Energy umbrella to enhance interest in STEM Education

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Abstract

As technology evolves and advances, STEAM (science, technology, engineering, art and maths) education becomes increasingly essential. By including it comprehensively in the classroom, it provides opportunities to prepare the new generations to face important challenges. It requires the use of innovative and alternative methods of teaching and learning, such as projects, laboratory practices and technological tools. And it allows the development of skills such as analysis, documentation and problem solving, supporting them to deal with situations in their daily lives.
This chapter will present a STEAM project developed in the 4th ESO physics class that consists of the construction of an energy umbrella that would help increase the percentage of electricity genera-ted in a sustainable way and provide electricity savings, since it would allow energy self-sufficiency; getting closer to achieving the Sustainable Development Goals (SDGs).
It has been developed in English, which has allowed students to develop the linguistic competence of a second language, professional skills, greater concentration and memory.

1. Introduction

The STEAM method is a teaching-learning method that is based on the idea of educating students in five specific disciplines; Science, Technology, Engineering and Mathematics (in English Science, Technology, Engineering, Arts and Maths; STEAM). A methodology focused on problem solving, through which questions are asked, objects are examined, background information is tracked and needs are investigated.
On the one hand, (Morrison, 2006), cited by (Lantz, 2009), executive director of the Teaching Institute for Excellence in STEM (TIES), points out that STEM is the creation of a discipline based on the integration of others in a new "everything", thus building an interdisciplinary bridge with its own identity.
Also, (Tsupros, 2009), cited by (Lantz, 2009), specialist in the STEM curriculum for Intermediate Unit 1(IU1), defines STEM education as an interdisciplinary strategy for learning where academically rigorous concepts are they fit the real, that is, science, technology, engineering and mathematics are put into practice in contexts related to school, society, work and a global initiative of the development of the gift in STEM and with the ability to compete in the new economy.
In addition, several functions of STEM education are highlighted. (Morrison, 2006), cited by (Lantz, 2009), suggests that STEM students should be:
- Problem solvers. Being able to determine questions and problems, plan investigations to collect, collect and organize data, draw conclusions and then put it into practice in new and innovative situations.
- Innovators. Creatively use the concepts and principles of Science, Mathematics and Technology, putting them into practice in the processes of engineering design.
- Inventors. Recognize the needs of the world and creatively design, test and implement the solutions obtained (engineering process).
With this methodology, students get used to working as a team, making joint decisions in the face of research, carrying out collaborations and making hypotheses. Likewise, this educational system is capable of increasing creativity when it comes to solving problems, improves individual critical thinking, improves self-esteem and boosts communication skills.
Likewise, it helps them learn through first-person experimentation, which improves long-term retention of concepts.
Learning science, engineering, technology, art and mathematics in school implies not only passively "receiving" the concepts constructed by science, engineering and mathematics, but also "doing" science, engineering, art and mathematics, that is, actively engaging in the cognitive, social and discursive activities of the field.
This framework proposes the classroom as a space in which to reproduce in STEM education practices analogous to those that occur in the professional STEM world, as has been proposed for some time by the framework of school scientific activity in our country (Izquierdo, Espinet, García, Pujol, & Sanmartí, 1999). This framework is not only consistent with the framework of sociocultural learning (Rogoff, 1994), but also promotes a more accurate vision of what the STEM professional world itself is like (Duschl & Grandy, 2012), as well as consistent with the framework of competencies