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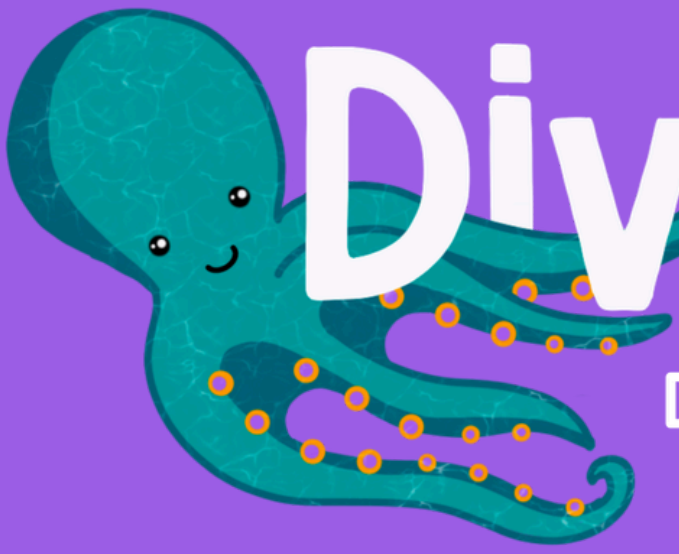

DivE(d)

Diversifying Education

Puzzle-based learning methods

Project output #2

#DivEdKA2 #Erasmus+

2026
This manual was created as a Project Result of the Erasmus+ Strategic Partnership project “DivE(d): Diversifying Education” (2024-2-EE01-KA220-YOU-000290125).

The project is implemented by Vivere Kool (Estonia) together with Shokkin Group (Estonia), Nausika Educational Foundation (Poland), Fondazione Artos (Italy) and Cesis Berzaine Primary School (Latvia) with the support of the Estonian National Agency.

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Content written by:
Pavel Vassiljev

Edited and designed by:
Olalla González

About the project

The ultimate goal of **DivE(d)** is to develop a **set of inclusive learning methods** (LEGO®, puzzles, LARPs, TTRPGs) suitable for **diverse-ability groups** of young people in the **youth work and education fields**.

Our objective is to support inclusivity and learning enhancement of diverse groups of young people, including those with special needs. We aim to equip educators with **tools and methods that are accessible, engaging, and adaptable to young people with varying abilities**.

PROJECT RESULTS

- **5 capacity building webinars** about inclusive education and play.
- **5 webinar visual summaries**.
- **20+ exercises** using puzzle, LEGO®, LARP and TTRPG-based formats.
- **4 video trailers** introducing each approach.
- **2 know-how training activities** for 24 educators from the involved countries.

About the partner organizations

NGO Vivere school is an inclusive private school in Tallinn. The concept of the school is to create an inclusive learning environment and to develop a support system including the development of new innovative methodologies and training for teachers and professionals working with children with accessibility needs.

Cesis Berzaine is a school for children with special educational needs with the main value of human dignity: teachers who understand children's daily and future needs, believe in each child's ability to achieve, inspire and support children on their own way.

Shokkin Group is a non-governmental and non-profit youth organization founded in 2011 with the main aim of empowering young people from different backgrounds living in Estonia by providing them with opportunities for personal, professional and social growth.

Fondazione Artos was established in 2006 as partner of Caronno Pertusella's municipality in order to manage all social and educational services of the municipality, working with formal and non-formal education.

Nausika was established to design, promote, and implement educational games for personal development and social transformation. We design and lead activities about climate change, sustainable development, ecology, soft skills and mental health.

About the authors

Pavel Vassiljev

Pavel holds a master's degree in transformative game design from Uppsala University and has been designing educational games for youth camps, youth centers, international groups, and school settings since 2011.

Olalla González

Olalla works as a professional graphic facilitator and recorder since 2018 and designs educational games and materials aimed at young people, youth work practitioners and educators in collaboration with Shokkin Group Estonia.

> I was lucky enough to meet many educators applying playful learning in my student years. I learned the basics of psychology and economics through play in primary school; management and law in high school; and business foundations and marketing management in university. **So, when I entered the world of teaching and training, it was only natural that games would be my favorite go-to's in the toolbox.**

> Games are a great way to diversify teaching methods. Through games, you have the potential to not only provide **knowledge**, but also practice relevant **skills** and influence **attitudes** of students. Bringing a game into the classroom brings the much-needed competence development, real-world connection, and cross-subject integration.

> These puzzle-based and tabletop-style games are designed to fit in a 45-minute timeframe and give students space to practice previously learned content. We encourage educators to take the games and adjust them as they see fit. **A game is a flexible tool, so don't be afraid to adjust the rules and the outline to your and your group's needs.**

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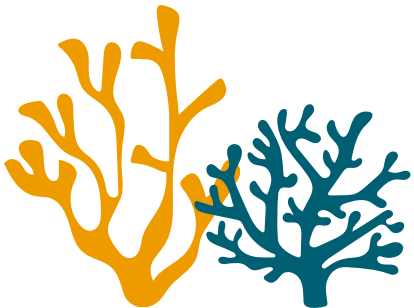
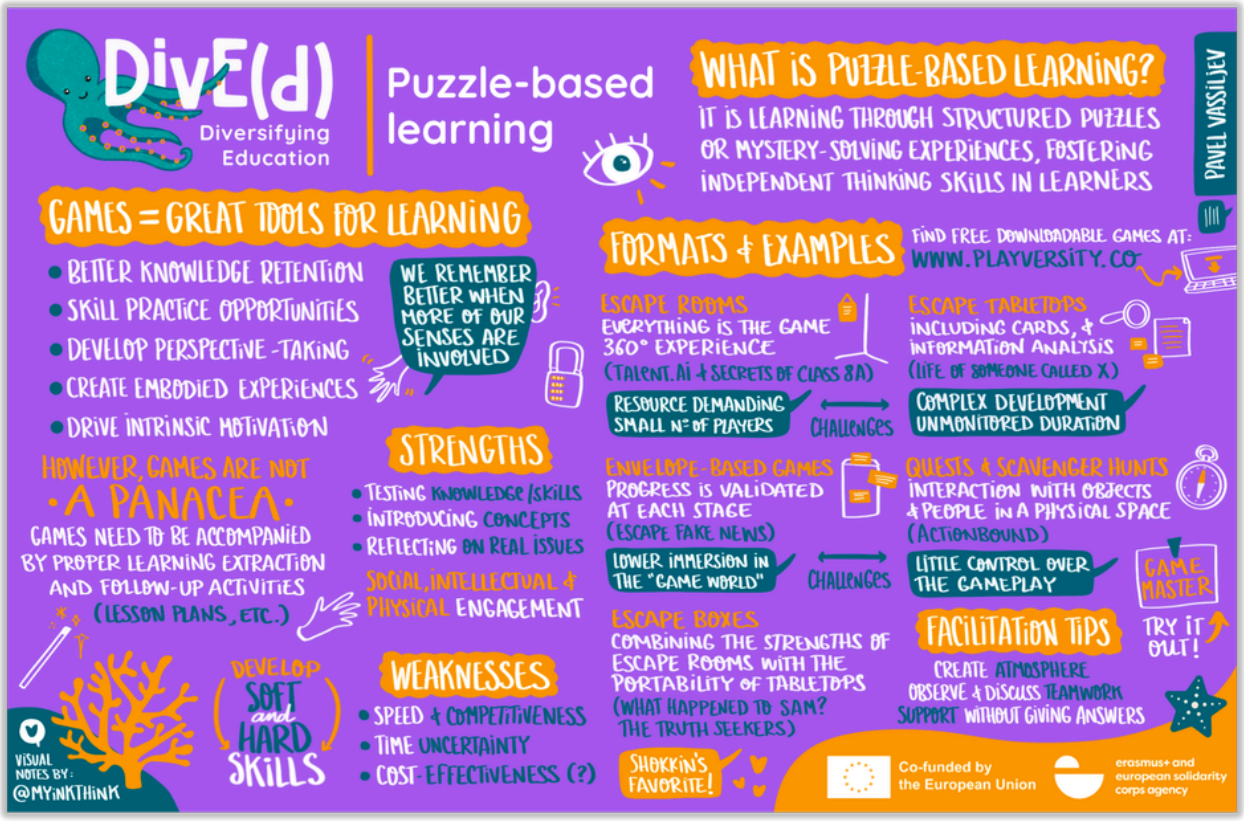


About puzzle-based learning

Puzzle-Based Learning (PBL) is a pedagogical approach that focuses on teaching students how to frame and solve unstructured problems. Unlike traditional "textbook" problems that often come at the end of a specific chapter and require a straightforward application of recently learned formulas, puzzles can be **context-free, deceptively simple, and require a "thinking about thinking" approach.**



Puzzle-based learning (PBL) has evolved from ancient oral traditions into a structured pedagogical approach focused on critical thinking and problem-solving. From the ancient origins of "riddling games" used by elders to transmit logic and facts to scientific thinkers like Newton, who utilized puzzle-like thinking to decode complex systems. **Today, PBL includes escape games, scavenger hunts, and standalone puzzles and riddles.**

The formalization of "Puzzle-Based Learning" as a distinct academic methodology was led by Zbigniew Michalewicz and colleagues, who argued that there is a "missing link" in education: students are taught what to learn but not how to think through unstructured, real-world problems.

THE "WHY" BEHIND THE METHOD

The goal of PBL is not to teach specific mathematical formulas, but to build mental stamina, persistence, and critical thinking. The ultimate goal is the "Eureka!" or "Aha!" moment: the sudden realization of the correct approach that brings a sense of accomplishment and reinforces the learning process.

When creating a puzzle-based lesson, we use the concept of a "puzzle loop" that mirrors five key problem-solving steps: **1) identifying the problem; 2) gathering information; 3) brainstorming; 4) testing,** and, if needed, **5) iterating solutions.**

When students interact with an escape box, they first have to find correlations between the objects and information they have at the moment; gather more information of a specific kind; see how this information can be interpreted and where it can be used; come up with a solution; apply the solution and modify it if needed, and proceed to the next step. **Puzzle-based games have the possibility to provide the most instant feedback on whether the track a group takes is the correct one or not.**

APPROPRIATE TARGET GROUPS

Puzzle-based learning is versatile and can be adapted for a wide range of learners. We can design simple puzzles or complex, elaborate escape room concepts:

- **Early childhood (ages 5-10):** Focuses on classification, symbol recognition, and spatial reasoning through physical puzzles (e.g., tangrams or sorting games) to build basic logic and perseverance.
- **Middle and high school:** Used to reduce "math anxiety" and introduce students to the idea that being "stuck" is a natural and productive part of the learning process.
- **Undergraduate STEM:** Historically the primary target, where PBL is used in first year of university seminars to bridge the gap between high school learning and the complex, unstructured nature of professional engineering.
- **Professional and vocational training:** Puzzles are used in industry workshops to foster teamwork, creative problem-solving, and "out of the box" thinking.
- **Inclusive education:** Particularly effective for diverse-ability groups because puzzles can be tiered. The visual and hands-on nature of many puzzles reduces language barriers and caters to different learning paces and abilities.

APPROPRIATE SUBJECTS AND TOPICS

While PBL originated in mathematics and computer science, its application in and outside of the classroom is nearly universal:

- **STEM Fields:** Probability, logic, geometry, physics, and algorithmic thinking are natural fits.
- **Humanities:** Escape games can be used in history or geography to model critical analysis or follow events. For example, a "historical puzzle" might involve deducing a timeline from conflicting accounts, creating a timeline of events, or discovering a historical event from the point of view of one of the actors.
- **Business and management:** Puzzle-based exercises can help students understand resource allocation, optimization, and strategy in competitive environments.
- **Language learning:** Word puzzles and ciphers can reinforce vocabulary and syntax in an engaging way.
- **Social issues across subjects:** Topics like bullying, disinformation and fake news, and human rights challenges can organically be discovered through stories and puzzles.

Using PBL in the classroom can be very diverse. You do not have to dedicate a full lesson to a game. On the contrary, you can go from a 5-minute warm-up to a multi-lesson story. It is really up to you.

- **5-minute warm-up:** A quick puzzle to shake up the start of a lesson.
- **End of lesson test game:** Using a puzzle or an escape game to assess how well students retained knowledge.
- **Full lesson:** Delivering new content entirely through a story-driven game.
- **Multi-lesson story:** A long-term investigation where theory is taught between game steps.

