EARLY

EARLY Teaching Scenario

Topic: Making a playing piece in Tinkercad & 3D-printer intermediate level. Playing pieces can be used in various games that the students make in other subjects or whenever the play board games in school.

Learning outcome: Learn how to

- plan a personal playing piece from pen and paper to a physical 3D-print.
- draw and design in Tinkercad
- give constructive feedback to peers
- assess their own learning (in your own preferred way; portfolio apps, etc.)

Curriculum

Finnish curriculum

Programming is a part of mathematics and crafts and at the same time forms part of the ICT-competence, which is one of the seven key competences in the Finnish curriculum. Illustrated here next in the picture.

Applying the 7 key competences

Target group: intermediate level, pupils in primary school
Age of students / School level: Grade 5-6
Number of pupils: 10-12
Duration (estimated time/number of lessons): 2 lessons

Prerequisites (necessary materials and online resources):
- 3D-printer with a suitable filament.
- 10-12 computers with an optical mouse (recommended for drawing and designing), internet access,
- SD-card and SD-card reader
- Slicing software (Cura is preferred).

Introduction to the scenario *(incl. possible applications, alternatives, and risks)*:
- emphasize sketch on paper in the planning phase of the playing piece and allow time for discussion with peers.
- intervene and offer further guidance if the sketch of playing piece is too unrealistic/not possible with 3D-printing technology.
- avoid 3D-printing to many objects at a time.

Before the sequence begins (preparatory work for teacher):
- Register at tinkercad.com, browse the site and functions, and run the "get started tutorial".
- **Students also need to have basic knowledge in Tinkercad prior to the sequence.**
- For more tricks: https://youtu.be/RCyPmDGdNmk and
https://www.youtube.com/watch?time_continue=977&v=6gBVEBly1lI&feature=emb_logo.
- book your 3D-printer for a longer period of time, if it is busy often in your school.
- one piece of paper/student for planning the playing piece.
- pen, eraser, and ruler for each student
- calibrate the 3D-printer bed.
- check filaments (different colors)

The main part of the scenario (two lessons a' 45 mins):

<u>lesson one:</u> **Sketching the playing piece**

Preparations: Create an inspiring environment for creating the playing piece. Supply a pen and paper to every student. Prepare to divide the students into pairs for giving and receiving feedback.

1. The teacher introduces the project to the students and explains the limitations for the playing piece. Students take notes and are clear with what they shall achieve by the end of lesson one.
2. Students start sketching with pen and paper. The teacher roams the classroom and offers support in planning the playing pieces.
3. **When 15 minutes left:** Divide students into pairs and let them share their sketches. The pairs must give written feedback on the sketch (so far) and present it to their partner.

Evaluation (5 minutes)

- What did you learn today?
- What was challenging?
- What do you want to learn next?
- How did you feel when giving/receiving feedback?
- What changes will you make to your sketch?

lesson two: Designing playing piece in Tinkercad

Preparations: Prepare computers, clear memory cards if full.

1. Students revise their sketch and make the last necessary changes.
2. Students log on to Tinkercad and start designing their playing piece, using their sketch. The teacher actively assists the students in "tinkering".
3. Students finish their design and share it with the teacher in the preferred way.
4. The teacher starts the 3D-printing process.

Evaluation (5 min)

- What did you learn today?
- What was challenging?
- What would you have done differently?

Summary (knowledge, skills, understanding):

1. Students will know:
   - the basic functions in Tinkercad
   - how to describe themselves through a playing piece (identity)

2. Students will be able to:
   - manage the process from sketch to digital design and finally physical 3D-print.
   - give and receive feedback from peers
   - draw and create a unique design in Tinkercad

3. Students will understand:
   - that designing in 3D is a process of trial and error