GOOD PRACTICES IN STEM EDUCATION

Title	Light Pollution: A historical study on a modern threat
Brief description	Studying Ancient Astronomers especially in Greece, Egypt, and Middle East we are astonished by the detailed descriptions of the Constellations and Stars. Eratosthenes is describing in full detail the Hydra constellation, while Aratus described the constellations of Orion, Ursa Minor and Major, Draco and Cepheus. Their ability to observe a wide number of stars was mainly due to low "light pollution". Nowadays, stars are almost out of sight especially in cities due to high levels of "light pollution". We will compare the number of stars observed by ancient astronomers to the number of stars we can observe nowadays, revealing information about "light pollution" through centuries. We will use hands-on experimentation, measurements, the Stellarium application and a Google plug-in to detect light pollution for each place.
Level	Students studying Physics and Astronomy. **Age range:** 13-18 years old
Advantages Why is it innovative/ attractive to students?	Hands on learning, Inquiry based learning, ICT in education, use of Open Science Resources, teach students to cooperate and act as researchers. Involves students into real research procedure encouraging them to create an experimental apparatus, apply software application, combine those measurements together, find evidence, process experimental data and present them. As far as we know for first time we introduce students into collaboration group work, acting as young researchers and mainly combining experiment and ICT tools.
Teachers' opinion	An integrated inquiry based scenario that combines bibliographic research, evidence, hands on experiment, ICT tools, teamwork, collaboration, comparison between experimental results and computer data. Data processing and presentation, doubt and consideration and finally follow up activities. The role of Galileo's assistant is extremely attractive and provocative.
Students' opinion	

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Difficulties	Mainly on technical aspects, fast internet connection, free ICT tools, well plug in functioning. On the other hand we have some matters related to a totally different educational philosophy that dominates schools, so we choose to apply our scenario as a project subject, or as an object at excellent groups.
Further information / Case Studies	**Technical Requirements:** Internet connection, appropriate software: Stellarium, Google Earth plug-in, Microsoft Office, Microsoft Windows, Computers, video projector could be useful. **Author's background:** Knowledge of Physics, knowledge of Astronomy, Constellations, stars. Stellarium, Google+, internet, Google Earth plug-in. Ancient astronomers' descriptions of stars and constellations (use of Wikipedia can be useful). **Connection with the curriculum:** Strongly related with Astronomy (Second Class of Greek High School), Physics (First, Second and Third Class of Greek High School). Partly related with Philosophy and ideas of ancient astronomers and philosophers (Eratosthenes, Hipparchus, Aratos). **Learning Objectives:** Hands on learning, Inquiry based learning, ICT in education, use of Open Science Resources, learn students to cooperate and act as researchers. **Guidance for preparation:** Search in literature, bibliography, internet and other sources, about detailed descriptions of stars and constellations developed by ancient astronomers. Download the plug-in GaN2013.kmz for Google Earth. Download Stellarium. Both Stellarium and Google Earth GaN2013.kmz are free in internet. https://drive.google.com/file/d/0BwzFYgTXc0fhb3laRjNwaWxmN2s/view

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