# PBL Specifications for Minecraft Environments O1/A2

## Revision History

| Version | Date | Author | Description | Action | Pages |
|---------|------|--------|-------------|--------|-------|
| [..] | DD/MM/YYYY | PARTNER ORGANIZATION | [Creation/Insert/ Delete/Update of the document] | [C/I/D/U] | [No. of 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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Partner Organization:                                                          **Deliverable: A1/O2**

EPITOME          **Version: 1**

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# Contents

# 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 with teachers, especially for students from 8 to 13 years old. 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 and to help the inclusion of girls in Computer Science and STEAM.

## 1.3  The scope of this output

The methods elaborated in the context of A1/O1 provided the initial input of requirements which are transcribed to specifications for a Minecraft world in the context of the present output.

The PBL experiences which will materialise through the elaborated methods of O1/A1 will be based on the present specifications for a Minecraft world so that it is immediately apparent how the environment can be used to deliver each experience.

The value is evident and very significant as the specifications allow for the manifestation of remote learning experiences to concrete Minecraft implementations. The present specifications provide a tool for delivering remote PBL experiences through Minecraft.

# 2  Problem Based Learning Specifications

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]

Using as input the methods of A1/O1, we herewith transcribe them to specifications for a Minecraft world [EPITOME World].

The EPITOME World [A2] will demonstrate hands on how to deliver each PBL experience using the specifications of the present document.

In the following subsections we transcribe each method of A1/O1 to Minecraft specifications for delivering PBL experiences.

## 2.1   Learning Journal
The Minecraft: Education Edition (M:EE) platform provides a number of different tools that the learner can use as a learning journal. These tools are:

a. Book and Quill [available in the Items tab or by using slash command:/give @s writable_book]:

The Book and Quill is good for documenting stories. It is a tool essential for journaling one's learning experience. Learners can use it in order to take notes, record results, store photos and of course export them outside of M:EE in order to study it later, or give it to a teacher for review. Players can use it to add pictures taken with the Camera into a portfolio book, and edit the book text. After editing their book, players can click on Sign to personalize the cover and sign to lock their book. After locking, even the author cannot change the content and the book will appear in purple colour in the inventory. When clicking on the book from the inventory, it will open for exporting. The

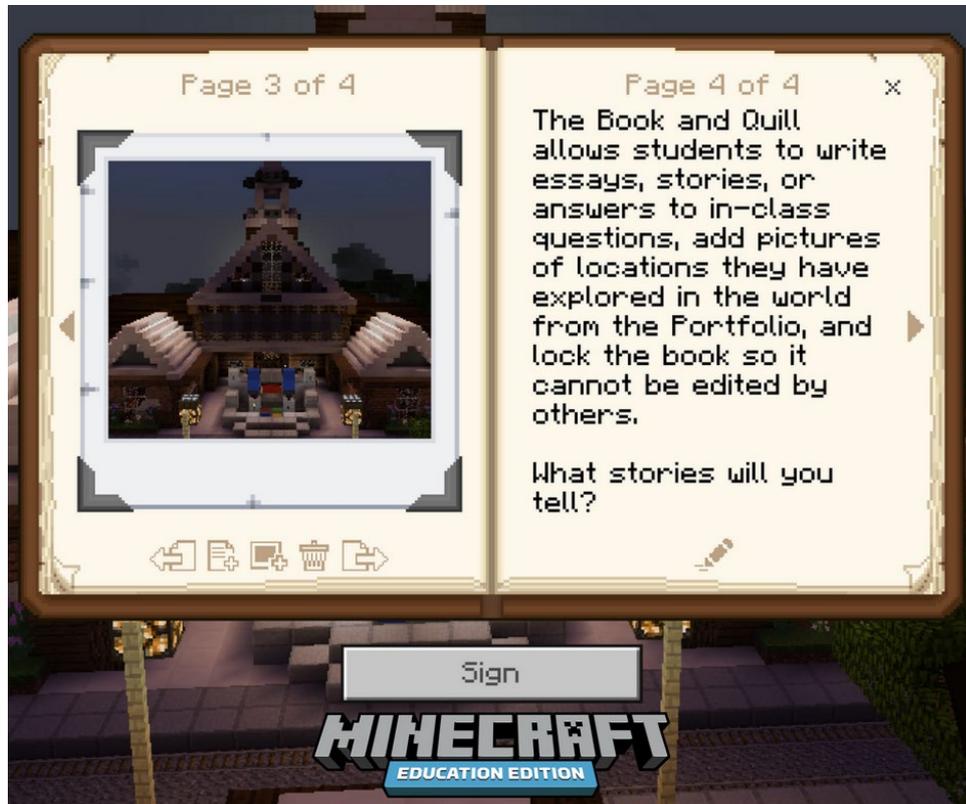PUBLIC/DRAFT

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default filename for export is <Book Title> <Author Name> and by default is saved in the documents folder. The exported book will be a ZIP file. Picture pages are saved as JPEG files while text on the pages is saved as TXT files



b. Portfolio [portfolios can be obtained in the creative inventory or through the /give command]:

