



Case Study 04

Basic data

Title of Research Teaching Unit	Geometry around us
Unit created by	Istituto Comprensivo “Malaspina” – Massa (IT)
Based on Concept	Geometry in various cultures
Concept created by	University of Vienna (AT)
Date of teaching	27.11.2023
Number of students in class	22
Number of migrant students	2

1. Unit Description of Research Teaching Unit

Title	Geometry around us
Age of students/grade	Grade 7
Length of the unit	2 hours
Mathematical topic	<ul style="list-style-type: none">● Geometrical shapes● Applying basic knowledge about Geometry in real situations
Prerequisite knowledge	<ul style="list-style-type: none">● Identifying geometrical objects.● Learning through the use of formulas to measure perimeter, area and volume● Applying Mathematics in everyday life contexts.● Learning about different (and similar) use of geometrical figures in different countries and cultures.
Materials needed	<ul style="list-style-type: none">● Stationery● Ruler and tape measure
Objectives	<ul style="list-style-type: none">● Identifying geometrical objects.● Learning through the use of formulas to measure perimeter, area and volume● Applying Mathematics in everyday life contexts.● Learning about different (and similar) use of geometrical figures in different countries and cultures.
Notes on work with migrant students	<ul style="list-style-type: none">● In the step with the students identifying geometrical figures through some pictures, we can realize a table of these figures, starting from their names in the different motherlanguages of the students involved, and from the formulas to measure perimeter, area, total surface and volume. At the beginning, this table will be kept in view, in order to have a better memorization. In this way the work will be simpler and more comprehensible for everyone. In the same way this can be done with units of measurement and possible conversion tables.● Working on reality tasks will be developed in small groups in order to foster students' involvement and social relationships.● The aim of showing the results and/or the pictures chosen by each group is to let the students tell something about their cultures and that is measured starting from the lexicon each one of the students has learnt.

Lesson plan

The activities to be developed

Observing and finding geometrical pictures (photos and drawings), measuring in real life, answering questions about reasoning which are taken from a book on Italian National standard proofs (INVALSI).

Activity development and methodology

The chosen figures belonged to the school environment in order to be used and measured directly.

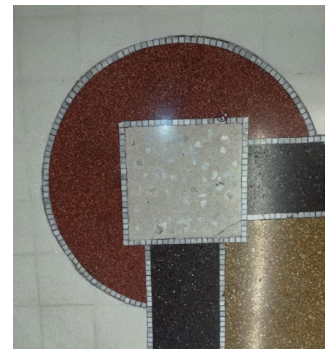
The students used flashcards with translated words taken from the formulary.

Working in groups (4/5 each) and presentation of the work.

The lesson was developed in 3 steps:

Step 1: Observation of photos and images

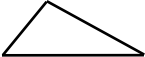
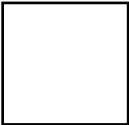
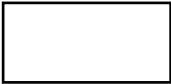
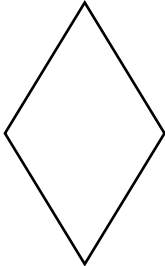
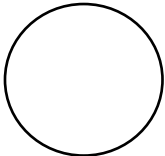
The students surf the net and show pictures with geometrical decorative elements to the other groups. Then the most meaningful ones will be chosen to recognize the geometrical figures inside and afterwards these ones will be organized in a table. Here there are some pictures which can be a starting point for your choices (the school flooring, the decorative elements in a garden, a typical building or monument in your country)



Step 2: Recovery of solution formulas

In this step the teacher, together with the students, will fill in the table for each figure with the formulas (perimeter, area, total surface and volume) in order to check their previous knowledge, too.

(here it is attached an example of a ready to use table)

Figure	Name	Formulary
		
		
		
		
		

Step 3: Reality tasks

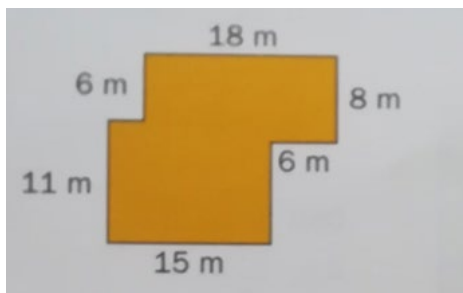
The teacher will propose reality tasks that can be solved thanks to reasoning and applying the formulas already revised. The students will have to work in small groups (max 4 students each) in order to foster their interactions.

