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Case study F

Basic data

Title of Research Teaching Unit	Consumption of drinking water in Prague
Unit created by	Da Vinci School, Prague (CZ)
Based on Concept	Concepts for teaching units WIEN-2, Environmental Concerns
Concept created by	University of Vienna
Date of teaching	15/01/2024
Number of students in class	18
Number of migrant students	2

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1. Unit Description of Research Teaching Unit

Title	Consumption of Drinking Water in Prague
Teaching unit concept	Environmental Concerns
Age of students/grade	14
Length of the unit	3 x 45 min
Mathematical topic	Statistics, percentages
Prerequisite knowledge	<ul style="list-style-type: none">• proportionality, percentages, basic statistical concepts and graphs
Materials needed	<ul style="list-style-type: none">• worksheet, calculator or mobile phone, spreadsheet• internet access to access other statistics
Objectives	<ul style="list-style-type: none">• to practice reading tables and graphs• to practice working with percentages• to bring attention and awareness to the consumption of water as a limited natural source• to identify possible ways of reducing personal water consumption
Notes on work with migrant students	<ul style="list-style-type: none">• can be adapted using statistics from other cities or countries, possibly from countries of original

Consumption of Drinking Water in Prague

The following table shows the average daily consumption of drinking water per person in Prague in litres. For example, in 2022, each inhabitant of Prague consumed an average of 111 litres of drinking water per day.

2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
111	106	106	108	109	107	114	112	113	111

Source: <https://www.pvk.cz/vse-o-vode/pitna-voda/>

Task 1. Basic statistical data

- In which year was the average water consumption the highest and in which the lowest?
- Determine the mean, modus and median of daily drinking water consumption.
- Construct a bar graph representing daily water consumption.

Task 2. Percentage

- By what percentage did water consumption fall between 2013 and 2014?
- Water consumption increased by 1 litre between 2016 and 2017. Between 2020 and 2021, water consumption also increased by 1 litre. By how many percent did water consumption increase in each of these cases?
- Complete the following table in which the 2013 consumption represents 100%.

2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
100 %									

Task 3.

The estimated daily drinking water consumption in 2022 was distributed according to the following table. Make an estimate of the distribution of consumption for 2014 so that the items are in the same proportion as in 2022.

	2022	2014
Flushing toilet	26	
Personal hygiene, shower	40	
Washing clothes, cleaning	18	
Food preparation, washing dishes	10	
Washing hands	6	
Watering plants	5	
Drinking	2	
Other	4	
TOTAL	111	106

Task 4. Home preparation - till next lesson

Find out from your household water bill what your daily drinking water consumption is. Try to monitor and estimate your drinking water consumption over the course of a day and put the information into a table.

	Our family's consumption	My personal consumption
Flushing toilet		
Personal hygiene, shower		
Washing clothes, cleaning		
Food preparation, washing dishes		
Washing hands		
Watering plants		
Drinking		
Other		
TOTAL		

Task 5. Ways of reducing drinking water consumption

In groups of three, compare your daily water consumption. Where do you differ the most and what do you have in common?

- Create a bar chart showing each item (e.g. toilet flushing) and the consumption of each member of the group so that you can compare your consumption using the chart.
- Discuss ways to reduce water consumption. Suggest ways in which you yourself can reduce water consumption.

Task 6. Whole class discussion of findings

2. Interview Analysis

The teacher teaching this unit is the head of the Da Vinci School on the outskirts of Prague. He has very rich experience of 20 years of teaching mathematics and is also involved in research in didactic of mathematics. The teacher received no pre-service training in work with migrant pupils and no in-service teacher training in the issue before the last 12 months. However, he attended in-service teacher training conference in Prague at Charles University organized within the frame of the M4M project.

Da Vinci school, where the lesson was conducted, is a private school where individual needs of each of the learners is respected.

The teacher has experience of teaching migrant pupils and he believes the greatest obstacles in these classrooms are language, vocabulary and motivation of the pupils. Yet, he sees that migrant pupils bring new impulses to the classroom and make the whole group more sensitive to cultural issue as well as respect other cultures more. Having migrant pupils in the classroom made the teacher increase initial support for migrant pupils, making sure they are able to follow and join in.

The lesson was conducted with eighteen students aged 14-15. Two of them had migrant background and were in the Czech Republic more than a year.

The objectives of the lessons were to develop work with percentages, data analysis and modelling as well as representation and interpretation of a given data set

The work included group work in groups of three. The unit was well received by the pupils who were interested in the topic of the unit. However, some of them failed to fulfil the task to analyse their own consumption of drinking water.

The topic proved to be suitable for all pupils in the group, allowing individual approach. The gifted pupils were eager to work with the data sets in new, additional ways.

The cross-curricular character of the activity is its plus, it is linked to environmental issues.

Overall, he was very positive about the activity, its progress and outcome.

3. Improvement Suggestions

The teacher did not feel the need to modify the teaching unit any further. The work for teachers from other countries is to adapt the material to the data from their own countries, which needs some time when planning the lesson.