1.2. Improving learning in technological-advanced societies

SP - (18877) - PROMOTING CITIZEN SCIENCE IN SCHOOLS THROUGH STEM-BASED PROJECTS

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Short Abstract

Computational Thinking (CT) has emerged in the last decade as a thematic trend in education, particularly in primary and secondary education. Many authors have pointed CT as a set of competencies that every student should developed and not only the students of computer science classes. In this context, the field of Science, Technology, Engineering, and Mathematics (STEM) can provide the appropriate contexts to promote the development of CT through the development of projects that put students to solve real-world problems using digital technology. Projects of a multidisciplinary nature allow students to develop problem-solving skills and computational practices, using these technological artifacts to think and create.

This paper's proposal presents two case studies aimed to promote citizen science in k-12 school's context though the implementation of STEAM-based projects. The first case, developed with three group of students with different ages of different schools and cities and, the second case developed with a group of students with same age and class.

The project developed in the first case sought to challenge students to think about the importance of technology in making rule systems in agriculture more efficient. Based on the viewing of the same film about the use of technology in agriculture, each group developed mini STEM projects based on Micro:Bit and Lego Mindstorm EV3 proposing solutions to save water in plant irrigation. Solutions based on soil humidity and temperature measurement and drip irrigation systems were developed. The data collected with the sensors of humidity and temperature were analyzed in articulation with mathematic subject. The second case presents a project developed with an 8th grade class in the ICT subject and aimed to lead students to understand how digital technology can contribute to the promotion of environmental education and citizen science. The students built temperature, humidity, and air quality measuring stations that they placed at various locations within the school to collect this data in real time. The Micro:Bit based systems send real-time data to the Thingspeak online application that allows them to monitor the variables over time. To build the stations the students use modeling and 3D printing to make each physical component.

Starting from the analysis of the design and implementation of these two projects, this paper proposal seeks to analyze how different students understand the role that digital technology can play in citizen science. In another point of analysis, we intend to analyze the relationship between the development of STEAM-based projects and the promotion of students' computational thinking skills. In addition, we intend to analyze the relationship between the development of STEAM-based projects and the promotion of STEAM-based projects and the promotion of students' computational thinking skills.

Keywords: Citizen Science, Computational Thinking, K-12 Education, STEM Education, Sustainable Development.