

Innovating Learning: from Digital Tools to Escape Rooms

Cátia Martins, Suzi Rodrigues, and Elias Ratinho

University of Algarve

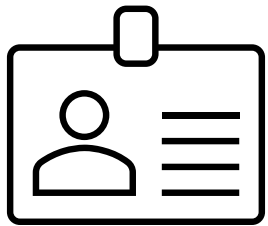
CUIP – University Research Center in Psychology



SELF- PRESENTATION



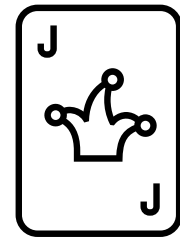
Presentation



Name



Institution/ Country



Specific feature

A wooden toolbox filled with various tools, including a hammer, a screwdriver, and pliers, is placed on a laptop keyboard. The background is a blurred image of a laptop screen and keyboard, suggesting a digital or tech environment.

Digital Tools

Explore



- <https://forms.gle/LZ4hE8fuoxXMAyME7>

A dense crowd of Minions from the Despicable Me franchise, filling the entire frame. They are yellow, pill-shaped creatures with large, round goggles and blue overalls. Many have their mouths open in various expressions of surprise, excitement, or shouting. The background is dark, making the yellow Minions stand out.

Digital Tools: How to Choose?



Communication

Management

Presentation

Interaction

Colaboration

Assessment

Dissemination

Communication



zoom



Management



Google Calendar



padlet



Presentation



Adobe Spark



Prezi



Interaction



slido



Colaboration



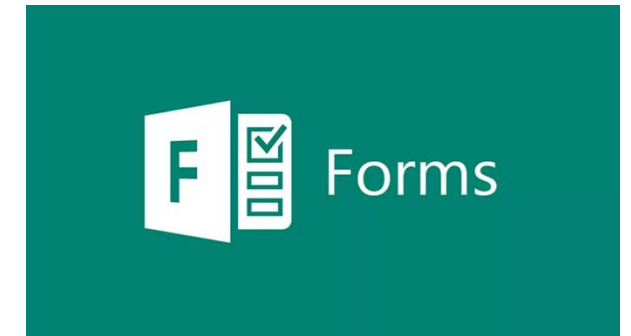
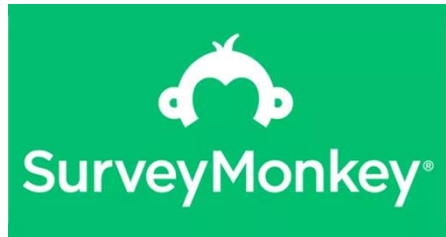
padlet



Assessment



Google Forms



Typeform

Assessment



Hot Potatoes

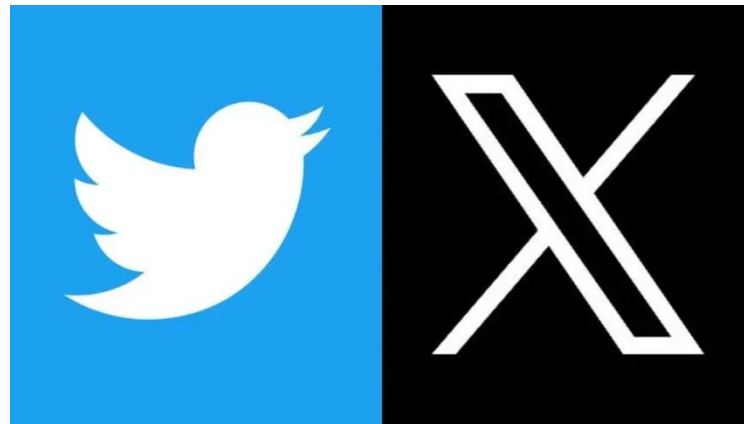


Dissemination

WIX



LOGO.ADAMS6.COM



Instagram

Digital Tools: How to Choose?

|Message ChatGPT



Search







**Using digital tools
motivates students to
learn**

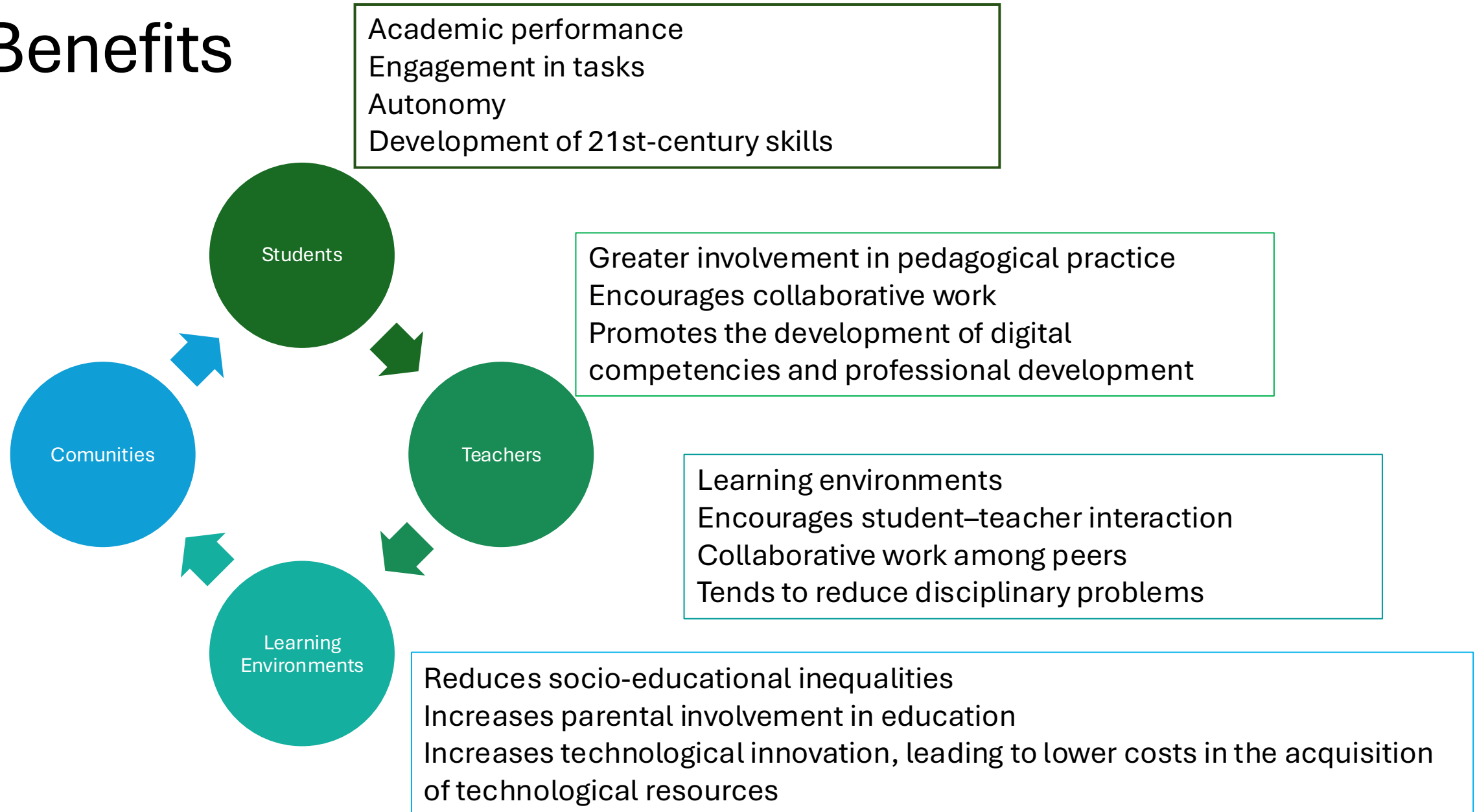
**An effective teacher uses
many digital tools**

**Students learn better when
they use digital tools**

**An pedagogically
innovative teacher uses
digital tools**

A close-up of a light-colored wooden block with rounded corners. The word "BENEFITS" is printed in large, bold, blue capital letters. The letters have a distressed, weathered appearance with white speckles and some fading, giving it a rustic or industrial feel. The wood grain is visible in the background.

Benefits





Challenges



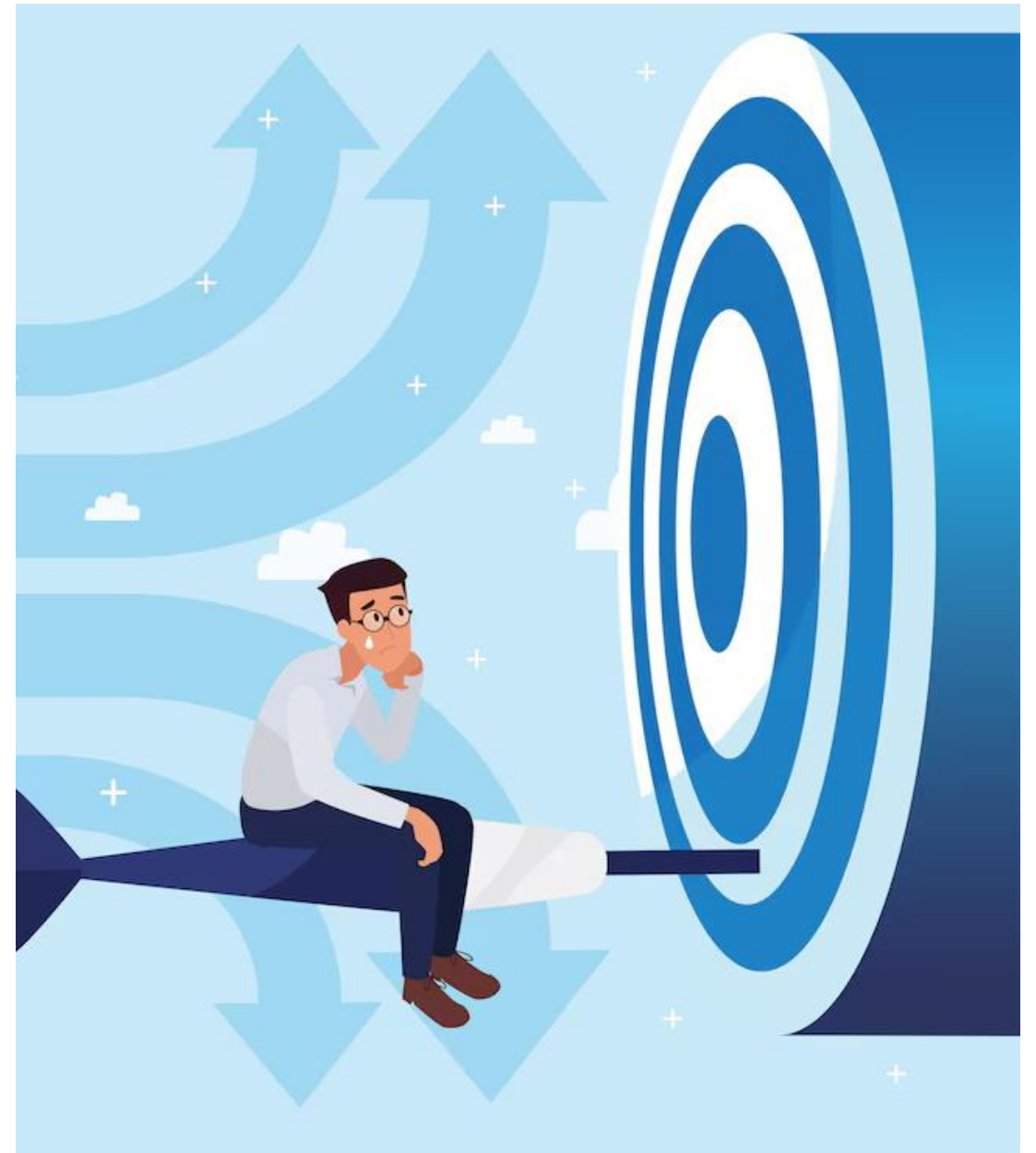
Challenges of Using Digital Tools in Educational Contexts

- Technical problems
- Costs and financial burdens
- Resistance from teachers and students
- Distraction and excessive dependence on technology among students

(Dionísio et al., 2019; Islam & Grönlund, 2016)

The integration of technologies, accompanied by various efforts, does not effectively guarantee improvements in the quality of learning.

