Rethinking Active Learning and Distance Education
Funded by Erasmus - Project KA226

Teacher Manual

Online Cell Culture Game

Serious Games

Teacher manual for online cell culture game

Introduction to the course

In this online game, the students will use an online interactive platform to experience how perform cell culture of attaching cells in real life. It is a real time game and thus takes into account the growth rate of the cells.

In the game the students will have to think about:
1) preparing themselves with protective clothing before starting;
2) how to start a cell culture, by thawing cells, and prepare the materials needed;
3) the time planning and how to subculture the cells;
4) and when the culture is ready to perform experiments.

Note: You have to advice your students to play and continue the game always on the same device. Preferable the same computer.

At the start of the game, the student will have to read the tutorials. We also put the instructions in the appendix of this document.

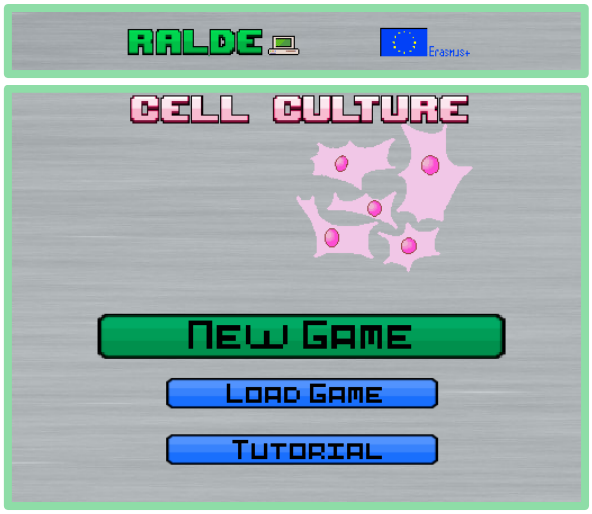


Figure 1: Starting page of the game; https://cell-culture-game.ralde.eu/

In order to make this an effective and interactive session, it is important that the students has already some background knowledge on how to perform a cell culture. You can either use our RALDE virtual cell culture practical (https://ralde.eu/index.php/virtualpracticals) or use your own teaching materials.

The game will teach them how to monitor cell growth and when to change medium or subculture. However, the risk of cell contaminations is not build into the game.

The gaming element is that the student can either loose a heart of their own "life" if they make a mistake. In parallel, they can also loose the "life" of the cells, when they do not properly monitor or treat the cells during subculturing (please see appendix for more details). They play on trial-and-error basis, so there will not be any feedback when they made a mistake. The advice is then that they should check their theory and can start a new game.

Intended learning outcomes

General learning outcomes

- Ability to perform and to understand the steps of the cell culture techniques in a real life situation.

Competences

- The students will have acquired learning abilities that will permit them to continue studying in a self-directed and autonomous manner.
- The students will acquire knowledge on the handling of different tools and equipment, and learn to properly carry out cell culture techniques.

Concepts

- Basic principles of the biology of cells in culture.
- Adequate design of cell culture laboratories, as well as the required equipment, reagents and materials.
- Ensure adherence to safety
- Basic cell culture techniques.
- Monitor cell growth and proliferation in a virtual environment.
- Develop problem-solving skills for common cell culture issues.

Skills

- Develop critical thinking skills by making decisions in simulated scenarios.
- Evaluate and optimize cell culture conditions.

Integrating these learning goals into the gameplay can create an engaging and educational experience for players interested in cell culture and biology.

Access to the online cell culture game

Access to the online practical: https://cell-culture-game.ralde.eu/
Access to the online content: https://ralde.eu/index.php/seriousgames

Appendix: Tutorial on how to play the game

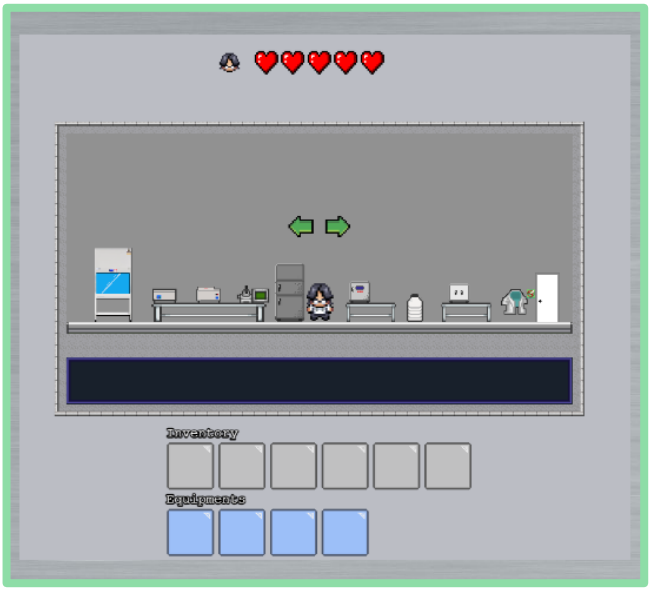
This is a real life and real time game. You should really play the game as if you are doing a real life cell culture. So you need to think about and keep an eye on how quick the cells grow, and when you need to change medium or subculture them.

