

# Unraveling the Universe

## Audio tools as an inclusive teaching resource in Astronomy

Mariana Gomes<sup>1</sup>, Mariana Regado<sup>2</sup>, Carolina Bento<sup>3</sup>, Francielle Silva<sup>1</sup>, Jackson de Farias<sup>2</sup>, Maria Clara Alvarenga<sup>1</sup>, Mariana Navia<sup>1</sup>, Aires Silva<sup>4</sup>, Silvia Lorenz Martins<sup>1</sup>

<sup>1</sup> Valongo Observatory, Morro da Conceição, RJ e-mail: mariana19@astro.ufrj.br

<sup>2</sup> Instituto de Física, Cidade Universitária, RJ e-mail: marianaregado@gmail.com

<sup>3</sup> Center of Mathematical and Natural Sciences, Cidade Universitária, RJ e-mail: cbento98@gmail.com

<sup>4</sup> Benjamin Constant Institute, Urca, RJ e-mail: airessilva@ibc.gov.br

**Abstract.** Faced with the pandemic caused by the new SARS-CoV-2 coronavirus, Astronomy teaching activities needed to adapt, overcoming difficulties in accessing teaching resources, resulting from social inequality. The impact on the teaching of visually impaired people was aggravated by social isolation, as educational materials mostly use tactile content. Faced with this problem, Universo Acessível, an extension project of the Valongo Observatory - UFRJ, found as an alternative the audio tools, specially the Talking Book resource, with the objective of reducing the impacts on the teaching-learning process of Astronomy contents for blind or low vision people in this period. In partnership with the Benjamin Constant Institute, in 2021 the first talking book of the project was published: "Desvendando o Satélite Natural da Terra em formato de livro falado" (translated as: "Unraveling the Earth's natural satellite in Talking Book format"), which addressed topics covered by the National Curriculum Base about the Moon, available virtually nationwide to public educational institutions that serve students with visual impairments. In this work, the talking book will be presented as a resource to support programmatic content in Astronomy for children who are blind or have low vision. The talking book is an assistive technology resource for people with visual impairments through a clear and well-punctuated voice, offering autonomy and freedom of thought to the reader. The text was recorded by the broadcaster with voiceover function hired by Instituto Benjamin Constant, which also performed the final editing of the audio tracks in the Sound Forge software. The proofreading and comparison process between textual and recorded parts is carried out in detail, so that any errors are adjusted and corrected by the speaker. For podcasts, storytelling and sonification processes are explored. Currently, other astronomy books are being developed by the project. The application of these audio tools for educational purposes promotes inclusion, engaging a diverse audience in the exploration of the Universe in a playful way, becoming the main form of contact with this target audience.

**Resumo.** Diante da pandemia causada pelo novo coronavírus SARS-CoV-2, as atividades de ensino da Astronomia precisaram se adaptar, superando dificuldades de acesso a recursos didáticos, decorrentes da desigualdade social. O impacto sofrido no ensino de pessoas com deficiência visual teve por agravante o isolamento social, visto que os materiais educativos fazem uso majoritariamente de conteúdo tátil. Frente a esta problemática, o projeto de extensão Universo Acessível, do Observatório do Valongo-UFRJ, encontrou como alternativa as ferramentas de áudio, especialmente o recurso do Livro Falado, com o objetivo de reduzir os impactos no processo de ensino-aprendizagem de conteúdos de Astronomia para pessoas cegas ou com baixa visão neste período. Em parceria com o Instituto Benjamin Constant, em 2021 foi publicado o primeiro livro falado do projeto: "Desvendando o satélite natural da Terra em formato de Livro Falado", abordando tópicos contidos na Base Nacional Curricular acerca da Lua, em formato mp3 e disponibilizado virtualmente em âmbito nacional a instituições públicas de ensino que atendam alunos com deficiência visual. Neste trabalho será apresentado o livro falado como recurso para apoio de conteúdo programático em Astronomia para crianças cegas ou com baixa visão. O livro falado é um recurso de tecnologia assistiva para pessoas com deficiência visual através de uma voz clara e bem pontuada, oferecendo autonomia e liberdade de pensamento ao leitor. O texto foi gravado pela radialista com função de locução contratada pelo Instituto Benjamin Constant, a qual também realizou a edição final das faixas de áudio no software Sound Forge. Os processos de revisão e comparação entre parte textual e gravada são realizados minuciosamente, para que eventuais erros sejam ajustados e corrigidos pela locutora. Para podcasts, explora-se a contação de histórias e processos de sonificação. Atualmente, outros livros falados de Astronomia estão sendo desenvolvidos pelo projeto. A aplicação destas ferramentas de áudio com finalidade educativa promove a inclusão, engajando uma audiência diversa na exploração do Universo de forma lúdica, tornando-se a principal forma de contato com este público-alvo

