

# THE DEVELOPMENT OF THE TEACHER'S PROFESSIONALITY: A GOWIN'S V AS AN INQUIRY-BASED RESOURCE

Dulce Lima (1,2), Nir Orion (3), Clara Vasconcelos (2,4)



GIFT Workshop



1) Agrupamento de Escolas Manoel de Oliveira, R. Robert Auzelle 134, 4100-431 Porto, Portugal ([dulce.lima@fc.up.pt](mailto:dulce.lima@fc.up.pt)); (2) Interdisciplinary Center of Marine and Environmental Research (CIIMAR), University of Porto, Porto, Portugal, Novo Edifício do Terminal de Cruzeiros do Porto de Leixões, Avenida General Norton de Matos, S/N, 4450-208 Matosinhos, Portugal. (3) Department of Science Teaching, Weizmann Institute of Science, Israel, 234 Herzl Street, POB 26, Rehovot 7610001 Israel ([nir.orion@weizmann.ac.il](mailto:nir.orion@weizmann.ac.il)); (4) Unit of Science Teaching and Department of Geosciences, Environment and Land Planning, Faculty of Sciences, Porto University, Rua do Campo Alegre s/n 4169-007, Porto, Portugal ([cvascon@fc.up.pt](mailto:cvascon@fc.up.pt))

Gowin's V is an educational resource developed to help students and teachers clarify the nature and aims of experimental work in science. It is presented as a V-shaped diagram with key elements that allow the student to analyse the knowledge structure and understand how it is constructed. The constant interaction between the theoretical conceptualisation, necessary for the resolution of the guiding question which guides to the event to be investigated, and the methodological conceptualisation, with the recording and interpretation of the observed data and the resulting conclusions, promotes the construction of knowledge and the development of investigative skills and attitudes. The experimental work activity proposed for the teaching of Natural Sciences to 7<sup>th</sup>-grade students follows an inquiry-based teaching methodology. This active methodology places the student at the centre of the educational process and the teacher as the learning facilitator. This proposal is intended to be a contribution to teacher training in the promotion of practical experimental work, which promotes meaningful learning and scientific reasoning in the student.

## Theoretical framework

The Earth's surface is constantly changing. Landscapes are modified by external geodynamic agents that fracture and remove sediments from the rocks that constitute them. Weathering and erosion are the processes responsible for the continuous alteration of the rocks exposed on the planet's surface.

## Principles/Assumptions

- Weathering is the process of physical and/or chemical weathering of rocks, which is followed by rock erosion;
- Erosion consists in the removal and transfer of sediments resulting from weathering on the Earth's surface by the action of erosive agents (water, wind, ice and/or living beings);
- The erosive agents are responsible for the transport of sediments;
- The transport of rock fragments causes the particles to collide with each other, changing their characteristics, and making the fragments smaller, rolled and lighter.
- The resistance of rocks to erosion depends on the characteristics of their mineral constituents, the bond between them, and the arrangement of sediments in the rocks;
- Moving fragments abrade the rocks through which they pass.

## Concepts

External geodynamics, rock, mineral, weathering, erosion, erosive agent, transport, mass, sediment/fragment/particle, angular/rolled, bearing scale.

## Guiding Question

What happens to sediments during their transport on the Earth's surface?

Although the conditions of transport are different from reality, the proposed experimental work allows students to reason by analogy with the natural process of mechanical erosion of sediments, and it is, therefore, valid and essential for the teaching of Geology. The gypsum cubes represent the sediments, and the carton tube, represents the distance travelled by the particles.

## Value Claiming

## Knowledge Claiming

Transport causes sediment erosion and changes their characteristics, namely size, mass and shape. The further the sediment travels, the smaller the particles become and the lower their mass. The angular sediments become more and more rolled in a gradual process of erosion.

## Events/Objects

- Record the mass of 4 identical gypsum cubes;
- Mark an arrow on one side of a cube (1.);
- Draw the marked side of the cube on a sheet of paper at the end of each shaking sequence (S0, S1, S2, S3, S4, S5);
- Place the 4 cubes inside the 55 cm long carton tube (2.) and shake 50x;
- Repeat for a total of 250 shakes;
- Using the supplied bearing scale, check the shape and size of the cube (3.).