Problem 1

If a rectangular cloth remnant is $2\text{ m} \times 3\text{ m}$, how many square handkerchiefs (side 30 cm) can you make out? How many rhomboidal remnants ($D=25\text{ cm}$, $d=15\text{ cm}$)?

Problem 2

Calculate the area and the perimeter of the coloured parts in the figures:



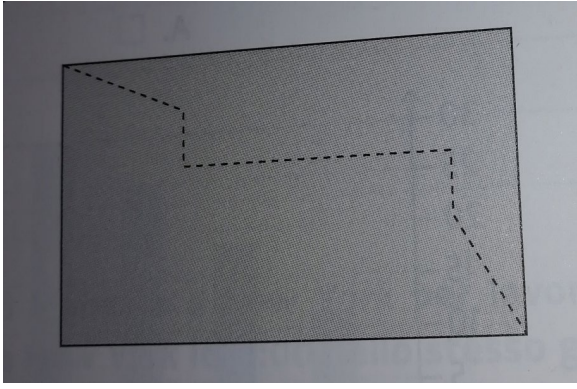
Problem 3

Calculate how much white marble you need to make out the mosaic in the picture, if the light blue square's side is 4 cm



Problem 4

A rectangular card has been cut into 2 parts, as shown in the following picture. What can you say about their perimeter and their area?



2. Interview Analysis

The teacher teaching this unit has 14 years teaching experience. The length of her mathematics teaching practice is 10 years. Her other subject is Science. For teaching in multicultural classrooms, in her initial teacher training, she received some theoretical lessons about inclusion and students' involvement. No training for teaching in multicultural classrooms in her in-service teacher training.

In recent years she always had 1 or 2 foreign students in her classes. The most frequent problem she has encountered is that these migrant students have poor or partial schooling. Consequently, even if they are clever, they don't have prerequisite knowledge to attend the lessons properly.

The main advantage of having migrant students in the classroom is that we can be in touch with different situations and habits, which is a constant stimulus to knowledge and respect.

When having migrant students in the classroom she changes teaching strategy: she prefers working in groups and peer tutoring. In addition, her lessons become a little bit more practical and laboratorial.

Some parts of the lesson plan were replaced by different activities/materials, namely:

- surfing the net for pictures or materials was replaced by measuring on real objects;
- schoolbook was replaced by problems about perimeters and areas taken from a book on Italian national standard proofs;
- creation of posters was replaced by oral presentation.

3. Improvement Suggestions

Lesson plan has been evaluated suitable in the current form. However, in her teaching, as described in the previous section 2. *Interview Analysis*, some parts of the lesson plan were replaced by different activities.

4. Classroom observation

Students fairly participated in the lesson, especially in the first half of the activity (looking for pictures) and they cooperated in finding the solutions.

The climate was positive but the teacher had to intervene in order to involve all students.

Compared to other teaching units students and students cooperated more.

From a motivational point of view, working in groups to solve real problems was suitable for all students, because peer tutoring helped students in troubles. However, probably there could have been more interest if the activity had been concluded with a concrete action.

From a cognitive point of view, the level of learning increased because students enhanced the use of the formulas and their reasoning about problems. However, some questions about perimeters and areas taken from the specific book INVALSI were difficult for some students.

The proposed teaching unit made it possible to carry out an effective recovery effort for students in difficulty, because working in groups led the students to overcome some difficulties in Maths, but also in text comprehension.

The teaching unit made it possible to carry out an effective stimulus action for the brightest students, because they were proud about sharing their ideas, being the spokesperson in their own group and in the final presentation of the work.

The main methodological choice and inclusion strategy used for pupils with a migratory background was the distribution of formularies with the translation of the words used in Geometry.