

Cooperate to build a building with Terraria

Previous compulsory steps / Prior students' knowledge	Both the educator and the students should know how the game works and be familiar with some of its possibilities (what the players can create). If they do not have prior experience, it is recommended to either play for 1 hour or to watch a gameplay video before using this sequence. Educators will also need to configure the LAN connection before carrying out the second step of this sequence.
Learning objectives	To plan and create a building with a minimum level of complexity that requires students to test different strategies. To use concepts, tools and mathematical strategies to solve problems. To have an attitude of researching and testing multiple strategies when facing a problem. To use mathematical reasoning in non-maths environments. To design and construct structures and evaluate the suitability of the results. To work as a team and distribute tasks among the group.
Subjects	Mathematics, Technology, Design
Recommended Age	10-18. The complexity of the assignment can be adapted to the level of the students.
Material needed	Computers (one per student). If the game is available for other platforms, these could be used as well, instead of computers.

Sequence duration	2 – 3 hours
Individual or group activity	Group
Skills developed	Collaboration & teamwork, Creativity, Planning, Presentation skills
Price range of the game	0 – 20 €
Similar games to use with the approach of the sequence	<p>Minecraft, Minecraft education edition (requires a license and a monthly payment), Minetest.</p> <p>Other approaches include:</p> <ul style="list-style-type: none"> • Overcooked 2: In this case, the players cook dishes, so you should focus the planning on this type of creation. • Dragon Quest Builders 2: This is also a building game, like Minecraft, but it does not have a multiplayer option. Instead, players can share their creations and “visit” them virtually. Moreover, this game has a story that you have to play for nearly 4 to 6 hours before being able to build freely. We only recommend it if the educator knows the game very well and can load a pre-saved game that has already unlocked the possibility to build freely.

<p>Tips for inclusion</p>	<p>The game Terraria has several accessibility options such as changing the number of enemies that appear at once. Several other features can also be changed, including: text size, controls (keyboard and mouse, if playing on a computer), some interface elements and their colours, etc., to be more inclusive for students with varied visual impairments and learning disabilities.</p>
<p>Tips for shortening the duration of the sequence</p>	<p>It is recommended that educators spread the sequence activities over 2-3 class sessions if they cannot do all the activities at once.</p> <p>If the educator wishes to do a shorter sequence of only one hour, they may consider shortening the planning time in Step 1 to about 10 minutes and giving students 30-40 minutes to create their (much more simplified) constructions in Step 2. In this case, students may skip the preparation of formal presentations laid out in Step 3 and give an informal demonstration of their creations in a few minutes each, for a total of 10-15 minutes of presentations to the class (as in Step 4).</p>

Step by step: how to implement the sequence

- **Step 1: Plan your building (30 - 40 min)**

In this activity, students will create one or more buildings together in groups. Later on, each member of the group will play from different computers on the same LAN connection. Since planning and testing building strategies are part of this sequence, the educator should decide either what kind of buildings they would like students to make or, at the very least, which conditions (size, number, purpose) are the most important for students' buildings. Keep in mind that this is something the students should be able to complete in a limited amount of time — in this case, one hour.

In this initial step, the educator's guidance is important, but the students should be the ones who decide what to build and how to build it. This way, students are given free rein to use their creativity in employing different mathematical and design concepts they already know or have learned in class. For example, the educator may decide to challenge students to build a house with a certain number of rooms, or to have a certain number of NPC (non-playable characters) living in the rooms. Here, the most important point is that students should sit down and plan what they would like to do before playing, thus taking into account some possible difficulties they may encounter (such as combating enemies, needing to seek materials for crafting, etc.) before they start to play the game.

To help them plan, you can give the students a written guide with questions such as:

- How many rooms are you going to build?
- How will they be connected?
- How will the buildings or rooms give the NPCs protection from their enemies at night?
- What tasks will each group member be in charge of while they play?

- **Step 2: Play and create (60 min)**

Each student will connect to the game from a different computer on the same LAN connection. This means that educators will need to configure the setup prior to the class taking place, with the required setup depending on the game used. See the instructions on the games' official website or forms, as well as the links below, for configuring these settings.

How to set up a LAN server:

- [On Terraria](#)
- [On Minecraft](#)
- [On Minetest](#)

When the game is set up properly, students can start creating their buildings together, with each of them connected on a different computer and contributing to the joint construction.

- **Step 3: Prepare a presentation of the completed building (20 – 30 min)**

Next, students will prepare a presentation for their fellow classmates showing what they created. To do this, they can either use the game itself, or take screenshots of their progress. Optionally, if you have more than the minimum time for carrying out this sequence, you might think about asking students to create a short gameplay video that shows part of their construction process. This will help reinforce additional technological, narrative, and presentation skills.

Students should spend about 20-30 minutes preparing a brief presentation that answers some of the questions posed in Step 1. At the very least, presentations should include reflections on the following key aspects:

- How did the processes of planning and building work in your groups?
- How different were the results from what you had planned?
- What difficulties did you encounter during the process?
- What actions could be taken to help overcome these difficulties?

*Note: This step may be more relevant for formal education settings. Non-formal educators using the sequence may choose to adapt the activity to their contexts and objectives, or skip it altogether.

- **Step 4: Presenting the buildings (10 min per group)**

Finally, each group will present their work to the rest of the class, using the visual aids and presentation speech they created in the previous step. The educator's role in this last step is to ensure the students present the aforementioned key aspects, as well as to stimulate questions about the process and help students compare and contrast their experiences.

*Note: This step may also be more relevant for formal education settings. Non-formal educators using the sequence may choose to adapt the activity to their objectives or simply hold an informal follow-up discussion with students to see what they have learned from the activity.



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