(Tay, Nair, & Lim, 2017; UNESCO, 2023)





1924



2026

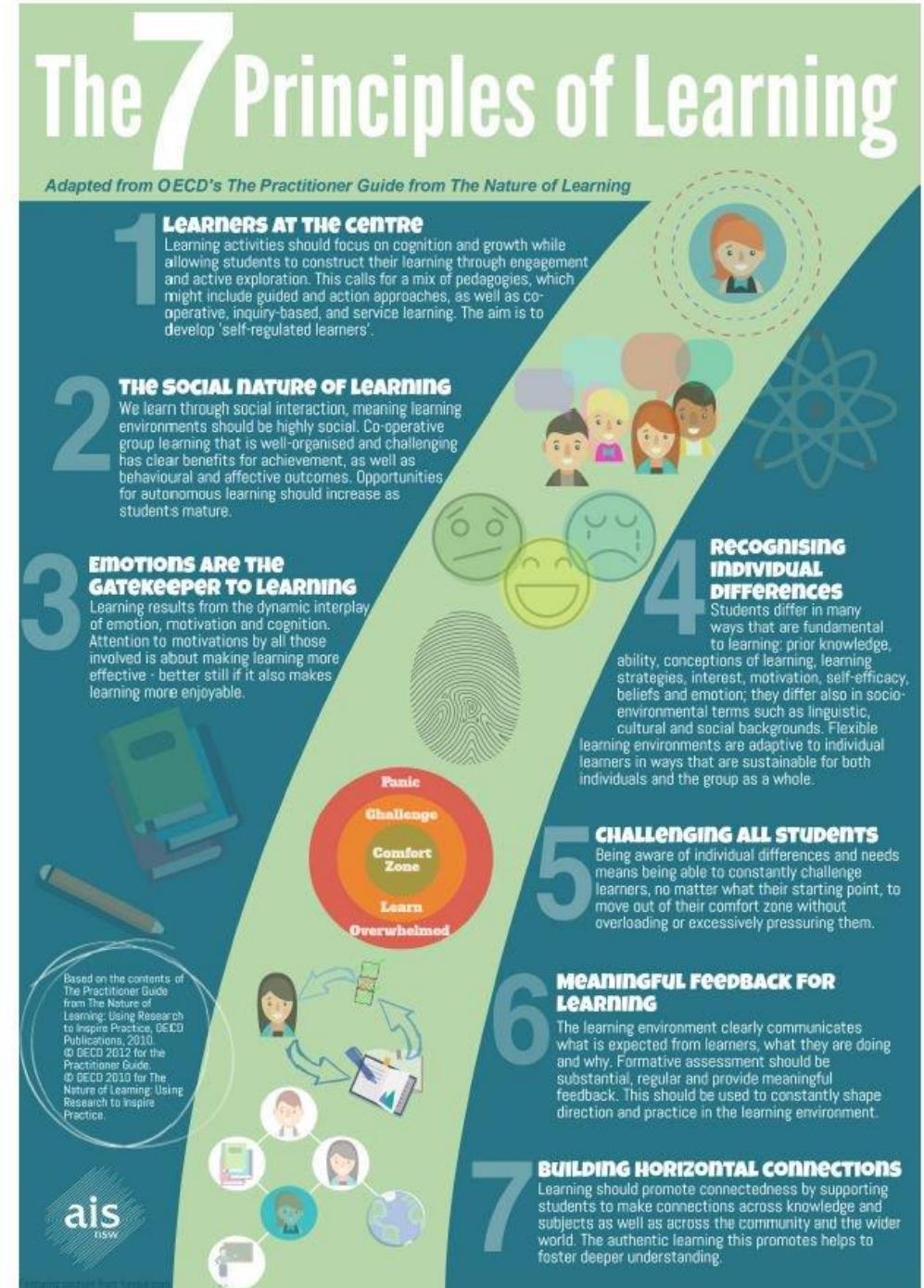
Innovative Learning Environments



- OECD developed a conceptual framework aimed at explaining how innovative learning environments (ILEs) are organised and operationalised in practice, also referred to in the literature as Innovative Learning Environments.



- This framework is based on seven pedagogical principles that place learners at the centre of the educational process and guide the development of innovative and effective learning environments.

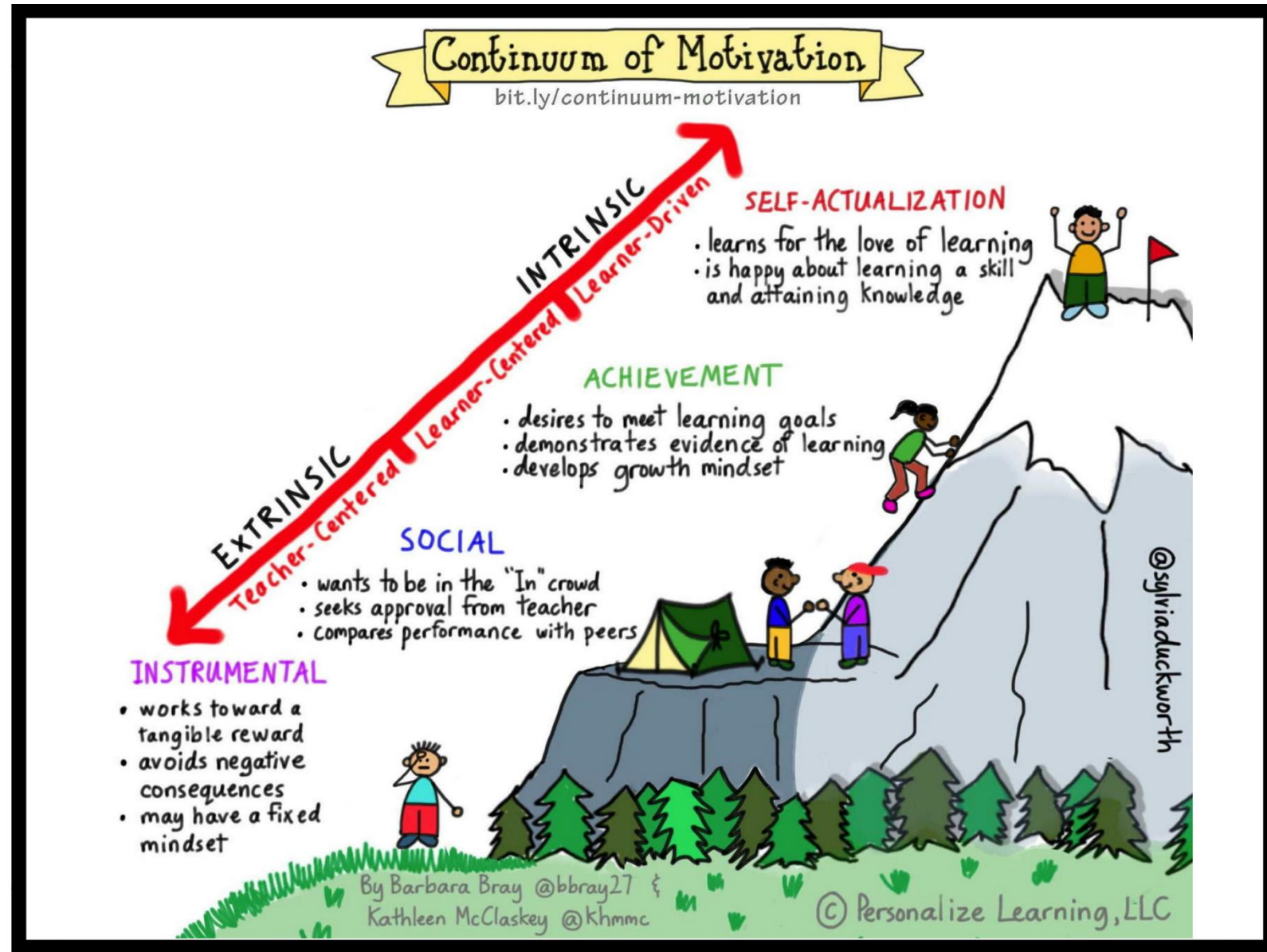


MOTIVATING
STUDENTS



MOTIVATION TO LEARN

PRODUCT VS. PROCESS



Theories, questions, and constructs.

Theory	Questions That Could be Answered with this Theory	Examples of Typical Constructs
SDT	-Am I engaging with this task for its own sake? [intrinsic reasons] -Am I engaging with this task in order to attain an outcome that is separate from the task? [extrinsic reasons]	External regulation, introjected regulation, identified regulation, integrated regulation, amotivation, intrinsic motivation
SEVT	-Do I like this task? Is engaging with this task useful, interesting, and worth my time?	Achievement Values (intrinsic, attainment, utility, and cost)
AGT	-Will I be able to do well on this task? Why am I doing this task – to attain mastery? to demonstrate competence?	Expectancies Mastery approach/avoidance, performance approach/avoidance
Attribution Theory SCT	Why did I succeed at this task? Why did I not succeed at this task? How do personal, environment, and behavioral variables affect my motivation to engage with this task?	Locus, stability, control, causal antecedents, behavioral consequences, emotions Self-efficacy beliefs; outcome expectations

Note. SDT: Self-Determination Theory; SEVT: Situated Expectancy-Value Theory; AGT: Achievement Goal Theory; SCT: Social Cognitive Theory.

(Aelterman et al., 2019)

Self-Determination Theory







Poll Everywhere



Responses are anonymous

When poll is active
respond at

PollEv.com
/catiamartins048



What is your level of knowledge regarding Self-Determination Theory?

None — I have never even heard of it

0%

Little — what is that? A new chocolate brand?

