challenges and advancing in the time available. Precisely for this reason, at the end of the activity it is necessary to pause, take a step back and reflect. Without this step, there is a risk that the experience will be reduced to a motivating but superficial activity.

Debriefing serves several pedagogical functions. First, it allows key concepts to be reviewed and possible misinterpretations to be corrected. Second, it promotes metacognition, as it helps students think about how they have learned, how they have organised themselves and what strategies they have used. Thirdly, it provides teachers with valuable information about the effectiveness of the design, the difficulty of the challenges and the appropriateness of the teaching sequence.

For debriefing to be truly useful, it should be structured in three stages.

a) **Reconstruction of the experience**
   In this first stage, the aim is for students to express how they experienced the activity. This first stage allows them to release tension, organise their experiences and reflect more deeply. Questions such as the following can be asked:

- How did you feel during the game?
- Which challenge did you find most difficult?
- At what point did you get stuck?
- Which strategy helped you most to move forward?

b) Analysis of the problem-solving process

Next, focus on how the team worked and the decisions made during the activity. Some useful questions are:

- How did you organise yourselves at the beginning?
- Were tasks assigned or did they arise spontaneously?
- Was communication effective?
- Did you make good use of your time?
- What would you do differently if you were to repeat the experience?

c) Consolidating learning

Finally, the debriefing should connect the experience with the educational objectives and conceptual content. Here, the teacher revisits the challenges posed and helps to explain what was learned from each one. Some questions may include:

- What concepts or content were behind each test?
- What did you learn about sustainability or microplastics through the game?
- How does this experience relate to real situations in the textile industry?
- How would you apply what you learned in another context?

This last phase is what makes the Escape Room a tool for deep learning, as it allows participants to move from a specific experience to a more general and transferable understanding.

For the debriefing to work well, it is advisable to set aside a specific and sufficient amount of time within the session. It should not be left as a hasty addition at the end. It is also advisable for teachers to combine open-ended questions with a brief final summary, reviewing the main lessons learned and connecting them to the teaching unit or topic covered.

In some cases, the debriefing can be supplemented with a short written self-assessment or peer assessment. This allows each student to evaluate their contribution to the team, identify strengths and recognise areas for improvement. Some brief questions could be:

- What did I contribute to the team?

- What skill did I use the most?
- What do I need to improve to work better in future activities?
- What have I learned today that I would not have learned in a lecture-style class?

5. Annexes

Annex A. Team assessment rubric

GENERAL INFORMATION	
Escape Room Title	Name of the activity or the educational Escape Room being evaluated.
Date	Day on which the activity was carried out.
Team	Team identifier number or name created by the participants.
Team Members	Names of the students who are part of the team.
Objective Achieved	☐ Yes ☐ No Indicate whether the team successfully completed the Escape Room or reached the final objective of the activity.
Game Time	Total time spent by the team to complete the Escape Room or until the established time limit was reached.
Evaluator Name	Person responsible for carrying out the evaluation (teacher or facilitator).

TEAM RESULTS					
Communication within the team	1 ○	2 ○	3 ○	4 ○	5 ○
Active participation of all members	1 ○	2 ○	3 ○	4 ○	5 ○
Organisation and time management	1 ○	2 ○	3 ○	4 ○	5 ○
Strategy for solving challenges	1 ○	2 ○	3 ○	4 ○	5 ○
Application of prior knowledge	1 ○	2 ○	3 ○	4 ○	5 ○
Correct use of instrumental techniques	1 ○	2 ○	3 ○	4 ○	5 ○

Interpretation of clues and data	1 ○	2 ○	3 ○	4 ○	5 ○
Creativity and critical thinking	1 ○	2 ○	3 ○	4 ○	5 ○
Use of clues or aids	1 ○	2 ○	3 ○	4 ○	5 ○
Comments:					

