

Astrofísica de La Plata (CCT La Plata - CONICET, UNLP).

LEARNING EVALUATION OF MOON'S SYNCHRONOUS ROTATION MEDIATED BY COMPUTATIONAL RESOURCE

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We report in this poster a learning evaluation about Moon's synchronous rotation by analyzing results of the use of hypermedia The Sun, Earth and Moon in blended learning intervention of an introductory physics discipline. The animation is displayed in a dynamic interactive screen on which the user has control of the progress of the animation sequence. The results are obtained from quantitative and qualitative analysis of issues drawn from a pre-test and a learning assessment counting with 77 students respondents. Learning outcomes indicate that animation helps in learning the phenomenon of Moon's synchronous rotation and students evaluate the use of animations as a motivator and facilitator of learning.

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“PLANETÁRIO E TEATRO DIGITAL JOHANNES KEPLER” AND ITS INSTITUTIONAL PEDAGOGICAL PROJECT

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This work relates the reception of schools, started on August 2012, in the astronomic laboratory of the “Planetário e Teatro Digital Johannes Kepler”, located in the “Sabina - Escola Parque do Conhecimento” in Santo André, São Paulo. The idealization of this project, authorship of Marcos Calil, PhD, consists in four apprenticeship environments disposed around the planetary dome. They make reference to the System Sun - Earth - Moon (Tellurium), Solar System, Astronautic and Stars. On Tuesdays and Wednesdays the astronomic laboratory is used by Santo André municipal schools for focused lessons, being possible on Thursdays scheduling for private and public schools. On weekends and holidays is

opened for the visitors. Since the inauguration to the beginning of activities with students, the monitor team was guided and trained on contents of Astronomy and Astronautic to execute the schools service. This is done in four stages, which are: reception, course through the astronomic laboratory, dome session and activities closure. During the reception the acquaintance rules are passed on for a better visit. Before starting the course the monitors do a survey about the previous knowledge of the students. On the astronomic laboratory resources of the environment are used to explain the contents of Astronomy and Astronautic, always considering the age group and the curriculum developed in classroom. After the course the students watch a planetary session supporting the contents seen on the astronomic laboratory. At the end a feedback is done with the students about the subject discussed. During the visit the teachers fulfill an evaluation about the place and the service. From August 2012 to November 2012 were attended between municipal, public and private schools. From the 4932 students attended, 92% belonged to the municipal network, 5% to the private network and 3% to the public network. From the 189 evaluations done by the teachers, 97.8% were satisfied, 2.1% partially satisfied and 0.1% unsatisfied with the reception promoted by the team of the planetary. Meantime the satisfaction presented on the evaluation is thought that the use of non-formal places is an ally of apprenticeship. The “Planetário e Teatro Digital Johannes Kepler” by its team collaborates for an education and divulgation of the Astronomy and Astronautic make part of the reality and quotidian of the students of the city of Santo André.

<sup>1</sup> Theatre Digital and Planetarium Johannes Kepler.

BRAZILIAN ERATOSTHENES PROJECT

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The objective of Brazilian Eratosthenes Project is the development and application of teaching training actions according the “docent autonomy” concept to basic Astronomy Education. Argentina coordinates the project in South America, but Brazil works in this project since 2010 with the theme “Projeto Eratóstenes Brasil” in the homepage: <http://sites.google.com/site/projetoerato>. Two schools measure a sticks shadow and communicate their results. After, they calculate an average radius

of Earth. The stick (gnomon) should stay in vertical position in the leveled ground. Since 2010, the project received hundreds of Brazilian schools with different experiments that were constructed with autonomy, because our site doesn't show some itinerary pre-ready to elaborate the experiments. To collect data for our research, we will use interviews via Skype with the teachers. These data are useful to researches about Science Education area and the Teaching Formation. Teaching professional practice could change and we see modifications in the teachers work, what depends of their realities and context. This project intents to respect the docent autonomy. This autonomy to responsible modifications during continued formation is called "activist formative model" according Langhi & Nardi (Educação em Astronomia: repensando a formação de professores. São Paulo: Escrituras Editora, 2012). This project discusses about researches in Astronomy Education - still extreme rare in Brazil, when we compare with other areas in Science Education. We believe that actions like this could motivate the students to learn more Astronomy. Furthermore, this national action can be a rich source of data to investigations about teaching formation and scientific divulgation.

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## INTERACTIVE MATERIALS IN THE TEACHING OF ASTRONOMY

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This study presents results of a survey conducted at the Federal Institution of Education, Science and Technology in the North of Minas Gerais (IFNMG), and aimed to investigate the potentialities of the use of interactive materials in the teaching of astronomy. An advanced training course with involved learning activities about basic concepts of astronomy was offered to thirty-two Licenciate students in Physics, Mathematics and Biological Science. The following steps were to be taken: i) analysis of the pedagogical projects (PPC) of the licenciates at the IFNMG, research locus of its Campus Januária; ii) analysis of students' preconceptions about astronomy and digital technologies, identified by the application of an initial questionnaire; iii) preparation of the

course taking into account the students' previous knowledge; iv) application of the education proposal developed under part-time presence modality, using various interactive tools; v) application and analysis of the final questionnaire. The test was conducted with the qualitative and quantitative methodology, combined with a content analysis. The results indicated that in the IFNMG only the licenciate-course in physics includes astronomy content diluted in various subjects of the curriculum; the rates of students prior knowledge in relation to astronomy was low; an evidence of meaningful learning of the concepts related to astronomy, and of viability of resource use involving digital technologies in the Teaching of astronomy, which may contribute to the broadening of methodological options of future teachers and meet their training needs.

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## ELEMENTARY SCHOOL TEACHERS' CONCEPTIONS ABOUT THE APPARENT MOVEMENT OF THE SUN AND THE SHADOWS OF THE OBJECTS

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A research about the astronomical conceptions of 65 elementary school teachers, developed at the last module of a continuing education course, in 2012, is described. The module addressed the apparent movement of the Sun in the sky and its relation with the shadows of the objects. Two types of sundials were built and tested. A concrete model was used to simulate the phenomena. A test with five open questions was applied to the participants before and after the activities. Initially, the participants already had notions about the themes treated, because almost all recognized: the existence of variations in the position of the Sun in the sky both throughout the day as well as during the year; the existence of relations between such apparent movements and changes in the shadows of the objects; the possibility of using the shadows of the objects to measure time. However, 53.8% of the participants expressed, at first, the misconception that the Sun passes daily by zenith. And, in general, the responses had incomplete explanations. After the activities, some development