



Prison's Break: Digital Escape Rooms in Higher Education for Educators and Administrative Staff

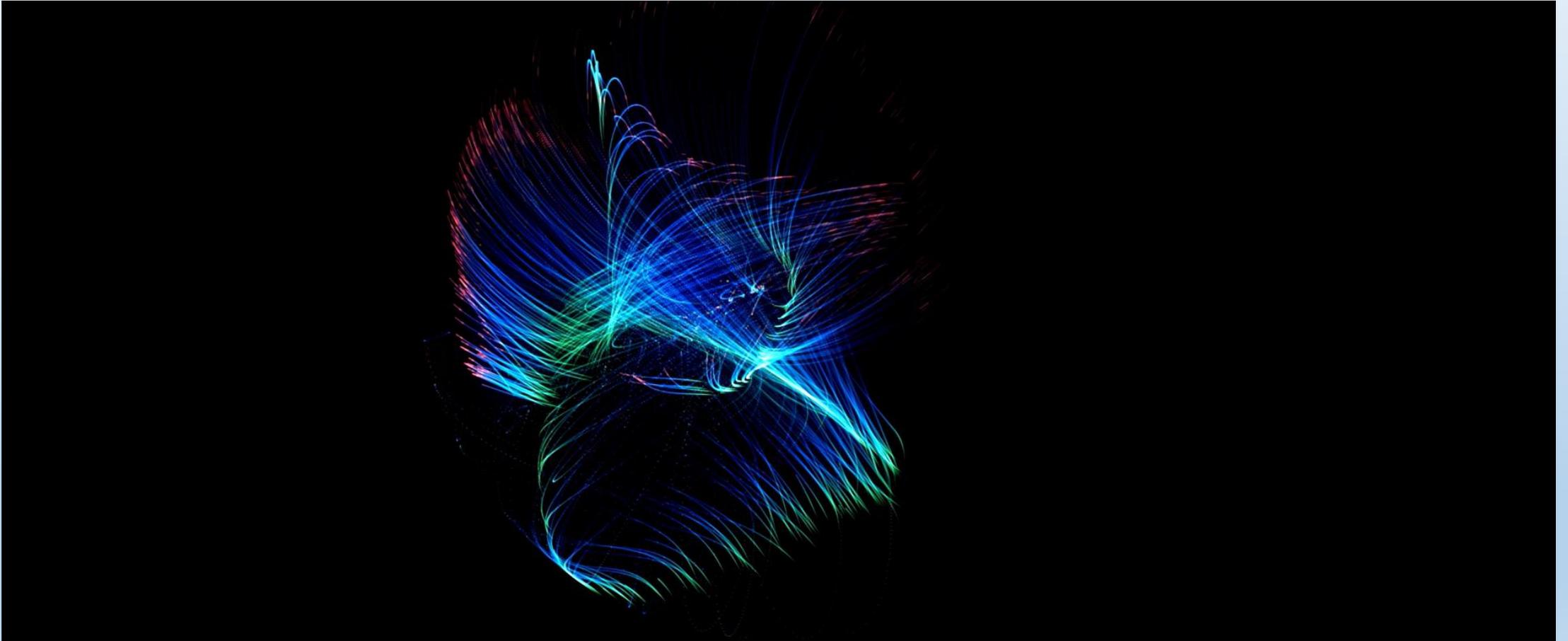
Carla M.A. Pinto

Polytechnic of Porto – ISEP and CIDMA

cap@isep.ipp.pt



Outline





Digital Escape Rooms for Administrative Staff

Innovative and Collaborative Training at the University

What Are They?

Digital escape rooms are interactive online activities that challenge participants to solve puzzles in teams. They can be used as tools for learning, simulating processes, and enhancing team collaboration.



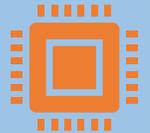
Benefits for University Administration



Training in administrative processes (e.g., registrations, scholarships, mobility);



Strengthening interdepartmental collaboration;



