

Training teachers for Astronomy Teaching

Spinardi, J. I. & Voelzke. M. R.

¹ Universidade Cruzeiro do Sul. e-mail: spina.1917@gmail.com, mrvoelzke@hotmail.com

Abstract. The present work aimed to map articles published in the following journals: Latin American Journal of Astronomy Teaching, Brazilian Journal of Physics Teaching, Brazilian Notebook of Physics Teaching and the CAPES Dissertations and Theses Data Bank, in the period from 2012 to 2022, on continuing education courses for Astronomy teachers, separating them into content courses on Astronomy and Astronomy teaching methodologies. The nature of the research is qualitative and content analysis has enabled the formation of two emerging categories (one focused on Astronomy content and the other focused on Astronomy teaching methodology). Thus, in a context of little production of research on teaching astronomy in teacher education, there was a greater predominance of research on Astronomy content in the face of Astronomy teaching methodologies used in continuing education courses for teachers.

Resumo. O presente trabalho objetivou o mapeamento de artigos publicados nos seguintes periódicos: Revista Latino-americana de Ensino de Astronomia, Revista Brasileira de Ensino de Física, Caderno Brasileiro de Ensino de Física e do Banco de Dados de Dissertações e Teses da CAPES, no período de 2012 a 2022, sobre os cursos de formação continuada para professores de astronomia, separando-os em cursos de conteúdo sobre Astronomia e de metodologias de ensino de Astronomia. A natureza da pesquisa é qualitativa e a análise de conteúdo possibilitou a formação de duas categorias emergentes (uma focada em conteúdo de Astronomia e outra focada em metodologia de ensino em astronomia). Dessa forma, em um contexto de pouca produção de pesquisa sobre ensino de Astronomia na formação de professores, evidenciou-se uma predominância maior das pesquisas sobre conteúdos de Astronomia em face das metodologias de ensino de Astronomia utilizadas nos cursos de formação continuada para professores.

Keywords. Astronomy teaching – Science teacher training – Astronomy methodology and content

1. Introduction

Astronomy has been awakening more and more nowadays a interdisciplinary function that aggregates several curricular components such as Physics, Chemistry, Mathematics and Biology, making its study and teaching fascinating for students and a challenge for teachers who need to be trained to such an undertaking, whether in Universities, with their curriculum, whether in the continuing education courses offered by Universities.

The large amount of information coming from the media social media and the diversification of information from magazines, TV channels and even textbooks, makes there is a contradiction between the volume of information and the understanding of this information, in a scientific way, in the sense that there is professional training for teachers for teaching and student learning. In this way, the appropriation of this conceptual knowledge of Astronomy as well as the teaching and learning methodology to students become, above all, inseparable. In the area of Education in Astronomy studies warn and highlight the problem of training (initial and continuous) deficit of teachers, in Brazil, in relation to the specific content of Astronomy (Bretones 1999; Langhi & Nardi 2007; Iachel 2013; Oliveira et al. 2018). These issues are today of extraordinary importance (Kilpatrick 1992) insofar as in which they manage the process of instructing instructors Science, especially with regard to teaching of Astronomy.

2. Methodology

The methodology used is qualitative and bibliographic in nature, based on magazines, periodicals and Dissertation Bank and Theses cited in Figure 1 comprising the period of 2012 to 2022, making up the research corpus. Figure 1 summarizes the general survey of works. According to Bardin (2011).

What is content analysis these days? A set of more and more subtle methodological instruments in constant improvement, which apply to 'discourses' (contents and contents) extremely diversified. The common factor of these multiple and multiplied techniques - from the frequency calculation that provides encrypted data, to the extraction of structures translatable into models - is a controlled hermeneutics, based on deduction: the inference. (Bardin 2011), p.15.

In this research, an attempt was made to answer the central question: which articles, dissertations and theses would address the issue of teacher training from the point of view of content and of teaching methodologies. The investigation was restricted to works that contemplated the criteria of: (i) works carried out in Brazil; (ii) that worked on the continuing education of teachers in the line of contents and teaching methodologies in Science courses; (iii) that were published from 2012 of 2022. Figure 1 summarizes the general survey of works showing in the first column its respective source, in the second the period of publication, followed by the respective total number of complete works available in their respective sites and the total number of articles selected for analysis.