**Keywords.** Teaching of Astronomy

### 1. Introduction and motivation

In view of the pandemic caused by the new SARS-CoV-2 coronavirus, it was necessary to reformulate Astronomy teaching activities, readapting the materials to overcome the difficulties in accessing teaching resources, resulting from social inequality. The impact on the teaching of visually impaired people was aggravated by social isolation, as educational materials mostly use tactile content. Universo Acessível, an extension project of the Valongo Observatory - UFRJ, with the objective of developing materials in order to facilitate the teaching-learning pro-

cess of astronomy for the blind or visually impaired, reformulated the production of teaching materials to reduce these impacts. Therefore, the exploration of audio tools, such as talking books and podcasts, was found as a solution. In partnership with the Benjamin Constant Institute, in 2021 the first talking book of the project was published: "Desvendando o Satélite Natural da Terra em formato de livro falado" (translated as: "Unraveling the Earth's natural satellite in Talking Book format") with ISBN 9786588612057, addressed topics provided for in the National Curriculum Base (BNCC) about the Moon, in .mp3 format,

available throughout the country for public education institutions that serve students with visual impairments.

## 2. Methodology and discussion

In partnership with the Instituto Benjamin Constant(IBC) in 2021, the talking book “Desvendando o satélite natural da Terra em formato de Livro Falado” (ISBN 9786588612057) was published, which addressed topics covered by the National Curriculum Base(BNCC) about the Moon, in format .mp3 and available virtually nationwide to public educational institutions that serve students with visual impairments.

The talking book is an assistive technology resource for people with visual impairment through a white reading, clear and well-punctuated voice, and in addition, it offers autonomy and freedom of thought to the reader. The text was recorded by the broadcaster with voiceover function hired by Instituto Benjamin Constant, which also performed the final editing of the audio tracks in the Sound Forge software.

The proofreading process is also fundamental in the production of a talking book, comparing the textual part with the recorded part requires extra attention. The marking of any error is passed on to the announcer who makes the necessary adjustments. For podcasts and other resources, storytelling and sonification processes are explored.

Currently, a talking book about Constellations in different cultures is under development, in the recording phase, a talking book about Mars and its explorations, in the editing phase, as well as talking books dealing with astronomical objects and the history of Astronomy.

## 3. Conclusion

Although the talking book has not yet been evaluated by IBC students, the use of this resource is useful, as it is part of the assessment and needs of the disabled user, as can be seen in the reports in the "Manual de Produção do Livro Falado"(FONSECA, 2020, p.13). The application of these audio tools for educational purposes promotes inclusion, engaging a heterogeneous audience in the exploration of the Universe in a playful way, and in times when the touch with hands must be extremely preserved due to the new coronavirus, these tools become the main form of contact with blind and low vision students. Establishing new connections with society, realizing their real needs and seeking new ways to meet them, overcoming the barriers imposed by the pandemic, is to make the Universe, everyone's home, accessible.

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