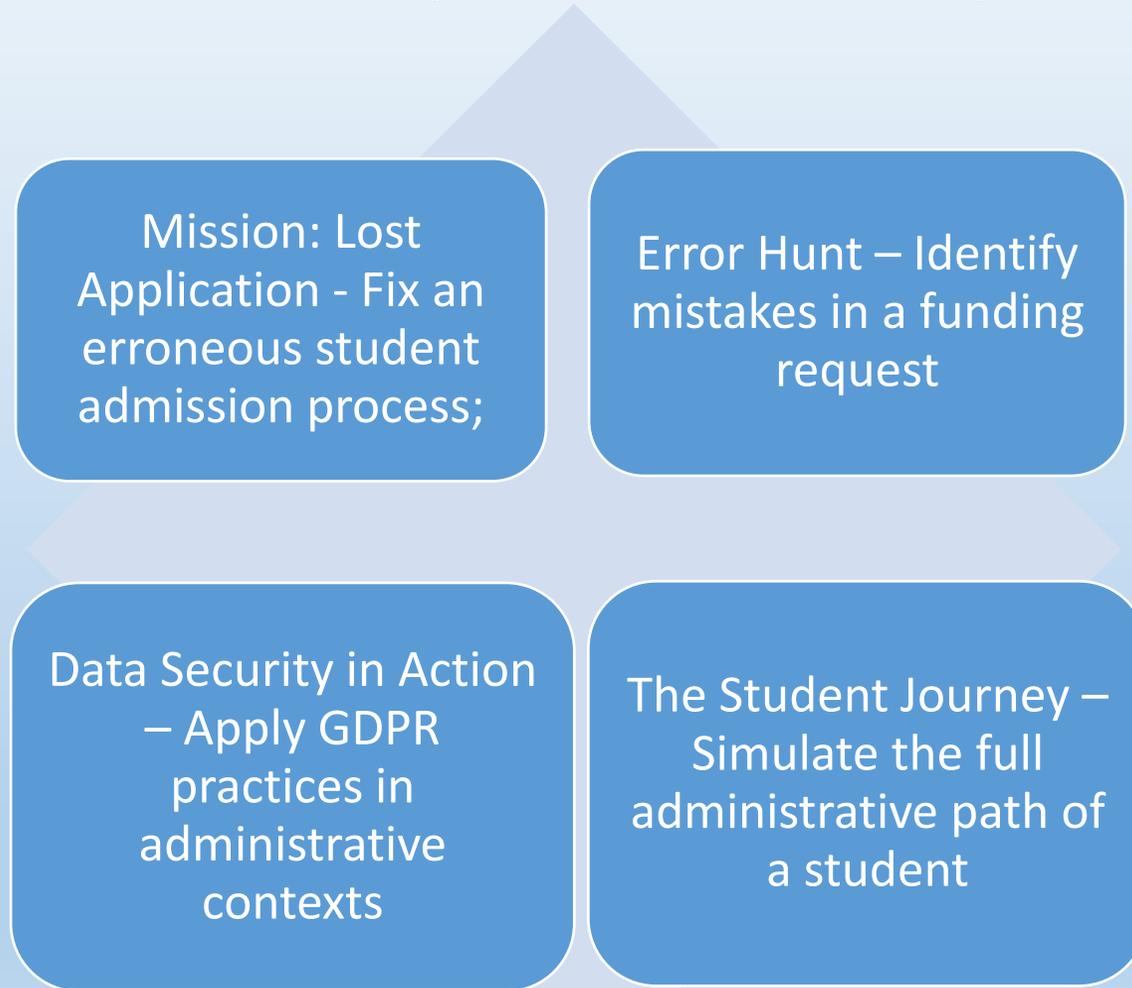
Training in new digital systems (e.g., ERP, SIGARRA, Moodle);



Effective onboarding of new staff.



Concrete Examples of Escape Rooms





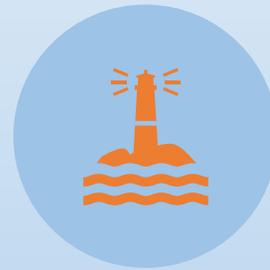
Next Steps



IMPLEMENT A PILOT
PROJECT WITH AN
ADMINISTRATIVE TEAM;



EVALUATE SUITABLE
DIGITAL PLATFORMS;



INTEGRATE ESCAPE
ROOMS INTO THE
ANNUAL TRAINING PLAN;



COLLECT FEEDBACK AND
ADAPT ACTIVITIES AS
NEEDED.



To Do



Integrating Digital Escape Rooms in Freshman Calculus

Engaging First-Year Students through Interactive Learning



Why Use Digital Escape Rooms in Calculus?

01

- Increase student engagement in abstract mathematical topics.

02

- Encourage collaboration and problem-solving in a dynamic format.

03

- Reinforce theoretical concepts through applied challenges.

04

- Support diverse learning styles via immersive, visual environments.



Target Audience & Course Context



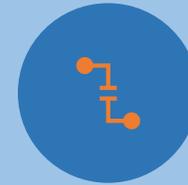
- STUDENTS:
FIRST-YEAR
UNDERGRADU
ATES IN STEM
PROGRAMS.



- COURSE FOCUS:
DIFFERENTIAL AND
INTEGRAL
CALCULUS.



