Writing a QR-Code

1. Name of the project:

Writing a QR-Code

2. Subjects covered from STEAM areas:

Science
Technology
Arts
Mathematics

3. Target group (age range and size of the group):

- Age group: 10 - 14 years
- Group size: class/course size

4. Duration of the activity:
2 lessons

5. Key words:

- Binary
- Decimal
- ASCII
- QR code

6. Key sentence describing context of the activity, followed by short description (200 words):

First, we will explain what QR codes are used for. It is important for this learning unit that information is read in unambiguously. Letters are not suitable for this purpose, since they can be quickly misrecognized and thus the uniqueness/recognizability is not given. Therefore, the binary system lends itself to using black and white squares as numbers, since these can be easily distinguished from one another and are still easily recognizable from a distance (see QR code). The second phase (theoretical phase) explains how words or letters can be uniquely encoded. One possibility is to convert letters into decimal numbers using an ASCII table and then convert these into binary numbers. In the third phase, the students should now write down the letters of the word to be encoded (for example, the name) vertically on a box paper (one letter per box) and to the right of the letters comes the binary 8-bit representation of the letter, where a filled

box means 1 and an empty box means 0. This creates a QR code-like image. Students should also "convert back" each other's QR codes. Finally, it should be mentioned again that a real QR code is used just like the codes created by the students to share data.

7. Description of the activity environment, including the list of materials and tools needed:

The first and second part will be worked out in plenary/class discussion and in the third phase
small groups are to be formed

8. Step by step, detailed description of the activity, including teaching and learning strategies:

Collecting on the board: Why do we need QR codes? Why not just use the link/information? How can we increase the recognizability? Plenary discussion: binary system as a way to represent a number as a black or white box. What if we only had 2 numbers/states? Could this increase recognizability? Theoretical block (short): Convert decimal to binary and vice versa Group phase: create QR codes as described above & convert classmates' QR codes back.

9. Learning objectives/competencies:

Students learn what QR codes are needed for and why normal letters are not appropriate. Students can switch between decimal number representation and binary number representation.

10. Evaluation/Assessment guidelines:

Active participation in the lesson

11. Lessons learned:

The content and learning objectives of computer science lessons can be linked very well with content and objectives from other subjects (especially mathematics). What was new for me was that you can also incorporate artistic aspects (here: creative drawing) into computer science activities.

12. Additional information/Links:

13. Contact person:
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