

Capacitation in Astronomy and affiliated sciences for teachers: Experience with the Directory of Teaching of the Region of Mauá [DERM]

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Abstract. Report's experience of the course Translation of scientific knowledge: Continuing education and training in Astronomy and affiliated sciences for teachers, offered to 22 teachers of the Directory of Teaching of the Region of Mauá [DERM], of the Secretary of Education of the São Paulo State, Brazil.

Resumo. Relato de experiência do curso Translação do conhecimento científico: Educação continuada e capacitação em Astronomia e ciências afins para professores, oferecido para 22 professores da Diretoria de Ensino da Região de Mauá [DERM], da Secretaria de Educação do Estado de São Paulo, Brasil.

Keywords. Astronomy – Capacitation – Teachers

1. Introduction

On May 10 2016, the author Ferreira carried out activities on Astronomy and affiliated sciences for 196 teachers of the jurisdiction of the Directory of Teaching of the Region of Mauá [DERM], attending teachers from state schools of municipalities of Mauá, Ribeirão Pires, Santo André, São Caetano do Sul, Suzano, Rio Grande da Serra and São Paulo, from the areas of Chemistry, Mathematics, Physics, Geography, Pedagogy and Sciences. At the time, they filled out the Prospective Sheet about Teachers with information on profiles, formations, teaching, etc. and to verify who was interested in participating in a more comprehensive training course, with 117 [59.7%] expressing favorably.

2. Development

Twenty-two teachers were enrolled to take part in the 40 hours course *Translation of Scientific Knowledge: Continuing education and training in Astronomy and affiliated sciences for teachers*, between October 8 and December 10 2016, prepared and taught by the author Ferreira, as program [Table 1] established in a project forwarded (São Paulo 2016a) and approved (São Paulo 2016b) by Secretary of Education of the São Paulo State and applied to the DREM Knowledge Network. On November 11 2016, five hours of technical visits were held at the Astronomical Pole of Amparo, of the Sphaera Planetaria Ltd., guided by Ferreira and with the collaboration of Prof. Francisco Pereira de Figueiredo, developing didactic and pedagogical activities in the Planetarium "Prof. Romildo Póvoa Faria", solar observations with filters for integral light and Hydrogen Alfa [$H-\alpha$], lecture on the theme *Curious Sun* and telescopic observations of celestial objects of the occasion.

3. Prospecting of previous and subsequent knowledge

In the first class, on August 10 2016, a questionnaire was applied with 50 questions [optatives, opinionateds and discursives] for the prospection of the previous knowledge of the cursists and, in July 1 and August 12 2017, respectively 203 and 245 days of the end of the course, another questionnaire with 48 questions

about the later knowledge, aiming to collect data to the analysis of the teachers cognitive evolution from Ausubel educational psychology (Ausubel, Novak Hanesian 1981). Also on July 1 2017, a technical visit was made to the Observatory "Abraão de Moraes" [OAM]/IAG-USP, in Valinhos/SP-Brazil, guided by Prof. Dr. Ramachrsina Teixeira, and also the second technical visit to the Astronomical Pole of Amparo, in Amparo/SP-Brazil, this time also contemplating activities in the ecological trail and terrarium workshop ministered by Prof. Luiz Gustavo dos Santos, thus associating Astronomy with the environment. Therefore, there were an additional ten hours, totaling 50 hours of course, that is, 25% beyond the 40 hours preliminarily established.

4. Conclusion

The data collected are being plotted and analyzed for later to verify the occurrence or not of the significant learning regarding the knowledge gained by the teachers, however, considering also the simple transposition, conception that the authors calls the *Translation of Scientific Knowledge*.

Class	Theme
1	- Presentation of the course [August 8 2016] and completion of the <i>Free and Informed Consent Term</i> . - Presentation of the <i>Pedagogical Commitment and the Class Schedule</i> . - Application of the previous knowledge questionnaire on Astronomy and related sciences. - History and Philosophy of Astronomy and Science.
2	- <i>Translating scientific knowledge to common knowledge: moving from basic Astronomy research to Education and Teaching</i> . - <i>STS-Astro: Astronomy in the focus of Science, Technology and Society</i> (Ferreira & Voelzke 2012). - Scientific literacy.
3	- Light pollution. - Satellities and space debris.
4	- Astronomical measurements and standarts. - Position Astronomy/Astronomical Geography.