- TOPICS
COVERED



• LIMITS AND
CONTINUITY



• DERIVATIVES
AND
APPLICATIONS



• INTEGRATION
TECHNIQUES



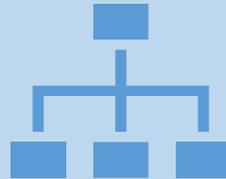
• DEFINITE INTEGRALS
AND AREA
CALCULATIONS



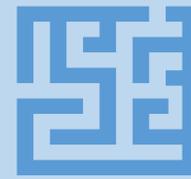
The Escape Room Approach



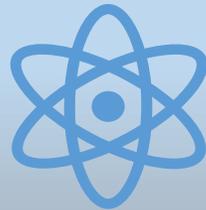
- Platform
Used:
Maxwhere



- Structure



• Puzzle-based
progression
through calculus
problems



• Interactive
3D
environment



• Embedded
tutorial videos
(e.g., ER1) for
guidance



- Example Activity: Solve
a sequence of calculus
challenges to “unlock”
the next room.



Benefits Observed

- Improved conceptual understanding and retention.

- Increased participation in problem-solving sessions.

- Positive feedback on motivation and course enjoyment.

- Useful for flipped-classroom and hybrid models.



Implementation Timeline & Resources

P. PORTO

isep Instituto Superior de
Engenharia do Porto

 **POLITÉCNICO
DE COIMBRA**

JKU
JOHANNES KEPLER
UNIVERSITY LINZ



 **HACETTEPE
UNIVERSITY**

Maxwhere

**MATH
DIGGER**

Start: February 2022

End: January 2025

Grant: 275 488,00 EUR





Access and Support

Escape Room #1 Portal:

<https://portal.maxwhere.com/mobile/web/url.html#812a87b2-0dd2-4e03-8905-68ab351a1ebe>



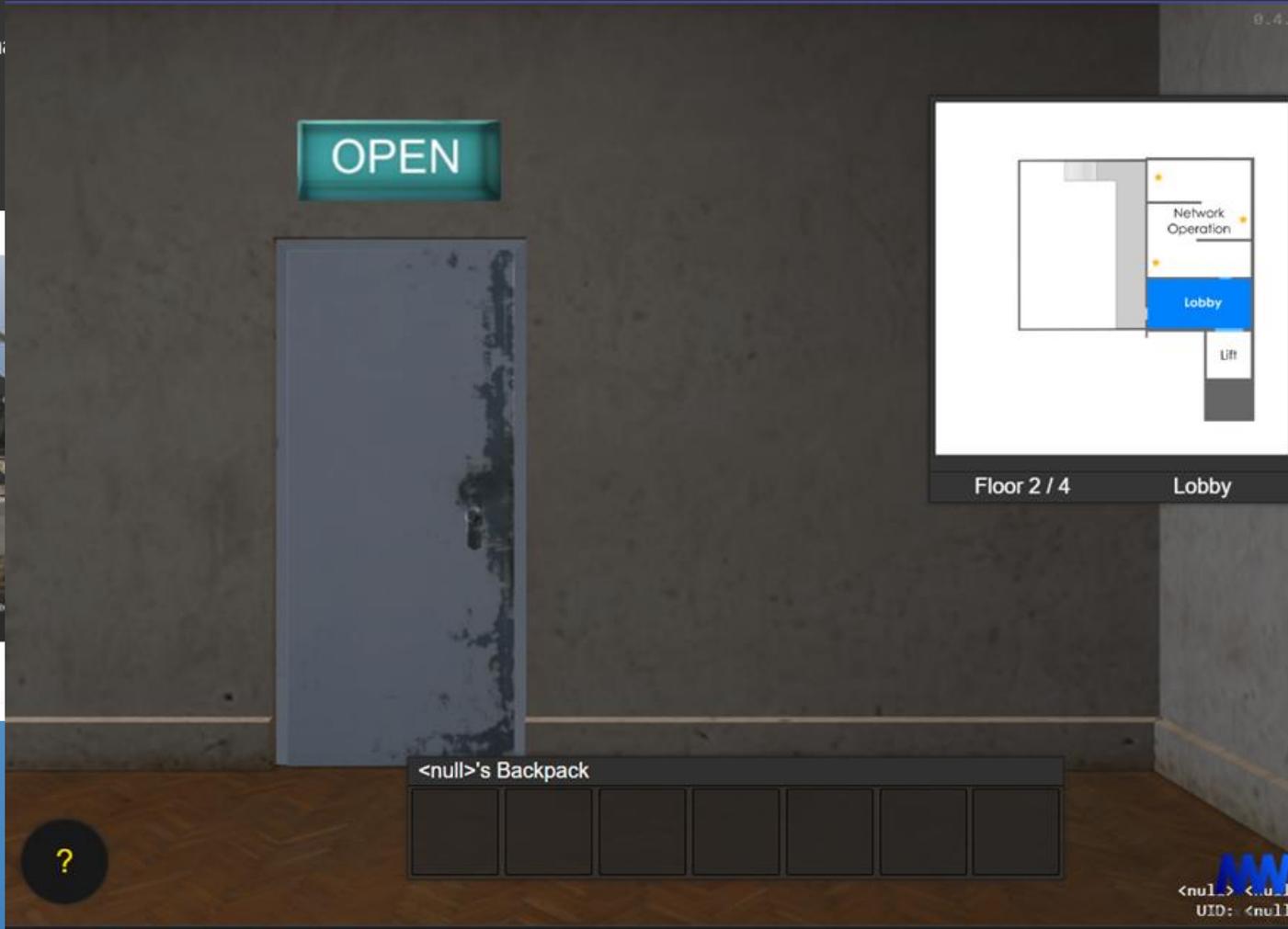
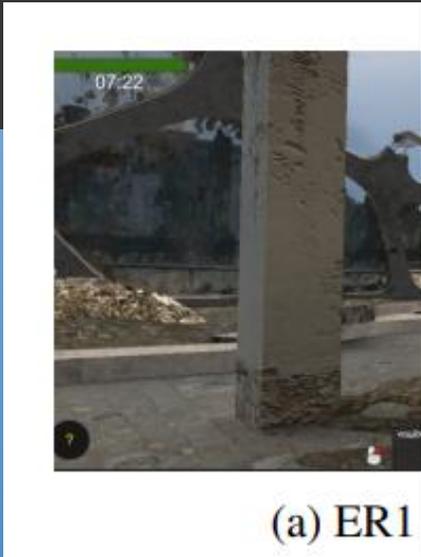
Scan me!

