

Tactile Notebook for Astronomy

Contemplating the Universe with the hands

Jackson de Farias², Erica Bhering¹, Julia Camões¹, Bianca Melo³, Aires da Conceição Silva⁴, e Silvia Lorenz Martins¹

¹ Valongo Observatory, Morro da Conceição, RJ
e-mail: slorenz@astro.ufrj.br

² Center of Mathematical and Natural Sciences, Cidade Universitária, RJ
e-mail: defarias@ufrj.br

³ Benjamin Constant Institute, Urca, RJ
e-mail: airessilva@ibc.gov.br

⁴ University of Architecture and Urbanism, Cidade Universitária, RJ
e-mail: biancasmello@gmail.com

Abstract. At a time when inclusion is the focus of so many debates, and the government itself stresses the importance of including pupils with disabilities in regular classrooms, we are going through dark times for science and for teaching it. Such obstacles to budget cuts and abandonment come to students making them feel immense difficulty to learn astronomy and science. Faced with the reality of the low quantity of tactile material, it was noted the interest of working the interdisciplinarity of Astronomy. In 2017 we developed the first tactile notebook, already finalized, tested and handed over to the Benjamin Constant Institute for distribution to all over the country. This notebook included part of the astronomy content given to sixth grade students. This second notebook we cover some concepts and properties of our solar system, we also present some data about extrasolar systems. This notebook, like the first one, will also be evaluated by IBC technicians who will also be responsible for their distribution. The notebooks were written using the APHont font to make it easier to reading by people with low vision. All figures have been adapted (with contrasting colors for students with low vision) and textured to be “printed” on the thermoform. The main idea is to be able to produce tactile teaching material to make the teaching of astronomy accessible to blind and low vision people

Resumo. No momento em que a inclusão é pauta de tantos debates, e que o próprio governo reforça a importância de incluir alunos com deficiência em salas de aula regulares, passamos por tempos sombrios para a ciência e para o ensino da mesma. Tais obstáculos, diante de cortes orçamentários e abandono, chegam aos alunos os fazendo sentir imensa dificuldade no aprendizado na área de ciências. Diante da realidade da baixa quantidade de material para o mundo da inclusão, notou-se o interesse de trabalhar a interdisciplinaridade da Astronomia. Em 2017 desenvolvemos o primeiro caderno tátil, já finalizado, testado e cedido ao Instituto Benjamin Constant para distribuição para todo o país. Tal caderno contemplou parte do conteúdo de astronomia ministrado a alunos do sexto ano. Nesse segundo caderno abordamos alguns conceitos e propriedades do nosso sistema solar mas também apresentamos alguns dados sobre sistemas extrassolares. Esse caderno, a exemplo do primeiro, também será avaliado por técnicos do IBC que também será o responsável por sua distribuição. Os cadernos foram escritos usando a fonte APHont para facilitar a leitura por pessoas com baixa visão. As figuras foram todas adaptadas (com cores contrastantes para alunos com baixa visão) e texturizadas para serem “impressas” no termoform. A principal ideia é poder produzir material tátil didático a fim de acessibilizar o ensino de astronomia a pessoas cegas e com baixa visão.

Palavras-chave. Teaching of Astronomy

1. Introduction

The project “Caderno Tátil para a Astronomia” (translated as: “Tactile Notebook for Astronomy”) has as purpose the inclusion of low vision and blind people. As we face a lack of adapted sensorial material for visually impaired people, the Valongo Observatory (OV - UFRJ) in 2017 had the initiative to develop the first notebook. It’s contents regard the Earth, Moon and Sun movements, and it’s already finalized and delivered to the Benjamin Constant Institute (IBC). Now we are facing the production of our second notebook that will explain the formation of the Solar System and also extrasolar systems. As well as the first one, it will be donated to the IBC.

2. Motivations and targets

The main motivation of the project is the production of tactile notebooks that are totally accessible and also low-cost. All of the materials are elaborated in an inclusive and not exclusive

way, meaning that it can be used by the blind, low vision and also for those who can see. Our target is to spread the astronomical and scientific knowledge, starting with 6th grade of elementary school students.

