EARLY Teaching Scenario

Topic: 3D printing in history class. Integration: ITC; maths, English

Learning outcome: Students learn:

- the characteristics of ancient Greek architecture
- specific terminology that is connected to the theme (columns, temple, stoa, theatre etc)
- to make a research about one freely chosen building in ancient Greece
- to make a 3D model of that building in Tinkercad
- to export and print 3D model with Ultimaker 2+
- to present their project and answer the questions

Applying the 7 key competences

Knowledge and skills pupils develop during the scenario: connect to curriculum →

Estonian National Curriculum for the 6th-grade students in history states that by the end of 6th class students should be able to:
- describe the culture of Ancient Greece;
- use studied terms in the right context;
- know how the legacy of Ancient Greek culture has influenced modern western culture;
- plan and evaluate activities for completing the project and correct them, if necessary;
- find answers to the research questions from different relevant sources;
- value art and be able to express themselves through different mediums of art;
- can use ITC and mathematical competencies in different real-life situations.

Estonian model of digital competences based on The Digital Competence Framework 2.0 of EU (https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework) states that by the end of 6th class students should be able to:
- find information from different digital sources;
- uses digital information for constructing new knowledge;
- uses different digital technology with the help of the teacher;
- uses and connects different devices for importing and exporting digital information.
- uses digital technology safely in order to protect devices, content, personal data and privacy in digital environments.

The course components that are trained in the project are as follows:
- critical thinking
- 3D modelling
- measures
- metric units
- information literacy
- problem-solving

- technology literacy

Target group: intermediate problem solvers with good digital competences. This does not depend on the age but on the previous experience with a different problem- and project based learning. This project was carried out with 6th-grade pupils (), pupils in primary school (6th grade).

Age of students: Ca 12 years

Number of pupils: full class (24 pupils)

Duration (estimated time/number of lessons): 5x45 minutes

Prerequisites (necessary materials and online resources):

- computers with Ultimaker Cura software
- Ultimaker Cura 3D printer

Introduction to the scenario *(incl. possible applications, alternatives and risks)***:**

- It is possible to differentiate the tasks. For example, the students can choose between creating an authentic Ancient Greece town in Minecraft or make a model of one building in 3D. These kinds of choices increase the motivation and sense of responsibility of the students.
- printing the buildings is time consuming and before the presentation, all the buildings must be printed out. So it needs some good planning.
- problems are good things and where the teacher lacks the knowledge, youtube (like here) always helps.

Before the program begins (preparatory work for teacher):

- gain some basic knowledge about 3D programming and printing.

The first part of the scenario (45 minutes):

The project begins after a lesson about Ancient Greek culture and architecture.

Step 1 ca 5 minutes - students choose a building for a research project.

Step 2 ca 10 minutes - students draft 5 research questions that are connected to the history and construction of the building. It is important to keep the research process in focus.

Step 3 ca 15 minutes - discussion about the research. What are good research questions; what are safe ways to find information (for example some pages are asking personal information before one can continue to the site etc); what are good search queries etc. Here the teacher can also explain why social networks are not reliable sources for information and that also Wikipedia must be evaluated like any other website.

Step 4 ca 15 minutes - students begin with finding answers for their questions from different online resources. During the research, students must also evaluate the sources on the basis of information and validity and understandability.

Homework: Watch the video and if possible try it at home: https://www.youtube.com/watch?v=UVrmesQqhjg

The second lesson (45 minutes)

Students will find answers to their research questions.

Third and fourth lesson (2 x 45 minutes)

Students will design and decorate the building in Tinkercad. The teacher will help and assist if necessary. It is also suggested to provide the students with online resources to get help. Example 1 or Example 2.
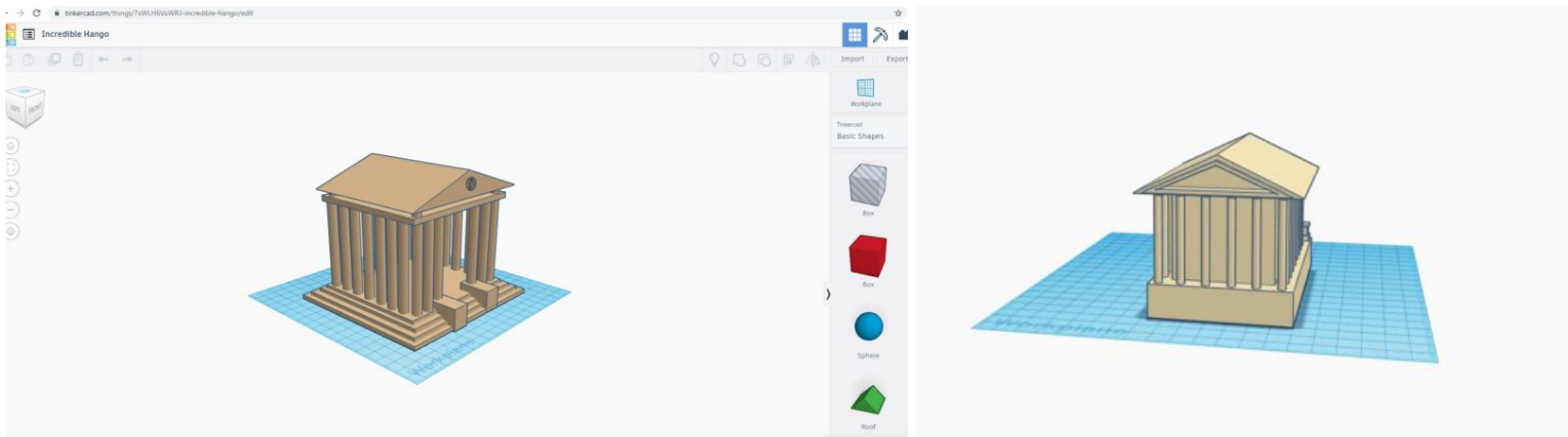
When the design is ready, export the design to the SD card.

Fifth lesson: presentation and evaluation. Students will present their work, answer the questions and evaluate their work process. Classmates will give constructive and supportive peer review to each other's work.