Puzzle-based DivE(d) games

Game name	Subject	Topic	Facilitation difficulty	Player number	Age	Game difficulty	Link to game
The Case Zero	Biology	Endangered Species	🔒🔒🔒	1-4	13-15	🔒🔒🔒	🔗
Cascade	Biology	Ecosystem stability	🔒🔒🔒	2-4	14+	🔒🔒🔒	🔗
EuroTour	Geography	European Geography	🔒🔒🔒	3-5	13+	🔒🔒🔒	🔗
ECOC0D5S	Geography	Modern Ecological Threats	🔒🔒🔒	2-4	13-15	🔒🔒🔒	🔗
The Syndicate Trials	Geography	Cardinal directions	🔒🔒🔒	3-9	14-15	🔒🔒🔒	🔗
Deadline Draft	Social studies	News classification	🔒🔒🔒	3-5	15-18	🔒🔒🔒	🔗
The Roman Calculator	History, Math	Roman numerals	🔒🔒🔒	2-12	11+	🔒🔒🔒	🔗
Rocket Escape	Maths	Algebraic Fractions	🔒🔒🔒	1-30	14-16	🔒🔒🔒	🔗
Punctuation Architects	Language	Punctuation	🔒🔒🔒	2-30	10+	🔒🔒🔒	🔗

Facilitation of puzzle-based activities

Facilitation in PBL is a delicate balance of "scaffolding" and "letting go." The facilitator's role is to act as a coach rather than an instructor.

FRAMING THE EXPERIENCE (BRIEFING)

Facilitation begins with setting the right atmosphere, often referred to as creating the "magic circle": **a safe environment where players agree to follow game rules in order to practice real-life skills.** The facilitator should establish a rapport with the students, framing the game as a challenge that requires logic and teamwork rather than "goofy" behavior.

The briefing must explicitly state the rules (e.g., "don't turn the tables upside down") and define the ultimate mission, such as finding a recipe for a perfect CV or contacting a missing classmate. When framing the experience, the facilitator invites students to enter the narrative and feel themselves as detectives, pirates, media influencers or scientists. The story provides an extra motivation to engage with the game and work in a team.

IN-GAME FACILITATION

The primary rule for a game master is to interfere as little as possible. Instead, the educator should observe actively and take notes on student logic and interactions within teams. These observations are vital for the later debriefing session. If teams are talking through theories but not trying them, the facilitator should encourage them to apply their ideas rather than just thinking.

As a game master, look for the "moment of frustration." If a student is frustrated but still trying, do not intervene. If they are about to give up, check-in with them. **Your goal is to keep them in the "Zone of Proximal Development": where the challenge is high enough to be interesting but not so high that it causes shutdown.**

Giving clues

If a team struggles for too long on a specific puzzle, the facilitator should step in with a gentle nudge. Instead of giving the answer, ask about their current logic. Effective hints include diverting their focus (e.g., "look at this from the perspective of the antagonist") or narrowing their focus (e.g., "you only need four numbers, not twenty"). You can take up one of these approaches:

- **Model the thinking process:** "What have you tried so far?" or "What do we know for sure?"
- **Point to a pattern:** "Do you see a similarity between the first two steps?"
- **Simplify the problem:** Suggest solving a smaller, similar version of the puzzle first.

FACILITATING THE DEBRIEFING

A game is not a "magic remedy"; it must be followed by a structured discussion to extract learning. **The debrief is the most important part of PBL. It is where the "Aha!" moment is turned into a generalizable rule.** The debriefing should follow three stages:

- **Emotional:** Let the “hype” and excitement go down by asking how players feel and what made them feel this way.
- **Intellectual:** Discuss the content, new information, or things they neglected during play. Highlight the most important story or puzzle parts.
- **Real-world connection:** Connect the game to day-to-day life (e.g., share examples of manipulation techniques in everyday communication).

At the end of the session, don’t forget to celebrate the struggle. Acknowledge the moments where they were stuck and how they overcame them to build "mental stamina".

Any game is a great way to build up interest and curiousity towards a topic or a subject. An educator can capitalize on the game experience with a follow-up activity right after or in the following meetings. Provide suggestions for books, documentaries, and podcasts to dive into the topic or prepare the next meeting to be dedicated to diving deeper into the topic.

Adapting a game to your audience

When talking about puzzle-based learning, we can talk about diverse interventions. From a 360-degree immersion with the use of technology and actors, to a simple envelope with a task based on the recently discussed topic, **the game format should be chosen based on your resources and the abilities of the students.** Choose a game format based on:

- **Escape rooms**: Offer maximum immersion and use physical space (walls, tables) but are resource-heavy and usually limited to one small group at a time.
- **Escape boxes**: Portable "Matrioska-style" games that use the immersion of an escape room but are more cost-efficient and allow multiple teams to play in one classroom simultaneously.
- **Tabletop escape games**: Highly portable and understandable, often merging digital (websites/chatbots) and analog elements.
- **Envelope-based games**: The most cost-efficient format, consisting mainly of printed materials handed out in stages by the game master.
- **Scavenger Hunts**: Ideal for large-scale discovery of a city or school using mobile tools like Actionbound.

RESOURCE ADAPTATION

High-tech "escape rooms" with physical locks and wooden boxes are engaging but expensive and time-consuming to reset. Mechanical or programmed elements add "cool" factors, but they might be unreachable for the average classroom. A relatable storyline and diverse puzzles placed in envelopes or shoe boxes can be as exciting as a high-tech game.

- **The envelope method:** Use a series of numbered envelopes. Each envelope represents a "lock." To "unlock" the next envelope, the team must show the correct solution to the game master (the "human lock") or find a code that corresponds to the next envelope's number.
- **Simple digital adaptations:** Use Google Forms with "response validation" where a correct answer is required to proceed to the next section.

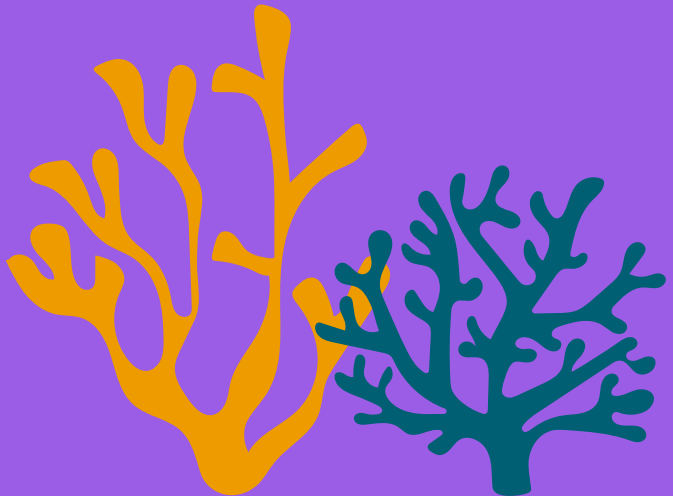
GAMEPLAY ADJUSTMENT

To prevent speedrunning, facilitators can tell players that speed is not the goal or even "trick" them by saying fast players might miss vital clues. If a classroom has different learning paces, the designer must iterate and tweak the information so that the gap between the fastest and slowest teams is minimal (e.g., 30 vs 35 minutes).

- **Scaffolding**: For younger or struggling learners, provide a "partial solution" or a template to guide their thinking.
- **Reducing/adding variables**: In some puzzles, reduce the variable for a simpler version. On the contrary, to challenge advanced students, add more constraints and take out some in-game pointers.
- **Differentiated participation**: In mixed-ability groups, assign roles (e.g., "The Scribe", "The Material Manager", "The Logic Lead") to ensure everyone contributes according to their strengths.

Puzzle-based
DivE(d) games

OUTLINES



The Case Zero

Puzzle-based game

Author: Melih Ulucan, Olalla González
Visuals by: Olalla González

Learning outcomes

1. To become familiar with the IUCN Red List, and the meaning of its scale (CR, EN, VU, NT, LC).
2. To map the main drivers of species endangerment (overfishing, habitat fragmentation, pollution, climate change and poaching).
3. To differentiate real ecological threats caused by human activity vs. false/irrelevant claims.

Specs

- **Group size:** 3-4 or individual
- **Age:** 13-15
- **Game session duration (including briefing/debriefing):** 40 minutes
  - 5 minutes briefing
  - 25 minutes gameplay
  - 5-10 minutes debriefing

Game setup

- Place **box #1** locked with a 4-digit lock on the playing area.
- **Box #2** and the final **box #3** remain locked inside box #1 and are only accessible once the corresponding puzzles are solved.
- Prepare one **phone** or (preferably) one **laptop** per team, and a visible **timer** help maintain the game flow.

Game rules (what is introduced to players)

"You are about to play a collaborative, communication-friendly puzzle game in which you must rely on logic, observation, and the information provided. You are encouraged to talk, share ideas, and work together as a team. No physical force should be used on any box, lock, or material. Your team should use **one phone or laptop** to scan the QR codes and explore the online platform linked to the game. All materials except the level info card are used once. If you feel stuck, you can ask me for support. I will not give you direct answers, but hints."

Intro trailer (read to players)

"A few hours ago, Europe's central wildlife monitoring system, The Red Archive, suddenly shut down. No warning. No explanation. Every digital file on our endangered species, vanished.

A brilliant scientist predicted this disaster years ago, and she created a secret backup of the entire Red List and locked it inside this secure physical case. You have been selected as the lead forensics team with the objective of restoring the lost records.

You can use the QR Code in this folder to access a partial, temporary version of the data that was wiped and use it to rebuild the original archive. Open the case. Recover the data. Save the species before they disappear for good."

Ultimate mission

To retrieve the Red List backup that the late scientist secretly preserved before the collapse of The Red Archive.

Step-by-step facilitation (what does the teacher do)

- Read the **game rules** and the **intro trailer** out loud and explain the players' **mission**.
- Distribute **Puzzle 1 materials (open folder)** to each team and let the game begin.
- Move around the room to **observe progress, support teams** if they are stuck, and ensure they are using the materials correctly (finding the search box in the website, etc.).
- If a team comes to a complete halt or is lagging behind, offer a **small hint** to help them refocus: guide them gently, but never reveal the solution.
- Finish with a **debriefing round** about what strategies they used to solve the puzzles and what learning points they got from the game.

Gameplay

PUZZLE 1

Players find box #1 on the table locked with a 4-digit lock. Once the game starts, the facilitator hands them out an unlocked envelope containing:

- **4 numbered A6 animal pictures** with common and scientific names;
- a **IUCN endangerment level info card**;
- a **fake phone with a QR code**.

Players scan the QR code, which takes them to the search section of the IUCN website.
(!) Since the game uses the real IUCN Red list website, the facilitator should **monitor that players find the search box** where they can input the name of each animal, and avoid having teams aimlessly browing throught the site.

In the website description, each species has a danger level assigned (CR, EN, VU, NT, LC) that corresponds to the ones in the info card. In the card, additionally, each level as a number associated to it, so when players map all four animals and their endangerment levels, they obtain the password **4135**, which opens the lock of the main box.

Puzzle 1 password: 4135

PUZZLE 2

When they open box #1, players find:

- **box #2 locked with a 5-letter lock;**
- **five threat cards with 3 statements each**.

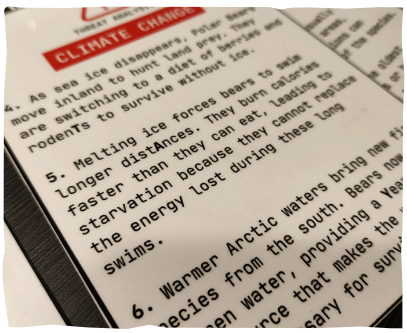
The cards refer to different **drivers of species endangerment** (overfishing, habitat fragmentation, pollution, poaching and climate change...). Each card contains three statements, making a total of fifteen threats numbered from 1 to 15, but only **one of the three threats is scientifically accurate**, while the other two are incorrect or misleading.

The goal in this puzzle is for players to carefully read each threat and identify the correct one on every card. Once the correct threats are identified, players must look closely at the selected texts, as each correct threat contains **one highlighted letter**.*

Players collect the highlighted letters from each correct threats and arrange them in the correct order according to the threat numbers (from 1 to 15). When the letters are combined in the correct sequence, they form the password “DANGR,” which is used to unlock the box and proceed to the next stage of the game.

Puzzle 2 password: DANGR (statements nº 1, 5, 9, 10, 15)

(!) In the game printable materials, threat cards don’t have pre-highlighted letters. When preparing the game, the facilitator can decide the letters to highlight based on the type of letter lock available and make their own markings once the cards are printed. Whenever possible, we suggest using meaninful words linking to the theme of the game.



PUZZLE 3

When players unlock box #2, they find:

- **8 A6 animal pictures with dates on them;**
- **4 riddle cards;**
- **a hint card;**
- **box #3 locked with a 4-digit lock.**

Each riddle card describes **two endangered animals** from the pictures and contains two highlighted letters.