Source	Period	Total works selected for analysis
Latin American Journal of Astronomy Teaching	2012 to 2022	9
Brazilian Notebook of Physics Teaching	2012 to 2022	4
Brazilian Journal of Physics Teaching	2012 to 2022	0
CAPES Dissertations and Theses Data Bank	2012 to 2022	31

FIGURE 1. Total researched and selected works

3. Results and Discussions

In view of the corpus selected for analysis, we highlight some initial considerations. Of the 13 articles selected and seen in the Latin American Journal of Astronomy Teaching, Brazilian Notebook of Physics Teaching and Brazilian Journal of Physics Teaching, in the analyzed period, only 4 articles are related to continuing education courses for teachers that worked on issues of teaching methodology so that teachers applied in the classroom with the students, that is: 30,8%. Thus, 69,2% of the publications in the period prioritized the continuing education of teachers in terms of astronomy content in its various forms.

Master's dissertations analyzed, 16 of them work on teaching content in courses of continuing education for teachers, 62,0% of which 30,8% of total work with teaching methodology of Astronomy. With regarding doctoral theses, 7 in total, 57,1% researched content themes in teacher training courses in astronomy and 42,9% with methodological research in the continuing education courses for teachers. such a universe of theses proved to be quite small in works that for if propagating one factor over the other would require a greater volume of work during the period, this being a very likely hypothesis. Figure 2 presents the synthesis of the two emerging categories found during the search.

4. Final Considerations

The present work aimed to map the state of art or knowledge from the last 10 years of articles in magazines, such as: Latin American Journal of Astronomy Teaching, Brazilian Notebook of Physics Teaching, Brazilian Journal of Physics Teaching and the CAPES Dissertations and Theses Data Bank, on the continuing education courses for teachers in teaching Astronomy, verifying the two emerging categories of this analysis: continuing education courses focused on content concepts and continuing education courses focused on strategies of teaching for the teacher to appropriate the techniques and pass it on to students. In this context, there was a low production of 13 articles, 24 dissertations, 7 theses and 44 setting works, demonstrating that there is a great need to increase research on these issues because increasing teacher training courses in teaching astronomy, there is more discussion of scientific terms, with a better quality of training for teachers and students involved. On the other hand, the courses analyzed here are particularly important for teacher training, both in terms of content and teaching methodologies, because in view of the few research works raised in the analysis, the instrumentalization of

Category	Brief Description	Works		
		Magazines	Dissertations	Theses
C01 course of formation of teachers focused on content of astronomy.	Works in that the researchers developed a content in astronomy to strengthen concepts in teachers.	9	16	4
C02 course of formation of teachers focused on strategies of teaching astronomy.	Works in that the researchers developed, along with the teachers, methodologies and strategies education of astronomy.	4	8	3

FIGURE 2. Emerging categories found during the research

the teacher by any of its components, whether of content or methodologies of teaching, makes him take a leap in quality in his teaching practice, also making him reflect on this same practice. In that sense, it is expected that the present work can contribute to future works, serving as a step in the scale of knowledge is noticing that there is little teaching research of astronomy in continuing education courses, whether to invest in an astronomy teaching methodology course and the greater acquisition of its contents related to students having a scientific literacy on the largest possible scale.

References

- Bardin, L., 2011, Content analysis. Sao Paulo: Editions 70.
- Bretones, P. S., 1999, Introductory subjects and astronomy in higher education courses in Brazil. Master's Dissertation, Institute of Geosciences, UNICAMP, Campinas, Brazil.
- Iachel, G., 2013, The paths of teacher training and research in Astronomy teaching, Doctoral Thesis, Faculty of Sciences, UNESP, Bauru, Brazil.
- Kilpatrick, J., 1992, A history of research in mathematics education. In: GROUWS, D. A. (ed.), Handbook of research on mathematics teaching and learning. New York, Macmillan.
- Langhi, R., Nardi, R., 2007, Astronomy teaching: most common conceptual errors present in science textbooks. Brazilian Physics Teaching Notebook, 24(1), 87-111.
- Oliveira, A. A., Fusinato, P. A., Batista, M., 2018, Astronomy in the curricula of Biological Sciences courses in the state of Paraná. Valore Magazine. 1(3), 334-342.