Criterion	1	2	3	4	5
Team communication	No communication or chaotic communication	Very limited communication	Sufficient but irregular communication	Clear communication among most members	Constant, clear and effective communication
Active participation of all members	Very few members participate	Uneven participation	Most members participate at an acceptable level	Fairly balanced participation	All members actively participate
Organization and time management	No planning or time control	Weak organization	Basic time management	Good organization of the work	Strategic and efficient organization
Strategy for solving challenges	Only trial-and-error approach	Unclear strategy	Basic strategy	Logical and organized strategy	Highly effective and well-planned strategy
Application of prior knowledge	No application of knowledge	Incorrect or minimal application	Partial application	Correct application of knowledge	Clear and effective integration of knowledge
Correct use of instrumental techniques	Incorrect or unsafe use	Use with many errors	Acceptable use	Correct use of techniques and materials	Precise, safe and efficient use
Interpretation of clues and data	Information not understood	Incorrect interpretation	Basic interpretation	Correct interpretation of information	Deep interpretation and connections between clues

Creativity and critical thinking	Do not seek alternative solutions	Little initiative	Some new ideas	Good critical thinking	High creativity and strong analytical thinking
Use of hints or assistance	Constant dependence on hints	Excessive use	Moderate use	Appropriate use	Minimal and very strategic use

Annex B. Individual assessment rubric

GENERAL INFORMATION	
Full Name	Full name of the student being evaluated
Escape Room Title	Name of the activity or the educational Escape Room being evaluated
Team	Team identifier number or team name created
Role assumed during the activity	☐ Coordinator or team leader ☐ Active collaborative participation in several tasks ☐ Occasional or limited participation ☐ Very limited participation / Observer ☐ Other: _____
Evaluator Name	Person responsible for carrying out the evaluation (teacher or facilitator)

INDIVIDUAL RESULTS					
Participation in the activity	1 ○	2 ○	3 ○	4 ○	5 ○
Contribution to the team	1 ○	2 ○	3 ○	4 ○	5 ○
Communication with the team	1 ○	2 ○	3 ○	4 ○	5 ○
Initiative in solving challenges	1 ○	2 ○	3 ○	4 ○	5 ○
Application of prior knowledge	1 ○	2 ○	3 ○	4 ○	5 ○
Correct use of instrumental techniques	1 ○	2 ○	3 ○	4 ○	5 ○

Critical thinking and analysis	1 ○	2 ○	3 ○	4 ○	5 ○
Responsibility in their role within the team	1 ○	2 ○	3 ○	4 ○	5 ○
Attitude and commitment	1 ○	2 ○	3 ○	4 ○	5 ○
Comments:					

Criterion	1	2	3	4	5
Participation during the activity	Hardly participates	Very limited participation	Occasional participation	Actively participates at various moments	Actively participates throughout the activity
Contribution to the team	Does not contribute to the team's work	Minimal contribution	Occasional contribution	Consistent contribution	Key contribution to the team's progress
Communication with the team	Does not communicate with the group	Very limited communication	Basic communication	Clear communication with teammates	Very effective and facilitative communication
Initiative in solving challenges	Does not propose solutions	Proposes few ideas	Proposes some ideas	Proposes useful solutions	Proposes innovative and effective solutions
Application of prior knowledge	Does not apply prior knowledge	Incorrect application	Basic application	Correctly applies knowledge	Integrates knowledge clearly and effectively
Proper use of instrumental techniques	Incorrect or unsafe use of instruments	Use with several errors	Acceptable use with some errors	Correct use of instruments and techniques	Precise, safe, and autonomous use of techniques
Critical thinking and analysis	Does not analyze information	Superficial analysis	Interprets part of the information	Correctly analyzes clues and data	Deep analysis and connections between information

Responsibility in the team role	Does not fulfill their role	Performs the role in a limited way	Performs the role at an acceptable level	Performs the role appropriately	Performs the role with great responsibility
Attitude and commitment	Disinterest or negative attitude	Low commitment	Appropriate attitude	Positive and collaborative attitude	High commitment and motivation

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