

Science outreach in astronomy at the Science Stand:

The experience of the Joaquina and Ellie projects at Guarulhos campus of Unifesp

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Abstract. The objective of the interinstitutional program (Unifesp / USP / IFSP) of science outreach Science Stand is to present scientific concepts in a playful way to elementary school students and other interested parties. This objective paper describes a structure of the Science Stand of the School of Philosophy, Letters and Human Sciences of the Federal University of São Paulo for outreach in astronomy. From different demands, spaces and exhibition formats, they are characterized and delimited as actions in different projects, being "Joaquina" and "Ellie" two examples. Our activities are performed from various approaches, with different uses of different didactic resources, such as models, assemblies, experiments, games, children's books, among others, from different themes of the natural sciences (articulating as humanities and arts).

Resumo. O objetivo do programa interinstitucional (Unifesp/USP/IFSP) de divulgação científica Banca da Ciência é apresentar conceitos científicos de uma forma lúdica para estudantes da escola básica e para outros interessados. Esse trabalho objetiva descrever a estrutura da Banca da Ciência da Escola de Filosofia, Letras e Ciências Humanas da Universidade Federal de São Paulo para divulgação em astronomia. A partir de diferentes demandas, espaços e formatos de exposição, são caracterizadas e delimitadas as ações em diferentes projetos, sendo Joaquina e Ellie dois exemplos. Nossas atividades são realizadas a partir de múltiplas abordagens, com diversos uso de diferentes recursos didáticos, tais como: maquetes, montagens, experimentos, jogos, livros infantis, entre outros, de diferentes temas das ciências naturais (articulando com as humanidades e artes).

Keywords. Teaching of Astronomy

1. Introduction

Astronomy is a field of knowledge that generally arouses great curiosity and popular interest, providing interesting topics to be addressed by the science outreach. With an interdisciplinary proposal for non-formal dialogic and critical science communication interventions for school-age children and adolescents, as well as the general public in different social spaces, the Science Stand program (Piassi, Vieira, & Santos 2017; Piassi et al 2018, 2019) aims at science outreach through playful experiments made with low cost materials and easy access, as well as other artistic and media resources. From this conception, the program seeks to arouse interest in the natural sciences, providing reflections on the nature of science and its relationship with the social, cultural and political spheres, from the perspective of Inquiry-based teaching. Thus, this paper aims to describe the structure of the Science Stand program of the School of Philosophy, Letters and Human Sciences of the Federal University of São Paulo (Unifesp) for a outreach in astronomy.

2. Description of actions

The methodology employed seeks to emphasize the playful aspect of interactions, making use of activities such as use of games, jokes and other interactive activities. Despite the emphasis on the natural sciences, the program also allows the approach of other areas of knowledge favoring the process of interdisciplinarity. From different demands, spaces and exhibition formats, actions and research in different projects are characterized and delimited, mobilizing different working groups in each one of them. These projects are classified by names that are actually anagrams forming acronyms that refer to characters of fiction and/or fantasy. The projects are characterized according to their



FIGURE 1. Collective drawing on the planets.

respective publics, spaces and modalities of actions. Joaquina and Ellie (Tab.1) are two such projects developed at Guarulhos campus of Unifesp, which have works related to astronomy.

2.1. Joaquina (Ladybug)

Developed for children (up to 10 years old), the name is an acronym in Portuguese for "Playing, Observing, Learning, Narrating: Investigations about Nature, Humanities and Arts". Ladybug being a recurring female character in children's books. Its actions are based on playful and didactic activities, focused on the critical observation of nature and on social relations and practices, which provide children with contact with themes related to science, humanities and arts, not as formal school content, but as dynamics and playing, occurring with fixed participation of a group, children of predetermined regular classes. The spaces used are the environments of elementary schools. Since the establishment of the project, astronomy has been one of the most commonly addressed themes and some of these actions of the Joaquina project are illustrated in figures 1 – 3 .

Table 1. Science Stand programs.

Project	Target audience	Spaces	Modalities of Actions
Joaninha	Children (up to 10 years-old)	Kindergarten/ elementary schools	Fixed, all children in pre-determined regular classes, Recreational activities
Ellie	General public	University units and elementary schools	Spontaneous and occasional or by group scheduling, Exhibitions and workshops with artifacts and recreational activities

**FIGURE 2.** Intervention on the stars.**FIGURE 3.** Activity on the phases of the moon.**FIGURE 4.** Left: Presentation to Fundamental I on phases of the moon. Right: Presentation to Fundamental II on Solar System.

Joaninha actions take place during the regular class period, in periodic sessions combined with the teachers of the involved classes, and the agents of the actions are not teachers of the class, but mediators of the Science Stand. Activities use features such as role-plays, dolls, models, live songs and puppets to address astronomy topics (Araujo et al 2015; Reis, Santos, & Piassi 2019; Simoni et al 2016).

2.2. Ellie

The name is an acronym in Portuguese for “Ludic Exhibitions of Outreach Itinerant Laboratories”. Intended for the general public, the project is a tribute to Eleanor “Ellie” Arroway, Carl Sagan’s character in the novel “Contact” and the eponymous film based on it. Being of spontaneous and eventual participation, where the space is the university unit and / or elementary schools, the actions are presentations, artifact workshops, recreational activities focused on material exhibitions (experiments, models, games) and other dynamics of Science Stand in specific actions, aimed at various audiences. The project serves, on campus, visiting schools on demand and also presents public spaces (parks, planetariums, railway stations, squares and schools) through the use of mobile display devices such as benches, easels, tents, etc. Figures 4 – 5 illustrate some of the audiences served by the Ellie project.

The goal of the Ellie project is to present scientific concepts in a playful way to elementary school students and other stakeholders. For this we have a space for science outreach mounted on a newsstand structure (such as the newspaper), but adapted to receive scientific and didactic equipment and with space for its

**FIGURE 5.** Presentation to EJA on phases of the moon.

manipulation by groups of students, located inside the Guarulhos campus of Unifesp (Amorim, Alves, & Izidoro 2018). In this space we receive groups of students and teachers of science to discuss scientific concepts and, especially, their applications in our daily lives. The proposal is to compose a collection of playful and motivating science experiments to integrate a traveling exhibition of science outreach with the mediation of undergraduate students (Amorim, Gonçalves, & Lacerda 2018).

3. Final considerations

The Science Stand initiative has as its primary function to democratize access to the discourses of science and technology, enabling a public outside the academic community to have access to scientific knowledge. So that interactive diffusion processes in astronomy happen according to the different target audiences, spaces and formats with which we work are characterized and delimited actions in different projects, as described in this work, aiming to consider these specificities, providing the diffusion of astronomy for school and non-school audiences.

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