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Citizenship education in Mathematics: exercises with a European context

A summary of works done by students of the Pädagogische Akademie in Vienna

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Introduction

Subjects such as History, German and Geography all have explicit objectives concerning political, civic or citizenship education in the curricula. Mathematics is not normally considered a subject that is concerned with such aims, but it nevertheless offers opportunities for introducing a European dimension in an unusual way by integrating it into the choice of examples used in mathematical exercises.

The context of an exercise is not usually questioned but may be just as opinion-forming as a political discussion or the provision of information. Sociological research into school mathematics textbooks has attempted for some time to document what images of society, family and women are contained in the texts. It has been discovered that mathematical examples in schoolbooks are sometimes used in a very unreflective way which reinforces political and social messages or stereotypes, e.g.: father = office; mother = kitchen; boys = sports; girls = dolls. However, these mechanisms could be used in a positive way to decrease prejudice or to increase knowledge about other countries, and may be an efficient way of developing a consciousness of European citizenship.

The new curriculum for lower secondary schools in Austria emphasises the objective of education towards Europe. Facing an enlarging Europe, Education Ministers are even thinking of creating a school subject called 'Europe' which will start at primary level.

This is the context of the task set for the students at the Pädagogische Akademie des Bundes in Wien which is reported below. Students were asked to create exercises in mathematics with an European context for teaching in lower secondary schools (10-15 years old): the European context was to be independent of the mathematical contents.

Didactic background

The aim of the exercise was that students learn about the simple didactic principles of creating worksheets with a mathematical content. In addition the exercise

- confronted students with the new demands in the curriculum;
- provided an impulse for both students and pupils to learn about other countries in a European context.

Students were asked to present their work and to reflect upon it. No specific restrictions had been placed upon the task and the outcomes varied widely, covering a wide range of results, from very basic worksheets to complex and well-designed learning games.

Outcomes

The following three examples demonstrate the variety of the outcomes.

Learning game: Mathematical Pursuit

This is an adaptation of the well-known game *Trivial Pursuit*, designed for two or more players or teams who must correctly answer questions in each of six categories, which are selected by rolling the 'Category Die', and scored according to the 'Scoring Die'. The game consists of Question-and-Answer Cards, the Category Die and Scoring Die, and Score Sheets.

The game is played as follows:

- The first player or team rolls both dice. Categories are colour coded: another player draws the first card from the deck and reads the question next to the appropriately-coloured oval. Answers are on the opposite side of each card. Cards are replaced in back of the box, behind the other cards, after use. If the first question is answered correctly the dice are rolled again.

Trivial Pursuit 2		
Brussels has 951,000 inhabitants. Subtract 61,000 and then 425,000 and you get the population of Antwerp. What is it?	Alf made a 10-minute telephone call to his friend in London. The call cost 2 Euros/minute. How many ATS did Alf pay?	How many Euros are 221 ATS?
In the UK 58,276,000 people live in an area of 242,534 km ² . How many people live on 1 km ² ?	The countries of the EU have an area totalling 3,353,887 km ² . What percentage of this is the area of Sweden (410,930 km ²)?	If the area of Portugal were similar to a square, each sides would be 304 km. Long. Calculate the area.


- If the answer is incorrect play passes to the player on the left.
- Correctly answering a question always entitles players to another turn, but players may only score once for each category, and then only if the 'score' symbol is showing on the Scoring Die. However, if the Scoring Die shows the 'score' symbol, the player may nominate a category for which a score is needed, and if the answer is correct a score is recorded
- A scorekeeper records the progress of the game on the Score Sheet. To win, a player or team who has scored in each category must answer a final game-winning question

in a category chosen by the other players after rolling 'score' on the scoring dice. An example of a question at this level is

Brussels has 951000 inhabitants. Subtract 61000 and then 425000 and you get the population of Antwerp: what is it?

The 'Europe' Puzzle

This puzzle presents ten verbal reasoning tasks.



Europapuzzle – Europuzzle 1

In Sweden the population density is 20 people per km². In The Netherlands the density is 19 times higher. Calculate the density of population of The Netherlands.

A story about Sylvie

An Austrian girl works as an *au-pair* in Paris. She gets to know the customs and traditions of her host family, and her spare-time activities and sightseeing tours in Paris are documented with mathematical examples such as

Sylvie goes to a restaurant and orders soup for FF 17.50, fish for FF 87.50 and a Coke for FF 15.00. If she invited her host family (two adults) to be her guests, and everybody orders the same, how many Euros would Sylvie have to pay?

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