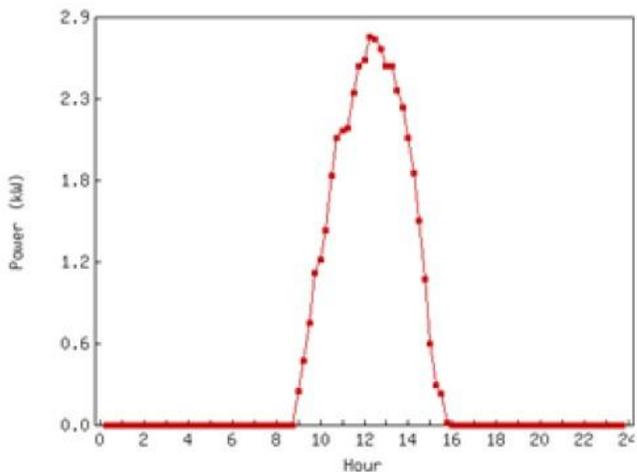


The Challenge Ahead of You

Entering the door next to you, you will find the

components and attaching them to the solar





Time	Solar Panel Power Output	Time	Solar Panel Power Output
0:15:00	0	12:30:00	2.77567
0:30:00	0	12:45:00	2.71062
0:45:00	0	13:00:00	2.58906
1:00:00	0	13:15:00	2.58657
1:15:00	0	13:30:00	2.41105
1:30:00	0	13:45:00	2.29156
1:45:00	0	14:00:00	2.07011
2:00:00	0	14:15:00	1.81613
2:15:00	0	14:30:00	1.47564
2:30:00	0	14:45:00	1.05591
2:45:00	0	15:00:00	0.588483
3:00:00	0	15:15:00	0.291857
3:15:00	0	15:30:00	0.231948
3:30:00	0	15:45:00	0.020073
3:45:00	0	16:00:00	0
4:00:00	0	16:15:00	0
4:15:00	0	16:30:00	0
4:30:00	0	16:45:00	0
4:45:00	0	17:00:00	0

