

Conceptions of students entrants of a Physics course on planets and dwarf planets in Solar System: A case study

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Abstract. In this work we sought to verify the knowledge of students of a class from the first period of a Licentiate degree in Physics of a federal teaching institution in the interior of Minas Gerais about planets and dwarf planets of the Solar System. The research was set up as a case study and had the participation of 26 students who answered a questionnaire with six questions, among them objective and discursive. A highlight in the research was the reclassification of Pluto as of 2006 by the International Astronomical Union (IAU) and the dynamic character of Science in the perception of these students. The categorization by similarity of responses, proposed by Bardin, was used as analysis methodology. Starting from the study of the answers it was noticed a great difficulty of the students in answering some of the questions of research, appearing with this some alternative conceptions. It was realized that the students had little knowledge about dwarf planets and did not fully understand the dynamic character of science.

Resumo. Neste trabalho buscou-se verificar, o conhecimento de estudantes de uma turma do primeiro período de um curso de Licenciatura em Física, de uma instituição federal de ensino do interior de Minas Gerais, sobre planetas e planetas anões do Sistema Solar. A pesquisa configurou-se como um estudo de caso e teve a participação de 26 estudantes que responderam um questionário com seis questões, entre objetivas e discursivas. Um ponto destacado na pesquisa foi a reclassificação de Plutão a partir de 2006, pela União Astronômica Internacional (IAU) e o caráter dinâmico da Ciência na percepção desses estudantes. Utilizou-se como metodologia de análise a categorização por semelhança de respostas, proposta por Bardin. Com o estudo das respostas percebeu-se uma grande dificuldade dos alunos em responder algumas das questões de pesquisa, surgindo com isso algumas concepções alternativas. Percebeu-se que os discentes tinham pouco conhecimento sobre planetas anões e não entendiam bem o caráter dinâmico da Ciência.

Keywords. Planets and satellites: general – Teaching of Astronomy

1. Introduction

It is common the presence of Astronomy contents in the National Curricular Parameters (PCNs; BRASIL 2007) of Elementary and Middle School, however, it is also common for students to complete High School and to engage in a higher education course without any contact with this subject (Langhi & Nardi 2007), or for non-compliance with the national curriculum suggested by NCPs in schools. Regarding to this problem, this research involves a study, through a research questionnaire composed of six objective and discursive questions, applied to a group of students who are new to a Bachelor's degree in Physics. These students are from an IFET (Federal Institute of Technological Education) in the interior of Minas Gerais, and the research will have as its central theme the planets and dwarf planets of the Solar System.

2. Objectives

To check the students' knowledge and alternative conceptions on the theme "planets and dwarf planets of the Solar System", and still having the reclassification of the planet Pluto as a dwarf planet in 2006 as an example, check if they perceive the dynamic character of Science as a unfinished process and in constant evolution of its concepts.

3. Methodology

This work is characterized as a case study because it involves only a beginner group of undergraduates in Physics. A research

questionnaire was applied with six questions being objective and discursive. A total of 26 students participated in the study. The analysis of the answers of the applied questionnaire was carried out based on the techniques of content analysis, by categorization (Bardin 2011).

4. Results and Discussions

Here we will present and discuss some of the answers given by the students to the research questionnaire. The first question of the work asked the students to list the names of the planets that compose the Solar System. Figure 1 shows a graph with the quantitative answers given to this question.

It was observed that many students are unaware of the eight planets of the Solar System and others still consider Pluto as one of these planets, characterizing the previous version of 2006 model of the Solar System, composed of nine planets. In the chart it was observed that only the planets Earth, Mars, Jupiter and Saturn were remembered by all 26 students participating in the research. Four students quoted Pluto as a planet, since it was represented in the other item and presented as the most recurrent alternative conception in this question. Question two asked students to choose up to two sources of information about the Solar System planets: (Internet, Internet and school, Youtube videos, Books, Magazines, School). Figure 2 shows the graph with the quantitative answers given to this question.

It is noticed that the majority of the students interviewed chose "Internet and school" and "Internet" as the main sources of obtaining the concepts linked to planets of the Solar System. It was observed that they mention school as source of obtaining

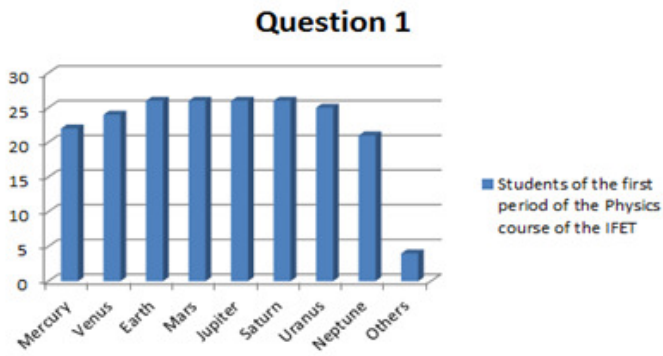


FIGURE 1. Representative graph of data collected from question 1.

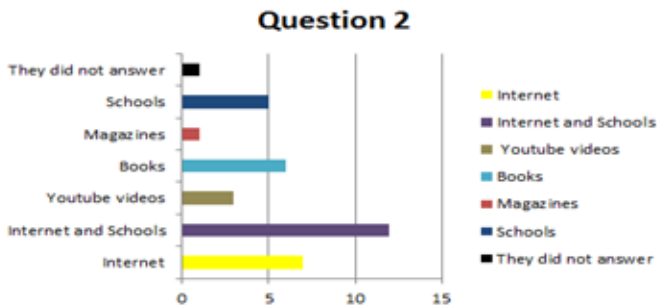


FIGURE 2. Representative graph of data collected in question 2.

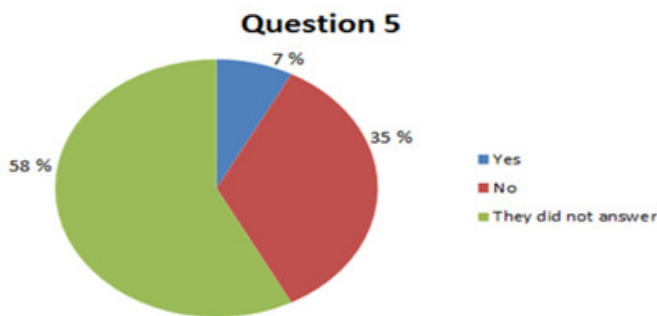


FIGURE 3. Representative graph of the answers given to question five of the questionnaire.

these concepts as the fourth in the order of choice. Question five cited that Pluto is far away from the Sun and has its surface covered with ice and therefore could be considered a comet of the Solar System. In this question the student should know a little about the definition and the main characteristics of a comet. Figure 3 represents the quantitative answers given to this question.

It was verified that the majority of the students did not answer this question, certainly for not knowing the characteristics that define a comet and with that to be able to differentiate it from Pluto. Question six questioned students about their knowledge of the dynamic character of Science. The case of reclassification of Pluto was used as an example. This was the question with the lowest response rate, since only six students among the twenty-six interviewed answered. Among the answers, all cited developments in the areas of medicine and pharmacy.

5. Final Considerations

It was noticed that the students interviewed had difficulties in answering questions related to planets and dwarf planets of the Solar System, often ignoring these concepts or even mixing them, confusing concepts of planet with "dwarf planet" or even comets. Another concern was the lack of knowledge and insight of the students regarding the dynamics of the nature of the Sciences.

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