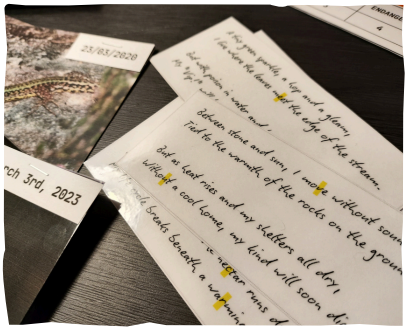
Players must first **group the pairs of animals** (two frogs, two lizards, two butterflies and two fish) with their corresponding riddle. They will soon understand that they have 4 pairs of cards, 4 digits to open the lock, and highlighted letters corresponding to threat levels (LC, EN, CR, and VU).

The next step is searching the animals of each pair in the IUCN website: players will see that only one in each pair has the same endangerment level as the one spelled in the riddle card. In this way, players shortlist 4 animals, one of each kind.

All that is left to do is use the dates on each picture and arrange them in chronological order. This process results in the sequence of threat levels **"LC-EN-CR-VU",** which, using the level info card from the first puzzle, translates into the code: **"1453":**

- **Lizards > LC > 1 > Podarcis bocagei > 23/03/2020**
- **Frogs > EN > 4 > Alytes dickhilleni > 9th September 2021**
- **Butterflies > CR > 5 > Polyommatus humedasae > March 3rd 2023**
- **Fish > VU > 3 > Entomacrodus chapmani > 14 Aug 2023**

Puzzle 3 password: 1453



Endgame

The game is completed when the final lock is opened and the team gains access to the **safe copy of the Red List list** together with a **closing letter**.

If the game is played with multiple groups, the team that reaches this final stage first can be declared as the **winner**.

The facilitator can add other elements in the box, like candy or animal stickers as prizes.

Analysis

- What was interesting or surprising during the game?
- What was confusing or challenging? How did you approach solving it?
- What is the full name of the Red List abbreviations LC, NT, VU, EN, CR, EW, EX? What does it mean in terms of animal specimen numbers?
- How did you determine which threats were “fake” or irrelevant to the species? What clues helped you decide?
- How do you think understanding real threats and population trends can help protect endangered species in real life?

Restart list

	WHAT	LOCK TYPE	CODE/ANSWER
1	Place the **Red List safe copy** and the **final letter** into box #3 and lock it.	4-digit	1453
2	Gather the **8 animal pictures** with dates, **4 riddle cards** and the **hint card**, put them in box #2 and lock it.	5-letter	DANGR
3	Put **box #2** and **5 threat cards** in box #1 and lock it.	4-digit	4135
4	Put **4 numbered animal pictures,** the **level info card** and the **fake phone** in an unlocked envelope.	-	-
5	Put the box and the enveloppe on the playing areas.	-	-

Follow-up suggestions (ideas for following lessons/meetings)

Highlight that endangered species are not limited to animals; many threatened plants also appear on the Red List. Have a session to browse the database further to discover plant species local to your country/geographical region and compare their conservation statuses.

Game variations

The back of all animal cards includes information related to the place of origin of that species and the main drivers of its endangerment. This data is purely informative and is not connected with any puzzle in the game, so you can choose to print the animal cards one-sided in order not to have this details in the game and lower the amount of information that players interact with.

Material list

Physical objects

- A lockable (preferably) red box/container/bag (box #1)
- A lockable box that fits into box #1 (box #2)
- A lockable box that fits into box #2 (box #3)
- An envelope
- (Optional) Old floppy disk/hard drive to simulate the safe copy.

Locks

- 2 x 4-digit lock
- 1 x 5-letter lock

Printouts

- 1 x Fake phone with QR code
- 12 x A6 Animal pictures (4 numbered + 8 dated)
- 1 x Level info card
- 5 x Threat articles
- 4 x Riddle cards
- 1 x Hint card
- 1 x Safe copy (hard drive)
- 1 x Final letter

The Case Zero

Facilitator's Notes

Here you can find supporting explanations regarding endangerment factors statements:

OVERFISHING

✅ **Option 1**
Bluefin Tuna are top predators that grow very slowly, taking up to a decade to reach breeding age. Industrial fishing removes them from the ocean much faster than they can naturally replace themselves, creating a mathematical gap that leads to extinction. Unlike smaller fish, they cannot simply "bounce back" in a single season.

❌ **Option 2**
While dolphins often interact with fishing boats, their beaching is typically caused by things like sonar interference, illness, or getting trapped by the tide. In nature, a predator that failed a hunt would simply move to the next school of fish; they do not have the human ego required to "give up" due to losing a race.

❌ **Option 3**
Animals are physically limited by the amount of energy and eggs their bodies can produce at one time. A species cannot suddenly decide to double its birth rate to save itself from humans. Evolution takes thousands of years to change reproductive speeds, not a few years of heavy fishing.

CLIMATE CHANGE

❌ **Option 4**
While scientists have seen bears eating berries or bird eggs, these are "snacks," not meals. A 500kg bear cannot maintain its body weight on tiny berries anymore than a human could survive on a single grape a day. They are specialized predators that need seal blubber (fat) to keep their internal organs functioning in sub-zero temperatures.

✅ **Option 5**
Polar bears are high-performance animals that require massive amounts of fat from seals to survive the freezing cold. When the ice melts, they are forced to swim for days to find a solid platform; this burns thousands of calories. If the energy they spend swimming is higher than the energy they get from their next meal, they enter a "energy debt" that leads to starvation.

❌ **Option 6**
Unlike polar bears in cartoons, real polar bears are not efficient at "fishing" in the open, deep ocean. They are "ambush predators" that need the ice as a stable floor to sneak up on seals. In open water, fish are much faster than a swimming bear, and the bear would waste too much energy trying to chase them down.

HABITAT FRAGMENTATION

❌ **Option 7**
While sunlight does help plants grow, the plants that grow in cleared areas are usually tough weeds or grass, not the high-energy fruit trees that rainforest animals depend on. Furthermore, the loss of the "canopy" (the top layer of trees) changes the humidity and temperature, making the area too hot and dry for most rainforest species to survive.

❌ **Option 8**
Actually, the opposite is true. When a forest is divided into small patches, predators can easily patrol the "edges" of the woods. It is much harder for an animal to hide in a tiny cluster of trees than in a massive, deep jungle. Fragmentation usually makes hunting easier for predators and humans, not harder.

✅ **Option 9**
Orangutans need large, connected areas of canopy to travel and find enough seasonal fruit to survive. When we build roads or farms through a forest, we create "fragmentation." These animals are often unwilling to cross open ground where they are vulnerable, so they get stuck in a small patch of trees until they run out of food or become inbred because they can't find new mates.

POLLUTION

✅ **Option 10**
Plastic doesn't just choke animals; it tricks them. A turtle's stomach sends a signal to the brain saying "I am full" when it is stuffed with plastic bags or fishing lines. Because the turtle feels full, it stops hunting for real food (like jellyfish). It essentially starves to death with a stomach that feels completely satisfied, which is a common reason for population decline.

❌ **Option 11**
This is a very dangerous misconception. Microplastics don't just pass through; they are often small enough to enter the bloodstream or get lodged in tissues. Furthermore, as small fish eat microplastics and bigger fish eat them, the plastic concentration increases (bioaccumulation). It affects the entire food chain, not just the animal that first swallowed it.

❌ **Option 12**
While there are "garbage patches," plastic is actually everywhere. As plastic breaks down, it floats at different depths and is carried by every minor current. Animals that migrate, like sea turtles or whales, must pass through these "invisible" plastic clouds to reach their nesting grounds. There is no such thing as a "safe zone" in a connected ocean.

POACHING

❌ **Option 13**
While less competition for food sounds good, it doesn't matter if there are no adults left to breed. Many poached species, like rhinos, have very long pregnancies (15+ months). Even with "extra food," they cannot physically speed up their reproduction fast enough to outpace the high-speed killing by poachers.

❌ **Option 14**
Poaching is driven by global markets and high prices. If one area is wiped out, poachers simply move to the next "safe" region. Furthermore, many of these species are migratory. If a "safe" population wanders into a "danger" zone during their natural travels, they are killed, meaning no population is truly stable until the trade is stopped everywhere.

✅ **Option 15**
In many species, like elephants, the oldest individuals (the matriarchs or big bulls) are the "libraries" of the group. They know where the water is during droughts and how to raise young. When poachers kill the oldest animals for their large tusks, the remaining population is left with "orphans" who lack the knowledge needed to survive, leading to a total collapse of their social order.

Cascade:
The Ecosystem card game

Puzzle-based game

Author: Pavel Vassiljev
Visuals by: Olalla González

Learning outcomes

1. To identify and classify organisms based on their roles in the ecosystem.
2. To model and explain complex ecological interactions (predation, mutualism, competition) and their immediate effects on an ecosystem.
3. To analyze the concept of “ecosystem stability” by observing and managing the chain reactions caused by species placement and removal.

Specs

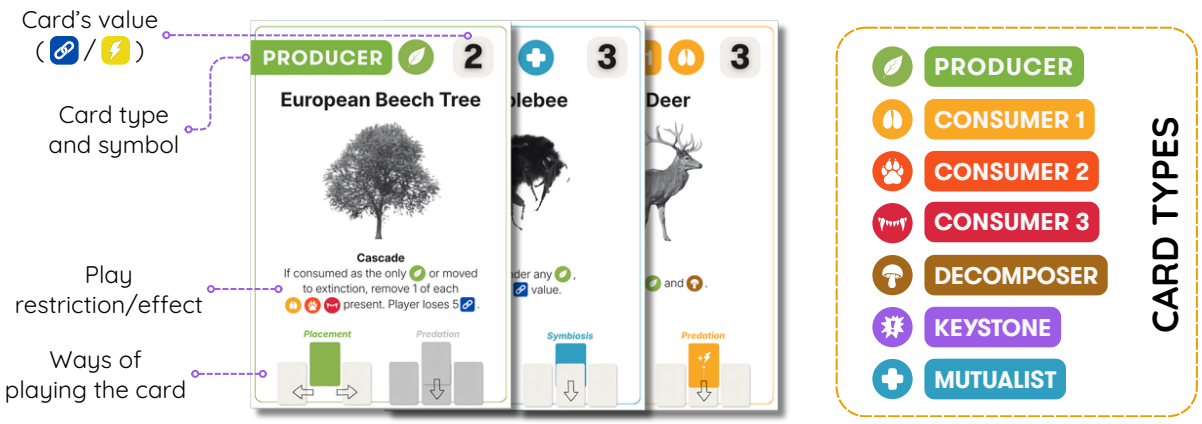
- **Group size:** 2-4
- **Age:** 14+
- **Game session duration (including briefing/debriefing):** 45 minutes
  - 10 minutes briefing
  - 25 minutes play and presentation
  - 10 minutes debriefing and theory

Disclaimer

This game is a simplified, linear model of a natural ecosystem. Real-world ecology is complex, three-dimensional, and involves infinite variables not represented here.
Feel free to make adjustments to better suit the group that you work with. Based on the group dynamic, we invite you to assess whether the game should be played individually, in pairs or in small groups.

Game setup

- Lay out the two **Extinction cards** on each side of the line, leaving space for 7 cards in-between. This forms the gameplay area, also called **“Ecosystem row”**.
- Shuffle all **Species cards** and place them **face down** as the draw deck (Species deck).
- Draw the top **5 Species cards** and place them face-up in the Ecosystem Row. Keep 2 spaces free. The ecosystem might be pretty unstable.
- Deal **4 Species cards** face down to each player forming their conservationist hand.
- Prepare the score sheet by placing player pawns on **15**, **1** and **0** on the cascade count.



Game rules (what is introduced to players)

On their turn, each player can choose to do **one** of the two following actions:

1 Place & Displace

This action includes the following sequence:

a. Placing: Choose a card from your hand and place it into the Ecosystem Row.

b. Displacing: Push any of the adjacent cards to the sides in order to make space for the new card.

c. Checking for Extinction: If a card is pushed past the 7th slot, it is removed from the game and placed on the Extinction Pile. If it is the only card of its type, the player loses 2 .

d. Gaining : Gain Interconnectedness Points equal to the card's value.

! **Symbiosis placement:** When a Decomposer or Mutualist card is placed under another card, it gains for both the card's value and the value of the card it is played under.

OR

2 Consume & Replace (see next page)

2 Consume & Replace

This action includes the following sequence:

a. Consuming: Place a Consumer on top of its valid Prey.

b. Gaining : Gain Energy Points equal to the Prey's value.
If the Prey had a or associated, add their value, too.

c. Checking for Cascade: If you covered the only visible Producer card, resolve the Cascade action.

Cascade: When a Producer is driven extinct or is overconsumed:

- The player who causes the event immediately loses 5 .
- Apply the effect written on the card.