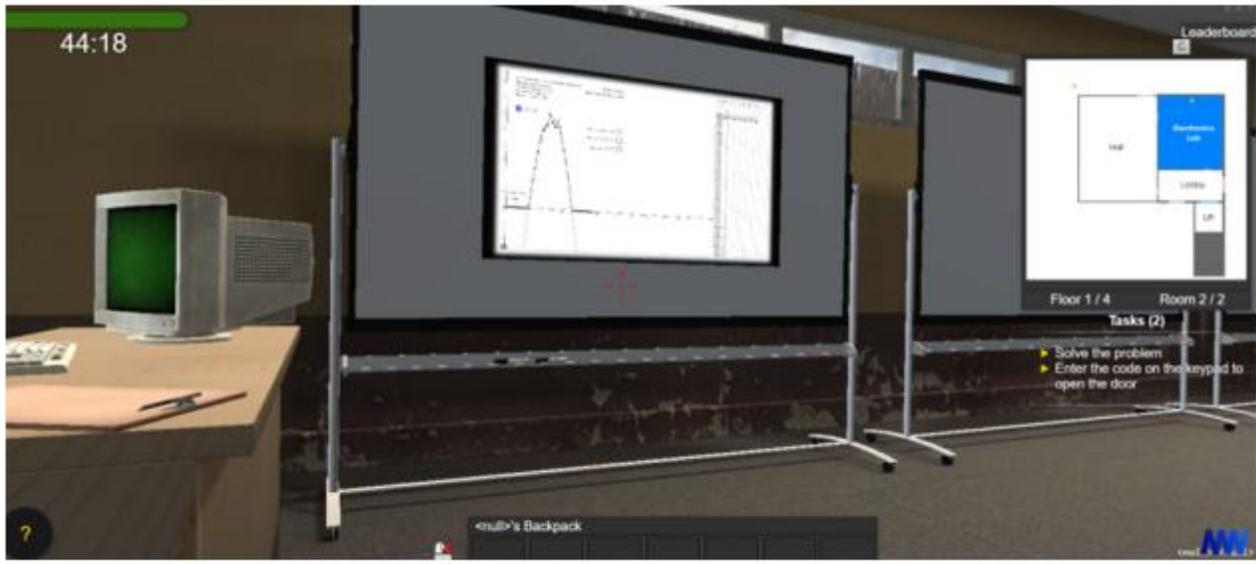
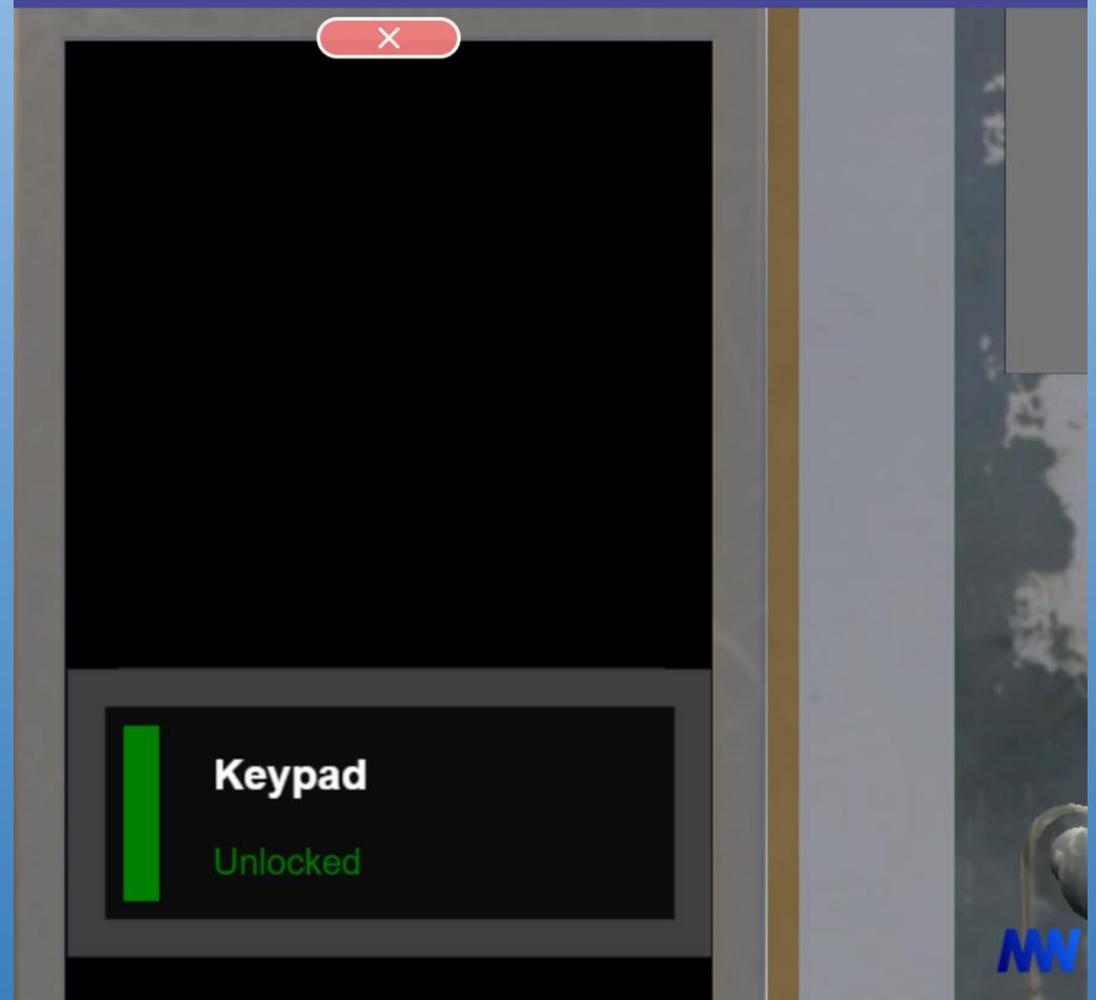
