

3D Objects

The Moon and the TRAPPIST-1 extrasolar system

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Abstract. To teach astronomy to elementary and high school faces a variety of issues. Problems increase when discussing content access for people with disabilities, especially blind or low vision ones, who deal with over valuation of vision and lack of specific strategies. Aiming to overcome educational inequalities through the perspectives of Cultural Accessibility and Inclusive Education, the project “3D Objects: The Moon and the TRAPPIST-1 extrasolar system” was created by the Accessible Universe group at Valongo Observatory (OV - UFRJ) under the guidance of Prof. Silvia Lorenz in a partnership with the IBC (Benjamin Constant Institute). This institute focuses on the development of materials for the improvement of the teaching and learning process of visually impaired students. As of today, we manufactured, using low-cost materials, tactile versions of the Moon and the TRAPPIST-1 system

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 “impresas” 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..

Keywords. Teaching of Astronomy

1. Introduction and Motivation

To teach astronomy to elementary and high school faces a variety of issues. Problems increase when discussing content access for people with disabilities, especially blind or low vision ones, who deal with over valuation of vision and lack of specific strategies. Aiming to overcome educational inequalities through the perspectives of Cultural Accessibility and Inclusive Education, the project “3D Objects: The Moon and the TRAPPIST-1 extrasolar system” was created by the Accessible Universe group at Valongo Observatory (OV - UFRJ) under the guidance of Prof. Silvia Lorenz in a partnership with the IBC (Benjamin Constant Institute). This institute focuses on the development of materials for the improvement of the teaching and learning process of visually impaired students. As of today, we manufactured, using low-cost materials, tactile versions of the Moon and the TRAPPIST-1 system.

2. Developing and Targets

The choice of the materials that were produced considered the needs exposed by the IBC’s education professionals and also the student’s interest. The production involved some fundamental

concepts for the resources adaptation for this public, with the procedure of using different textures and high contrast. It’s important to mention that the objects made are inclusive and not exclusive. The development of the Moon had as a main objective discuss the following concepts: near and far side, craters and Lunar lowlands.

3. Materials and Methods

Over a Styrofoam ball, was applied the map of the lunar surface in gores to help the tactile reproduction - trough suede powder and papier-maché. The resource was already approved in experimental classes at IBC. The adaptation of TRAPPIST-1 system has as main purpose the discussion about habitable zone e conditions for extraterrestrial life. Until now, the elements used in the production of the planets (b, c and g) and the central star were Styrofoam, tulle, papier-mache, felt, fabric; considering the scientists hypotheses about recent discoveries.

4. Conclusion

Understanding education and culture as human rights, the acknowledgement of the importance of these productions towards

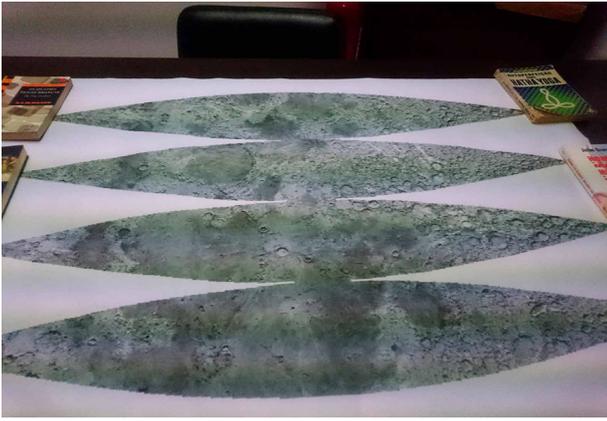


FIGURE 1. High definition lunar surface photo adapted to be glued on the Styrofoam sphere



FIGURE 4. Starting papier-maché craters and structure processes following the lunar map



FIGURE 2. Textured moon for the blind and adapted in high contrast colours to stress the differences between structures



FIGURE 5. Blind IBC students testing the material



FIGURE 3. Latitudinal cutouts being glued to Styrofoam sphere

educational equality has lead us to the elaboration of new actions. Therefore, we are planning to hold a Moon Kit, clay crater workshops at the IBC and groups at OV to produce a new Moon along the discussion of inclusion. We have achievements such as participation in the “Astrotubers” channel, presentations in the Occupational Therapy course, recently we were interviewed by

the podcast Missão Exoplaneta to talk about our project and we has received a prise at the Ninth UFRJ Academic Integration Week.