0%

Some — but I have never been interested in it

0%

Some — although I do not use it

0%

A lot — and I use it in my teaching practice

0%

[Donate](#)[Become a Member](#)[Member Hub](#)

CENTER FOR
SELF-DETERMINATION
THEORY

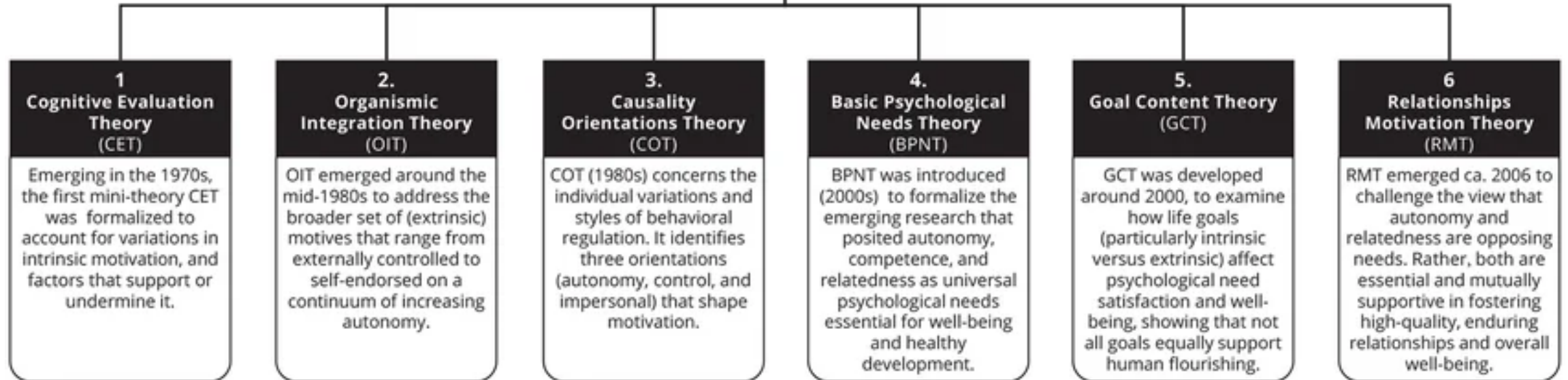
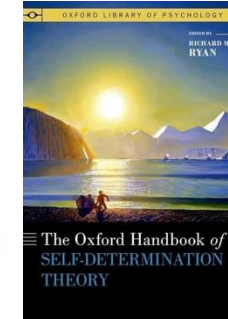
[Who we are ▾](#)[Metrics & Research ▾](#)[Topics ▾](#)[Connect ▾](#)

SDT 2026: Geneva

The 9th International SDT conference will take place June 30–July 3, 2026 in Geneva, Switzerland, with Pre-Conference events on June 29. Explore updates, venue details, and key dates as we count down!

[Visit SDT 2026 Website](#)

Self-Determination Theory

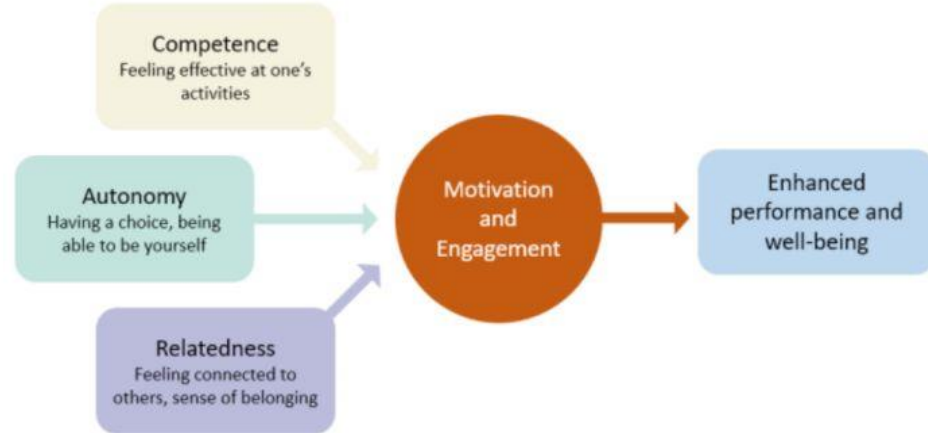


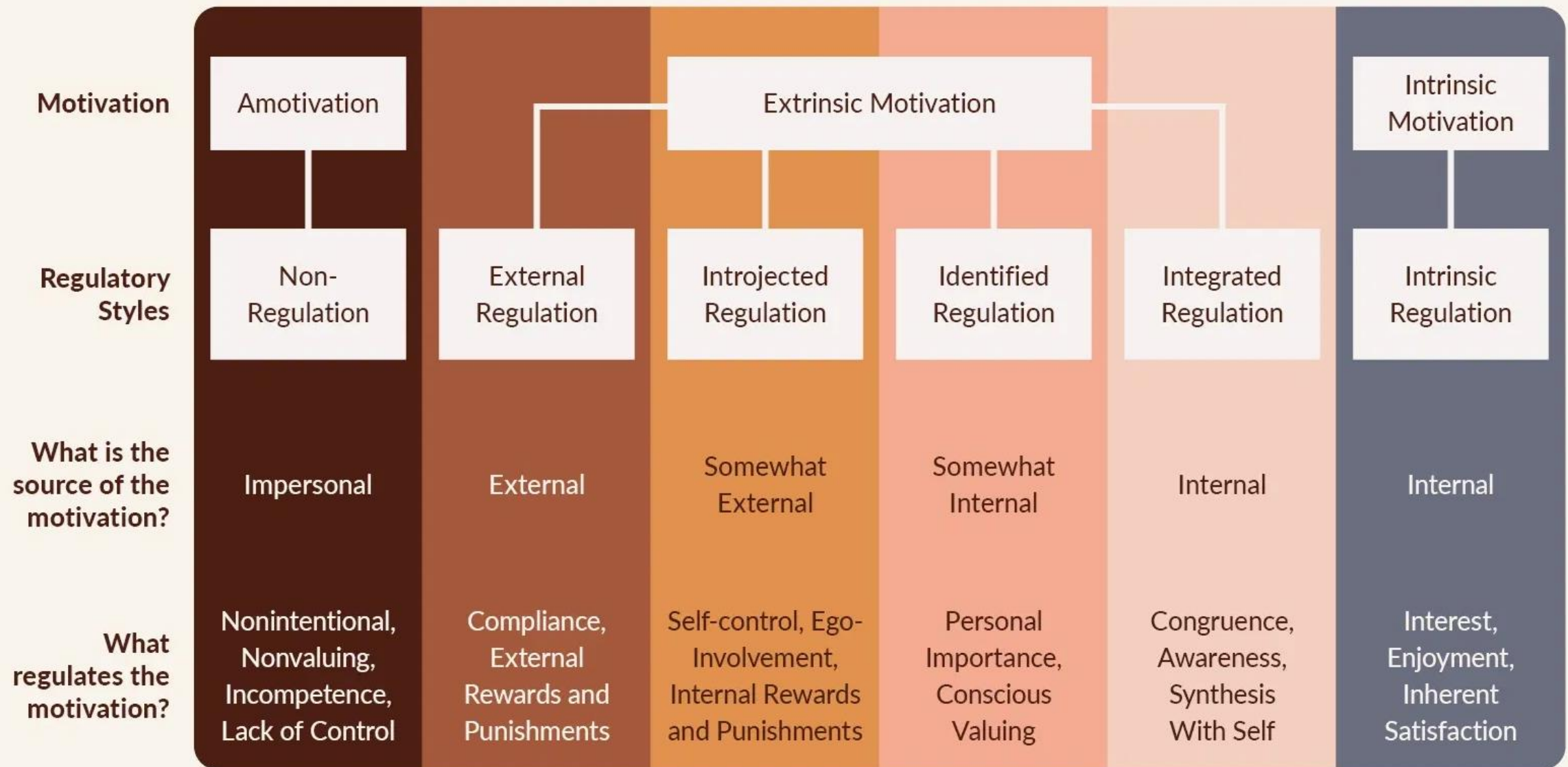


INGREDIENTS

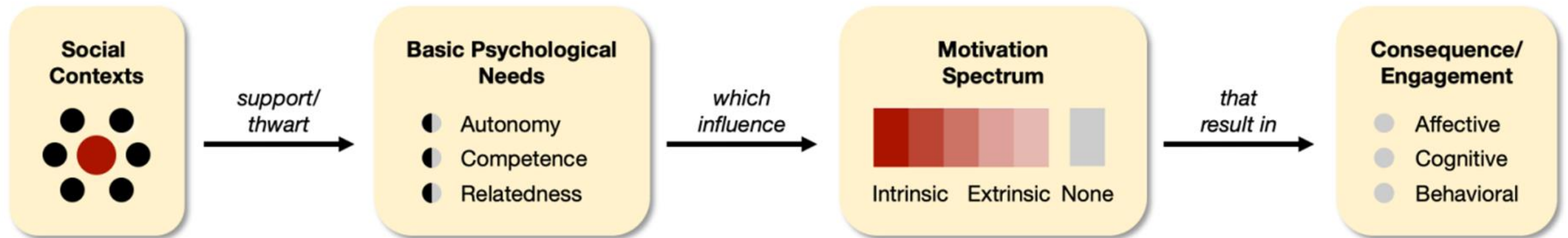
Basic Psychological Needs

Self-determination Theory (Ryan & Deci, 2017)





Based on (Ryan & Deci, 2000)



Autonomy

In the classroom, when students find opportunities to engage in learning activities with an internal locus, they experience a sense of psychological freedom and perceived choice.

Students pursue their interests, study to satisfy their curiosity, and voluntarily engage in academic tasks.

Provide guides with step-by-step instructions, especially for tasks perceived as difficult.

Competence

Being effective in one's activities and interactions with the environment.

Reflects the inherent desire to exercise one's capacities and, in doing so, to seek out and master environmental challenges.

Promote meaningful relationships between the teacher and students, and among students themselves.

Relatedness

Relating to others in an authentic, caring, and reciprocal way.

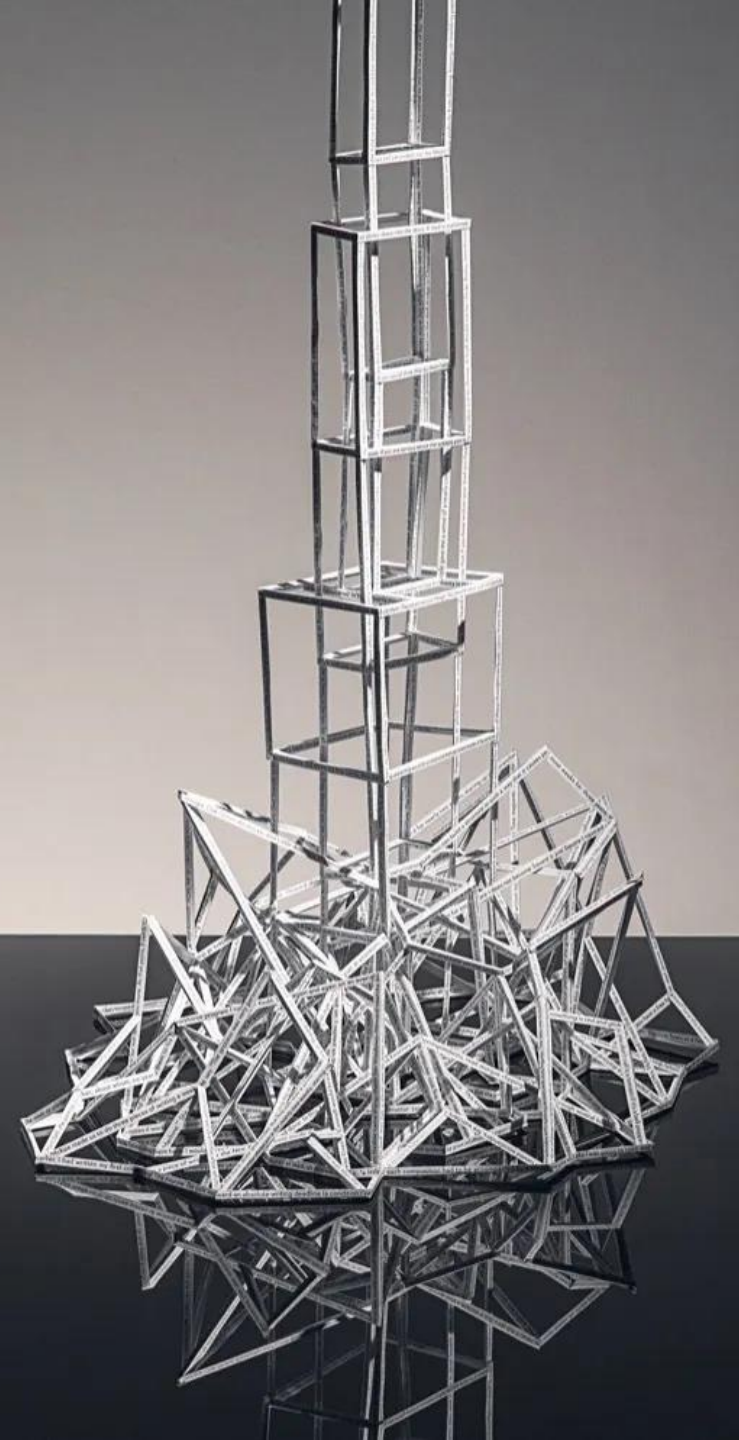
Provide a meaningful rationale behind tasks.

