

# Extension Project "Juruá Astronomy for Indigenous Communities": A Journey of Education, Scientific Outreach, and Teacher Training

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**Abstract.** The main objective of the extension program is to promote education, scientific dissemination and teacher training, both in indigenous and traditional schools, with a focus on Astronomy as a central theme. Using the perspective of Cultural Astronomy, and the theoretical framework of M. Ogawa, we seek to develop Science teaching activities based on a multicultural perspective, valuing and respecting ethnic-racial and cultural diversities, establishing interactions with both educators and indigenous communities.

**Resumo.** O objetivo principal do programa de extensão é promover a educação, divulgação científica e formação de professores, tanto em escolas indígenas como em escolas tradicionais, com enfoque na Astronomia como tema central. Utilizando a perspectiva da Astronomia Cultural, e o referencial teórico de M. Ogawa, busca-se desenvolver atividades de ensino de Ciências baseadas na perspectiva multicultural valorizando e respeitando as diversidades étnico-raciais e culturais, estabelecemos interações tanto com educadores quanto com comunidades indígenas.

**Keywords.** Teaching of Astronomy

## 1. Introduction

The main objective of the "Astronomia Juruá" program is to promote education, scientific outreach, and teacher training, both in indigenous and traditional schools, with a focus on Astronomy. By adopting the perspective of Cultural Astronomy and drawing from the theoretical framework of Ogawa (2017), the aim is to develop Science teaching activities based on a multicultural perspective, emphasizing the value and respect for ethnic, racial, and cultural diversities, while fostering interactions with educators and indigenous communities. The program was initiated in 2018 in response to a demand from a Mbyá-Guarani community in the city of Viamão, Rio Grande do Sul (RS). During the 2022-2023 period, activities included visits with a traveling digital planetarium, dialogues with indigenous leaders, the presentation of educational materials, and the sharing of teaching resources (in Portuguese and Guarani). We also interacted with teachers, covering previously shared materials such as the Afro-Indigenous Star Map (Fig. 1), the Lunar Planisphere<sup>1</sup> (Fig.1,2), and Scientific Postcards in alternative communication. Interactions with the community resulted in a master's project and subsequently led to the first author's enrollment in a Postgraduate Program in Physical Education.

## 2. Development

The approach adopted in the research and extension project is based on the recognition of the importance of holistic worldviews present in many indigenous cultures. In these cultures, the interconnection between different aspects of nature and culture plays a central role. We also embrace the perspective of Cultural Astronomy, as outlined by Cardoso (2019), as an essential foundation for the development of a scientific education that takes into account the rich ethnic, racial, and cultural diversities that exist. Our understanding, when considering Science Education

<sup>1</sup> Available in <http://www.if.ufrgs.br/fatima/planisferio/planlunar/planisferio-lunar.html>



**FIGURE 1.** Representative image of indigenous celestial planispheres developed by Brito, Bootz & Massoni (2018)

for indigenous students, is that it is crucial to incorporate this holistic worldview and connect it meaningfully to other elements of indigenous culture and knowledge.

Currently, our main focus is on comparing the work of Moreira & Moreira (2022), titled "Cosmological Calendar: Symbols and Main Constellations in the Guarani Vision," authored by Mbyá-Guarani leaders, with astronomical star cultures (Fig. 3). To achieve this goal, we have initiated the first of a se-



**FIGURE 2.** Lunar planisphere used in activities with teachers at the indigenous school.



**FIGURE 3.** Photo taken during a visit to the indigenous community, showing the University's team and indigenous leader talking about the tapir constellation.

ries of five meetings at the school located in the village, which will address the star cultures representing "ARA PYAU" (new time) and "ARA YMÃ" (old time).

"ARA PYAU" corresponds to the spring and summer period in the Western calendar, while "ARA YMÃ" represents the autumn and winter period. Within these collaborative meetings, we will establish connections and relationships between astronomical star culture and the concepts of time and seasonality present in indigenous culture, promoting a deeper and more enriching understanding of Astronomy from multiple cultural perspectives. At the beginning of the new time, in the spring of 2023, meetings will be conducted focusing on asterisms known as the "Beija Flor" (Hummingbird) and "Homem Velho" (Old Man), representing the end of winter and the arrival of spring in the first case, and summer in the second case. The Old Time will be explored in the first semester of 2024. The meetings will be recorded to be studied and analyzed during the development of the master's degree of the first author of this work.

### 3. Conclusion

In the literature, we found discrepancies in the records of asterisms in the Mbyá-Guarani star culture and the times when they are observed. Our initiative, driven by the demand of indigenous leaders, aims to contribute to the appreciation of the community's identity and the documentation of their perspectives based on the teachings of Elder Alcindo Werá Tupã, who resides in a village in Biguaçu (SC). Additionally, we intend to develop approaches for Science Education that connect local knowledge and wisdom with Western scientific knowledge, which will be shared in indigenous and non-indigenous schools. We seek to align with the Mbyá-Guarani way of life, which, among other aspects, regards the school as part of the Tekoá (place of the Guarani way of being). This challenges the division between formal and non-formal learning spaces, as well as the division of content by disciplinary subjects and the role of teachers. We want to investigate if these approaches resonate with the Guarani way of life and if they contribute to the "construction of a specific curriculum closely aligned with the reality lived by each indigenous community, with the perspective of integrating their ethno-knowledge with selected universal knowledge" (Grupioni, 2023). The warm reception of the community, constructive dialogue with local teachers, and mutual respect reinforce the importance and continued relevance of this project, which embraces cultural diversity and promotes a more inclusive and comprehensive approach to science education.

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