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Astronomy teaching as a formative itinerary in natural sciences in high school

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Abstract. In the context of changes that have taken place in Basic Education (BE) over the last few decades, Astronomy teaching, yet if not treated as an independent discipline, has always been present, although in a diffuse way, as topics taught in disciplines of Natural Sciences (NS). However, many researchers indicate that such contents are still rarely addressed in classrooms, and, in this sense, it is believed that the formative itineraries, introduced by the National Common Curricular Base (NCCB) as a way for students to deepen in specific area of knowledge, can rescue Astronomy in High School (HS). Therefore, the study objective was to present a proposal to work Astronomy teaching as an independent discipline in HS, through a formative itinerary. This is a summary of the Educational Product resulting from the research of the professional master's degree of the Postgraduate Program in Science and Mathematics Teaching at the Cruzeiro do Sul University, which presented Instructional Design (ID) resources, with the purpose of offering to teachers the necessary planning for the implementation of the Astronomy itinerary.

Resumo. No contexto de mudanças que se sucederam na Educação Básica (EB) ao longo das últimas décadas, o ensino de Astronomia, mesmo que não tratado como uma disciplina independente, sempre esteve presente, ainda que de forma difusa, como tópicos ensinados nas disciplinas de Ciências da Natureza (CN). No entanto, muitos pesquisadores destacam que tais conteúdos ainda são pouco abordados em salas de aula e, nesse sentido, acredita-se que os itinerários formativos, introduzidos pela Base Nacional Comum Curricular (BNCC) como uma forma dos estudantes se aprofundarem em conhecimentos específicos de uma área do conhecimento, possam resgatar a Astronomia no Ensino Médio (EM). Portanto, o objeto deste estudo foi apresentar uma proposta para trabalhar o ensino de Astronomia como uma disciplina independente no EM, por meio de um itinerário formativo. Trata-se de um recorte do Produto Educacional resultado da pesquisa do mestrado profissional do Programa de Pós-Graduação em Ensino de Ciências e Matemática da Universidade Cruzeiro do Sul, que apresentou recursos de Design Instrucional (DI), com a finalidade de oferecer aos professores o planejamento necessário à implementação do itinerário de Astronomia.

Keywords. Teaching of Astronomy

1. Introduction

In the context of changes that have taken place in Basic Education (BE) over the last few decades, Astronomy teaching, yet if not treated as an independent discipline, has always been present, although in a diffuse way, as topics taught in the disciplines of Natural Sciences (NS).

However, many researchers indicate that such contents are still rarely addressed in classrooms, reflecting difficulties, related to teacher training and the lack of good quality teaching material, free of conceptual errors and alternative conceptions (Langhi & Nardi, 2009).

Despite these difficulties, exploring the Astronomy teaching's peculiar multidisciplinary proves to be important for the development of the competences and abilities expected in the formation of students in Basic Education.

In this sense, Anastacio & Voelzke (2022) believe that the formative itineraries, introduced by the National Common Curricular Base (NCCB) as a way for students to deepen in specific knowledge of an area of knowledge, can rescue Astronomy in High School (HS).

2. Objective

The object of this study was to present a proposal to work Astronomy teaching as an independent discipline in HS, through a formative itinerary.

This is a summary of the Educational Product resulting from the research of the professional master's degree of the Postgraduate Program in Science and Mathematics Teaching at the Cruzeiro do Sul University, which presented Instructional Design (ID) resources, with the purpose of offering to teachers the necessary planning for the implementation of the Astronomy itinerary.

3. Astronomy teaching and NCCB

In Brazil, contents related to the study of Astronomy are present in practically all levels of education, although not as an independent discipline (Barboza & Voelzke, 2016), the contents are worked under the theme "Universe, Earth and life", within the six structuring themes of Physics teaching (Brasil, 2002).

However, much research in the Astronomy education area show that the contents are minimally treated in Basic Education, in Early Childhood Education, Elementary School and High School (Langhi & Nardi, 2009).

Even with this distance, the reform that instituted the NCCB reaffirms the importance of Astronomy teaching as one of the specific competences in Natural's Sciences and its Technologies area (Brasil, 2018).

In this scenario, the formative itineraries presented by the NCCB as a series of activities that students can choose to deepen their learning constitute an alternative for bringing Astronomy teaching closer together as a proposal that reconnects the school with the contemporary world, with the capacity to promote interdisciplinarity, involving the diverse disciplines that make up the Natural's Sciences and its Technologies area.

4. Astronomy Formative Itinerary

The proposed educational product was developed with Instructional Design (ID) resources, with the purpose of offering a plan for the Astronomy formative itinerary in High School.

For the planning of Astronomy itinerary was structured Table 1, which presents the synthesis of the analysis phase and represents, from a pedagogical point of view, the scope in which the itinerary will be offered, with data regarding the objective, workload, duration and target audience.

Table 1. Itinerary data

Itinerary name	Astronomy in High School	
Objective	Bringing Astronomy content to High School students within the Natural Sciences formative itinerary	
Workload	Presential	24 hours/class
	On-line	8 hours/class
Length	16 weeks (one academic semester)	
Target Audience	2nd and 3rd year High School students	

The proposal considered the NCCB's prediction about the virtualization of up to 20% of the total workload of HS (Brasil, 2018) and, therefore, adopted a hybrid approach, with part of the workload mediated through the virtual learning environment Moodle[1], which has iterative activities such as, for instance, the activity shown in Figure 1, which used the Drag and Drop model, and proposed that the student identify the planets of the Solar System.

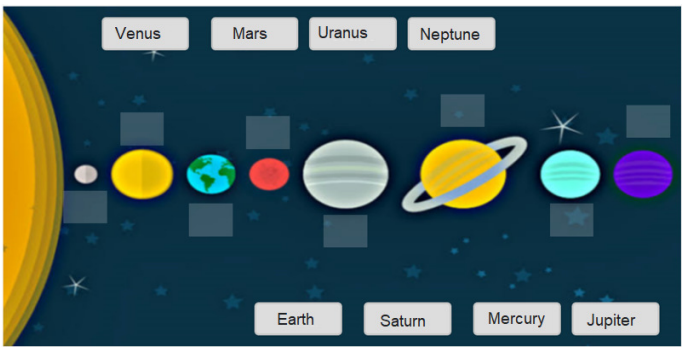

Figure 1. Activity using Drag and Drop

The use of distance learning platforms allows the teacher to replace part of the orality of a traditional class with digital content, organized by links, hypertext, audio, and video, favoring the student to choose the best way to deepen in a given subject (Souza, 2019).

5. Final considerations

Astronomy teaching has relevant importance in the formation of the young protagonist and, in this perspective, despite the distance and lack of its contents in Basic Education mentioned by many authors (Langhi & Nardi, 2009; Albrecht & Voelzke, 2011), the proposal of formative itineraries introduced by the National Common Curricular Base (Brasil, 2018) created a range of options for HS, which, in a way, lack a deeper discussion.

In this sense, the proposal discusses an application beyond the theoretical, which allows exploring the Astronomy teaching in the context of the formative itineraries in High School.

Therefore, due to its originality, it is expected that the study can provide teachers with an initial, guiding model that allows working on the Astronomy contents from the perspective of an independent discipline.

[1] Available at https://moodle.com, accessed on 11/24/2022

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