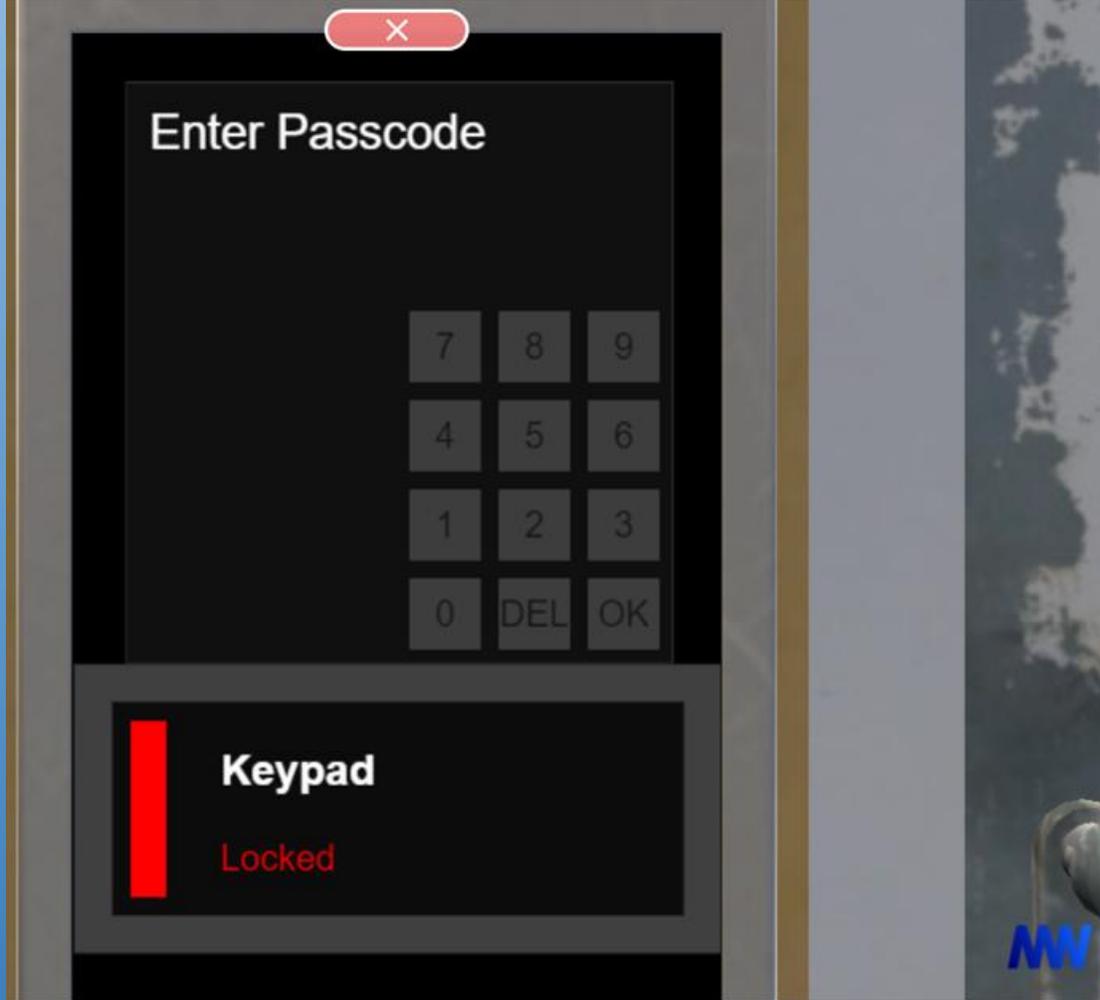