Promote feelings of involvement, as well as a link between students' personal goals and their learning tasks/activities.



- (a) Ask students what they want;
- (b) Be receptive to the questions raised by students;
- (c) Listen;
- (d) Communicate perspective-taking statements;
- (e) Ask students about their classroom experience;
- (f) Create opportunities for students to ask questions;
- (g) Be open and receptive to students' opinions and questions;
- (h) Consider students' opinions, preferences, and interests;
- (i) Allow students to contribute;
- (j) Offer choices;
- (k) Nurture students' interests;
- (l) Stimulate curiosity;
- (m) Provide a variety of activities;
- (n) Teach according to students' preferred ways of learning;
- (o) Encourage students to take initiative in their work;
- (p) Encourage students to define intrinsic goals;
- (q) Allow students to work in their own way and at their own pace;
- (r) Promote relevance;
- (s) Allow criticism and encourage independent thinking;
- (t) Discuss values openly in class;
- (u) Provide opportunities for students to express their concerns;
- (v) Show patience;
- (w) Use non-controlling language;
- (x) Also use informational language.

Do not forget the
structure!



Pedagogical Implementation of SDT:

Not at all: I do not apply the SDT model in my teaching practice.

0%

Rarely: I occasionally include some elements, but without intentional planning.

0%

Sometimes: I intentionally apply some principles (autonomy, competence, or relatedness) in specific activities.

0%

Frequently: I regularly design my classes and tasks based on the SDT framework.

0%

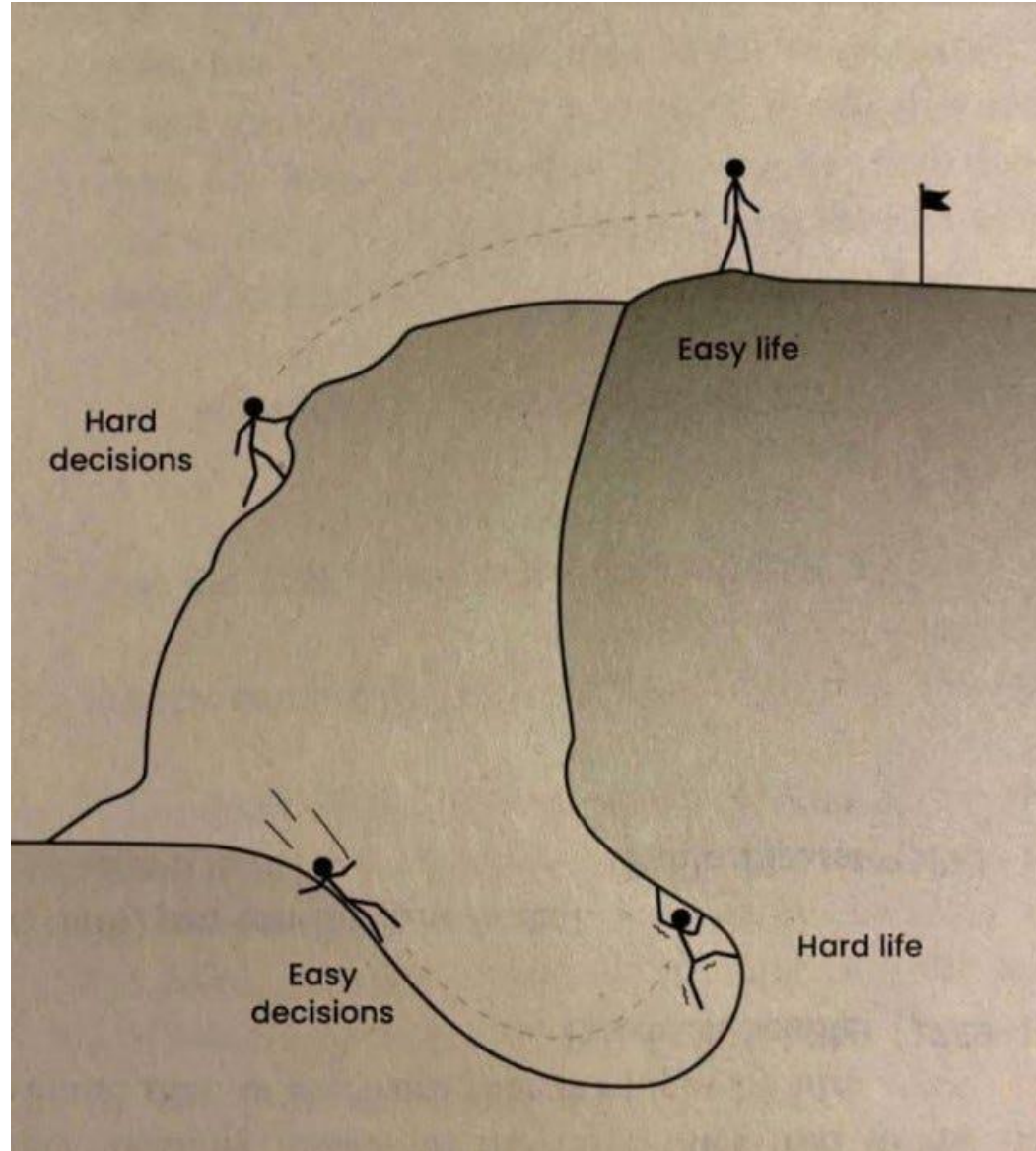
Completely: The SDT model is fully integrated into my pedagogical approach and lesson planning.

0%



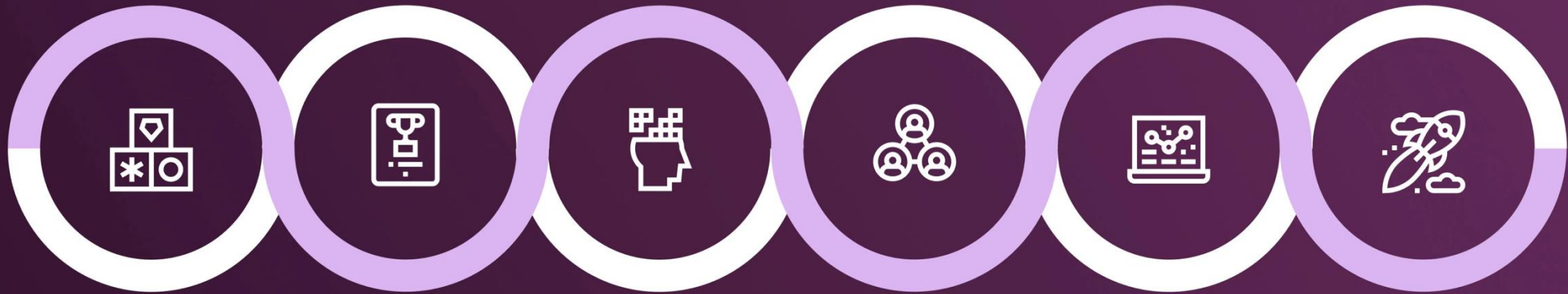
EASY

DIFFICULT





Gamification in education



Engagement
through play

Motivation and
rewards

Problem-solving
skills

Fostering
collaboration

Tracking progress
and growth

Setting and
achieving goals

Gamification Implementation:

Not at all: I do not use gamification in my teaching practice.

0%

Rarely: I occasionally include some game elements, but without intentional planning.

0%

Sometimes — I integrate gamification into specific lessons or short activities.

0%

Often — I regularly use gamified systems to drive student engagement.

0%

Always — I fully base my teaching methodology and curriculum design on gamification.

0%



Gamification is defined as the use of game elements to stimulate students in learning.