The goal:

You are a lab technician and you got a request from your colleagues to provide them with 4 T75 flasks of HepG2 cells at passage 4-5 and 85% confluency.

So you need to thaw cells and culture them. You will start with defrosting a tube of cells that were frozen at passage 2 and have to culture them until passage 4-5. When ready, at 85% confluency, you can give them to your colleagues as “ready for experiments”.

You can move around using your keyboard arrows or by clicking on the green arrows above the character.



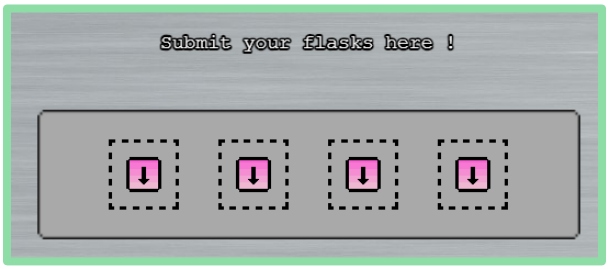
When an interaction is possible with some of the laboratory equipment, a blue tag will appear. Just click on the tag to use the equipment. Be careful, you need to wear the correct protective equipment/clothing in order to use some lab devices.

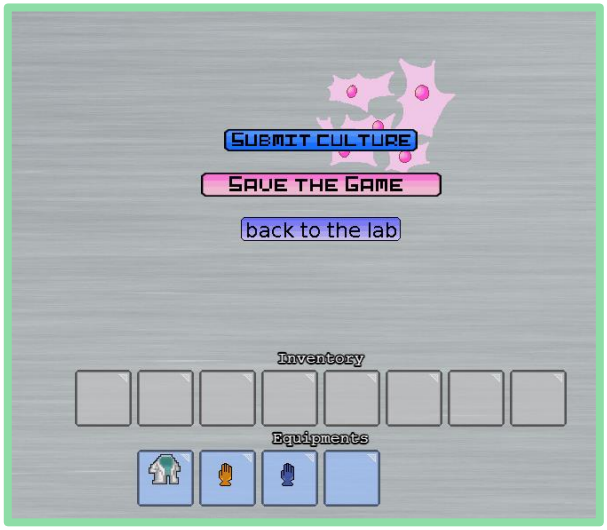
The pickable items will be displayed with a little “+”sign. Just click on it to pick it up.

If you want to save the game, when you finished your task(s) of the day, just go to the lab door and click on the “save the game” button.
You will be able to load your progression by clicking on the “load game” button on the main menu.

Note: You will have to use the same device/computer to keep playing the game. Otherwise, your progression will not be saved correctly.

When your cells are ready, go to the “submit culture” button.

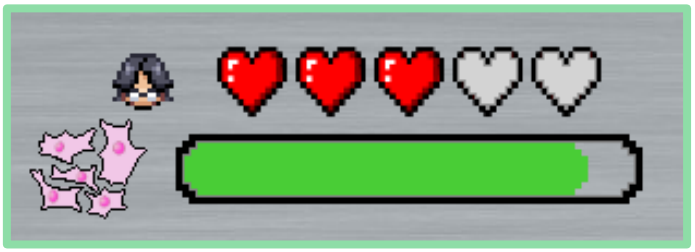




The gaming element is in performing the cell culture without using your “lifes” and delivering cells in good “health” (when cells are alive = green bar).

You can either loose a heart of your own “life” if you make a mistake. For instance, if you do not wear proper protective clothing.

In parallel, you can also loose the “life” of the cells (green bar), when you do not properly monitor or treat the cells during subculturing. For example, if you do not check the growth of the cells or change medium in time.



When you make a mistake, you will not receive any feedback in the game that will tell you what you did wrong. The advice is then that you should check your theory and can start a new game.