Once a player makes the action and resolves consequences, they **draw one card from the deck** and then the **turn is passed clockwise** to the next player.

Intro trailer (read to players)

"You are a team of global Conservationists monitoring a critical and fragile ecosystem. The local environment is under threat, and the delicate balance of life is wavering. Your mission is not to merely survive, but to introduce keystone and diverse species to forge the most resilient and interconnected food web possible.

Every card you play can stabilize the environment or, with a disastrous Trophic Cascade, push the system toward total collapse. The future of the biome rests on your ability to manage the flow of life. Strategize well, for in this system, the removal of one species can mean the doom of many."

Ultimate mission

To finish the game with the highest total score of **Interconnectedness Points** .

Step-by-step facilitation (what does the teacher do)

- Introduce the **goal** and the **seven card types**.
- Explicitly link the rules to the scientific concepts:
  - **Consumption** = Energy Points gain
  - **Mutualism** = Extra Interconnectedness Points
  - **Extinction** = Interconnectedness Points loss
  - **Producer or Keystone Removal** = Trophic Cascade.
- Help players lay out the Ecosystem Row and deal hands.
- Monitor play, acting as a rule clarification resource.

Endgame

The **game ends** immediately when **one** of the following conditions is met:

- The Species Deck runs out.
- A player triggers the third Cascade by Extinction

(i.e., the third Producer card is removed, signaling system collapse).

Calculate the number of and count (½ of , round up if needed).
The player with the highest total wins.

Analysis

- Which cards were the easiest to place and why?
- Which were the most difficult to keep on the board?
- Did you prioritize gaining Energy Points by consuming prey, or Interconnectedness Points by creating stable links? In real life, what is the trade-off between maximizing resource gain and maintaining system stability?
- Can you name a real-world keystone species and describe its effect?

Follow-up suggestions (ideas for following lessons/meetings)

Discuss the role of humans in the current world and how humans influence food chains, extinctions and habitats. You can task students to explore the news and find evidence of animals interacting with the human-made world (wild animals in the cities and change of behaviors).

Game variations

- **Solo Mode (Max IP Challenge):** The player draws and places cards against a fixed target score, following all Trophic Cascade rules, but the chain-reaction effects are randomly decided by a die roll (1-3 pushes left, 4-6 pushes right).
- **Competitive Extinction:** A rule modification where the player who successfully forces an opponent's card into the Extinction Pile gains 2 , promoting aggressive play and competitive exploitation.

Material list

Physical objects

- 9 Game pawns (2 in each color and 1 neutral)

Printouts

- 1 x Scoring sheet
- 42 x Game cards:
  - 9 x Producers
  - 8 x Primary Consumers
  - 10 x Secondary Consumers
  - 4 x Tertiary Consumers
  - 3 x Keystone
  - 4 x Mutualists
  - 2 x Decomposers
  - 2 x Extinction cards

Printable materials

EuroTour

Puzzle-based game

Author: Pavel Vassiljev
Visuals by: Olalla González

Learning outcomes

1. To identify European countries based on physical features, capitals, and key cultural and economic facts.
2. To analyze how different geographic and economic strengths dictate different strategies for development.
3. To practice risk assessment by deciding whether to act on limited information or wait for more certainty.

Specs

- **Group size:** 3-5
- **Age:** 13+
- **Game session duration (including briefing/debriefing):** 40 minutes
  - 5 minutes briefing
  - 25 minutes play and presentation
  - 10 minutes debriefing and theory

Ultimate mission

To possess the most points at the end of the final round (Turn 5, 7 or 9).

Disclaimer

This game focuses on rapid factual recall and association. While it covers economic and cultural facts, it is a simplified representation of European diversity and complexity for gameplay purposes. This is a flexible learning game. Feel free to make adjustments to better suit the group that you work with.

Game setup

- Print a **Scoresheet** per group.
- Place the **Game Map** in the center of each group's table (accessible to all players).
  - Alternatively, project the map on the screen if playing in teams.
- Shuffle a deck of **Country Cards** for each team and place them face down in a deck near the map.

Intro trailer (read to players)

"You are about to enter a EuroTour competition by traveling throughout the European Union and the Schengen Zone using only your knowledge and wit. Answer the questions correctly, guess the country early, and claim to be the first to reach the correct destination. Are you ready to put your geographical knowledge to a test? Let's go!"

Game rules (what is introduced to players)

- The game is played in rounds. A turn consists of a **Reader** (player to the left of the Active Player) and an **Active Player** (the guesser).
- The Reader picks up a card and reads Fact 1 about a given country. The Active Player has 10-15 seconds to make a choice: Make a Guess or Ask for Fact 2:
  - **Make a guess immediately:**
    - Correct: Player gets 3 Points. Turn ends.
    - Incorrect: Player hears Fact 2 about the country. They may guess again for 1 Point.
  - **Ask for Fact 2 (skip first guess):**
    - Correct: Player gets 2 Points. Turn ends.
    - Incorrect: Player hears Fact 3 about the country. They may guess again for 1 point.
- If the Active Player misses their final guess (after Fact 3 is read), the player to their Right can steal the turn and make their own guess. If correct, they get 1 point.
- To finalize a successful turn, the correct guesser must point to the country on the Game Map and add the Country Card to their personal collection. If they were not able to correctly locate the country, the card goes into the discard pile.
- After the turn, the role of the Active Player rotates clockwise.

Step-by-step facilitation (what does the teacher do)

- Divide the class into tables of **3, 4, or 5 players** (the game mechanics work best in small circles).
- Read the Intro Trailer. **Explain the risk/reward system:** emphasize that guessing early is worth more points but carries the risk of being wrong. Demonstrate one sample turn.
- Assign the **number of rounds based on group size** to ensure the game fits in the 25-minute window:
  - **3 Players: Play 9 Rounds each.**
  - **4 Players: Play 7 Rounds each.**
  - **5 Players: Play 5 Rounds each.**
- Select a **starting player** for each group. Circulate the room to ensure the "Reader" and "Guesser" dynamic is flowing correctly and that students are pointing to the map to confirm their answers.
- If you are limited with time. Call "Time" and guide the scoring and reflection.

Endgame

The game ends when the last player finishes their designated final round. **Players add 1 extra point for every Country Card in their personal collection.** Players count their points.

The player with the highest total wins. In case of a tie, the player with the highest number of Country Cards collected wins.

Analysis

- Which countries were the hardest to identify? Why? Was it because of physical geography or cultural facts?
- Did anyone take a risk on 'Fact 1' and got it wrong? How did that change your strategy for the next turn? Is it better to be safe for 2 points or risky for 3?
- What was the most surprising economic or cultural fact you learned today?

Follow-up suggestions (ideas for following lessons/meetings)

- Assign students the country they "missed" the most times to research 3 new facts about.
- Have students write their own Country Cards for a country of their choice to test the class next time.

Game variations

- **Battle Mode:** If you cannot break into small table groups, play as 2-4 teams. One student represents the team each turn but can consult the group for 10 seconds before guessing.
- **Hardcore Mode:** Remove the map. Players must describe the location of the country and its neighbors instead of pointing to the map.

Material list

Physical objects (optional)

- 84 x Tokens instead of the scoresheet (you can use coins, buttons, or any game tokens).

Printouts

- Scoresheet (1 per group)
- Country Cards (31 per group)
- EU+ Schengen zones Map (x1) (can also be projected)
- Blank Country Cards (as many as you want)

Printable materials

ECOCODES

Puzzle-based game

Author: Melih Ulucan, Olalla González
Visuals by: Olalla González

Learning outcomes

1. To link specific human activities to their direct environmental consequences.
2. To explore five modern ecological challenges (deforestation, water scarcity, floods, ocean pollution and overconsumption) and their causes.
3. To evaluate green habits such as mindful consumption and waste reduction as necessary tools to restore balance to unstable climate indicators.

Specs

- **Group size:** 2-4
- **Age:** 13-15
- **Game session duration (including briefing/debriefing):** 45 minutes
  - 5 minutes briefing
  - 30 minutes play and presentation
  - 10 minutes debriefing and theory

Disclaimer

This game consists of five consecutive puzzles, each presented in a separate, unsealed envelope. Players solve puzzles one by one. When they find an answer, they write it in the answer sheet and show it to the teacher. If the code is correct, they receive the next envelope. The game continues until all five codes to reboot the system are collected.

Game setup

- Prepare the space so players have a **flat surface to play on**. If several teams play simultaneously, ensure enough space between them so answers are not overheard.
- **Prepare the envelopes** with corresponding materials and category tags (see printable materials).
- At the beginning of the game, players receive only materials for puzzle #1. **Other envelopes stay with the teacher** and are distributed only when a group successfully solves the current puzzle.
- Make sure each team has a **phone with internet access** to scan QR codes.
- Optionally, set a **timer** to manage the flow of the game.

Game rules (what is introduced to players)

"You are about to play an environmental escape game consisting of five separate missions. Each mission is delivered in a different envelope and focuses on one ecological challenge.

Once you find the code to a puzzle, write it on the answer log and show it to the facilitator. Don't write on any other material except the answer log. If your answer is correct, you will receive the next envelope.

Everything in the game is used one, and you are allowed to use one phone per team to scan media material. If at any point during the game you feel stuck, you can ask for help from the facilitator."

Intro trailer (read to players)

"Late last night, the Global Environmental Monitoring Agency experienced a total system collapse. A massive data corruption has wiped our records of the world's forests, oceans, and river basins.

But the data isn't gone, it's locked. The system's fail-safe has hidden the recovery keys inside five encrypted files. You are being deployed as Green Hackers, and your mission is to decode each file to get the stabilization codes and reboot the database.

If you can crack all five codes, we will restore the planet's balance.
The clock is ticking. Hack the codes. Save the data."

Ultimate mission

To decode the five encrypted files and deliver the code sequence to the Agency Command (facilitator) in order to reboot the database and recover the lost environmental data.

Step-by-step facilitation (what does the teacher do)

- Read the **game rules** and the **intro trailer** out loud and explain the players' **mission**.
- Distribute **Puzzle 1 materials** and the **answer log** to players and let the game begin.
- Move around the room to **observe progress, support players** if they are stuck, and ensure they are using the materials correctly.
- If players comes to a complete halt or are lagging behind, offer a **small hint** to help them refocus: guide them gently, but never reveal the solution.
- Finish with a **debriefing round** about what strategies they used to solve the puzzles and what learning points they got from the game.

Gameplay

PUZZLE 1 (DEFORESTATION)

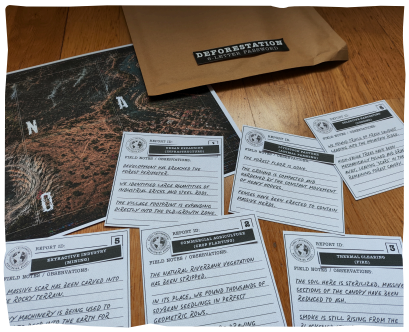
Players are handed the **answer log** and **envelope #1** with the tag “DEFORESTATION”.
Inside, they find:

- **aereal view map divided in 6 zones;**
- **6 numbered field reports** with descriptions of different actions leading to deforestation, but without titles;
- **6 title tags** with the name of the actions.

Players must analyze the environmental evidence on the cards, assign them the correct title, and match them to a specific zone on the map.

The map letters in the order of the cards (1 to 6) spell the password: **C-A-N-O-P-Y.** Players write the code in the answer log and show it to the facilitator, who gives them envelope #2.

Puzzle 1 password: CANOPY



PUZZLE 2 (WATER SCARCITY)

Inside envelope #2, with the tag “WATER SCARCITY”, players find:

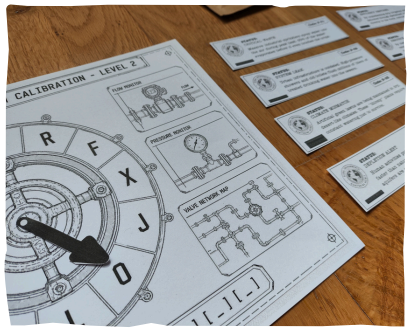
- a **valve sheet**: a circular dial with 12 letters;
- a **pointer** to attach to the center of the dial;
- **8 data strips** (4 problems and 4 solutions).