Figure 4: ER1 - GeoGebra Panel Room 1 Tasks



Figure 5: ER1 - GeoGebra Panel Room 1 Tasks





Current Battery Energy Level is 50 kWh
Energy Consumption of the door is 4 kWh
Power of eco LED Lamp 8 W
Light should be available for 45 min

The function is defined by: $f(x) = (-0.54) \cdot (x - 11.92)^2 + 11.9$

Time in minutes to Charge the Battery from 0% to 80%

Maximum number of eco-LED Lightbulbs you can use (ROUNDING)

Confirm Values

Current Battery Energy Level is 41 kWh
Energy Consumption of the next door will be 7 kWh
Energy Consumption by eco-LEDs has been 1 kWh
After leaving this room, remaining energy will be 33 kWh
Energy Density of LNG/Gas 29 kWh/m³
Solar Power Carbon Footprint 45 g/kWh
CO2 footprint LNG/Gas 679 g/kWh

First set your height, then calculate the answers to the questions.
You can then confirm whether your answers are correct.

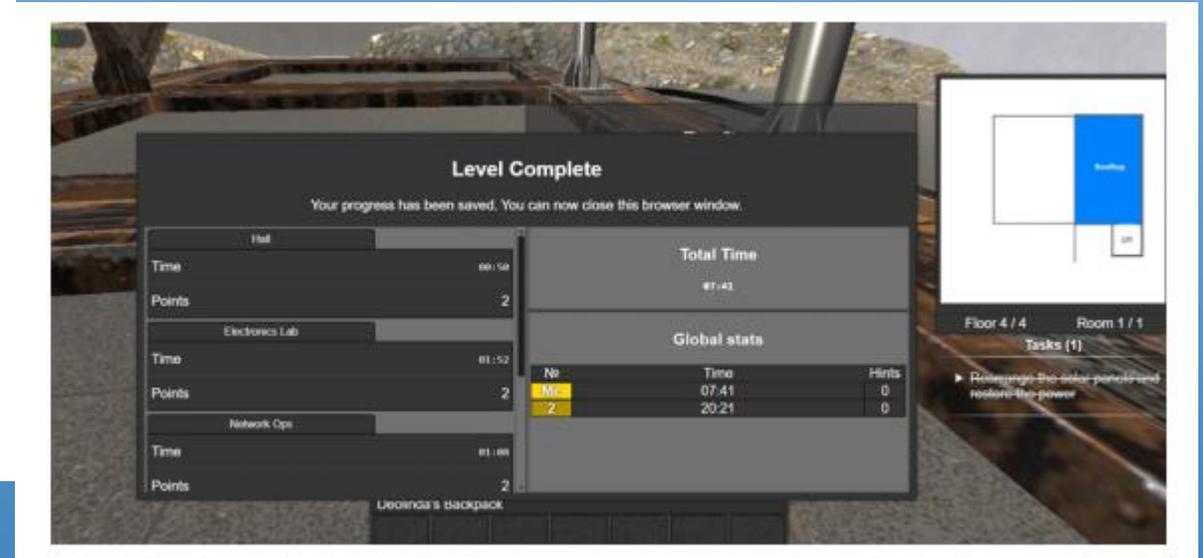
Your height is set to 1.62m.

Set Height to Calculate

Given the barrel had your height in meters, what is the radius in cm? ROUNDING!

Difference between Carbon footprints of LNG/Gas and the Solar Cells in gram CO2? ROUNDING!

