



Elaboration of PBL Challenges O1/A3

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Revision History

Version	Date	Author	Description	Action	Pages
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(*) Action: C = Creation, I = Insert, U = Update, R = Replace, D = Delete

Referenced Documents

ID	Reference		Title
1	2020-1-UK01-KA226-HE-094536		EPITOME Proposal
2			

Applicable Documents

ID	Reference	Title
1	[PARTNER ORGANIZATION]	[TITLE OF THE REFERENCED DOCUMENT]

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1 Introduction

1.1 The scope of the project

The project aims at supporting the use of digital learning spaces by European educators as a means to help them continue to deliver through virtual classrooms Problem Based Learning activities that were until now offered only through physical collaboration in classrooms. By helping HE institutions with pedagogical departments to extend their academic curricula with practical approaches towards remote PBL in combination with Game Based Learning, EPITOME aims to improve the current situation with respect to the teacher's ability to deliver remotely, through virtual classrooms, the same quality of education they delivered in physical classrooms until now.

1.2 Target groups

The target groups are academic staff of HE establishments which have pedagogical departments, and which can use the outcomes to extend their teaching so as to equip the educators of tomorrow with the knowledge and skills to deliver remotely PBL experiences to their students through their virtual classrooms. Target group is also the school community which is in desperate need of all-inclusive resources which can be immediately put to use by the teachers in order to facilitate remotely collaborative problem solving. Additional target group are the STEAM centres which also need to be in position to operate remotely and from a wider perspective, any teaching/training organisation that can benefit from the use of digital learning environments independently of the age groups it addresses as game-based learning has been proven to be efficient for all age groups.

1.3 The scope of this output

Minecraft challenges can be used for synchronous learning with students working together in a virtual environment, or as assignments that are shared back with the educator or students once completed. Minecraft offers students a creative space to build, model, or design an environment to demonstrate their understanding of a topic.

In the present output we elaborate 5 challenges, each targeting students aged 8 to 13. The elaborated challenges comprise the EPITOME PBL framework to allow learners to go through a process of inquiry in response to the elaborated challenges.

All challenges are presented in the same way (e.g. Name, Duration, Subject, Grade, Other Subject areas, Idea, Driving Question, Milestones, Content & Skills to be addressed, 21st Century Skills, etc.)

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2 Elaboration of PBL Challenges

The high level description of the project methodology is depicted as follows:

- Elaborate Minecraft-aware methods for delivering PBL experiences [A1/O1]
- Materialize the methods to PBL specifications for Minecraft worlds [A1/O2].
- Design PBL challenges for the EPITOME world. 5 challenges will be elaborated, each targeting students aged 8 to 13 [A1/O3]
- Develop a handbook for practitioners to implement PBL experiences in Minecraft [A1/O4]
- Create a custom Minecraft World, the EPITOME world and accompany it with resources and mods to support the implementation of the elaborated PBL challenges [A2]

In the present document we elaborate 5 challenges, each targeting students aged 8 to 13. All challenges are documented using the same template and are presented in the same way (e.g.: Name, Duration, Subject, Grade, Other Subject areas, Idea, Driving Question, Milestones, Content & Skills to be addressed, 21st Century Skills, etc.)

Each challenge makes use of the methods of A1/O1 and the respective specifications of A2/O2. The methods are references using their respective numbers:

1. Learning Journal
2. Scaffolding
3. Multiple Paths to success
4. Self-Peer evaluation
5. Reinforcing effort/Providing recognition
6. Game-based learning (GBL)
7. Role-Playing
8. Scenario Based Learning
9. Differentiated Instruction

In each of the sub-sections which follow we present a Challenge. These challenges will be supported by the EPITOME Minecraft World of A2. The custom Minecraft world, the EPITOME world will be conceptualised and built specifically to support the delivery of the PBL challenges elaborated here.

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2.1 Understanding Buoyancy

Duration: 20 – 30 minutes

Subject: Physics

Grade: 8th (14 y.o.)

Other Subject Areas: Mathematics

Idea: Understanding Buoyancy using visual examples in Minecraft

Driving Question: What is the meaning of Buoyancy

Milestones:

1. Learn the definition and formula of Buoyancy.
2. Explore examples of Buoyancy.
3. Perform experiments/ Complete tasks that require the knowledge of the principles of buoyancy.
4. Final Quiz.

