PHYSICAL ARTEFACTS AND SIMULATION FOR UNDERSTANDING ATHEROSCLEROSIS: STEM EDUCATION AND MATHEMATICS LEARNING IN A VOCATIONAL SCHOOL

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THEME:

STEM education in diverse contexts

BACKGROUND AND AIMS

Interest in STEM education has increased worldwide, along with the concern for developing integrated approaches to STEM education. Some researchers have drawn attention to the role of mathematics in STEM education, in arguing that a reciprocal relationship between mathematics and the other STEM disciplines is crucial to the understanding of ideas and concepts of those disciplines (English, 2016; Maass et al., 2019).

In line with the above assumptions, our research project focuses on the secondary education of students (aged 16-18) in a health assistant course in vocational education. A STEM education experience, covering a total of 40 hours, was developed in mathematics classes, on the topic of linear and quadratic functions. The STEM tasks were designed by considering the vocational context of healthcare. All proposed tasks presented real problems on basic health issues and involved simulations using physical materials.

The study addresses the research question: what are the relations established between mathematical notions and health concepts in tasks involving experimentation with physical materials?

METHODOLOGY

Data collection involved observation, interviews and the written reports produced by the students in each STEM task. The class consisted of 13 students who, in general, showed difficulties in mathematics, although they did not seem to have a math refusal attitude. The students had never worked on integrated STEM tasks and they showed interest and enthusiasm in carrying out the tasks. We will present a qualitative case-study focused on the interplay between mathematics and health knowledge concerning the atherosclerosis task.

RESULTS AND CONCLUSIONS

In the task on atherosclerosis, the students had to search information about the disease. From the information collected and the discussion on the real situation, the students established connections between the arteries and mathematical objects. Through experiments with materials that simulated blood in the arteries and the progressive formation of plaque on the walls of the arteries, the students collected data on the blood volume as successive layers were created inside the veins. A spreadsheet was used to analyze the numerical data and plotting the graph of a function describing the decrease of blood volume consistent with atherosclerosis.

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