Players must pair each problem (ways how water is wasted) with its solution (how to save it). Each strip gives an instruction:

- **problems indicate direction: clockwise or counter-clockwise**.
- **solutions indicate the number of clicks.**

Starting at the “12:00 - START” position, players move the arrow for each pair in order (1, 2, 3, 4). The arrow will land on a new letter after each turn. In order, these letters spell the recovery password: **F - L - O - W.**

Puzzle 1 password: FLOW



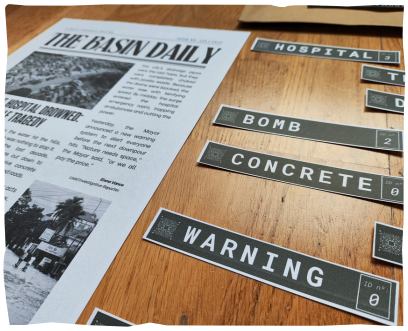
PUZZLE 3 (FLOODS)

When players open the envelope #3, with the tag “FLOODS”, they find:

- a **newspaper article** about a city disaster caused by climate change, deforestation, and clogged infrastructure.
- **10 data strips** (keywords with ID numbers).

Some of these words appear in the article, while others are "decoy" words that do not appear in the text at all. Players needs to find the **5 specific keywords** hidden in the newspaper article **(BOMB, CONCRETE, PLASTIC, HOSPITAL, WARNING)** and discard the decoy strips that are not present in the text. Then they must arrange the 5 correct strips in the order they appear in the story (as indicated above). Once the strips are ordered correctly, the ID numbers on the strips will reveal the 5-digit code: **32010**.

Puzzle 3 password: 32010



PUZZLE 4 (OCEAN POLLUTION)

When players open envelope #4, with the tag “OCEAN POLLUTION”, they find:

- a flopy disk with a **QR code** labeled "INTERCEPTED DRONE FEED";
- an A5 **analysis card** listing the three pollution types, their "Unit IDs” and the formula with the decryption math (puzzle solution calculation).

Players scan the QR code and listen to three consecutive radio logs, where a person describes the development of an ocean expedition, mentioning different pollution levels:

- Log 1: Alpha sector (microplastics) - Level 3
- Log 2: Beta sector (ghost nets) - Level 1
- Log 3: Gamma sector (fuel leakage) - Level 5

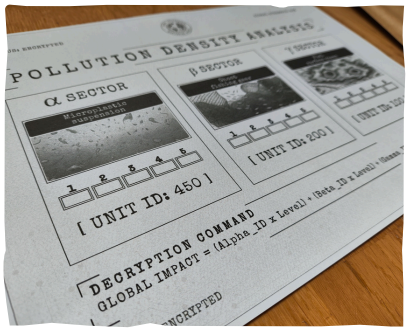
Players look at the analysis card to find the "Unit IDs" assigned to each pollution type, and use the formula to combine the data they heard with the IDs they found:

(Microplastic ID × Level) + (Ghost Net ID × Level) + (Fuel ID × Level) = GLOBAL IMPACT

- Microplastics: 450 × 3 = 1350
- Ghost nets: 200 × 1 = 200
- Fuel/oil leakage: 100 × 5 = 500
- TOTAL: 1350 + 200 + 500 = 2050

Final stabilization code: 2050

Puzzle 4 password: 2050



PUZZLE 5 (SUSTAINABLE CONSUMPTION)

When players open envelope #5, with the tag "SUSTAINABLE CONSUMPTION", they find:

- a **personal impact log** of a person's purchases in three different shops;
- **three paper receipts** corresponding to each of those purchases.

The receipts contain a mix of wasteful products, "sustainable-looking" distractions, and the specific eco-friendly items mentioned in the personal impact log. Players read the logs and check the receipts to find the specific items that match those clues. At the same time, they have to ignore "red herrings", which are sustainable items but don't match the specific description.

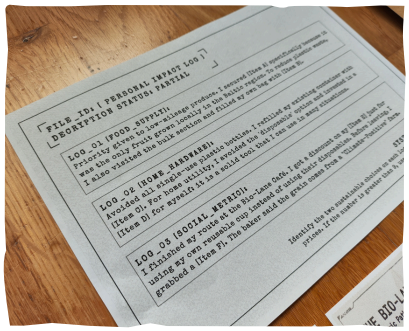
Logs and receipts are matched according to the shop and product types, and they also follow a chronological order following the logs numbers:

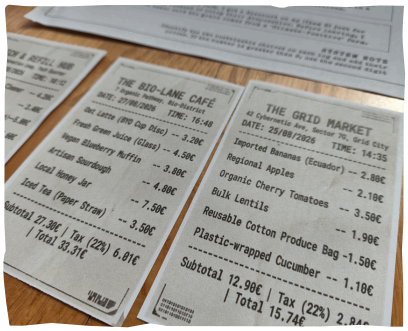
1. LOG_01 [FOOD SUPPLY] > The Grid Market (25/08/2026)
2. LOG_02 [HOME_HARDWARE] > Tech & Refill Hub (26/08/2026)
3. LOG_03 [SOCIAL_METRIC] > The Bio-lane Café (27/08/2026)

Once they find the two correct items in a log, they add their prices together. The total gives them one digit of the three-digit code:

- Log 1 (food): regional apples (2.10 EUR) + bulk lentils (1.90 EUR) = 4 EUR > **4**
- Log 2 (tech): laundry soap refill (3.40 EUR) + modular multi-tool (41.60 EUR) = 45 EUR > **5**
- Log 3 (social): oat latte (3.20 EUR) + artisan sourdough (4.80 EUR) = 8 EUR > **8**

Puzzle 5 password: 458





Endgame

The game ends when players collect the last code and give their completed asnwer log to the facilitator. The facilitator can simulate that they input all answers in a computer/tablet and announces: **"It worked, the system has been rebooted!".** The game ends.

Analysis

- Which puzzle felt the most challenging for your group, and how did you handle it together?
- How did your communicate and divide tasks during the missions? What worked well, and what didn't?
- What did you learn about how human actions influence forests, oceans, and other natural systems?
- What new idea, fact, or connection did you discover while solving the puzzles?
- Based on what you saw in the puzzles, which of these environmental problems do you believe your own country is currently experiencing the most (deforestation, drought, floods, ocean pollution, overconsumption), and why?
- Did the game make you think differently about your own daily habits? If yes, what might you change?
- Based on the puzzles, which environmental problem do you think needs the most urgent action in your community or country, and what could be done about it?

Restart list

	WHAT	CODE/ANSWER
1	Check for scribbles and place the **three purchase receipts** and the **personal impact log** in **envelope #5**. Make sure the tag "SUSTAINABLE CONSUMPTION" is glued. Keep the envelope with you.	458
2	Check for scribbles and place the flopy disk with the **QR code** and the **A5 analysis card** in **envelope #4**. Make sure the tag "OCEAN POLLUTION" is glued. Keep the envelope with you.	2050
3	Check for scribbles and place the **newspaper article** and the **10 data strips** in **envelope #3**. Make sure the tag "FLOODS" is glued. Keep the envelope with you.	32010
4	Check for scribbles and place the **valve sheet**, the **pointer** and the **8 data strips** in **envelope #2**. Make sure the tag "WATER SCARCITY" is glued. Keep the envelope with you.	FLOW
5	Check for scribbles and place the **aereal view map**, the **6 numbered field reports** and the **6 title tags** in envelope #1. Prepare this envelope to be handed out to players at the start of the game together with the **answer log**.	CANOPY

Follow-up suggestions (ideas for following lessons/meetings)

For one week, ask students to keep a "receipt journal" similar to the one they hacked in the game. They don't need to track money, just "Impact Points":

- +1 Point: used a reusable container
- +1 Point: chose a local product
- -1 Point: used a single-use plastic item.

The goal is to see which student (or team) can keep their "Carbon Baseline" the lowest.

Game variations

- Game materials include two versions of the valve sheet for puzzle #2, one of which has no letters in the dial: a game variation can be to write the letters with a UV pen and add a UV light to the contents of the envelope, so players need to find out how to “see” the letters.
- It is possible to laminate the analysis card in puzzle 4 and add an erasable marker to the contents of the envelope. In that way, players can mark the danger level of each sector.

Material list

Physical objects

- 5 x Envelopes
- 1 x Floppy disk or thematic prop (optional)

Printouts

- Answer logs (one per playing team)
- 1 x Aereal view map
- 6 x Squared field reports (deforestation causes)
- 6 x Title tags (deforestation causes)
- 1 x Valve sheet
- 1 x Pointer
- 8 x Data strips (4 problems + 4 solutions)
- 1 x Newspaper article
- 10 x Data strips (words)
- 1 x A5 analysis card
- 3 x Purchase receipts
- 1 x Personal impact log

The Syndicate Trials

Puzzle-based game

Author: Melih Ulucan, Olalla González
Visuals by: Olalla González

Learning outcomes

1. To identify continents and global zones using map-reading and coordinate skills.
2. To use latitude–longitude and cardinal directions to locate specific regions on a world map.
3. To classify animals into their correct biomes (desert, Sahel, savanna/grassland) based on geographical and environmental clues.

Specs

- **Group size:** 3-9
- **Age:** 14-15
- **Game session duration (including briefing/debriefing):** 40 minutes
  - 5 minutes briefing
  - 25 minutes gameplay
  - 5-10 minutes debriefing

Disclaimer

This game uses a facilitator-led progression where teams trade codes for new materials, culminating in a single 3-digit lock at the final stage. Please note that maps and coordinate sheets are thematic artifacts designed for gameplay and they prioritize the theme of the journey over exact scientific or GPS precision.

Game setup

- Place the **final coordinate template** in a central, visible location in the room.
- Keep the **final locked box** (treasure chest), **Puzzle 2 and Puzzle 3 materials** with you (facilitator) and distribute them only when teams complete the corresponding stages.
- Make sure each team has a **phone with internet access** to scan QR codes.
- Optionally, set a **timer** to manage the flow of the game.

Game rules (what is introduced to players)

You are about to take part in a geography-driven treasure hunt designed by the legendary Captain Luso himself. To succeed, you must read maps carefully, communicate clearly, and rely on **logic rather than guesswork**.

No physical force should be used on any lock, box, or material. If something doesn't open, revise the information you have and try again. All materials in the game are used once, **except the world map**. Please, **dont' write in any game materials**. You can use the provided paper for your notes during the game.

If at some point you feel stuck, **ask for help** from the game master/facilitator.

Intro trailer (read to players)

"Years ago, a man named Captain Luso spent years chasing a treasure no one believed was real, and somehow... he found it. He used it, lived with it, and before his death, he chose to hide it again. He left behind only a series of notes. No location, no easy answers, just a challenge: "find it, if you can". Many have tried, and all have failed. Now it is your turn. Follow his path, understand his journey, and prove you can reach what no one else ever could."

Ultimate mission

To find the location of Captain Luso's treasure.

Step-by-step facilitation (what does the teacher do)

- Divide players into **3 teams** and assign each team a **separate table** or workspace.
- Read the **game rules** and the **intro trailer** out loud and explain the players' **mission**.
- Distribute **Puzzle 1 materials** to each team and let the game begin.
- Move around the room to **observe progress, support teams** if they are stuck, and ensure they are using the materials correctly (map and transparency alignment, etc.).
- When a team provides the correct answer, **verify it** and give them the next set of materials (Puzzle 2, then Puzzle 3).
- If necessary, remind teams that **they should not share answers**, but mention that collaboration between teams may be required at later stages.
- As teams reach **Puzzle 3**, guide them to combine their results and complete the **final coordinate** in the middle of the room.
- Once teams announce the correct location, bring them the **final box (trasure chest),** let them open it, read Luso's final note and "discover" the treasure (candy coins).
- Finish with a **debriefing round** about what strategies they used to solve the puzzles and what learning points they got from the game.

Gameplay

PUZZLE 1

When the game starts, players receive:

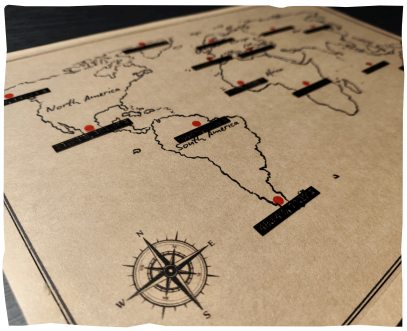
- **World map;**
- **Transparent coordinate sheet;**
- **Luso's note #1;**
- **Note with puzzle's task (mapping Luso's journey).**

In the letter, Luso writes about his journey across different regions of the world using cardinal directions and making reference to key landmarks and landscapes. Each team receives a different itinerary, but all follow the same structure: start point and three different locations.

Players must place the **transparent coordinate sheet over the world map**, revealing a set of marked locations. By combining the clues from Luso's note with the coordinate points, they identify the starting point and three different locations he passed by.