The portfolio is a tool like the Book and Quill, which is basically solely used to take log of the pictures that the learner has captured on the M:EE world. The portfolio is a storage space where all the pictures taken are stored. Like the book and quill, it too is exportable to a different file for safe-keeping or review. Captures are saved there automatically, therefore it's easier to use and more convenient. Although this cannot act as a detailed log of one's journey, like a Book and Quill can, this can serve as a quick "highlight reel" of the lesson, or all the lessons the student has been this far or the same course.

c. **Camera** [it can be obtained in the creative inventory in Education Edition]: The camera is the tool that the Minecraft users can utilize in order to capture pictures and store them in the two containers mentioned above. It provides a more gamified version of simply taking a screenshot of your progress every time it's needed and also requires a minor procedure (pointing the camera and setting it up), that makes the note taking process less tedious and more of a fun activity. Using a camera from the inventory captures a first-person screenshot. It may also be placed creating thus a camera entity that can track the player, and take pictures from the camera's perspective. Close-up snapshots of an item on the ground can be taken by holding the Shift key while right-clicking.

d. **Structure Block** [available using the /setblock, /fill, or /give commands]: Structure blocks are one of the few things in Minecraft that do not generate naturally but can be obtained using commands. The structure block is a block used to save an area of your Minecraft World, and export it as a 3D object (.obj file). With that, the

learners can save their progress or send it for review, without being limited by the 2 dimensions of a picture. Also, producing 3D objects as homework, or using them to study seem more interesting to students because it's different from what they've been used to.

External Resource: https://education.minecraft.net/en-us/trainings/tutorial-4-camera-and-portfolio [Tutorial on the use of Camera, the Portfolio and the Book & Quill]

External Resource: https://www.sportskeeda.com/minecraft/how-use-structure-blocks-minecraft [How to use structure blocks in Minecraft]

External Resource: https://www.youtube.com/watch?v=OKIfw1fjSlY [How to Use Structure Blocks in Minecraft: Education Edition]

## 2.2 Scaffolding

Scaffolding is an interesting concept that can be implemented in many different ways in M:EE. All those different ways can be preferred over another depending on the lesson, the number of learners and the complexity of the task at hand.

a. Importing data from the teacher.

This can easily be done with the use of the tools discussed above. Unfortunately, 3D models cannot be imported on M:EE **yet** (they can on Minecraft BEDROCK Edition, which is the version that M:EE is based on). However, images of what they are expected to accomplish or text with the format of the notes that they are expected to take, can be a vital tool for any student to better understand the task at hand, and also understand how to tackle later tasks and lessons, without the use of scaffolding.

b. Command Blocks.

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In all versions of Minecraft, there are a certain type of blocks, that are called command blocks. Those basically execute commands that maybe the player couldn't have done on their own, or as fast. At the beginning of the lesson, command blocks can be enabled, which will basically work as training wheels for the players. Once the players get the gist of the task at hand, command blocks can be turned off or disabled, so that the players can either repeat the task without the training wheels, or continue the same task but finish it without any help. Examples of what command blocks can allow the player include: Ability to fly, ability to place blocks, give more blocks to the player, more health, more resources, faster speed, jump boost, night vision etc.

c. Code Builder.



The Code Builder is a feature exclusive to the M:EE platform. With the use of the Code Builder, players can set up commands that basically give them the effect of command blocks. The code builder can be set up by the teacher or the students themselves. The code builder holds more potential that will be discussed on later methods. As far as scaffolding goes, the code builder can do things similar to the command blocks, the only thing that is different is the way that they are set up and summoned. For example, there can be a set up where you have only a limited number of uses of a command blocks, or the code builder can be used infinitely, from anywhere in the world.

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d.  Multiplayer Functionality.

M:EE provides an easy-to-use Multiplayer server. Through this functionality the teacher can demonstrate first hand to the students how to complete certain tasks, give immediate feedback, answer questions, enable-disable command blocks, set up the code builder etc. The multiplayer functionality will be discussed more, later on.

## 2.3  Multiple Paths to Success

This is where the free world of Minecraft can be utilized at its most. We can lead the players to the same result with literal different paths. Each representing a different aspect or point of view. We can also have a point gathering system, where the students can acquire the different points from multiple different places, making the learning activity non-linear or even adequate from taking completely different paths. Even without paths, we can create an open – yet confined – space where the students can execute activities or gather information at their own pace.