5	<ul style="list-style-type: none"> - Solar System. - Earth-Moon system. - Selene fecund: the history of the conquest of the Moon. 	<p>pag_0028_FD01T52ED4QA2e7JBNQH3LMVDBS.pdf&pagina=28&data=06/07/2016&caderno=Executivo%20I&paginaordenacao=100028> Accessed in: Jul. 6 2016.</p> <p>SÃO PAULO. Portaria do Dirigente Regional de Ensino, de 12-12-2016 Homologando, nos termos da Res. 58/11, o curso “Translação do Conhecimento Científico: Formação e Capacitação Continuada em Astronomia e Ciências afins para professores”, autorizado pela Portaria EFAP, de 05-07-2016, publicado no D.O. de 05-07-2016, realizado no período de 01-10-2016 a 10-12-2016, com 40 horas na Rede do Saber da Diretoria de Ensino de Mauá. (2016b) Diário Oficial do Estado de São Paulo, Seção I, p. 28 126 (232), 13 de dezembro de 2016. Available in: <https://www.imprensaoficial.com.br/DO/BuscaD02001Documento_11_4.aspx?link=/2016/executivo%2520secao%2520i/dezembro/13/pag_0040_4B85TI600T244e4980KUDGT0Q7U.pdf&pagina=40&data=13/12/2016&caderno=Executivo%20I&paginaordenacao=100040> Accessed in: Dec. 13 2016.</p>
6	<ul style="list-style-type: none"> - Movements of the Earth; Earth and seasons. - Solars and lunars eclipses. 	
7	<ul style="list-style-type: none"> - Technical visit [November 26 2016] to the Astronomical Pole of Amparo, in Amparo/SP-Brazil, of the Sphaera Planetaria Ltd. 	
8	<ul style="list-style-type: none"> - Asteroids and comets. - Meteoroids, meteors and meteorites (Danger comes from space: Impacts with Earth). - Astrobiology and exoplanets: probabilities of life in the Universe. 	
9	<ul style="list-style-type: none"> - Cosmology: nebulae, stellar evolution, stellars clusters, galaxies and the Universe. 	
10	<ul style="list-style-type: none"> - Astronomy and related sciences in the National Curricular Parameters for Fundamental Teaching [PCNEF I and II], National Curricular Parameters for Medium Teaching [PCNEM and PCN+], Curricular Proposals of the State of São Paulo/Brazil and the National Curriculum Base Common [BNCC] of the Brazil [the acronyms in portuguese]. - Astronomy in didactics and paradidactics books: corrects and errors. 	
11	<ul style="list-style-type: none"> - Astronomicals softwares. - Astronomical workshop: Celestial Rotating Planisphere. 	
12	<ul style="list-style-type: none"> - Teczynical visit [July 1 2017] at the Observatory “Abraão de Moraes” [OAM]/IAG-USP, in Valinhos/SP-Brazil, with the lecture <i>Gaia: a new age of Astronomy of the Universo in three dimensions</i>, by Prof. Dr. Ramachrisna Teixeira, director of OAM; presentation of the structure, equipments and scientific and educational activities of OAM. - Technical visit and activities [July 1 2017] at the Astronomical Pole of Amparo, in Amparo/SP-Brazil, with observations of the Sun with filters for integral light and H-α; sessions in the Planetarium “Prof. Romildo Póvoa Faria”; ecological trail and terrarium workshop guided by Prof. Luíz Gustavo dos Santos, demonstrating the environmental the ecological aspects of the region integrated with the Astronomy; recognition of the sky without sight; telescopic observations of the Moon, Jupiter, Saturn and stellars clusters. 	
13	<ul style="list-style-type: none"> - On July 1 and December 12 2017, application of the questionnaire of the subsequent knowledge of the teachers participating in the course. 	

Table 1. The themes of the course Translating scientific knowledge: continuing education and training in Astronomy and affiliated sciences for teachers, developed and taught by Ferreira to teachers from the jurisdiction of the Directory of Teaching of the Region of Mauá from October 8 to December 10 2017, July 1 and August 8 2017.

References

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