Lesson Plan

CODING GIRL
GIRLS JUST WANT TO HAVE FUN CODING

2023-1-SK01-KA220-SCH-00015112

Topic	Harmful effects on the environment	
Block Title	Let's measure with micro:bits pH, CO2, lighting intensity, environmental noise	
Age category 8-15	**Duration(min)** 180 min	**Number of teaching hours** 3

Student-oriented educational goals (content and performance standards)

- Science: being able to explain the meanings of the terms pH, carbon dioxide, light intensity as a physical quantity, noise as a physical quantity.
- Mathematics: calculation of CO2 content in the air based on measured data Technology / ICT: micro:bit programming, micro:bit connection
- Art and Design: creation of the packaging of the measuring device
- 21st century skills: master the basics of programming, application of programming as part of everyday life

Didactic aids and didactic technology:

- micro:bit,
- sensor for measuring CO2,
- sensor for measuring pH,
- sensor for measuring light intensity,
- sensor far measuring noise,
- display,
- rainwater container.

References / Resources (videos, methodology):

Motivational phase:

The teacher motivates the students by means of motivational questions: Do you know the effect on the environment of water pH, carbon dioxide, lighting intensity and environmental noise? The teacher discusses with the students.

Duration (min): 20 min

Objective (student-oriented): How the intensity of the environment, the noise of the environment, the pH, the carbon dioxide content have a negatíve effect on the environment.

Introductory activity - motivation: motivational interview

Introduction to the issue (key words): pH, carbon dioxide, lighting intensity, environmental noise Interactive questions and answers (teacher, student):

Do you know what acid rain is? What causes acid rain? Do you know what physical quantities are? Can we measure some physical factors with the micro:bit?

Source view:

Explanation of the purpose of the activity: Diagnostics of the students' previous knowledge. Connection of knowledge from other subjects:

- Chemistry-carbon dioxide, pH
- Physics - physical quantities (illumination, noise)
- Environmental education - acid rain
- Informatics/Technology - Programming, principle of sensors

Setting expectations: We expect that the pupils will be sufficiently motivated to carry out the planned activities.

Exposure Phase (Exploration):

Duration (min): 110 min

Objective: Implementing a micro:bit-based setup and programming it will deepen students' ICT skills. Based on their knowledge, students will create measuring devices for individual factors being measured and design casings for these instruments. Practical measurement of environmental properties will create an interdisciplinary link between physics, chemistry, computer science, and environmental education. Students will gain understanding at the intersection of these fields. Evaluating the results they have measured will enhance their analytical thinking and teach them how to process and interpret collected data. Students will work in groups of *S* members.

Science integration (main subject): Environmental Education

Activities: Using micro:bits, create measuring devices to measure pH, CO_2, light intensity, and environmental noise levels. Carry out measurements for each factor and record the data in a table. Perform practical measurements of noise intensity, lighting, and CO_2 concentration, followed by evaluation of the recorded data. From the collected data, students will learn to assess measured parameter values in relation to the environment (space). Attention will also be given to the influence of external factors such as the location of measurement, traffic intensity, time of measurement, etc.

Computer Science integration (use of micro:bit)
Activities: Implement a measurement system based on micro:bit according to the given task (measuring noise, light intensity, CO_2 concentration).

Review and evaluation of the exposition phase (from the student's perspective):
Students will evaluate the recorded data in relation to measurement conditions (environment, time of measurement).

Exposure phase (exploration}:

Duration (min): 95

Goal: discuss the given problem in groups, propose a solution and create a program in the madecode.org environment for micro:bit, test your application

- Integration of mathematics (incorporation of combinatorics) Activities: creating a password for a girl's diary
- Jnformatics integration (micro:bit integration)

Demonstration of password strength by gradually increasing the number of password characters.

Linking cross-curricular relations - calculate possible combinations of solutions and verify with the created program Group discussion: each group presents its solutions, other students can comment and ask questions

Revision and evaluation of the exposition phase (from the pupil's point of view): pupils, using the questionnaire application Mentimeter, report whether they liked the activity or not

Fixation phase (fixing and deepening):

Duration (min): 20

Objective: to verify understanding of the curriculum by applying different combinations of buttons on the micro:bit

Activities: Each group sets a password with 8 characters, the groups exchange micro:bits with each other and try to crack the password, the first group to crack the other group's password wins.

Pupil assessment:

The winning team can present their project to other groups in the year - peer learning

Attachments:

https://makecode.microbit.org/_ls4UyiKH9dEH - assessment

https://makecode.microbit.org/_eHaVYjMccVpV - password