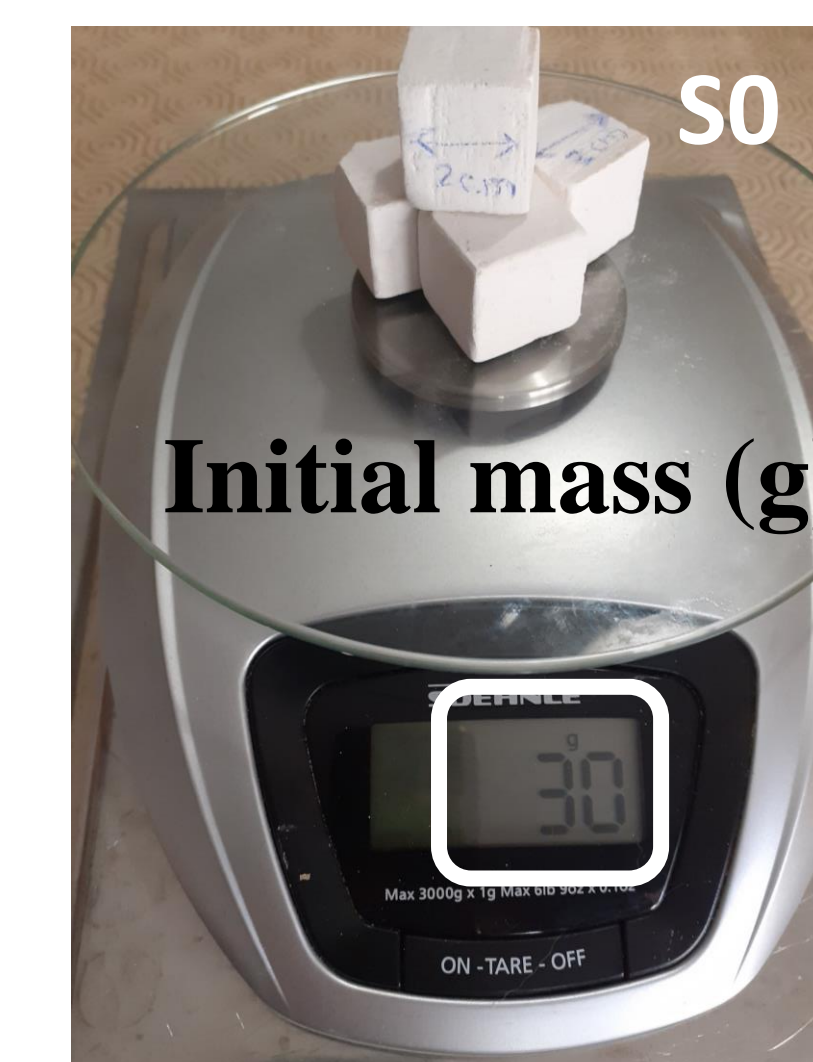
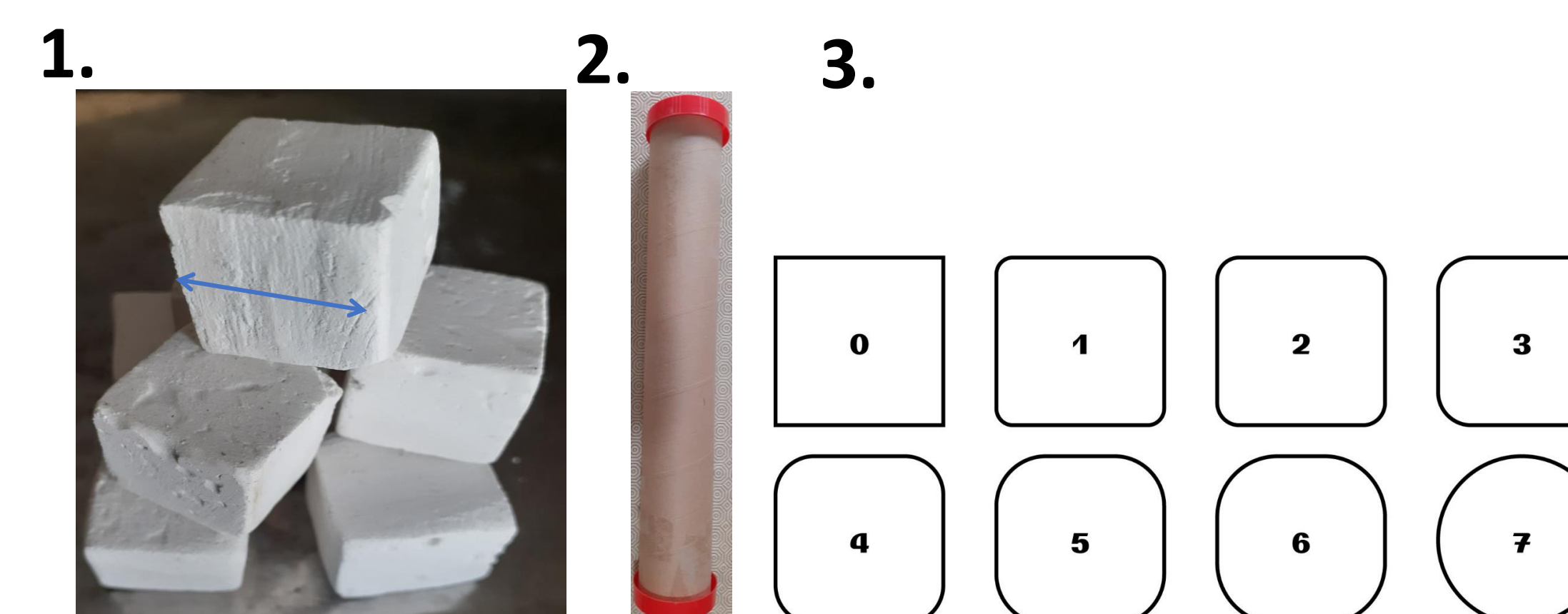
## What external geodynamic agent is implicit in sediment transport and erosion ?

## Transformations

Mass lost after stirring:  $30 - 26 = 4 \text{ g}$

Stirring sequence	Number of stirrings	D=TL x NS (Distance covered=tube length X number of stirrings)	Value (Bearing Scale)
S0	0	0 m	0
S1	50	27,5 m	1
S2	100	55 m	2
S3	150	82,5 m	3
S4	200	110 m	4
S5	250	137,5 m	5

## Records



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