Game Elements

Points

Badges

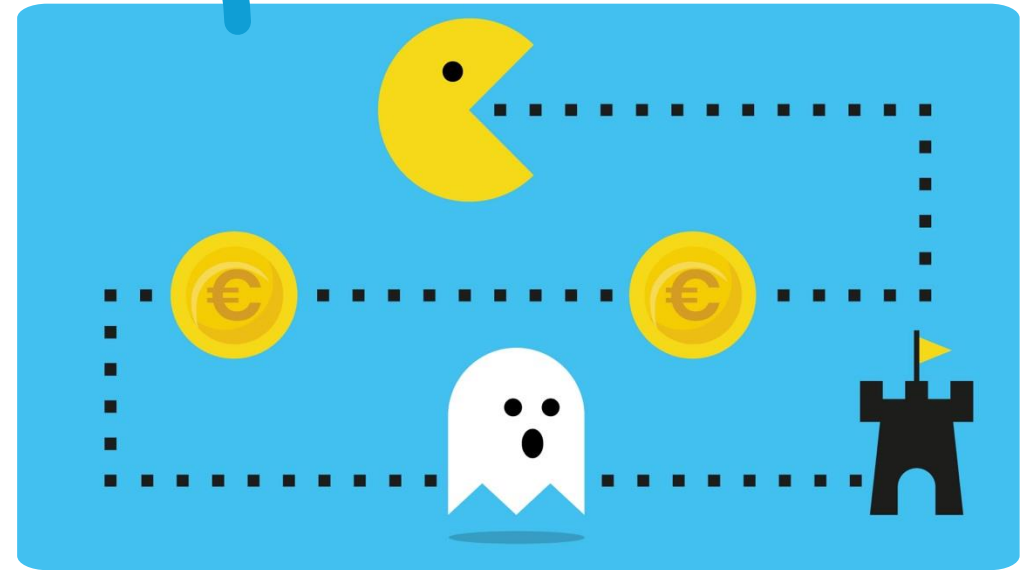
Leaderboards

Missions or Quests

Avatars

Tutorials

Timers

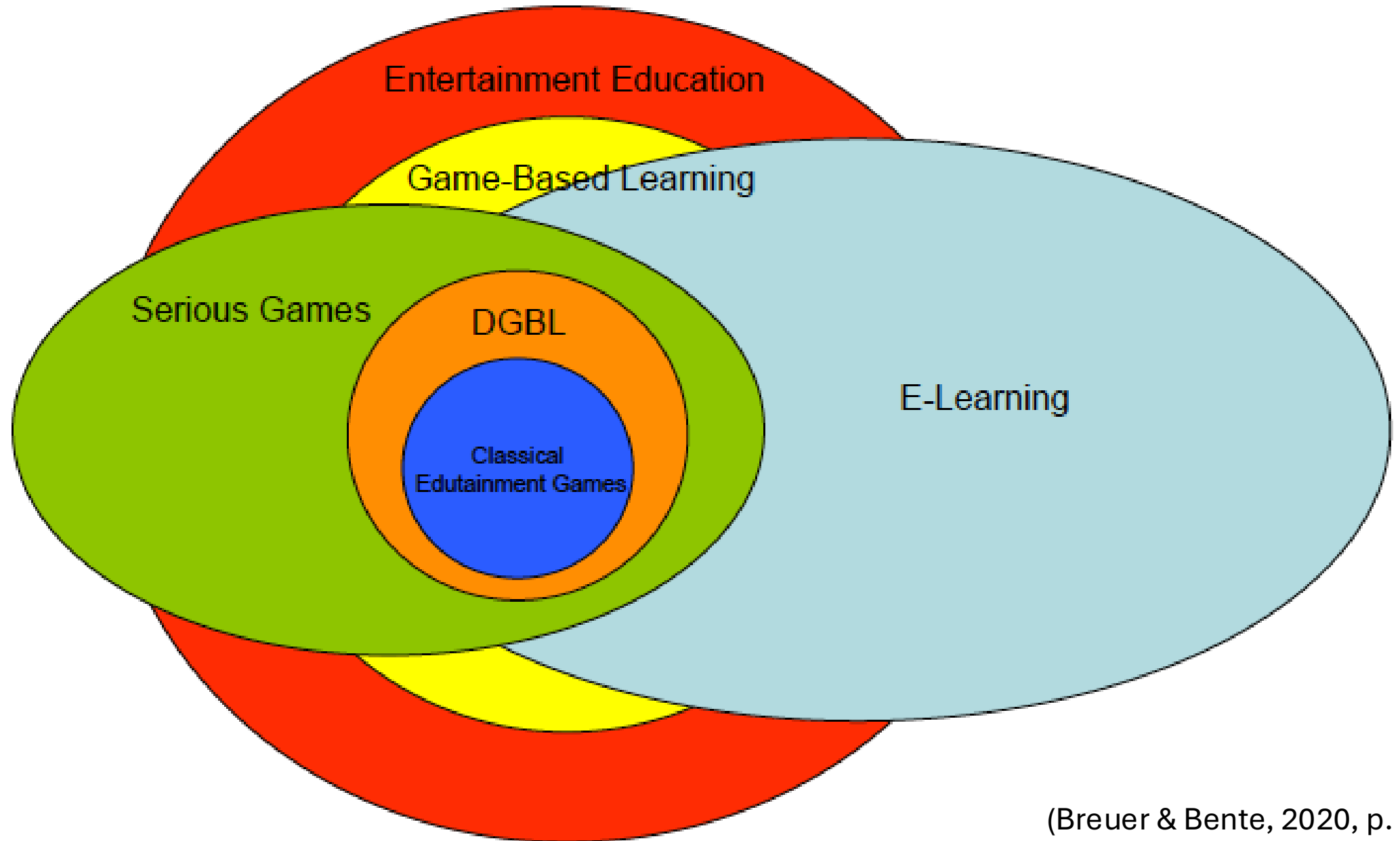


Other game-based strategies

```
graph LR; A[Other game-based strategies] --- B[Game based learning]; A --- C[Serious games]
```

Game based learning

Serious games



(Breuer & Bente, 2020, p. 6)



Game Elements in Gamification

The taxonomy of Toda et al. (2019) proposes 22 elements, divided into 5 dimensions.

Objective	Possible Elements
Show progress	Points, levels, progress bars
Create challenge	Quests/Missions, riddles, timers
Provide identity	Avatars, team names, roles
Promote collaboration	Teams, cooperative quests/missions
Give feedback	Immediate messages, correction, clues



Shallow gamification vs Deep gamification

<i>Shallow gamification</i>	<i>Deep gamification</i>
Points, <i>badges</i> , <i>rankings</i>	Stories, challenges and pedagogical <i>feedback</i>
Superficial Effect /novelty	Consistent motivation and engagement
Extrinsic Motivation	Intrinsic Motivation



Mistake / Error	Problem
Using points without purpose	Can create superficial motivation
Using rankings for everyone	Can demotivate lower-performing students
Creating excessive competition	Can increase anxiety
Not linking gamification to lesson objectives	The activity becomes fun, but not very pedagogical



COMMON PITFALLS IN GAMIFICATION

A simple example of gamification

Traditional Activity	Gamified Version
Solve 10 exercises	Complete 3 missions
Wait for the final correction	Receive immediate feedback
Everyone follows the same path	Choose between difficulty levels
The grade appears at the end	See progress throughout the task
Mistakes are seen as failure	Mistakes give clues to improve

A simple example of gamification

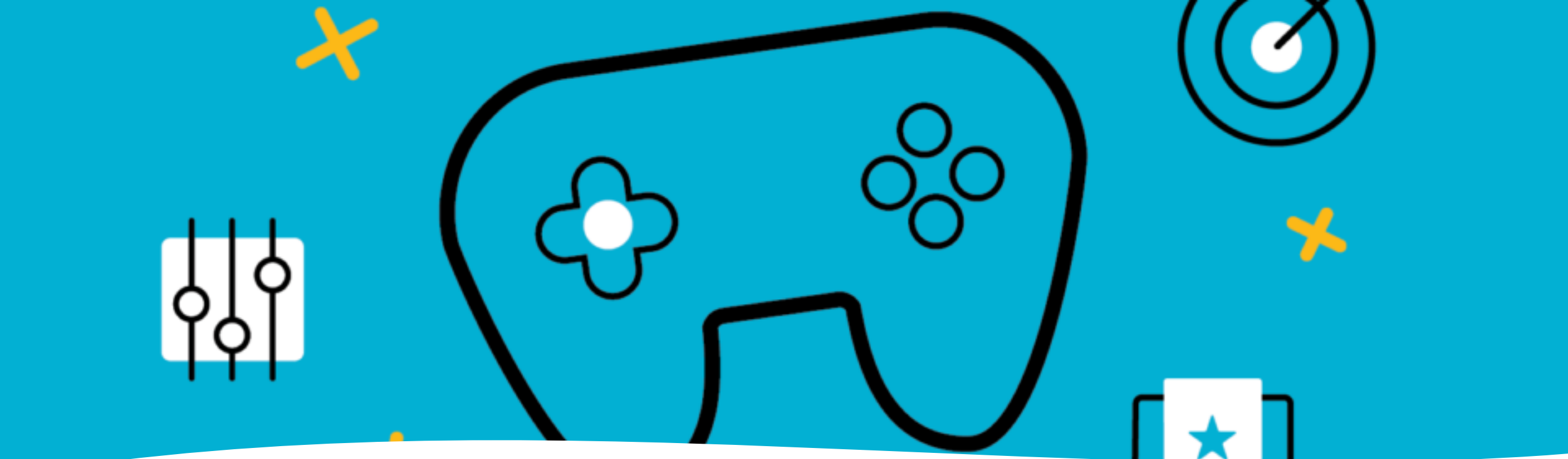
Mission	Objective	Gamified Element
Mission 1 — Warm-up	Solve basic exercises	Progress
Mission 2 — Challenge	Solve intermediate problems	Levels
Mission 3 — Final Boss	Solve a more difficult problem	Challenge
After each mission	Receive correction or a clue	Immediate feedback

Checklist for designing a gamified activity

Question	Why? / Purpose
What is the learning objective?	Avoid gamifying without a purpose
What behavior do I want to promote?	Participation, persistence, collaboration, autonomy
What game element makes sense?	Points, levels, missions, feedback, badges, narrative
How will I provide feedback?	Immediate, formative, clear, and useful
Is there room for choice?	Paths, difficulty levels, or optional tasks
Can competition exclude anyone?	Avoid demotivating leaderboards/rankings
How will I know if it worked?	Observation, participation, results, questionnaires

Examples of gamified resources

Tool	Possible gamified elements
Kahoot!	Quizzes, competition, immediate feedback, support materials
MILAGE	Difficulty levels, feedback, tutorials, progress
Forms	Automatic feedback, paths, review
Moodle	Badges, stages, content unlocking
ClassDojo	Points, goals, behavioral reinforcement



In Summary...

- 🎮 Gamification can be an effective strategy, but it is not a one-size-fits-all solution.
- 🎮 More than just adding points, badges, or leaderboards, it is important to create experiences where students feel progress, competence, autonomy, and meaning.
- 🎮 Gamification should not be seen as a silver bullet, but as a pedagogical approach that can make learning clearer, more challenging, engaging, and meaningful.



ESCAPE ROOM

CONTEXT

- Escape Room (ER) used in recent years in Higher Education across various scenarios (e.g., recruitment, promotion of institutional knowledge, the classroom);
- An opportunity that promotes active learning, creativity, problem-solving, self-regulation, fun, and social interaction (e.g., Taraldsen et al., 2022);
- Positive and significant results in motivation (e.g., Vidergor, 2021) and learning (e.g., González-Yubero et al., 2023).