In order to receive the materials for the next puzzle, **players must be able to show Luso's journey path to the facilitator** (see table below):

SECTION	TEAM 1	TEAM 2	TEAM 3
Start Point	**Southernmost** tip of the New Continent (Patagonia)	**Northernmost edge**/prehistoric shield of ice (Greenland)	**East**/Ancient empire with a great wall (China)
Location 1	**Northeast** to a massive forest (Amazonas)	**Southeast** to the lands of the Vikings (Scandinavia)	**Southwest** to a tiny island in the ocean (Maldives)
Location 2	**Northwest** across the narrow bridge (Panama canal)	**East** to the bridge between two continents (Istanbul)	**Southeast** to a vast continent (Northern Australia)
Location 3	**North** to the northwestern edge of the world (Alaska)	**West** to the Roman "world's end" /westernmost point (Galicia).	**South** to a great bay on the southern coast (Melbourne)



PUZZLE 2

In this puzzle, players receive:

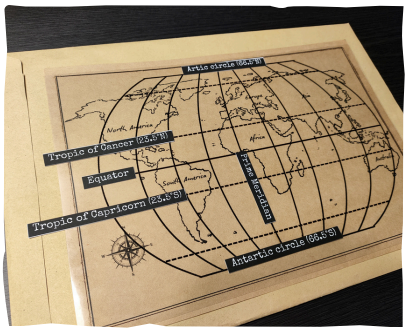
- **Transparent sheet with parallel and meridian lines;**
- **Transparent sheet with globe areas and topographic markings;**
- **Six labels with parallels' names;**
- **Luso's Note #2**;
- **Old recorder with a QR code;**
- **Note with puzzle's task (finding the code of the region where the treasure lays).**

Players begin by reading Luso's second note, where he talks about the land where he hid his treasure without naming it directly, and tells about how his travels became a great legend. Players must scan the **QR code** and listen to the audio recording of Luso's legend, which provides geographic clues using concepts such as the Tropic of Cancer, the Equator, the Prime Meridian, as well as cardinal directions.

To solve the puzzle, players must first correctly place the **parallels' labels** on the transparent sheet. **(!)** Even if they understand the audio clues correctly, a wrong placement of the labels will lead them to the wrong result:

- **South of the Tropic of Cancer;**
- **North of the Equator;**
- **To the east of the Prime Meridian;**
- **Drifting too far toward the rising sun, the waters of the world's longest river will block the path. Turn back, for you have gone too far.**

Once players have placed the labels and followed the audio directions, they will have located a region in Africa at the crossing of the globe areas 15 and 15, leading to the password **1515**. When the code is found, the facilitator provides the next set of materials.



PUZZLE 3

In this puzzle, players receive:

- **1 biome card** (Desert, Sahel, or Savanna);
- **3 numbered animal cards;**
- Luso's **note #3**.

In his note, Luso confirms that the place where he hid his treasure was, indeed, Africa, and he mentions first the **Desert, then the Sahel, then the Savanna** (order in which later on the numbers need to be arranged).

Using the biome card as a reference, teams must analyze environmental conditions and identify **the one animal** out of the three they received that has the biological adaptations to survive those conditions.

- **Team 1 – Desert biome:**
  - ✅ Fennec Fox (18)
  - ❌ Lion (15) (desert)
  - ❌ Sahelian goat (47) (Sahel)
- **Team 2 – Sahel biome:**
  - ✅ Dorcas Gazelle (11)
  - ❌ Dromedary Camel (31) (desert)
  - ❌ Giraffe (65) (Savanna)
- **Team 3 – Savanna biome:**
  - ✅ African Elephant (30)
  - ❌ Addax (7) (desert)
  - ❌ Striped Hyena (28) (Savanna)

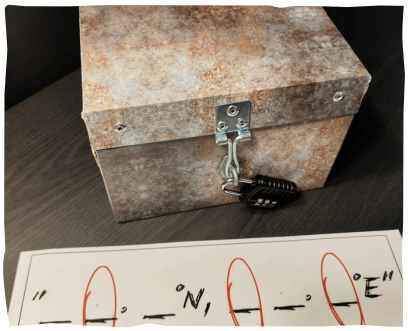

Endgame

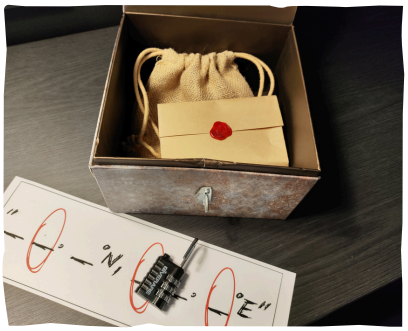
Once teams have their animals, they head to the table in the middle of the room to work with the coordinate file:

- Desert biome → Fennec Fox → 18
- Sahel biome → Dorcas gazelle → 11
- Savanna biome → African Elephant → 30
- **"_ _ . _ °N, _ _ . _ °E" > 18.1°N, 13.0°E.**

At this moment, **the facilitator brings up the final box (locked with a 3-digit code),** symbolizing that players have indeed found the location of Luso's treasure.

Within the coordinate, some digits are highlighted. Players extract those digits to form the final code: **810,** which opens the treasure box, where players find **Luso's note #4** and the treasure itself (candy coins). The game finishes.





Analysis

- During the game, what made you feel the most pressure or excitement, and why?
- How did your team organize itself during the different puzzles (map reading, coordinate solving, biome sorting)? What teamwork strategies worked best?
- Which geography concepts became clearer to you during the game (continents, latitude/longitude, global zones, biomes)?
- How can you apply the skills you used today (reading maps, interpreting clues, analyzing biomes, collaborating) to real geography tasks?

Game variations

The game can also be played using locks at every stage instead of the facilitator handing out new materials. For this, it will be necessary to arrange the materials in a way that they all fit in one main locked box that is given to players from the beginning:

Set-up stage

- Keep only the **final locked box** (treasure chest) with you.
- Place puzzle 3 materials inside a lockable folder/box. Place this box inside of a slightly bigger folder/box together with Puzzle 2 materials. Finally, place this bigger box on the table together with Puzzle 1 materials.

Puzzle 1

- Players start the game with Puzzle 1 materials and a box locked with a **number lock**. It is up to the facilitator where the numbers for the lock come from: coordinates from Luso's final location, the sum of all the locations he went through, etc.

Puzzle 2

- When they open the first box, players find puzzle 2 materials and the smaller box locked with a **4-digit lock (1515)**. When players open this box, they find puzzle 3 materials and the game procees as in the original, no-lock version of the game.

Follow-up suggestions (ideas for following lessons/meetings)

The game materials include 3 animals of each biome. Ask each team to find the other two animals that belong to their biome and have them explain why. If necessary, the facilitator can use the facilitator notes included in the game materials as supporting document.

Have the students pick a new grid area on the map and write their own three-sentence "Luso riddle" using cardinal directions. They then swap riddles to see if their classmates can pinpoint the new location.

Material list

Physical objects

- 1 x Main box (treasure chest)
- Candy coins or another element that can symbolize the treasure.

Locks

1 x 3-digit lock

Printouts

- 3 x World Map* (one per team)
- 3 x Transparent Coordinates sheet (one per team)
- 3 x Transparent World Grid Map (one per team)
- 3 x Transparent Red areas sheet (one per team)
- 3 x Luso's Note #1 (a different note per team)*
- 3 x Luso's Note #2* (one per team)
- 3 x Luso's Note #3* (one per team)
- 1 x Luso's Note #4*
- 18 x Parallels labels (6 per team)
- 6 x Task description notes (2 per team for Puzzle 1 and 2)
- 3 x Old recorder with QR code + descriptive tag (one per team)
- 3 x Biome cards (one per team)
- 9 x Animal cards (three per team)
- 1 x Final coordinate tag
- 1 x Decorative "Syndicate Field File" foldable folder for biome and animal cards

* Some materials in the game are provided in two versions: one with a texturized background emulating old parchment, and a simpler, no background version that can be printed in carton or brown paper for a more realistic effect. The printable materials also include wax seals that can be cut out and used to "close" Luso's notes.

Printable materials

The Syndicate Trials

Facilitator's Notes

Here you can find supporting explanations regarding puzzle 3 for biomes and animals:

DESERT BIOME

✅ **Correct: Fennec Fox (18)**
The desert is defined by extreme daytime heat, cold nights, and almost no accessible water. Survival depends on avoiding the hottest parts of the day and enduring long periods without water. The Fennec Fox fits these conditions perfectly: it is a small, nocturnal animal that avoids daytime heat and can obtain moisture from its food. Its body is adapted for insulation and heat regulation, making it ideal for desert survival.

Why not the lions and Sahelian goats?
❌ Lions depend on hunting large prey and require consistent access to food and water. In deserts, prey is scarce and conditions are too extreme for effective group hunting.

- They live in the savanna biome, where prey is abundant and hunting is possible.

❌ Goats need regular access to vegetation and water. In deserts, plant life is too limited for them to survive long-term, and they are not adapted to extreme heat.

- They live in semi-arid regions like the Sahel, where vegetation is available.

SAHEL BIOME

✅ **Correct: Gazelle (11)**
The Sahel is a transition zone with limited water, sparse vegetation, and wide open terrain. Survival depends on speed, mobility, and the ability to feed on low vegetation while traveling long distances. Gazelles are perfectly adapted: they are fast, agile, and can survive with minimal water by feeding on plants.

Why not dromedary camels and giraffes?
❌ Camels are specialized for extreme desert conditions and long periods without water. While they can pass through the Sahel, it is not their optimal habitat.

- They live in the desert biome, where extreme dryness dominates.

❌ Giraffes rely on tall trees for food. In the Sahel, vegetation is too sparse and not tall enough to support their feeding habits.

- They live in the savanna biome, where trees and food sources are sufficient.

SAVANNA BIOME

✅ **Correct: Elephant (30)**
The savanna consists of open grasslands with scattered trees and seasonal water shortages. Survival depends on adapting to heat, limited water, and large open spaces. Elephants are key to this environment: they use their strength to shape the land, dig for hidden water, and survive long dry periods.

Why not addax and hyenas?
❌The addax is adapted to extreme desert conditions and survives with very little water in sandy environments. The savanna does not match its specialization.

- It lives in the desert biome, where dryness is extreme.

❌ Hyenas can survive in multiple environments, but they are more suited to semi-arid regions where scavenging is more effective. They do not rely on the key survival traits highlighted in the savanna description.

- They are more commonly associated with semi-arid regions like the Sahel.

Deadline Draft: The Newsroom

Puzzle-based game

Author: Pavel Vassiljev
Visuals by: Olalla González

Learning outcomes

1. To practice rapid evaluation of news sources based on Currency, Relevance, Authority, Accuracy, and Purpose.
2. To construct a narrative using only verified information while filtering out noise.
3. To recognize common "red flags" under time pressure.

Specs

- **Group size:** 3-5
- **Age:** 16-18
- **Game session duration (including briefing/debriefing):** 40 minutes
  - 5 minutes briefing
  - 25 minutes play and presentation
  - 10 minutes debriefing and theory

Disclaimer

This game simulates a high-pressure newsroom. Headlines used are fictionalized for educational safety but mimic real-world misinformation tactics.

Game setup

- Shuffle the **News cards** and **Action cards** together to form the playing card deck.
- Give every player a **"Front Page" Player Mat**.
- Explain the **C.R.A.A.P. model** if not already known.
- Deal **5 cards** from the card deck to every player and leave the remaining cards in the middle of the table.

Intro trailer (read to players)

"Welcome to the newsroom. I'm your Editor-in-Chief. We go to print in exactly 20 minutes. The internet is flooding us with leads - some are breaking news, some are propaganda, and some are just cat memes. Your job is to curate the next issue of the front page. You need six solid, verified stories. If you publish fake news, we get sued. If you publish nothing, we go bankrupt. The deadline is absolute. Publish your stories, pass the rest. GO!"

Ultimate mission

Construct the highest-scoring issue by curating 6 cards that pass the C.R.A.A.P. test while forcing opponents to publish low-quality content.

Game rules (what is introduced to players)

- The game is played simultaneously. You are given **15 seconds** to inspect your hand, choose one card and place it face down next to your player mat.
- Once the time is up, players **simultaneously flip** their chosen cards to reveal them:
  - If it is a **Story Card**, place it into the **"Cover Story"** or **"Story"** slot to publish it, or into the **"Spike"** slot to withhold it from publication.
  - If it is an **Action Card**, apply the effect immediately and then discard the action card. If multiple action cards are played, resolve based on who placed it on the table first.

Placement Constraints:
You have 2 "Spike" slots, which don't count for the final scoring. You can use the "Spike" to get rid of a bad story card. Once full, you must publish whatever story card you draft, even if it's bad journalism.

- Once everyone places their card or makes their action, each player passes their remaining hand to the **player on the left** and takes enough cards from the deck to have **5 cards**.
- Play until the card deck is gone.

Step-by-step facilitation (what does the teacher do):

- Divide the class into tables of **3-5 players**.
- Read the **intro trailer**. Explain the **game rules**. Demonstrate one sample turn and ask if there are any questions.
- Set up the **countdown timer** and announce the start of the game.