A commonly used practice is to have the final quiz of the world available at all times, so that the students will be able to explore all they want, creating their own journey at their own pace, and completing the quiz whenever they have acquired all the knowledge that they were missing.

This is another place where the Code Builder could come into place. By limiting the commands that the player has available, we can have the code builder execute actions that the player could also execute. So, tasks could either be done "manually" or assigning to the code builder to do those tasks for the player.

## 2.4  Self-Peer Evaluation

The self-peer evaluation can be done in many different ways. Students can present their results in class, by exporting their notes so that other students can compare and review. Moreover, with the Multiplayer functionality, students can face each other on PvP (player versus player) combat, or time challenges, so the review basically occurs by the outcome of

the race. Also, players can visit each other's worlds, comparing their findings, providing and understanding different perspectives.

The evaluation can be done traditionally, with a grading system. Or players could have the opportunity to give one of three different items to their favourite execution. For example: a diamond, a gold ingot and an iron ingot. At the end of the challenge, each player can see their evaluation by checking what items their peers have handed to them.

## 2.5 Reinforcing Effort/ Providing Recognition

(See also Self-Peer Evaluation) This method can be utilized similarly to the method mentioned above. Only this time, the teacher gets to look and review the exported files or the material inside the world.

The teacher can also visit a selected world and start showing off what are the pros and cons of everyone's work. They can provide corrections, alterations or praise.

## 2.6 Game Based Learning

Another method where we can take advantage of the multiplayer functionality of the game. We have unlimited options for creating activities that will make the students work with each other or against each other creating a fun learning environment. Because of Minecraft's popularity, we could combine lessons and activities with Minecraft challenges that have gone trending over the years, so that we know that those games are generally enjoyed and understood by most players. Those challenges can be as basic as platforming (going from place A to place B), or as complex as a point gathering system or a building challenge, where students will show off their understanding of the subject matter, as well as their creativity.

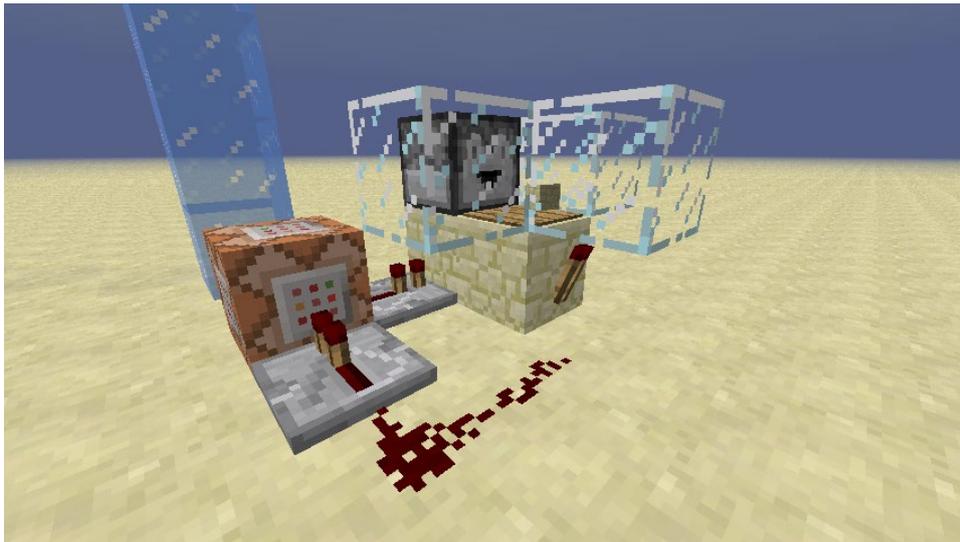A vital part of Minecraft is redstone. Basically, redstone and its components are the implementation of basic circuits in Minecraft. With those you can alter the game, with less impact than command blocks. However, basic circuits like a combination lock, AND gates, OR gates etc. can be implemented and used for each game's purpose. The redstone contraption can run in the background or be exposed as it provides a nice visual effect for the students.

## 2.7  Role Playing

An essential addition of the Minecraft: Education Edition platform is the introduction of NPCs (Non-Player Characters). Their dialogues, appearances and behaviours are completely customizable. NPCs can help flesh out the world in order for learners to get more into their roles, in this role-playing game.

With a wide array of block palettes, and textures that can be personalized, the different stories that can be painted are endless. Using the multiplayer functionality, learners can embody their roles and cooperate in order to complete their tasks collectively.

Also, an array of friendly and enemy mobs is available on this platform. They too can be customized. They generally make the experience more interesting and create the sense that there is something at stake.