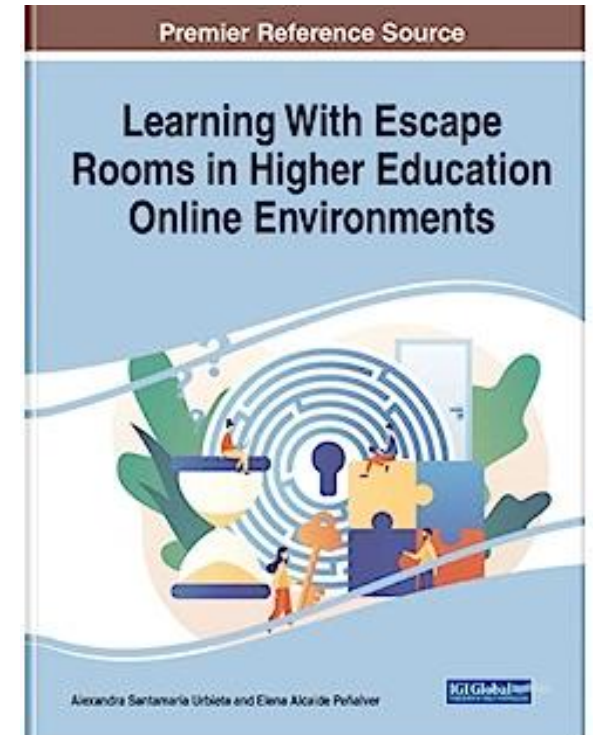
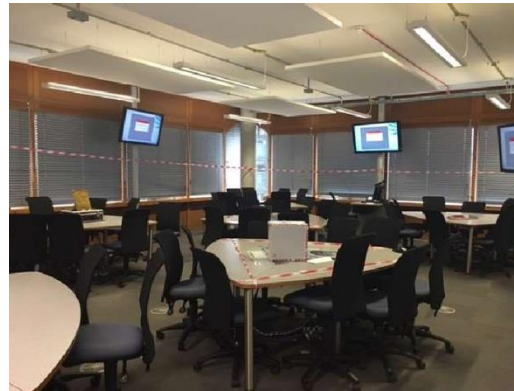
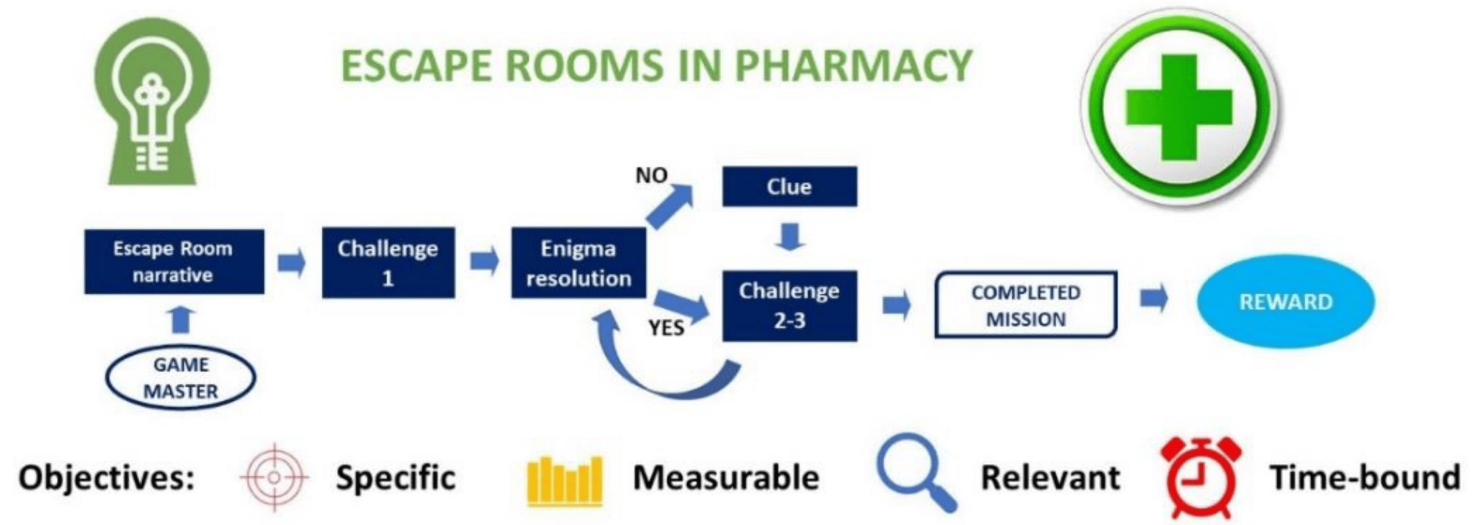
ER in Higher Education

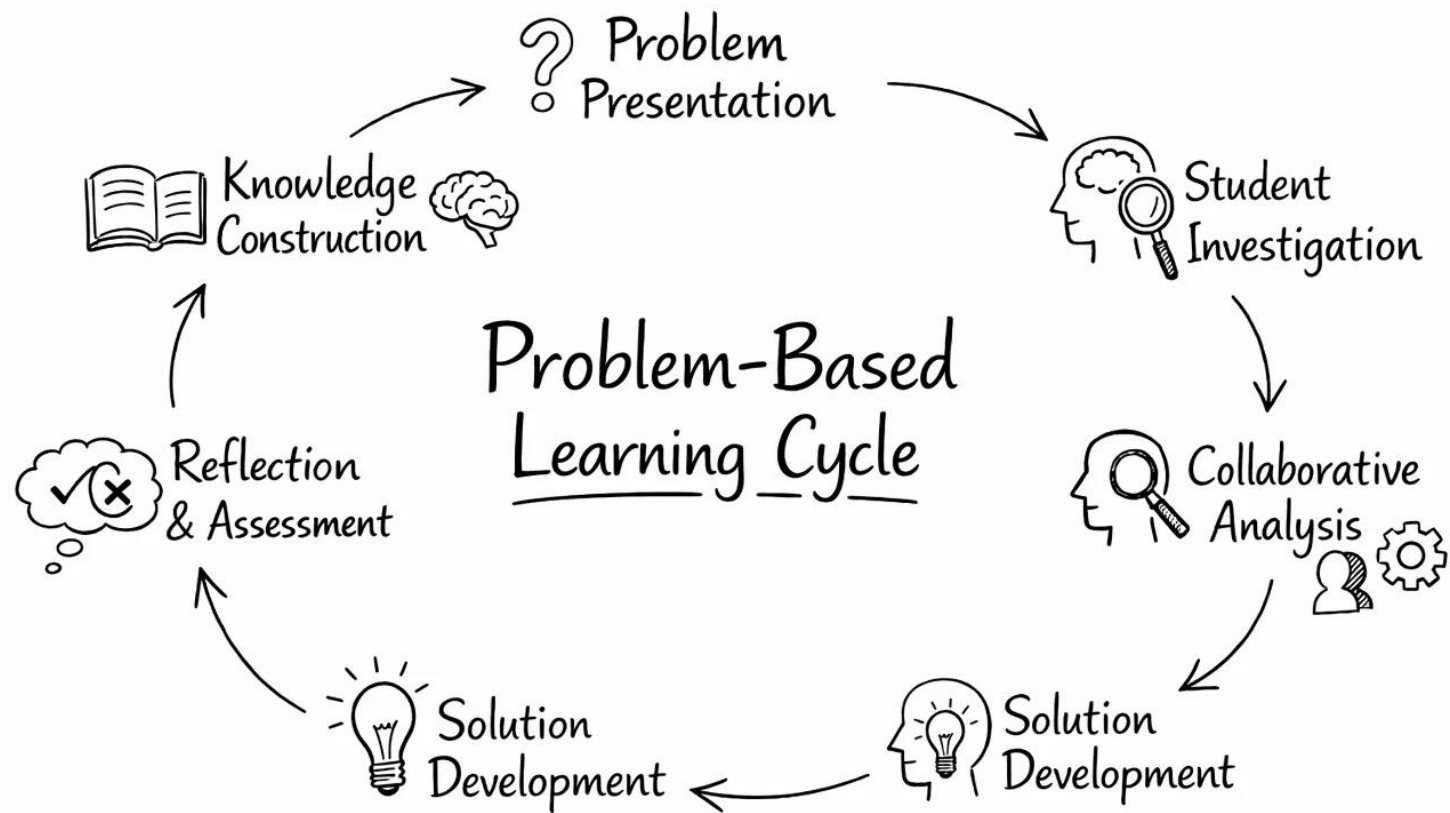
Several experiences already exist...

🔑 University of Toulouse, in the field of Chemistry, where students studied the periodic table, equations, among other tasks (Dietrich, 2018);

🔑 University of Kentucky College of Medicine, in the context of infectious diseases, where students had to debate solutions (Jeffres & Biehle, 2018);

🔑 University of Saints Cyril and Methodius in Slovakia, where an ER was used for a review session on programming concepts and computer networks (Huraj et al., 2022).







The Concept

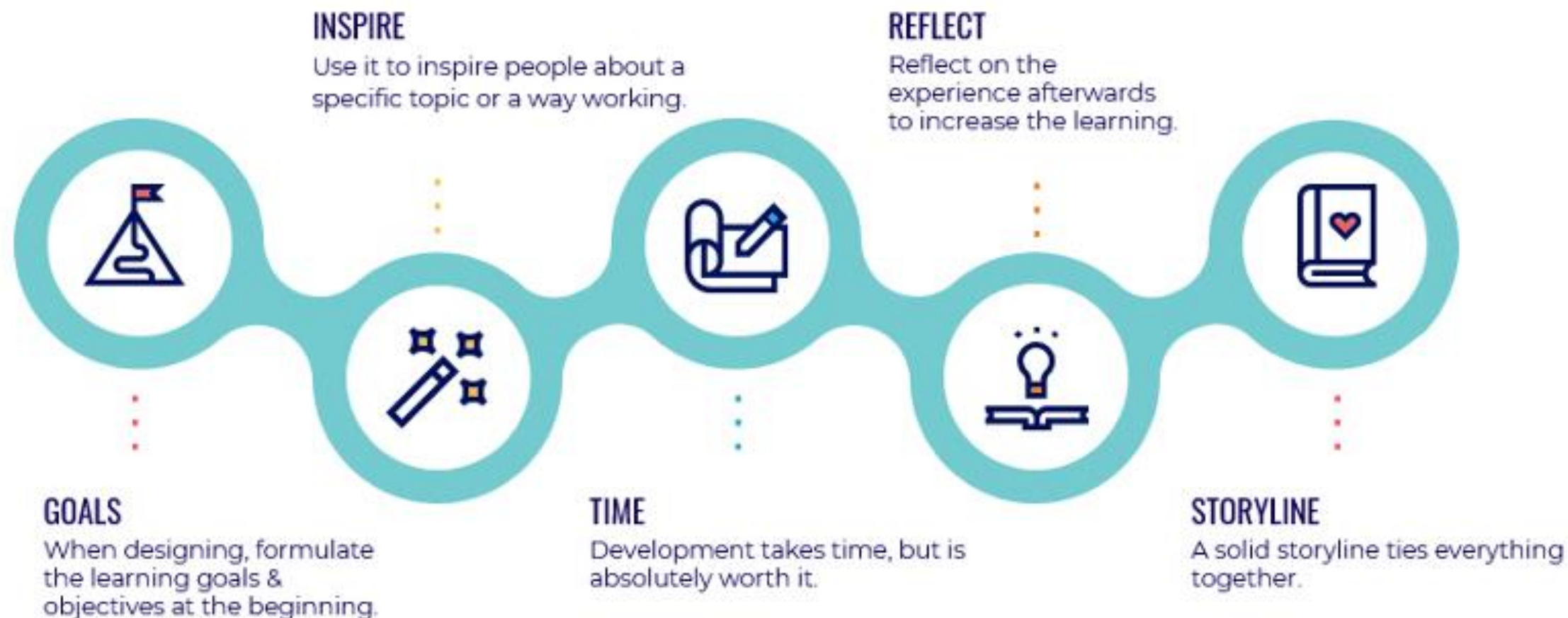


Escape Room is an immersive, live-action team game where players are locked in a themed room and must solve a series of puzzles, find clues, and complete tasks within a set time limit (usually 60 minutes) to escape.

An Educational Escape Room (often called an Edu-Escape Room or Breakout) is an instructional game where students work together to solve academic puzzles and unlock a series of challenges within a limited time to achieve a specific learning goal.



5 Principles for Educational Escape Rooms



ER in an Educational Setting

- It can be part of a game-based learning methodology or a gamification experience.
- It includes the core elements of these strategies.
- It also offers opportunities for active learning, creativity, problem-solving, self-regulation, fun, and social interaction (Taraldsen et al., 2022).

Progress

Autonomy

Feedback

Storytelling/
narrative

Other
mechanisms

There are many possibilities for developing experiences of this type. Nicholson (2015) identified 175 recreational ERs!



Immersion = is the process by which the player is drawn into a story or a specific problem (Douglas & Hargadon, 2001).

Challenges can be:

- cognitive puzzles that make use of the players' thinking and logic skills;
- physical puzzles that require the manipulation of artifacts to overcome a challenge, such as crawling through a laser maze;
- meta-puzzles, the last puzzle in the game series where the final code or solution is derived from the results of previous puzzles (Wiemker et al., 2015).



