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ENERGY UMBRELLA TO ENHANCE INTEREST IN STEM EDUCATION

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UDIMA

STEAM education (Science, Technology, Engineering, Arts, and Mathematics) has gained increasing relevance as a methodological approach capable of preparing students to meet the challenges of contemporary society. However, the implementation of bilingual STEAM projects in secondary education remains a field with limited practical evidence. This paper describes the design, development, and evaluation of an educational innovation project based on the construction of a solar energy-generating umbrella, with the aim of increasing students' interest in STEAM disciplines and contributing to the Sustainable Development Goals (SDGs).

The main objective was to design and build a sustainable electricity generating device through the STEAM methodology, conducted entirely in English. Specific objectives included: developing communicative competence in English; fostering cooperative work and creative problem-solving in everyday contexts; strengthening academic and personal skills; and empowering students to act as responsible citizens committed to energy sustainability.

The study adopted an action-research design. Participants were 24 students (13 female, 11 male) aged 15–16 years ($M = 15.4$) enrolled in a 4th-year ESO Physics class at a Spanish state secondary school. The project was carried out over 19 weeks (January–May), with approximately 5 hours of dedicated work per week, integrating content from the STEAM disciplines. Four instruments were used to assess the variables of interest: analytic rubrics (for prototype quality and English language production), a process portfolio, a teacher observation checklist, and a student self-assessment questionnaire.

The implementation of the project promoted active student engagement and contributed to the development of scientific thinking, collaborative learning, and communication skills. Furthermore, the integration of STEAM methodologies in meaningful real-world contexts increased students' motivation and interest in STEM education.

The implementation of this bilingual STEAM project proved to be an effective strategy for promoting meaningful learning, critical thinking, and environmental awareness among secondary school students.