## 2.8 Scenario Based Learning

(See also Role Playing) With the same tools as before, only this time with a more single-student centric model, we can have a large number of different scenarios with each student being the hero at their own story. Generally, single-player experiences are easier to implement and the program will struggle less to load each one player adventure. This doesn't mean that role-playing activities are more limiting that scenario-based ones, they are just easier to develop.

## 2.9 Differentiated instruction

This method can again be implemented with the implementation of different paths, each varying in difficulty, all leading to the same goal, with a different reward for each path. Prompting the players who chose the easier path to try the more difficult ones. The difficulty of the paths can vary with different platforming, more difficult multiple-choice questions, more or less advanced examples of the application of the knowledge the students are trying to understand etc. (See also Multiple Paths to Success).

Also, there is an in-built Game Mode system (peaceful, easy, normal, hard, hardcore), which basically varies on whether the player can encounter mobs (enemies), how hard they hit, how hard the player loses health, whether or not they (both the player and the mobs) can respawn etc.

# THE END

# ANNEX 1 – PEGI SPECIFICATIONS

As indicated by the PEGI (Pan European Game Information) website, children from 7 years old can play Minecraft. The game is indeed classified as PEGI 7. This means that the game can contain "scenes or sounds that can possibly be frightening to younger children" (nightly scenes, huge caves, meeting with monsters...) and "very mild forms of violence (implied, non-detailed or non-realistic violence)".

The "mild violence" in Minecraft takes different forms:

- killing farm animals for food,
- fighting and killing monsters,
- dying during fights or accidents (falling for example).

There is no blood in Minecraft and no realistic scenes which radically soften the different "violent situations" encountered by the player.

The Epitome world and its challenges doesn't involve violent content (monsters for example) or need violent actions. They could only be the fact of players acting outside the rules of the Epitome project.

More information on the PEGI website: https://pegi.info/

# ANNEX 2 – H/W & S/W SPECIFICATIONS

Minecraft has been released on lots of different platforms such as PC (Windows, Mac OS X, Gnu/Linux), consoles (XboX, Playstation, Wii U, Nintendo Switch, Nintendo 3DS) but these specifications are based on the latest version of Minecraft, the Java Edition.

## Technical specifications

### Minimum

- Hardware
    - Processor (CPU) : Intel Core i3-3210 3.2 GHz / AMD A8-7600 APU 3.1 GHz or better
    - Memory (RAM) : 4 GB
    - Graphics (GPU): Intel HD Graphics 4000 / AMD Radeon R5 series with OpenGL 4.4
- Network
    - Broadband Internet connection for downloading Minecraft files before playing offline
- Software
    - Storage : 2 GB HDD
    - Operating system : Windows 7 and up, Mac OS X 64-bit using 10.9 Maverick or newer, any modern Gnu/Linux 64-bit distribution

### Recommended

- Hardware
    - Processor (CPU) : Intel Core i3-3210 3.2 GHz / AMD A8-7600 APU 3.1 GHz or better
    - Memory (RAM) : 8 GB
    - Graphics (GPU) : Nvidia GeForce 700 Series or AMD Radeon Rx 200 Series with OpenGL 4.5
- Network :
    - Broadband Internet connection for downloading Minecraft files before playing offline
- Software
    - Storage : 4 GB SSD
    - Operating system : Windows 10 64-bit, Mac OS 10.12 Sierra or newer, any modern Gnu/Linux 64-bit distribution

The recommendations for Minecraft Windows 10 version are significantly the same.

## Raspberry Pi

A free Minecraft version exist for the Raspberry Pi and can be downloaded from this webpage (https://www.minecraft.net/en-us/edition/pi). However this version has been released in 2013 and never been updated. So it might contain several security vulnerabilities and can be not compatible with worlds created for more recent versions of Minecraft.

## Epitome world

The Epitome world will be usable with the Minecraft Java Edition.

However the typology and approach of challenges that teachers can create is adapted to all versions of Minecraft as well as Minetest, the open source version of Minecraft (https://www.minetest.net/).

# ANNEX 3 – GDPR

What is GPDR ?

The General Data Protection Regulation (GDPR) is a comprehensive new privacy law that gives residents of the European Union (EU) greater control over their "personal data" and requires organizations to maintain appropriate security of personal data. GDPR is an important step forward for clarifying and enabling individual privacy rights.

About Microsoft and GPDR

Since Minecraft has been bought by Microsoft in 2014, players need a Microsoft account to play the game. However, the Minecraft Education version used by the Epitome project complies with General Data Protection Regulation (GDPR). To this end, Microsoft will:

- not collect or use student personal data beyond that needed for authorized educational or school purposes.

- not sell or rent student personal data.

- not use or share student personal data for advertising or similar commercial purposes, such as behavioral targeting of advertisements to students.

- not build a personal profile of a student, other than for supporting authorized educational or school purposes or as authorized by the parent, guardian, or student of appropriate age.

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