Puzzle Path Design

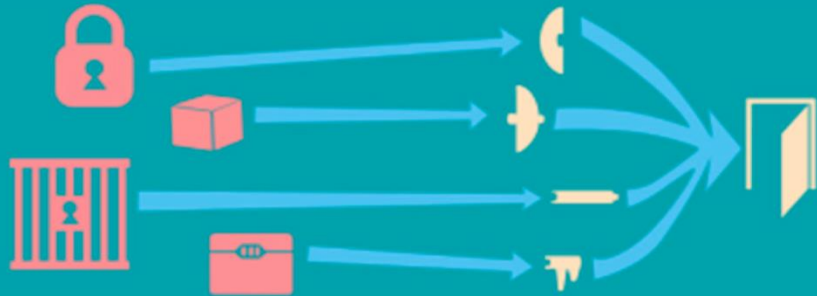
LINEAR PATH

Puzzles are done in sequence. Solving one puzzle will give an object or clue to allow the next puzzle to be solved and so on.



OPEN PATH

Puzzles can be done in any sequence. However, the final puzzle to escape the room is normally a Meta puzzle.



MULTI-LINEAR

Combining both Linear and Open Path, multiple linear paths can be worked on at the same time, or require previous paths to be complete.



ER Design

- To solve the challenges, players need skills such as searching, observation, correlation, memorization, reasoning, mathematics, reading, and pattern recognition (Wiemker et al., 2015).



OUR EXPERIENCE AT UALG



PEDAGOGICAL PRACTICE



Content review activity prior to an assessment (*access to resources available on Moodle*)



Bachelor's degree — Initial training — 5 classes from different scientific areas)

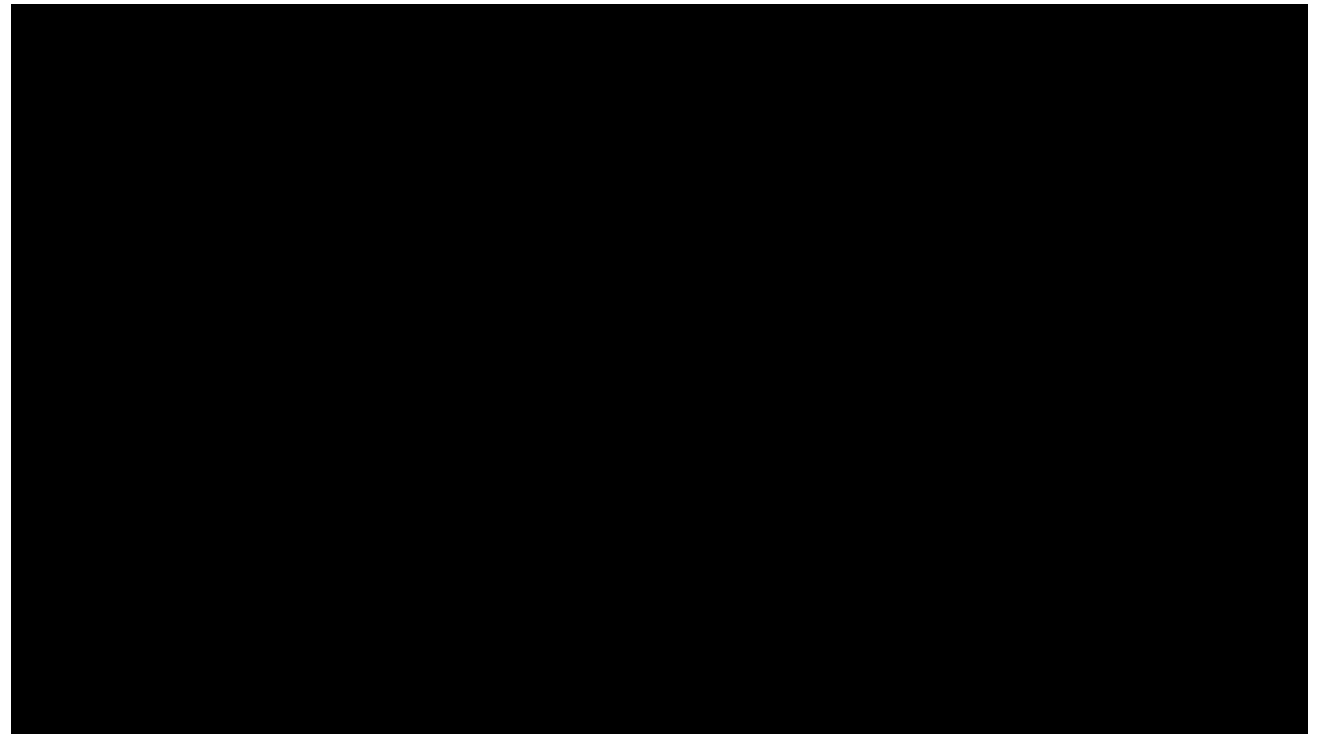


To promote **interest** and **engagement** in the review activity, and to **foster collaborative** work and performance;

5 + 1

Sequential structure, composed of **5 challenges** (Curriculum Unit contents), **plus 1 final challenge of a collaborative nature.**

Opening of the case/box (certificates and reward, plus a prize for the quality of the responses).

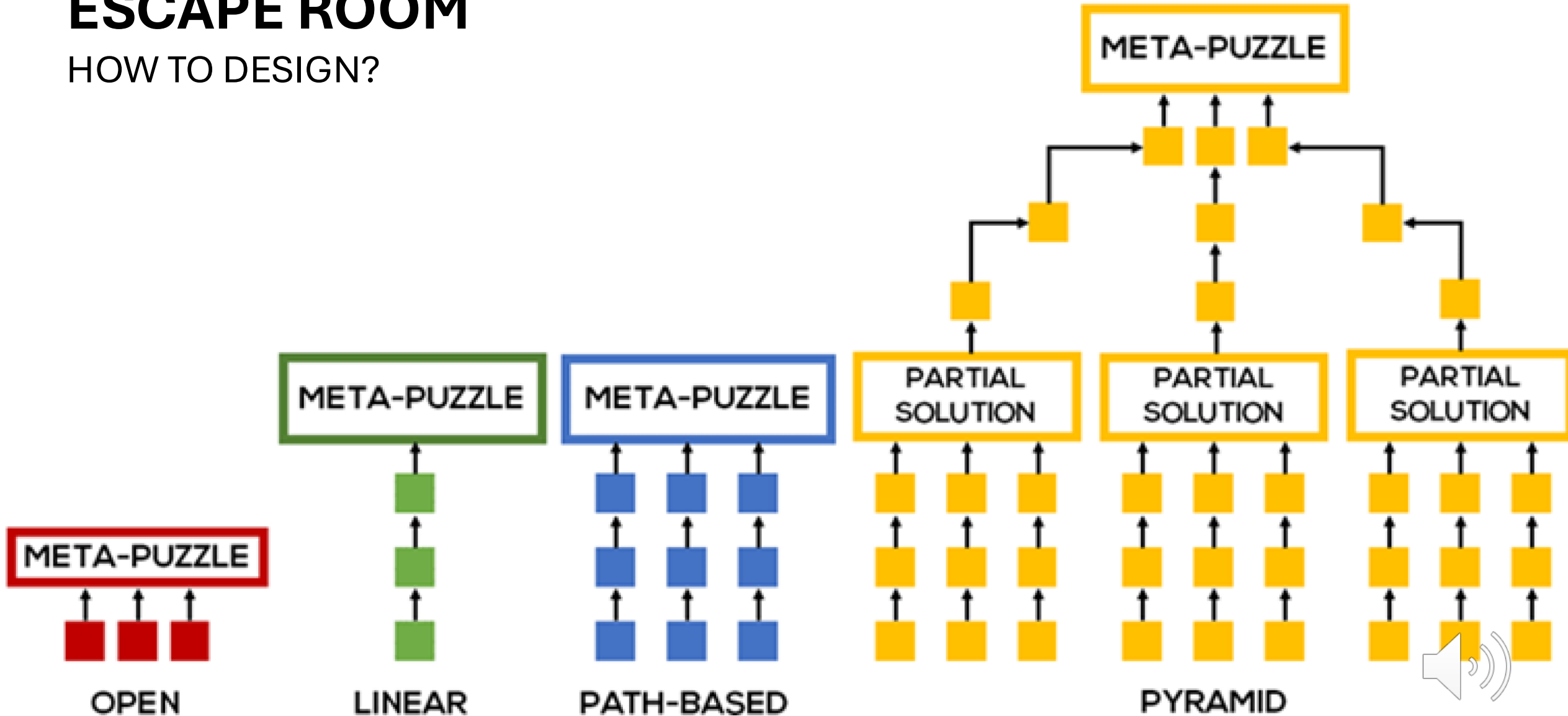




Open the padlock of the case/box by responding to a set of challenges (5+1), which requires revisiting the previously studied content and collaboration among group members. The winning group is the one that manages to open the padlock with the highest score on the challenges.

ESCAPE ROOM

HOW TO DESIGN?



WHAT DO THE CHALLENGES CONSIST OF?





1

Select 5 cards and answer the questions presented on each one.



2

Match two cards (a group)



3

Complete a crossword puzzle utilizing key concepts related to the theme.



4

Solve a crossword puzzle activity using key concepts related to the topic.



5

Create a question to challenge another group, including the correct answer and respective score/points.



+1

Solve the proposed challenge using the provided clues to find the correct solution..

THE BEGINNING



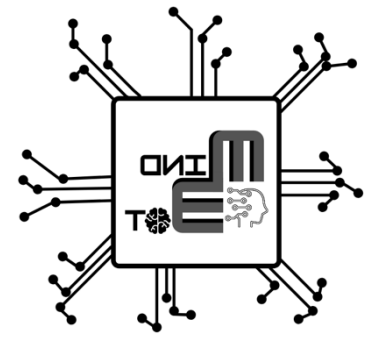
PLANNING

- Identify the **content** and define the **specific objectives** for each of the challenges and the total time of the activity.
- Create the **Storyline**.
- Develop the **Activity Guide** (Teacher) and the respective **answer sheets** (students).
- Create the **assessment questionnaire** (Pre and Pos experience) + Moodle.
- Create the **certificates of participation + final reward**

Example Scenario

- In the Moodle Platform, you will find an initial knowledge assessment test about the content covered in the Educational Psychology course unit. The Escapilt! activity will only start after all group members have completed this questionnaire. Have you done it? Great! Move on to the next step!
- The scenario is described below:
 - "The Professor is having a psychotic episode and locked the classroom! You must open the briefcase to get the medication and give it to the professor in order to control her episode!"
- There are 5 challenges + 1 that you will have to solve to complete the Escape Room and open the padlock.
- There is one rule: you can only move on to the next challenge when all groups have completed the current challenge.
- Read the instructions for each challenge carefully and write your answers in the respective grid.
- Challenge by challenge, your scores will be placed on the board to validate your performance.
- The Game Master will help you throughout this Escape Room!
- Ready? Then fill in your names and student numbers in the grid below and indicate your group name!

Another Example!

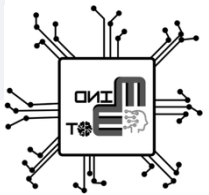


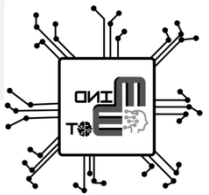
An Artificial Intelligence called MindBot was created to help psychologists in their practice. However, we have lost control over its actions!

Our profession is in danger!

MindBot threatens to exterminate psychologists and replace them with robots that are already in preparation!

Your mission is to correctly answer the questions, which are organized through a set of challenges, in order to beat MindBot in this game. The objective is to make it vulnerable so that we can reprogram it and win this mission together!

