

# Science outreach in astronomy for children: audiovisual production about eclipse by Unifesp Pedagogy students

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**Abstract.** In this work, we present an audiovisual production that addresses the theme of eclipses developed in a discipline of the Pedagogy course at the Federal University of São Paulo, aiming to promote Science outreach, focusing on the elementary school public and children. To make it possible to analyze the Science Communication in Astronomy videos produced by the Pedagogy students, we established five parameters to be identified in the productions: (i) Interdisciplinarity; (ii) Reproducibility; (iii) Playfulness; (iv) Simplicity; (v) and Dialogicity. Thus, designing DC material that dialogues with the needs of society is essential in meeting the new demand, in addition to helping to disseminate astronomy through research from the early years of elementary school.

**Resumo.** Neste trabalho apresentamos uma produção audiovisual que aborda o tema de eclipses desenvolvido em uma disciplina do curso de Pedagogia da Universidade Federal de São Paulo, visando promover a divulgação científica, com foco no público escolar de nível fundamental e infantil. Para tornar possível a análise dos vídeos de Comunicação científica em Astronomia produzidos pelas estudantes de Pedagogia estabelecemos cinco parâmetros a serem identificados nas produções: (i) Interdisciplinaridade; (ii) Reprodutibilidade; (iii) Ludicidade; (iv) Simplicidade; (v) e Dialogicidade. Dessa forma, conceber material de DC que dialogue com as necessidades da sociedade é imprescindível no atendimento à nova demanda, além de auxiliar na difusão da astronomia por meio da investigação desde os anos iniciais do ensino fundamental.

**Keywords.** Teaching of Astronomy – Diffusion

## 1. Introduction

Astronomy is a field of knowledge that generally arouses great curiosity and popular interest, providing interesting topics to be addressed by Science Outreach. Based on the works of Langhi and Langhi & Nardi (2009) and Marques & Freitas (2015) in this work we will take the meaning of Science Outreach as practices that aim to make scientific knowledge and culture accessible, considering the needs and expectations of its target audience, although the use of this term still generates discussions. Thus, Science Outreach in Astronomy constitutes a privileged area due to the cultural dimension of this science.

In this work, we present an example of audiovisual production that addresses the theme of eclipses in order to promote Science Outreach, with a focus on elementary and children's school audiences. The work was developed within the scope of an elective course called "Science Outreach in Astronomy for Children", offered to the Undergraduate Course in Pedagogy at the Federal University of São Paulo (Unifesp), offered in the 2nd semester of 2021.

## 2. Methodology

Students were asked to carry out an audiovisual production with simple and accessible language, with a maximum duration of up to 5 minutes recommended, which constituted the final evaluation work of the discipline. The content should be the presentation or explanation of scientific Astronomy concepts from an activity or artifact using low-cost and/or easily accessible materials, being desirable to highlight the construction and demonstration of the apparatus used.

To make it possible to analyze the Science Communication in Astronomy videos produced by the Pedagogy students, we

established five parameters to be identified in the productions, inspired by Piassi, Santos & Vieira (2015):

- i Interdisciplinarity: articulation of the natural sciences with the humanities, enabling a contextualized Science Outreach;
- ii Reproducibility: simplicity in assembly and with easily accessible materials enabling replication by children and/or interested parties;
- iii Ludicity: design and aesthetics should be highlighted, emphasizing the dimension of pleasure and curiosity;
- iv Simplicity: the artifact/activity must present itself to the public as something familiar and apprehensible;
- v Dialogicity: the artifact must quickly establish a social interaction, immediately inducing challenge, questioning, social interaction and investigation.

## 3. Results and discussion

The audiovisual production on eclipses focused on assembling and explaining solar and lunar eclipses through a model. The student starts the video by asking the audience some investigative questions and presenting the model as something that can be done at home. In this excerpt, we perceive the aspects of dialogicity and reproducibility, since this initiative indicates an attempt to establish a dialogue with the audience that is watching the video, choosing a simple and easy-to-understand communication, close to that of the children's audience, in addition to investigating the curiosity and generating expectation for the theme. She complements by giving indications of the possibility of reproducing the model with easily accessible materials and by simple processes to be carried out at home.

The student presents the purpose of the video, using a model to approach the eclipses, and then exposes the materials used,

3 Styrofoam balls, paints, brush, 3 barbecue sticks, a flashlight (may be a cell phone) and a support it could be a cardboard box or a styrofoam plate. In this excerpt, we see the care that the student takes with regard to the materials, all of which can be found in stationery stores or school supply stores, that is, the materials are easily accessible by the public, an aspect of reproducibility. While the materials are presented, there is a concern to implement clear subtitles positioned in a way that does not overshadow the presentation of the material by the student (Figure 1), ensuring an easy understanding and follow-up by the public, aspects of simplicity.



FIGURE 1. Materials used.

Still in this excerpt, we can comment on the aspect of simplicity, we managed to highlight the framing and the background, we noticed the student's concern to remain centered on the video, and avoiding a flashy element in the background, prioritizing attention to herself and the materials. We also noticed that the Styrofoam balls are highlighted and well painted, as the student was concerned with painting the continents, the Moon's craters and sunspots, contrasting all the elements and making the material the center of attention.

The assembly of the artifact is done in a simple way, like a system of fittings, with all the assembly processes described in the video, except for painting the stars, where the student indicates that it can be done freely, according to interest and creativity from the public. At this moment, we perceive three aspects: the interdisciplinary, the reproducibility and the ludicity. In the interdisciplinary, we noticed the articulation of astronomy with the arts, in which the student makes references to artistic freedom in the production of the model. As highlighted by Feistel & Maestrelli (2012), the presence of interdisciplinarity in initial teacher training is extremely important, through approximations with the context and with the different areas of knowledge, making it possible to contribute to the work to be carried out in Basic Education. Reproducibility, as it details the assembly of the model in a simple way, without requiring any other sophisticated process or specialized labor. The playfulness, since at different times the student emphasizes creativity, and highlights the production of the material as a pleasant activity, in addition, animated figures are used at different times, bringing empathy for the processes brought about. The purpose of recreational activities, according to Locatelli, Lima & Altarugio (2016), is that they are fun and pleasurable, materializing empathy with the artifact, inducing not only manipulation and exploration, but also challenges, games and plays.

During the conceptual explanation, a cell phone flashlight was used to represent sunlight (Figure 2), the student then clearly shows the shadow of the Moon (smaller Styrofoam ball) on the

Earth (medium Styrofoam ball) during a solar eclipse. Here, we note the aspect of simplicity, since it uses the real shadow of the Styrofoam balls, that is, a micro system, as an analogy of an astronomical phenomenon, the eclipses. We also noticed that she always keeps the artifact framed and points to what should be observed, facilitating the understanding of the phenomenon.



FIGURE 2. Model of the Sun-Earth-Moon System.

At the end of the video, the student invites the public to also make a model and spread the word reproducing what was done to other acquaintances. In this final moment, we again have an aspect of dialogicity and reproducibility, since there is again a dialogue between the student and the public, in an attempt to extend the discussions present in the video to the viewer's universe.

#### 4. Final considerations

This collection developed with low-cost materials together brings, in the most didactic and playful way possible, subjects from the areas of science to all spheres of the population, trying to de-stereotype Science as something that is complex difficult and inaccessible to some people. Therefore, our reward is to be able to arouse interest and curiosity in the world of science.

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