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Importance of the Itinerant Educational Observatory

A preliminary analysis of the impact of actions and scientific outreach in schools

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Abstract. TThe present work describes an initiative of the "Southern Stars: Journey through the Sciences" project carried out in 2022, associated with the activities of the extension program of the Institute of Physics at UFRGS, named "Itinerant Educational Observatory." The project aimed to contribute to the improvement of science education and the scientific, technological, and innovative development in the country. In alignment with the United Nations Sustainable Development Goal 4 (2015), the project focused on the training of teachers in accessible educational technologies for classroom use.

Resumo. O presente trabalho descreve uma iniciativa do projeto "Estrelas do Sul: Viagem pelas Ciências" realizada em 2022, associado as ações do programa de extensão do Instituto de Física da UFRGS "Obsevatório Educativo Itinerante". O projeto teve como objetivo contribuir na qualificação do Ensino de Ciências e no desenvolvimento científico, tecnológico e inovação no país, alinhado com o Objetivo de Desenvolvimento Sustentável 4 da ONU (2015), a ênfase do projeto foi na capacitação de professores em tecnologias educacionais acessíveis para serem utilizadas em sala de aula.

Keywords. Teaching of Astronomy

1. Introduction

This work aims to present one of the initiatives developed within the scope of the project "Southern Stars: Journey through the Sciences," conducted by the Institute of Physics at the Federal University of Rio Grande do Sul (IF/UFRGS). The project was selected under the call for the Science in School Program (MCTI/MEC/CNPq 2019). This interdisciplinary collaboration involved faculty, technicians, and students from IF/UFRGS, as well as members of the Itinerant Educational Observatory (OEI), the Planetarium, and the Museum of UFRGS, along with four schools belonging to the public education network in Porto Alegre and the State. The central objective of this project was to promote scientific, technological, and innovative progress in the country, aligned with Sustainable Development Goal 4 (UN-2015), which advocates for the promotion of quality education. In this context, this work focuses on one specific activity of the project called "#UFRGSpartiuEscola", carried out during the year 2022. This activity consisted of on-site visits to schools, offering a wide range of activities from the OEI outreach program.

2. Journey through the Sciences

The project focused on interacting with educators in basic education, engaging in various interactions, dialogues, and training sessions between teams (UFRGS and Schools). From these interactions, a series of materials, didactic approaches, and activities were designed to connect topics in Exact and Earth Sciences, Gender Issues, and Ethnic-Racial Diversities, aiming at Scientific Literacy in Science Education (Fig.1). It also incorporated other disciplinary fields of knowledge such as the Portuguese language, sociology, history, etc. In this sense, we understand Scientific Literacy by associating it with the interpretation of the term "literacy" based on theoretical references that indicate that communication occurs in multiple ways, involving the visual, the kinesthetic, and action (and, therefore, linked to the context, as communication is a social practice). Teaching the skill of reading and writing carries the intentions of those who promote the education it brings. Thus, scientific knowledge needs to be embedded in a socio-historical context to make explicit the ideologies and consequences of actions involving technical-scientific decisions. We rely on the perspective that everyone should appropriate science, regardless of their social status (Vitor & Silva, 2017).

3. Methodology

The Southern Stars Project began its activities between late 2019 and early 2020. Due to the Covid-19 pandemic, it was necessary to adapt our initial planning, always in dialogue with partner schools. In May 2022, we started in-person activities with the #UFRGSPartiuEscola initiative, a moment to implement the activities developed by UFRGS and School teams, with the involvement of elementary school teachers and undergraduate scholarship holders. This action was led by sessions of the Itinerant Digital Planetarium in each of the 4 schools (Fig.2), involving students, teachers, school staff (such as cooks, cleaning personnel, and monitors), and families. These events took place over 2 months, with 2 to 4 days spent at each school. In addition to OEI scholarship holders, we had teams from Outreach Programs like "Girls in Science," "Universe Adventurers, "Astronomy for Indigenous Communities," from other UFRGS units, and volunteers for extension activities, as well as UFRGS faculty and education professionals. For the activities, we had approximately 20 people per school and over 30 people in total. In addition to planetarium sessions, workshops were conducted for students and teachers, guided visits to the Cosmic Landscapes exhibition (Cypriano & Damineli, 2019), sky observations with telescopes and binoculars, and a circuit of interactive experiments, named Astronomy Islands.

4. Discussion

During the implementation of the initiative, we conducted a survey to assess the impact of the scientific outreach activities in

Figure 1. Student interaction on the astronomy island at elementary public school.

Figure 2. Itinerant digital planetarium serving the public.

schools and the students' attitudes toward science and career aspirations. The questionnaire was adapted from Tolentino-Neto (2011). The survey results reveal that 75% of students agree that they learned significantly by participating in the planetarium session, and 60% stated that the way they perceive the universe was impacted. For students in areas such as Religion, Art, Engineering, Philosophy, Culture, and Mathematics, there was no perceived connection between these fields and their understanding of what constitutes science. On the other hand, Biology, Astronomy, and Chemistry are among the areas most identified as "Science," followed by Medicine and Health and Physics. Finally, we collected testimonials to evaluate the impact of the participation of undergraduate students as scholarship holders or volunteers in the university extension activity. As a result, we identified a positive impact on building a closer relationship with the university. This includes greater knowledge about the courses offered by the institution, with potential beneficial effects on the decision to continue their studies at the university. These results suggest that the proposed activities not only enriched the students' learning but also fostered a stronger connection between the academic institution and the school community. The Southern Stars project as a whole facilitated the establishment of a collaborative network led by the Institute of Physics through the OEI Outreach Program and partner schools, which continue to develop joint projects.

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