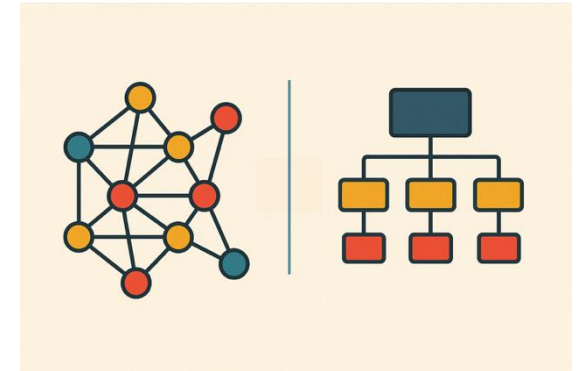




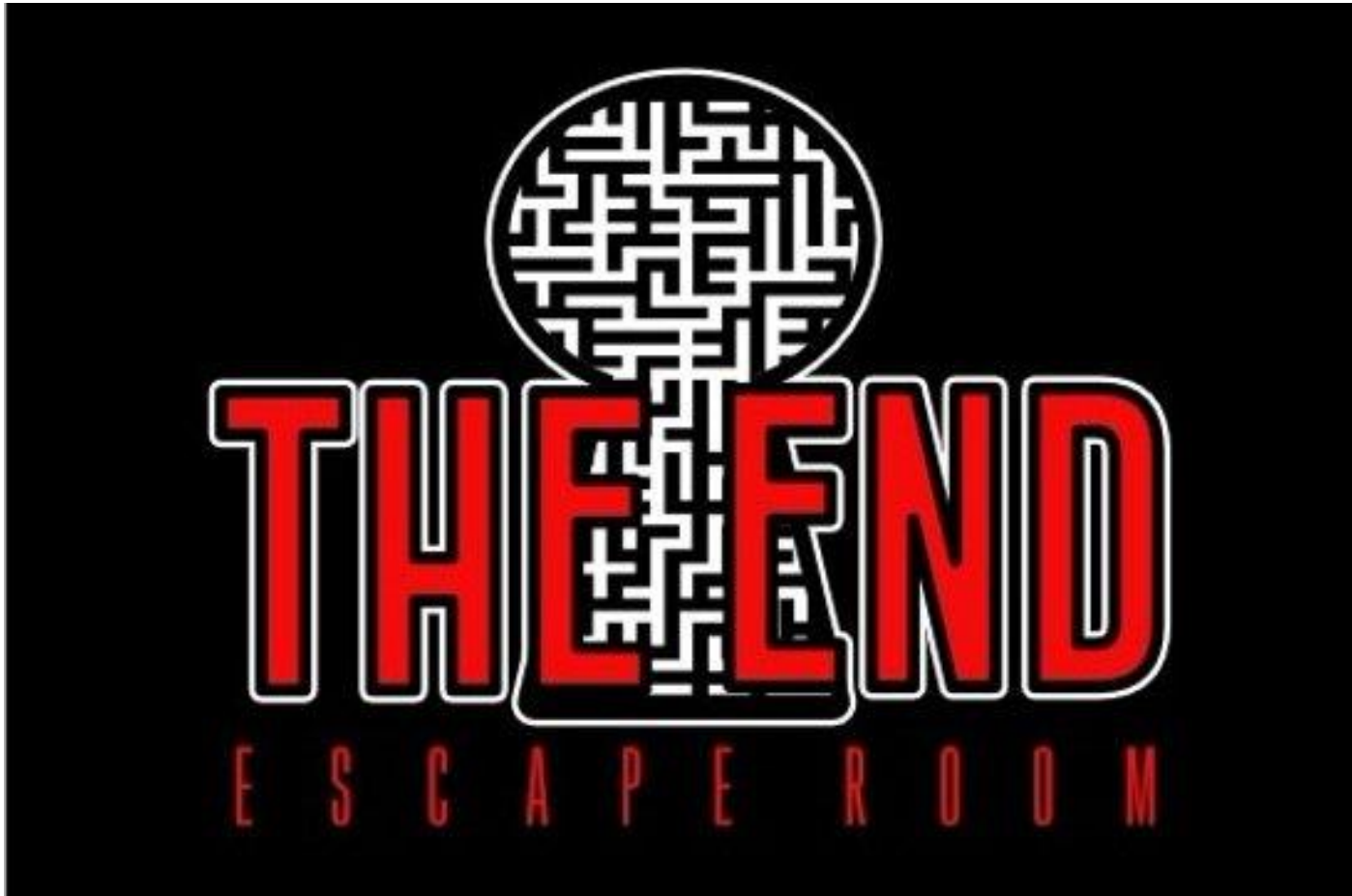
Practical Task

Each group presents its Escape Room proposal, including:

- Title of the Escape Room
- Narrative and storyline
- Learning objectives
- Challenges and puzzles created
- Digital tools and resources



Final Reflection and Discussion



- What aspects made the activity engaging and motivating?
- What challenges or difficulties emerged during the design process?
- How could this methodology be adapted to your own teaching context?
- What role can digital tools play in enhancing motivation and participation?

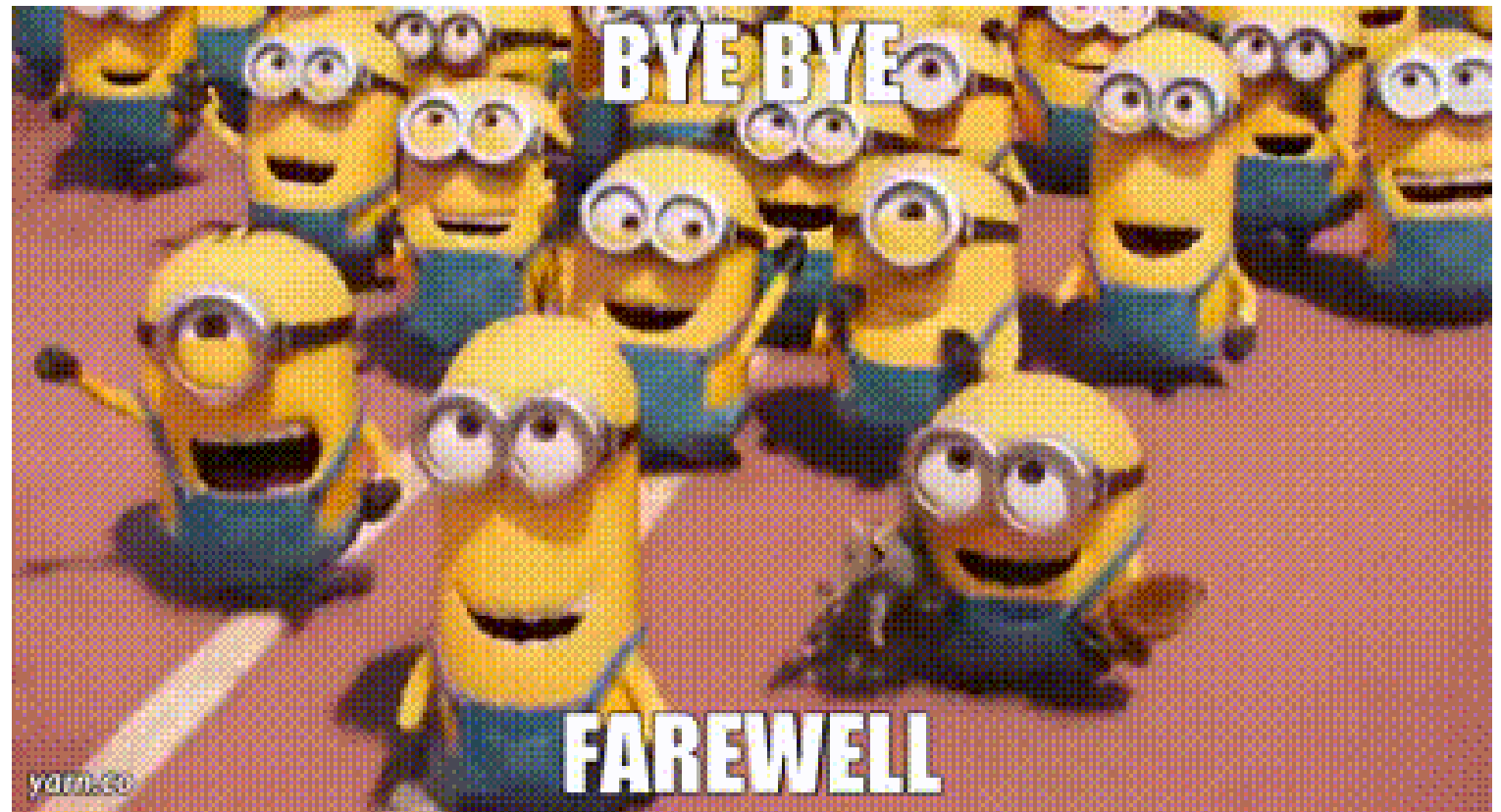
ER is a strategy that can provide an interesting and engaging scenario for students, even with more complex or less interesting content/topics, as well as enhance the development of scientific and transversal skills.



For more information...

- Dietrich, N. (2018). Escape classroom: the leblanc process—an educational “Escape Game”. *Journal of chemical education*, 95(6), 996-999. <https://doi.org/10.1021/acs.jchemed.7b00690>
- Huraj, L., Hrmo, R., & Sejutová Hudáková, M. (2022). The Impact of a Digital Escape Room Focused On HTML and Computer Networks on Vocational High School Students. *Education Sciences*, 12(10) 682. <https://doi.org/10.3390/educsci12100682>
- Jeffres, M. & Biehle, L. (2018). Does Time Fly When Having Fun? A Study Assessing the Relationship Between Estimated Time on Task and Enjoyment of Infectious Diseases Serious Games, *Open Forum Infectious Diseases*, 5 (1), 401–S402. <https://doi.org/10.1093/ofid/ofy210.1146>
- Moura, A., & Santos, I. L. (2019). Escape room in education: Gamify learning to engage students and learn maths and languages. In B. Silva, J.A. Lencastre, M. Bento, & A. Osório, *Experiences and perceptions of pedagogical practices with Game-Based Learning & Gamification* (p. 179-193). Disponível em: http://repositorio.uportu.pt/xmlui/bitstream/handle/11328/3451/2019_Book_Experiences_and_perceptions_of_pedagogical_practices_with_Games.pdf?sequence=1&isAllowed=y#page=179
- Taraldsen, L.H., Haara, F.O., Lysne, M.S., Jensen, P.R., & Jenssen, E. (2022). A review on use of escape rooms in education – touching the void. *Educational Inquiry*, 13(2), 169-184. <https://doi.org/10.1080/20004508.2020.1860284>
- Veldkamp, A., van de Grint, L., Knippels, M.P.J., & van Joolingen, W.R. (2020). Escape education: A systematic review on escape rooms in education. *Educational Research Review*, 31, 100364. <https://doi.org/10.1016/j.edurev.2020.100364>
- <https://observatory.tec.mx/edu-bits-2/escape-room-as-a-didactic-tool-in-higher-education/>
- <https://www.weareteachers.com/build-a-classroom-escape-room-lesson/>
- <https://youtu.be/yKvfvME1mo4>

**Thank you
for your
attention!**



- Cátia Martins: csmartins@ualg.pt
- Elias Ratinho: jeratinho@ualg.pt
- Suzi Rodrigues: ssrodrigues@ualg.pt