

Inclusion and Teaching of Astronomy for disabled students, trends observed in the publications of the National Symposium of Astronomy Teaching

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Abstract. This work proposes a bibliographic review, together with the annals of the five editions of the National Astronomy Teaching Symposium, where articles related to the "Teaching of Astronomy to disabled students" were selected, in order to verify the trends of these publications. The study was carried out by reading the title, the abstract and the key words. Four descriptors, used in the analysis of the articles and consequent survey of the tendencies of the publications, were elaborated. The descriptors questioned the types of deficiencies most quoted; The level of education; Which didactic activities of inclusion and education more quoted and what the contents of Astronomy. The authors concluded that among the 15 articles selected, 11 approached blind students and therefore there was a greater concern of the researchers in producing texts to support the learning of this audience. There was little indication of the level of education among the articles, with most of the work being linked to the general public. It was observed that 40.0% of the works dealt with the assembly of tactile devices for didactic support to the disabled students. The most quoted theme among the articles was Moon phases, but we were struck by the number of works that did not delimit a specific Astronomy theme to be approached.

Resumo. Este trabalho propõe uma revisão bibliográfica, junto aos anais das cinco edições do Simpósio Nacional de Ensino de Astronomia (SNEA), onde selecionou-se artigos relacionados ao "Ensino de Astronomia a alunos deficientes", com o objetivo de verificar as tendências dessas publicações. O estudo foi realizado a partir da leitura do título, do resumo e das palavras chave. Elaborou-se quatro descritores, utilizados na análise dos artigos e consequente levantamento das tendências das publicações. Os descritores questionavam os tipos de deficiências mais citadas; O nível de ensino; Quais as atividades didáticas de inclusão e ensino mais trabalhadas e quais os conteúdos de Astronomia. Os autores concluíram que entre os 15 artigos selecionados, 11 abordavam alunos cegos e por isso percebeu-se uma preocupação maior dos pesquisadores em produzir textos de apoio a aprendizagem desse público. Houve pouca indicação do nível de ensino, entre os artigos, ficando a maioria dos trabalhos vinculada ao público em geral. Observou-se que 40,0% dos trabalhos abordavam a montagem de aparatos táteis para apoio didático aos alunos deficientes. O tema mais citado entre os artigos foi fases da Lua, porém, chamou-nos a atenção a quantidade de trabalhos que não delimitaram um tema específico de Astronomia para ser abordado.

Keywords. Teaching of Astronomy — Publications, bibliography — History and philosophy of astronomy.

1. Introduction

Astronomy is considered an ancient science, for its, instigating character of human curiosity, is one of the areas that has attracted people to the study of Sciences. However in the last decades, his study has been superficially aggregated to other areas and thus forgotten by the educators in Sciences. According to the Brazilian Institute of Geography and Statistics, the number of students with special needs in the regular education network grew 249.0% since 1998 (Camargo & Nardi, 2007). This significant increase was a result of the guidelines of the National Education Guidelines and Bases Law (Law 9394/96; Brasil, 1996). However, studies have pointed to the inadequacy of the current school structure to receive such students. This work is based on a bibliographical research with the annals of the five editions of the National Astronomy Teaching Symposium, to verify the trends of academic productions, related to "Teaching Astronomy to disabled students". From a total of 539 published works, 15 articles related to this subject were selected. The research was carried out by reading the title, abstract and keywords of each article, analysing them from previously elaborated descriptors, Table 1.

2. Objectives

To verify, from a bibliographical revision, the trends of the publications of the annals of the National Astronomy Teaching Symposium, on the subject "Teaching of Astronomy to disabled students", using the descriptors presented in Table 1.

3. Methodology

This work was carried out through an analysis with the annals of the five editions of the National Astronomy Teaching Symposium, carried out in 2011, 2012, 2014, 2016 and 2018. From the total of published articles, 539, 15 papers related to the theme "Teaching Astronomy to disabled students", and using the descriptors presented in Table 1, inferences and analyses were made, aiming to survey the tendencies of the publications of these congresses on the proposed theme.

4. Results and discussions

The Figure 1 presents the quantitative of articles produced in the five editions of the National Astronomy Teaching Symposium, considering respectively the themes, "Astronomy" and "Teaching of Astronomy to disabled students". Comparing

Table 1. Analysis descriptors used in the research.

Descriptors for review next to selected articles	Search objectives when using the descriptor
What types of disabilities are most quoted in selected articles?	Check if the articles refer to hearing, visual, mental or other deficiency.
What level of education does the text of the article refer to?	Check that the selected articles deal with basic, fundamental, secondary or higher education.
Which didactic inclusion and teaching activities were most quoted in the selected papers?	Check what activities are performed and their influence on the teaching of disabled students.
What contents of Astronomy were most quoted in the didactic activities of teaching to the students, treated in the articles?	Check if there is a predominance of some Astronomy content linked to activities carried out with students.