Content: An activity that could be implemented after teaching the definition of buoyancy. The player/learner has the freedom to explore the world and “discuss” with NPCs what they see in the world and try to explain it. They can take notes using the Book & Quill and present their notes later in the class. Activities using Minecraft Functions can be implemented so that the players/learners try to implement their newly acquired knowledge. Capturing their solution can also help for the final class discussion. The final quiz can present a number of questions that attempt to cover more topics in buoyancy that couldn’t be implemented in the platform. These questions will be about real-life scenarios.

Skills to be addressed: Logical thinking. Memory.

Includes Methods: 1,3,5,8

Inventory:

- PPT with definition and formula of Buoyancy & examples
- Description of related Minecraft activities for using the knowledge
- Final quiz questions
- Mcworld file

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2.2 Solving Linear Equations

Duration: 20-30 mins

Subject: Mathematics

Grade: 8th (14 y.o.)

Other Subject Areas: -

Idea: Race for students to solve more linear equations

Driving Question:

Milestones:

1. Race initiation.
2. Discussion about mistakes.

Content: Multiplayer experience where the students, after they've had their lesson in linear equations, have to search for NPCs to solve questions. The questions that are easier to reach will be harder in difficulty, whereas the questions that are easier will require basic platforming (going from place A to place B), or will be further away. So, the students who are willing to solve the more difficult questions will save up time and be rewarded for it. When each student gathers enough points, they can wait for the others to finish, or give them hints. In the end, the wrong answers can be displayed (anonymously) and discussed. The teacher can provide help inside the world by demonstrating how to play the game.

Skills to be addressed: Calculation. Quick reactions.

Includes Methods: 2,3,6,9

Inventory:

- PPT with methods of solving linear equations
- MCWORLD file
- Linear Equation problems list

2.3 CO-OP: English Language Mystery

Duration: 20-30 mins

Subject: English

Grade: 5th

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Other Subject Areas:

Idea: Role playing mystery game about English grammar.

Driving Question:**Milestones:**

1. Each player completes their own task.
2. They discuss and “solve the mystery”

Content: Groups of 4 players form and join a multiplayer server. Each one chooses a role and then proceeds to complete their tasks. Some NPCs can only talk to certain people with certain roles. The challenges include completing sentences grammatically correct. Then each student must record their answers on the Book and Quill so that later the students can all get together and make sense of their clues. After revealing the secret, they can present their findings in class.

Skills to be addressed:

Includes Methods: 1,4,5,6,7,8

Inventory:

- PPT with grammar theory
- MCWORLD file
- Scenario and solution to the story

2.4 Capture The Flag: Pressure VS Force

Duration: 20-30 mins

Subject: Physics

Grade: 8th

Other Subject Areas: Math

Idea: PvP experience where players get to understand the differences between Pressure and Force.

Driving Question: What is the difference between Pressure and Force

Milestones:

1. Answering questions regarding their team's topic to boost their defenses.

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2 Answering questions regarding the opponent's team's topic to weaken their opponents. 3. Self-evaluation and discussion.

Content: Students get separated into two teams. The team of Force and the team of Pressure. Each team member can find NPCs scattered around the map to answer questions about their or their opponent's topic. Solving questions for their topic enhances their defenses, solving questions for their opponent's topic helps them get into their opponent's base. After a winner is declared, they discuss any wrong answers and the questions that weren't picked by anyone. The difficulty level of the questions can vary.

Skills to be addressed:

Includes Methods: 3,4,5,6,9

Inventory:

- PPT with theory on the definitions of pressure and force
- MCWORLD file
- Examples and differences of pressure and force

2.5 Treasure Hunt: PEMDAS

Duration: 20-30 mins

Subject: Mathematics

Grade: 5th

Other Subject Areas:

Idea: Treasure hunt competition to find the initials of PEMDAS by solving PEMDAS related problems

Driving Question: What is the order of operations?

Milestones:

1. Search and Acquisition of each of the treasures.
2. Discussions about mistakes and questions.

Content: Each player is set to find first 5 different blocks, each labeled with P,E,M,D,A and S respectively. This will be done by solving PEMDAS related problems. (eg: $12*(12+3) = a$) 180

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b) 147 c)48 d)50). Later they have to place each block to the correct place (in the correct order) and claim their trophy. Record can be kept of the false answers (anonymously) and later be discussed in the classroom. The difficulty level of the questions can vary. (And thus, be targeted to students of higher grades)

Skills to be addressed:

Includes Methods: 3,4,5,6,9

Inventory:

- PPT with theory regarding the order of operations
- MCWORLD file
- List of questions and solutions

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