3. Materials and Methods

The first notebook was produced in way to maximize the reading and learning experience of the IBC students. In light of this, in its development was utilized the Thermoform technique. For low vision, the APHont was used. Developed by APH, it embodies characteristics that have been shown to enhance reading speed and comfort for low vision readers. For the blind, the material was transcribed in braille and different types of textures were used in pictures. For the low vision, the focus was on the type font, colors and contrasts. The different textures of the mold

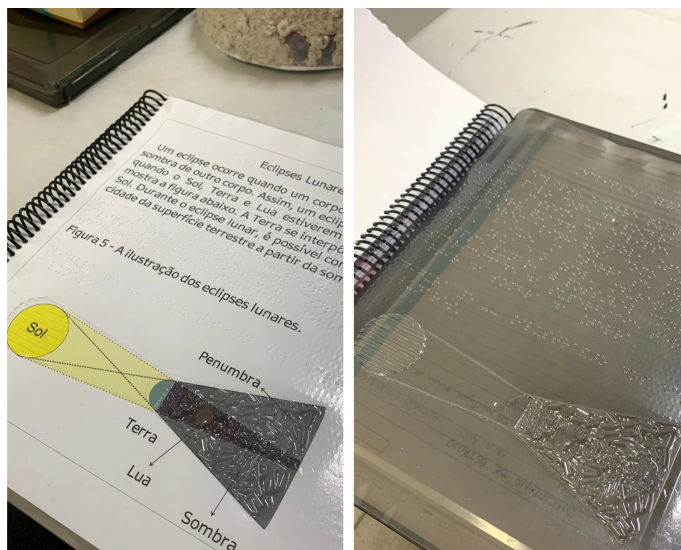


FIGURA 1. Both pages, texturized in thermoplastic sheet, written in APHont and colored with high contrast technique.

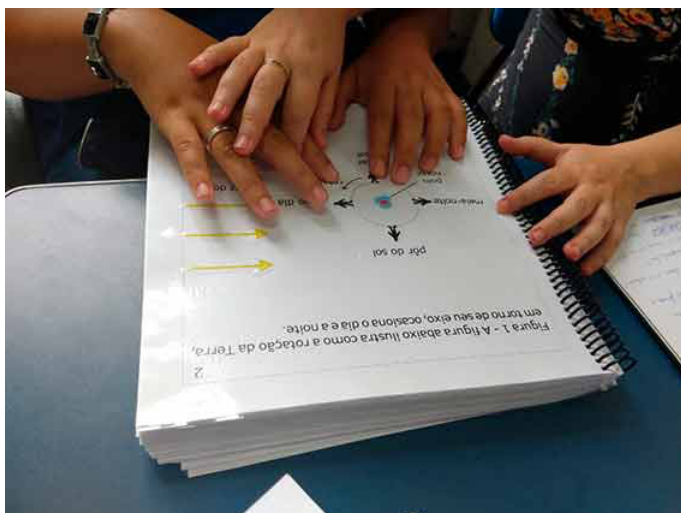


FIGURA 2. Thermoplastic sheet texturing test.

were made using low- cost materials, such as beads, sandpapers and strings.

4. Conclusion

The first notebook has already been tested by visually impaired technicians and students at IBC, and it was approved. Within the evolution of the project we aim to distribute this material for public schools of Brazil. Once we produce the mold, the notebook can be replicated by the Thermform technique. We have achievements such as participation in the “Astrotubers” channel, recently we were interviewed by the podcast Missão Exoplaneta to talk about our project and we has received honorable mention at the tenth UFRJ Academic Integration Week.

References

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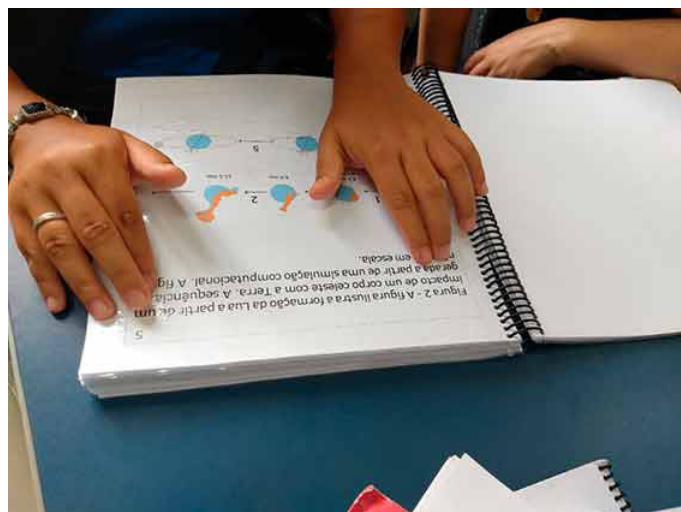


FIGURA 3. IBC technician performing braille test on a blind student.



FIGURA 4. Materials used to make pages.