	Story Cards	Action Cards
3 players	25	5
4 players	30	10
5 players	35	15

- Call out **"PRINT!"** every time the **15 seconds** are up. This induces the necessary stress to simulate a newsroom. Allow for a few seconds to place the played card or execute the action and call out "PASS!"

Endgame

The game ends when the card deck runs out. Together with the teacher, players check the **scoring sheet** and identify the winner.
In case of a tie, the player with the most points for the 2 cover stories wins.

- **Minus points:** -1 point for every empty story/cover story slot.
- **Bonus 1:** +5 Points "Pulitzer Award" if you have a "Full Scope" (Only Gold/Platinum cover stories).
- **Bonus 2:** +3 Points "Small Pulitzer Award" if you have "Quality Journalism" (Only Silver/Gold/Platinum cover stories).

Analysis

- How did you feel being time-constrained and having to act on very little information?
- Which element of C.R.A.A.P. was hardest to spot quickly?
- Look at the highest-scoring paper. What makes the cards more trustworthy?
- What are news sources that we can rely on more in our country? How do we assess that?
- When news channels post unreliable information, what can they do to make up for it?
- How can you be a more mindful news and media consumer?

Follow-up suggestions (ideas for following lessons/meetings)

Ask students to bring in one real news headline the next day and have the class vote on how these would score in-game. Invite students to look at local news portals and analyze the top headlines there; give those news pieces a Disaster-Platinum rating. Discuss reasons for a specific rating.

Material list

Physical objects

- Timer/stopwatch

Printouts

- 50 x News/action cards
- 5 x Player mats
- 1 x Scoring sheet

Digital

- Slideshow

Printable materials

The Roman Calculator

Puzzle-based game

Author: Pavel Vassiljev
Visuals by: Olalla González

Learning outcomes

1. To practice decoding Roman numerals.
2. To be attentive and practice focus.
3. To foster a collaborative attitude among students.

Specs

- **Group size:** 2-6 if played individual and 4-12 if played in pairs per deck of cards.
- **Age:** 11+
- **Game session duration (including briefing/debriefing):** 30 minutes
  - 5 minutes briefing
  - 20 minutes play and presentation
  - 5 minutes debriefing and theory

Disclaimer

This is a flexible learning game. Feel free to make adjustments to better suit the group that you work with. Based on the group dynamic, we invite you to assess whether the game should be played competitively or cooperatively. If competitively, then whether to play individually or in pairs. You can choose to give players the cheat sheets for the whole duration of the game, or give them a few minutes to study them and then take it away.

Ultimate mission

To earn as many points as possible.

Game setup

- Shuffle the card deck.
- Place the card deck with Roman numerals upwards.
- Distribute 1 point token per player.
- Take the top card and place it next to the deck, this is the starting card.
- Choose at random who will start playing the game.

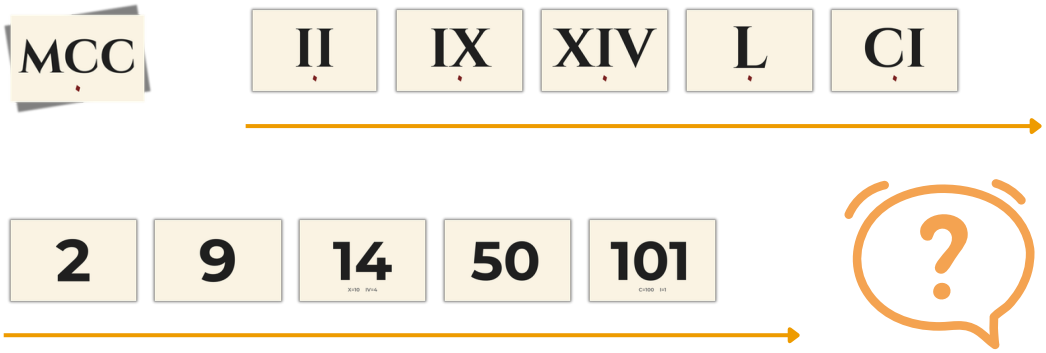
Game rules (what is introduced to players)

- The game is played in turns.
- On your turn, you have two options:
  a. **Keep the sequence running:** Take the topmost card and place it in the correct spot to keep the sequence running from the smallest to the largest numeral. The turn is then passed clockwise.
  b. **Declare a suspicion:** If you doubt the correctness of the sequence, you can point at the incorrect card. Then, that card and its neighbouring cards will be turned over to check their numerical values.
     i. If the sequence turns out to be **correct**, you will lose a token.
     ii. If the sequence turns out to be **incorrect**, you gain 1 token for spotting it.
     iii. The round then finishes, and the game table is reset to have one card. The person who gained or lost the point starts the round.
- You win if you manage to earn the most points by the end of the game (when the allocated time runs out).

Step-by-step facilitation (what does the teacher do)

Each game is played **from left to right.** The leftmost side is where the card deck is. Following this direction, a row of cards is formed, in which the numerical value on each card must get **progressively higher**.

As players take their turn, they must decide **either to question the validity of the entire row**, OR **take an additional card from the deck and insert it** (hopefully correctly) **anywhere into the row.**



If the player questions the validity correctly, i.e. there was an error in the specific part of the row (regardless of who actually committed this error!), the questioning player receives a **point token from the bank**. If the row was correct, the player gives their point token to the previously active player (if the player has no tokens to give, a token is taken from the bank).

In any case, the playing area is reset, played cards are discarded, and the round starts with one card on the playing area.

Note! You can question the validity only on your turn.

Endgame

The game ends when the allocated time runs out. The player with the most points wins the game.

If you are not time constrained, then you can play until one player earns **4 point tokens.**

Analysis

- What was the most difficult part of recognizing the Roman numbers?
- What helped you to remember the logic of Roman numbers better?
- How did you maintain the focus during the game?

Game variations

Cooperative mode: Invite players to create the longest possible chain without making any mistakes. Allow to discuss the placement. If a card is misplaced, the game master pauses the game, counts the number of correct cards and invites students to start over, trying to beat the current record.

Material list

Printouts

- 60 x Game cards
- 6 x Decoding cheat-sheets
- 18 x point tokens (coins)

Printable materials

Rocket escape

Puzzle-based game

Author: Vladimir Moskaljov, Aleksandra Tamberg-Pankratova, Rita Razvarova
Visuals by: Vladimir Moskaljov, Aleksandra Tamberg-Pankratova, Rita Razvarova

Learning outcomes

1. To identify algebraic fractions.
2. To apply expansion and simplification of fractions.
3. To use formulas of special multiplication in problem solving.

Specs

- **Group size:** 1-4 players
- **Age:** 14-16
- **Game session duration (including briefing/debriefing):** 45 minutes
  - 5 minutes briefing
  - 30 minutes gameplay
  - 10 minutes debriefing

Disclaimer

The game's online application is designed for repeated use and is fully adaptable. By updating the access codes, you can introduce different equations to easily scale the difficulty level, making the challenges simpler or more advanced based on students' needs.

Game setup

- Arrange the playing area (table/other flat surface) with the needed number of chairs.
- Set up a projector and speakers with the **intro video**.
- Prepare task envelopes according to each level, as well as the copy of the intro message.
- Players will solve tasks using physical materials and enter codes into the **digital system**.
- When a code is correct, hand the team the task envelope corresponding to the next level.

Game rules (what is introduced to players)

"You must work together as a team to solve four levels in order. Each time you find a 4-digit code and enter it into the system, the indicator will turn green and you will receive your next task. But be careful! You only have five lives. Every mistake loses a life, and if you run out, the rocket will explode and the game will be over. Once all four codes are correct, the launch will be ready."

Intro trailer (read to players)

The facilitator projects the intro video in a big screen with loudspeakers, then distributes one copy of the intro message to each team. If a projector is not available, the facilitator can read the text outloud, then distribute one copy of the message to each team:

"**THE APOCALYPSE HAS BEGUN. EARTH IS NO LONGER SAFE.**
Professor Quinn has been tasked with escaping to another planet to save human knowledge and start new life.

Her spacecraft was ready for launch, but there was an accident. The Professor is injured, and her memory is gone. She no longer remembers the critical calculations needed to launch the ship: ALGEBRAIC FRACTIONS.

The rocket's launch system is deadlocked, and it requires FOUR access codes to unlock the engines.

YOUR MISSION:
You are the emergency engineering team. To save the Professor and her knowledge, you must:

- Complete 4 levels.
- Recall the rules of algebraic fractions.
- Recover all access codes.

WARNING:
Time is running out. Every mistake drains the ship's power. If all lives are lost, the system will overload and the rocket will explode. If the system is not restored in time, the mission will be lost forever.

Professor Quinn and the future of our world is in your hands.
START THE MISSION."

Ultimate mission

To find all 4 codes and activate the rocket launch system to save the Professor and her knowledge.

Step-by-step facilitation (what does the teacher do)

- Guide players to the playing area.
- Introduce the game rules.
- Project the intro video (alternatively, read the text out loud).
- Distribute one copy of the intro message and envelope #1 to each playing team.
- Monitor progress and support if needed.
- When a team inputs the correct code, hand them out the envelope of the next task.
- Observe collaboration and problem-solving.
- Lead a debriefing discussion at the end of the game.

Gameplay

TASK 1

Players receive:

- A copy of the **intro message** with a **QR code** to the response input platform.
- A set of **8 A5 cards with fractions on one side and numbers on the other**, some of which are algebraic fractions and others, regular fractions.
- **Professor's message #1**, where she explains the characteristics of algebraic fractions and asks players to "filter" the real algebraic fractions from the "noise" (regular fractions), and then to arrange those in ascending order according to the numbers printed on side B.

Puzzle 1 password: 1368

TASK 2

Players receive:

- A set of **4 A5 cards with fractions on one side and numbers on the other**.
- **Professor's message #2**, where she explains how fraction expansion works and gives players the values of variables: **x = 2 and y = 3**.

Players must determine the factor by which each fraction was expanded. Then, when necessary, substitute the given variables values to obtain a numerical result. If the result is a two-digit number, only the last digit is used. Finally, players arrange the digits according to the order indicated on the back of the cards to form the code.
Detailed fraction solutions are available in the attached "facilitator's notes".

Puzzle 1 password: 4621

TASK 3

Players receive:

- A set of **4 A5 cards with fractions on one side and numbers on the other.**
- **Professor's message #3**, where she explains how fraction simplification works and gives players the values of variables: **x = 5 and y = 4**.

Players must determine the factor by which each fraction was simplified. Then, when necessary, substitute the given variables values to obtain a numerical result. If the result is a two-digit number, only the last digit is used. Finally, players arrange the digits according to the order indicated on the back of the cards to form the code.
Detailed fraction solutions are available in the attached "facilitator's notes".

Puzzle 1 password: 2600

TASK 4

Players receive:

- 6 fragments of 3 **Short Multiplication Formulas**.
- A set of **4 A5 cards with fractions on one side and numbers on the other**.
- **Professor's message #4**, where she tells players to first assemble the formulas from the broken fragments, apply them to the expressions and simplify the result.

Players must first assemble the formulas from the given fragments. Then apply these formulas to simplify each expression. After simplifying, they obtain numerical results. If the result is a two-digit number, only the last digit is used. Finally, players arrange the digits according to the order indicated on the back of the cards to form the code.

Puzzle 1 password: 2312

Endgame

- **SUCCESS:** All 4 codes are entered correctly → Rocket launches.
- **FAILURE:** All lives are lost OR time runs out → Rocket explodes.

Online platform

Analysis

- What strategies did you use?
- Which level was the hardest and why?
- What helped you solve the problems?
- Where did mistakes happen?

Follow-up suggestions (ideas for following lessons/meetings)

- Practicing similar problems individually.
- Discussing real-life applications of algebra.
- Individual task without the formulas given in Level 4 can be used for assessment.

Game variations

Because all four codes need to be inserted in the online application in order to get feedback, the facilitator can distribute all 4 envelopes from the beginning, allowing players to work in sub-teams if they want to.

Material list

Printouts

- 1 x System intro message
- 4 x Professor's messages/envelopes
- 5 x Pages with fractions
- 1 x Page with short multiplication formulas fragments

Printable materials

Rocket escape

Puzzle formulas results

TASK 2

Card 1

$\frac{3x}{4} = \frac{6x^2}{8x}$

Numerator: $3x \rightarrow 6x^2 = \times 2x$

Denominator: $4 \rightarrow 8x = \times 2x$

Factor: $2x$

Substitute $x = 2$:

$2x = 2 \cdot 2 = 4$

Result: 4

Card 2

$\frac{2x}{6} = \frac{4xy}{12y}$

Numerator: $2x \rightarrow 4xy = \times 2y$

Denominator: $6 \rightarrow 12y = \times 2y$

Factor: $2y$

Substitute $y = 3$:

$2y = 2 \cdot 3 = 6$

Result: 6

Card 3

$\frac{1}{5} = \frac{x^2y}{5x^2y}$

Factor: x^2y

Substitute $x = 2$, $y = 3$:

$x^2y = 2^2 \cdot 3 = 12$

Use the last digit: 2

Result: 2

Card 4

$\frac{4x}{8} = \frac{4x}{8}$

The fraction does not change.