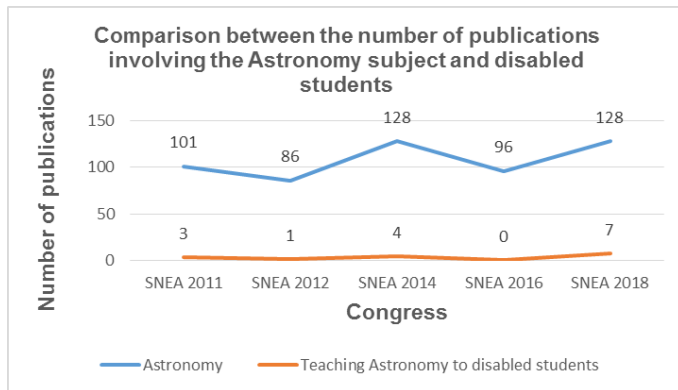


FIGURE 1. Comparative chart of the publications of the SNEA congress involving "Astronomy" and "Teaching of Astronomy to disabled students"

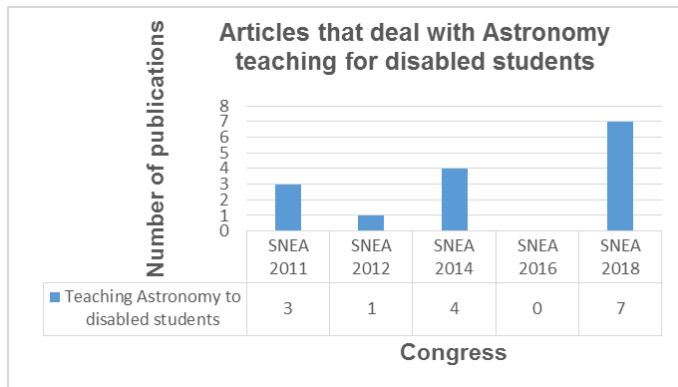


FIGURE 2. Graph representing the publications of the SNEA congress involving the theme, "Teaching of Astronomy to disabled students"

the first and last editions, Figure 1 shows an increase in the overall production of works, with the exception of 2016, where production was less than 2014. One explanation for this fact may be the realization in 2016 of the Research Meeting in Physics Teaching.

Considering the theme "teaching of Astronomy to disabled students", it was observed analysing Figure 2, that only 2.8% (15 articles) of the total work published in all editions of the National Astronomy Teaching Symposium (539 articles), were related to the research topic. A very small number considering the importance of including disabled students with regular education. Figure 2 showed a significant increase in the number of publications involving disabled students in the 2018 edition of the National Astronomy Teaching Symposium.

Considering the descriptor 1, Table 1, which questioned the types of deficiencies addressed, and from the analysis of the articles, it was noticed that among the 15 selected ones that dealt with the subject "teaching of Astronomy to disabled students",

most involved visually impaired, 11 of the 15 articles selected. Astronomy is a science in which celestial objects are usually viewed, it can be assumed that there is a concern of the researchers regarding the discussions and assemblies of devices that allow and facilitate the learning of Astronomy with the visually impaired. There were also three studies dealing with hearing impairment and only one considering Down syndrome. The second descriptor, Table 1, questions the level of teaching covered in the articles. It was noticed that the general public was quoted in four articles, mainly those that deal with the informal teaching, available in planetariums. There were also four articles directed to students in general and three directed to activities carried out with teachers. The third descriptor questioned which activities aimed at the most disabled students were quoted in the selected papers. As observed in the first descriptor most of the articles addressed activities related to blind students, in this way it was observed that five articles brought activities with materials for tactile contact, being this the methodology most used to work with students with this deficiency. There were also three articles addressing activities applied in the classroom and three others that did not inform the activity to be carried out, treating it in a general way. The fourth descriptor questioned which Astronomy contents were most quoted in the 15 selected articles. It was noticed that the theme "Phases of the Moon" was the most cited, present in three articles, there were three other articles related to various astronomical terms such as stars, planets, Solar System, Universe, galaxies and two dealing specifically with the theme Sun-Earth-Moon. A curious fact is that among the 15 articles selected, there were seven papers that, although they dealt with the Astronomy theme, do not specify it.

5. Final Considerations

It can be noticed that even with the inclusion law of disabled students in the regular education system LDB 9394/96, (Brasil, 1996) there is a small production of works related to this subject in the SNEA. It is also observed that there are isolated efforts of some education professionals to adapt and socialize disabled students with other students in the class, being one of the factors of great difficulty the lack of specific training to act with the deficient student. Today, undergraduate courses contribute to the offer of the pound discipline, which can ease the teacher's deficiency in dealing with deaf students, but in schools, teachers receive blind or severely disabled students and often do not know how to act. In general, there was an increase in the production of articles and consequent consolidation of the National Astronomy Teaching Symposium congress in the national scenario of research in education. As it deals with works related to Astronomy, there was an increasing production and interest of researchers involved with the teaching of Astronomy.

References

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