Confirm Values





Access and Support

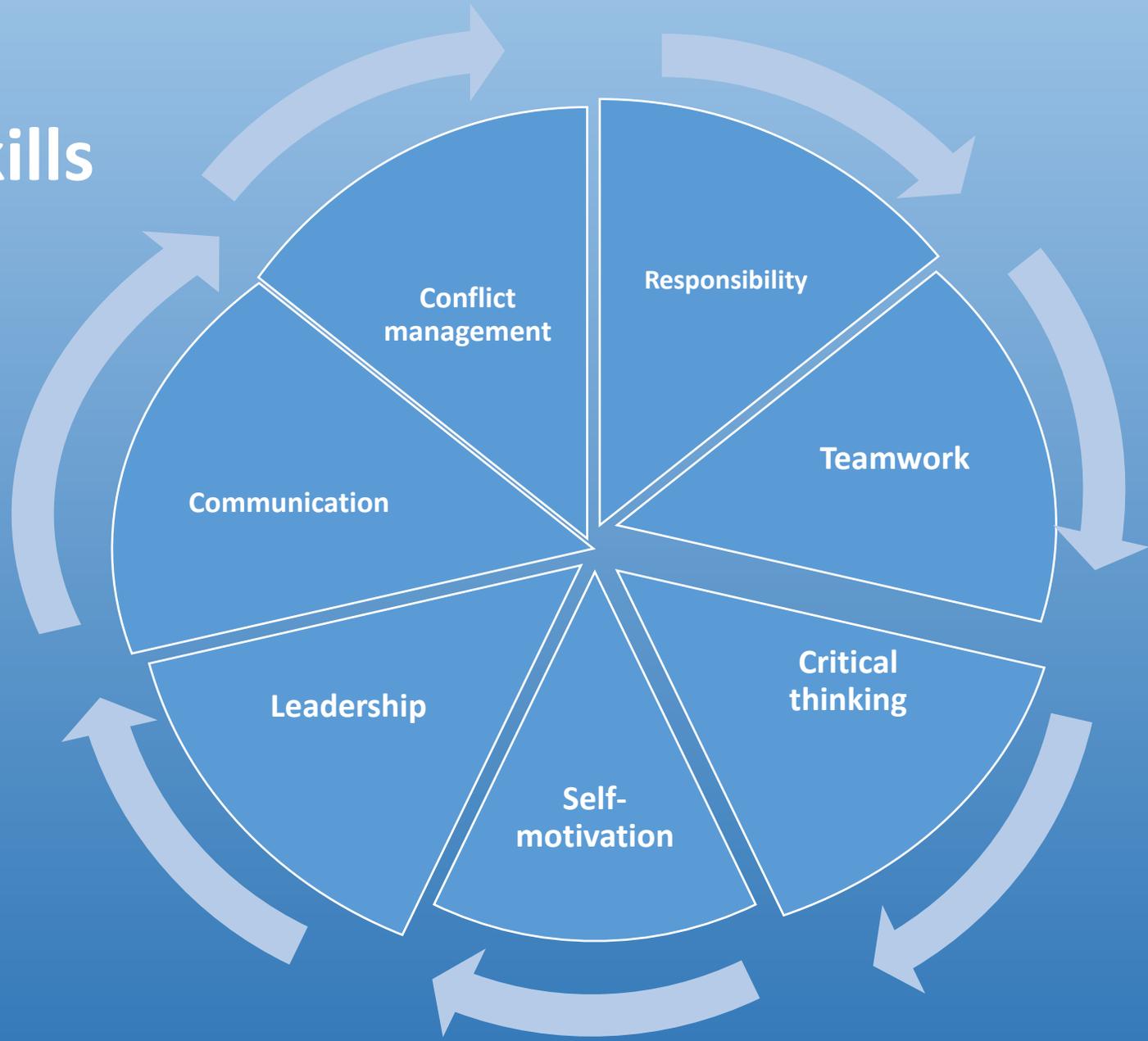
Escape Room #2 Portal:

- <https://portal.maxwhere.com/mwwweb/url.html?space=math-digger-er2>





Soft skills



- C1 - Mathematical thinking
- C2 - Reasoning mathematically
- C3 - Posing and solving mathematical problems
- C4 - Modeling mathematically,
- C5 - Representing mathematical entities
- C6 - Handling mathematical symbols and formalism,
- C7 - Communicating in, with, and about mathematics.
- C8 - Making Use of Aids and Tools

Learning Objectives	Competencies								
	C1	C2	C3	C4	C5	C6	C7	C8	Soft Skills
Pick up 3 parts to assemble a solar panel	X	X	✓	X	X	X	X	✓	✓
Best fit interpolation curve	✓	✓	✓	✓	X	X	X	X	✓
Curve parameters adjustment	✓	✓	X	✓	X	X	X	X	✓
Use integrals to calculate the Energy as a function of the Power	✓	✓	✓	✓	✓	✓	X	✓	X
Determine the time t^* at which 80% of the battery is charged	✓	✓	✓	✓	X	X	X	✓	✓
Calculate the remaining energy after leaving room 1	✓	✓	✓	✓	X	X	X	✓	X
Determine the maximum number of eco LED light-bulbs possible to be used	✓	✓	✓	✓	X	X	X	✓	X
Determine the volume of a barrel	✓	✓	✓	✓	X	X	X	✓	X
Calculate the radius of a barrel for the amount of LNG that has the same energy outcome in case the power supply would be from Gas	✓	✓	✓	✓	X	X	X	✓	X
Determine the difference of carbon footprint between Solar Cells and LNG/Gas	✓	✓	✓	✓	X	X	X	✓	✓
Align solar panels	✓	✓	✓	✓	X	X	X	X	✓



- A fantastic adventure.
- (Yet...) Multiple questions: define curricula, develop pedagogical materials, peer learning methods, assessment, ICT, e-learning, b-learning, hybrid learning, STORY-TELLING...
- Commitment, motivation, resilience, true knowledge of students...
- We are navigating stormy waters (Rod Stewart), but we can and must prevail.



Success consists of going
from **failure to failure**
without loss of enthusiasm.

- *Winston Churchill*





**When the student is ready
the teacher appears.**

**When the student is truly ready
the teacher Disappears.**

— Lao Tzu —

TheMindsJournal.Com

THANK YOU!



Carla M.A. Pinto
Coordinating Professor
Polytechnic of Porto
cap@isep.ipp.pt