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Analysis of the previous basic's Astronomy knowledge in students of the 2nd and 3rd years of high school

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Abstract. The study aimed to check the previous knowledge in basic Astronomy of the 2nd and 3rd years' students of high school in a private school in São Paulo, based on the premise that various subject-related content appears with different approach within the subjects of Physics, Geography and Biology. The investigation was conducted by applying a test consisting of ten multiple choice questions for 146 students and sought to quantitatively analyse the prior knowledge acquired by these students. Although it is a work in progress, it was found that students have potentially relevant prior knowledge, which allows motivating teacher interventions aimed a meaningful learning.

Resumo. O estudo teve como objetivo verificar os conhecimentos prévios em Astronomia básica dos alunos do 2º e 3º anos do ensino médio de uma escola particular de São Paulo, com base na premissa de que vários conteúdos relacionados à matéria aparecem com diferentes abordagens nas disciplinas de Física, Geografia e Biologia. A investigação foi realizada por meio da aplicação de um questionário composto por dez questões de múltipla escolha para 146 alunos e buscou analisar quantitativamente o conhecimento prévio adquirido por esses estudantes. Embora o trabalho esteja em andamento foi possível constatar que os alunos possuem conhecimentos prévios potencialmente relevantes, que permitem motivar intervenções do professor, visando uma aprendizagem significativa.

Keywords. Teaching of Astronomy

1. Introduction

Although many schools do not have in their formal curriculum the subject of Astronomy, when considering only high school, one realizes that their basic concepts are inserted, in different ways, in the subjects of Physics, Geography and Biology.

Therefore, despite not formally, Astronomy is present in students' daily school life and, from this perspective, the research sought to study and understand the impact of this learning on knowledge of basic Astronomy.

The work's main goal was describing the previous knowledge of Astronomy not formally acquired, using, in the data collection, a test applied to 146 students.

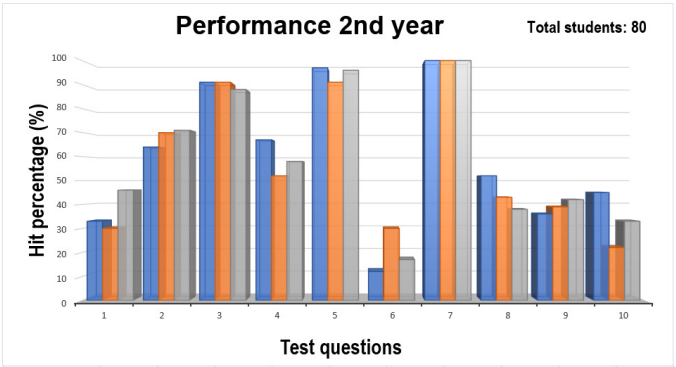
Based on the test result, the data were interpreted quantitatively regarding this students' prior knowledge (Prodanov and Freitas 2013).

The test, consisting of ten multiple-choice questions, covered topics that are present in the curriculum of the subjects of Physics, Biology, and Geography, such as the Big Bang, planetary movements and planets of the Solar System.

The basic concepts for the elaboration of the test were defined in Ferreira (2010), Mourão (1987) and Oliveira Filho (2013).

The study's result will be used as the basis for an Astronomy course, with emphasis on meaningful learning theory. Ausubel's meaningful learning theory is based on the idea that an individual's existing cognitive structure is the main and basic factor that influences the learning and retention of new concepts (Moreira 2011).

Therefore, the work was important to verify the existence of this previous knowledge in basic Astronomy, as base for the research new steps.



Question	1	2	3	4	5	6	7	8	9	10
2ºA	33%	64 %	91%	67%	97%	12%	100%	52%	36%	45%
2ºB	30%	70%	91%	52%	91%	30%	100%	43%	39%	22%
2ºC	46%	71%	88%	58%	96%	17%	100%	38%	42%	33%

Figure 1. Second year High School performance graph

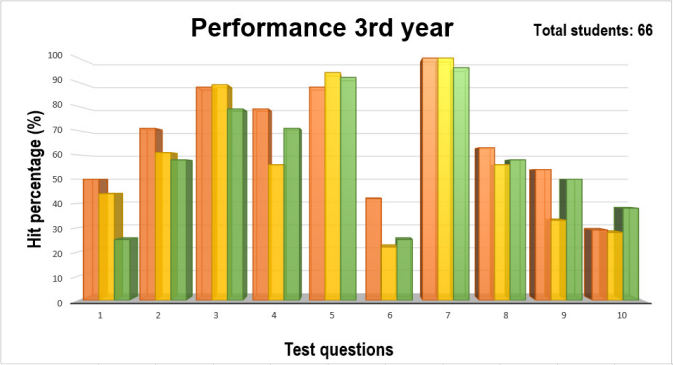
2. Discussion of results

The answers to the test questions were analysed through tables of correct answers percent. As a result, two graphs of quantitative distribution were generated:

(i) while the graph on Fig. 1 shows the distribution of the correct answers in the second-year high school class, composed of 80 students;

(ii) the graph on Fig. 2 shows the correct answers in the class of the third-year high school class, composed of 66 students.

These graphics results evidence that 2nd and 3rd years' performances were very close, with 58% and 61% of correct answers, respectively. In general, students understand the concept related to the Big Bang theory, talked in question 7, justified by the knowledge acquired in the subject of Biology, the study of the origin of life and the universe (first year High School).



Question	1	2	3	4	5	6	7	8	9	10
3ºA	50%	71%	88%	79%	88%	42%	100%	63%	54%	29%
3ºB	44%	61%	89%	56%	94%	22%	100%	56%	33%	28%
3ºC	25%	58%	79%	71%	92%	25%	96%	58%	50%	38%

Figure 2. Third year High School performance graph

On the other hand, in question 6, which deals with the planets of the Solar System, a much lower than expected performance was identified, which reveals the need for some basic concepts to be adopted more objectively.

Regarding the other questions, the answers evidences a general knowledge of the concepts, although very basic, which's justified because of that topics were treated in other subjects throughout these students' learning process, during basic teaching.

3. Final considerations

This research, in summary, has been identified that high school's students have a potentially relevant prior knowledge, which allows a new concept will be incorporated into their cognitive structure, thus promoting meaningful learning, according to Ausubel's theory (Moreira 2011).

Despite not formally worked, this study evidences that Astronomy is present on many subject's curriculum along basic education.

It is a research in progress and the results were important for the future work development, so far as it aims the interaction of new knowledge with the previous knowledge in Astronomy throughout a course for high school students.

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