Factor: 1

Result: 1

TASK 3

Card 1

$\frac{6x}{8} = \frac{3x}{4}$

The fraction is simplified by 2.

Result: 2

Card 2

$\frac{8xy}{12y} = \frac{2x}{3}$

The fraction is simplified by $4y$.

Substitute $y = 4$:

$4y = 4 \cdot 4 = 16$

Use the last digit: 6

Result: 6

Card 3

$\frac{6x^2y}{9xy} = \frac{2x}{3}$

The fraction is simplified by $3xy$.

Substitute $x = 5$, $y = 4$:

$3xy = 3 \cdot 5 \cdot 4 = 60$

Use the last digit: 0

Result: 0

Card 4

$\frac{18x^2y}{30xy} = \frac{3x}{5}$

The fraction is simplified by $6xy$.

Substitute $x = 5$, $y = 4$:

$6xy = 6 \cdot 5 \cdot 4 = 120$

Use the last digit: 0

Result: 0

TASK 4

(a+b)2 = a2+2ab+b2

(a-b)2 = a2-2ab+b2

a2-b2 = (a-b)(a+b)

Card 1

$\frac{4x^2-4y^2}{2(x-y)(x+y)} = \frac{4(x^2-y^2)}{2(x-y)(x+y)} = \frac{4(x-y)(x+y)}{2(x-y)(x+y)} = \frac{4}{2} = 2$

Result: 2

Card 2

$\frac{9x^2-9y^2}{3(x-y)(x+y)} = \frac{9(x^2-y^2)}{3(x-y)(x+y)} = \frac{9(x-y)(x+y)}{3(x-y)(x+y)} = \frac{9}{3} = 3$

Result: 3

Card 3

$\frac{(2x+2y)^2}{4(x+y)^2} = \frac{(2(x+y))^2}{4(x+y)^2} = \frac{4(x+y)^2}{4(x+y)^2} = 1$

Result: 1

Card 4

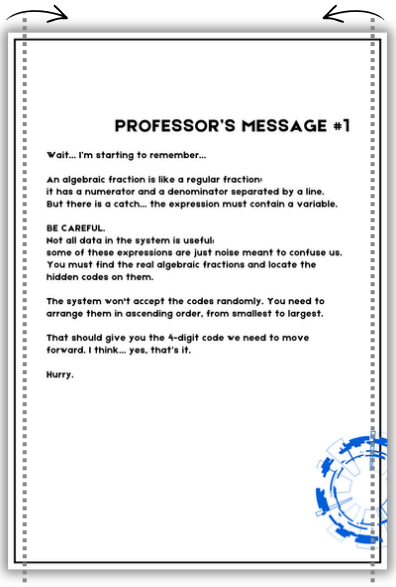
$\frac{16x^2-16y^2}{8(x-y)(x+y)} = \frac{16(x^2-y^2)}{8(x-y)(x+y)} = \frac{16(x-y)(x+y)}{8(x-y)(x+y)} = \frac{16}{8} = 2$

Result: 2

Rocket escape

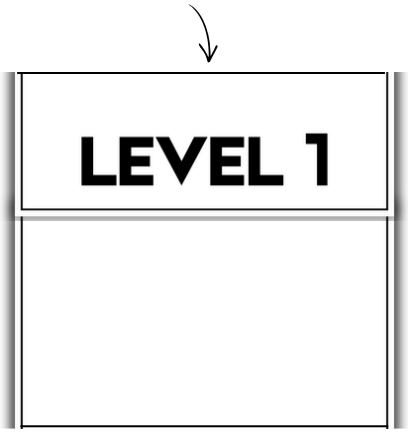
Instructions to create envelopes

1 Fold 5 mm of the left and right margins inwards.

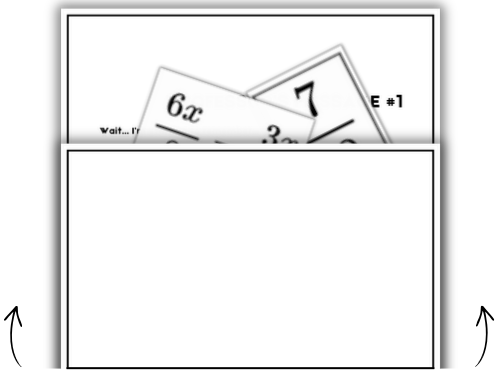


2 Fold ⅔ of the paper upwards.

3 Fold the top flap downwards.



4 Add necessary puzzle materials to the envelope and close the flap.



Punctuation Architects

Puzzle-based game

Author: Pavel Vassiljev
Visuals by: Olalla González

Learning outcomes

1. To correctly apply complex punctuation marks in sentences provided by the teacher.
2. To identify and articulate the key differences in punctuation rules.
3. To justify punctuation choices, shifting focus from "what" is correct to "why" it is correct.

Specs

- **Group size:** 1-30
- **Age:** 10+
- **Game session duration (including briefing/debriefing):** 20 minutes
  - 3 minutes briefing
  - 12 minutes play and presentation
  - 5 minutes debriefing and theory

Disclaimer

This is a flexible learning game. Feel free to make adjustments to better suit the group that you work with. Based on the group dynamic, we invite you to assess whether the game should be played competitively or cooperatively. If competitive, then whether to play individually or in pairs/small groups.

Game setup

There are two ways of playing this game: using a **worksheet template** that is prepared in advance **OR** using the **punctuation tokens and projected sentences** instead.

WORKSHEET VERSION

- Using the **worksheet template provided**, prepare sentences and space for “codes” for the lesson. Calculate the number of punctuation marks that need to be placed and define the rules they adhere to.

See examples in the next page.

Example of encoded sentence presented to the students:

SENTENCE	PUNCTUATION CODES						REASONING
After the lesson we went to the shop							

Example of decoded sentences matched with the reasonings:

SENTENCE	PUNCTUATION CODES						REASONING
After the lesson we went to the shop	,	.					*Commas after an opening phrase.* *Period at the end of a sentence.*

- You can then print out the encoded blanks and distribute them to each student/team.
- Divide players into **teams of 2-3** and ask them to decode the given sentences by filling out the template.
- Read the intro trailer to the players and start the timer.

TOKEN VERSION

- Using the **slide template provided**, prepare sentences for the lesson. Calculate the number of punctuation marks that need to be placed and define rules they adhere to.
- Prepare to project slides in the classroom.
- Divide players into **teams of 2-3**, give each team a set of **punctuation tokens**, and ask them to select tokens with the correct signs and put them in the correct order to form the code.
- Read the intro trailer to the players and start the timer.

Intro trailer (read to players)

"Greetings, Architects of Language!
Punctuation is the blueprint of clear communication: a single misplaced mark can collapse the entire structure of a sentence. Your mission is not just to guess where the marks go but to justify your construction. Speed matters, but precision is paramount. The first team to correctly find the punctuation code will earn the title of Punctuation Architect! The time starts... now!"

Ultimate mission

To be the first team to correctly select and place all necessary punctuation tokens into the target sentence(s) and accurately cite the reasons that justify each choice.

Step-by-step facilitation (what does the teacher do)

The teacher presents unpunctuated sentences to be decoded. Teams either use the **worksheet or physical punctuation tokens** to improve the sentence.

You can ask students to use the **BLANK token side** for any slot where no punctuation is required. Teams may consult the **Code of Punctuation** that justifies their token placement.

When a team is ready, they call out "Punctuation Architects!" and present their Token Sequence and Justification. Once all teams finish, proceed to scoring:

- **1 Point:** Per correct token placement (you can include blank tokens to symbolise no punctuation as well).
- **1 Bonus Point:** For the fastest team.
- **1 Bonus Point:** For the team(s) with the most correct answers.
- **1 Bonus Point:** Per correctly cited rule justification.

Endgame

The game ends when one of the following conditions is met:

1. **Time Limit**: The overall lesson segment dedicated to the game is completed, regardless of how many sentences were solved.
2. **Puzzle Solved**: A predetermined number of Challenge Sentences (e.g., 3-5) have been correctly solved and justified by the teams.

Analysis

- Which rules did you find most confusing? What can you do to remember them better?
- Were you guessing or analyzing more often?
- What did you use to confirm your answers?

Follow-up suggestions (ideas for following lessons/meetings)

You can use the game as a warm-up for a lesson, with just 1-2 sentences to decode and justify. You can also gradually introduce punctuation rules and then test it with a variety of rules with or without the list of rules (or only using personal notes from the previous lessons).

Game variations

- **Cooperative mode**: Allow the whole group to discuss choices and form correct punctuation sequences justifying the rules to one another.
- **Easy version**: Provide each team with the exact number of tokens for the sentence.
- **Silent game**: Teams must arrange and submit their Punctuation Tokens without speaking to each other.
- **Individual mode**: Instead of forming teams, make this an individual task and provide participants with a list of sentences without punctuation and blank spaces for inserting punctuation & justifying the rules.
- **Cutthroat mode**: Introduce a -1 point penalty for using the wrong punctuation sign.

Material list

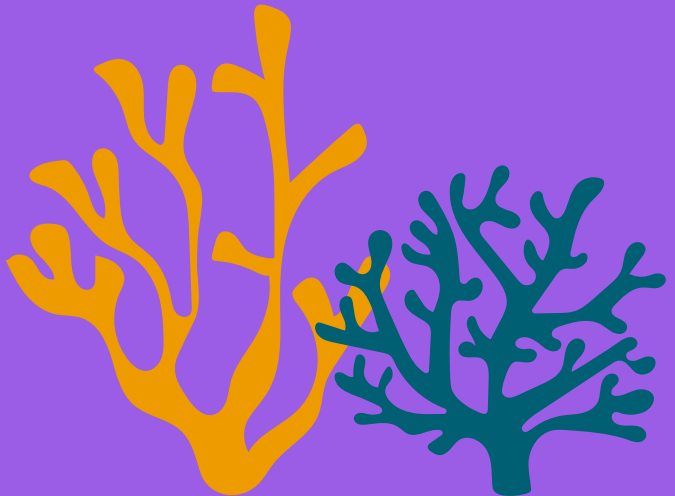
Printouts

- 1 x Code of punctuation rules per each student/pair/small group.
- 32 x Punctuation tokens (print a set per each student/pair/small group).

Digital

- Punctuation template
- Code of Punctuation template
- Sentence slide template

Printable materials



Resources list for more games

For more puzzle-based games take a look at:

- **www.playversity.co**, for print-to-play educational escape game and escape box scenarios;
- **www.breakoutedu.com** for a community of educators creating classroom escape games;
- **www.worldescapegames.com** for digital games and inspiration.
- **www.genially.com** for digital solutions to creating escape games online.

Puzzle-based activity design

If you are interested in designing puzzle-based lessons or educational games based on escape game elements, then here are some principles to keep in mind:

Start with the learning objective
What "general principle" do you want the students to learn?

Reverse engineering
Start with the actions that may provide the best way to reach the learning objectives and work backward to form puzzles and relevant steps and generate clues.

The narrative hook
Give the puzzles a theme. Instead of "Solve this logic problem," say "You are a team of scientists trying to contain a virus." Create a game world, a narrative, and some characters to engage your audience.

Ensure diverse puzzles
A good escape game utilizes various senses and gives different players a time to shine. Create a mix of audiovisual puzzles, some correlation-spotting elements, written pieces, and teamwork challenges to ensure moments of re-engagement of students.

Test and iterate
Always "playtest" your game with a colleague first. What seems obvious to the designer is often the hardest part for the player. You are on their side and you would like all groups to succeed. So keep on iterating the game until you find the best difficulty level.

The "failure" buffer
Design the game so that failure isn't the end. If they get a puzzle wrong, give them a "penalty" task that earns them a hint, or provide multiple lives, rather than just telling them they failed. Design a few extra tasks that can be provided to groups that complete the game faster than others.

When designing DivE(d) puzzle-based games, we used the game design canvas as a tool for tracking the creative process. The **first part of the game design canvas** is created to support setting the foundation of your game. The **second part of the game design canvas** is dedicated to idea generation and step-by-step idea mapping.

If you want to discover more tools for game design, take a look at the **Breakout Box manual** for designing escape games.

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