INTRODUCTION
The Greek National Observatory for Education “Eudoxos” (http://eudoxos.snd.edu.gr) and its educational projects have the primary mission to “deepen the understanding of physics through astrophysics and provide education through research”. In such a context, they provide hands-on astronomy research experiences to students of all levels. The internet revolution has made it possible to access an observatory remotely and request observations from a wide variety of instruments. Remote control of the observatory’s instrumentation and monitoring equipment was a challenge in itself. The next milestone was the development of educational curricula, tailored to the equipment of the observatory in the form of lab exercises using real data. All the exercises are designed to guide the students to understand the Universe using the scientific method of hypothesis, observation (experimentation) and analysis.

Astronomy studies nature on the grandest scale and answers some of the primeval questions of humanity. Space-based observatories and modern ground-based telescopes provide stunning images and unprecedented views of the cosmos. As such, astronomy strongly attracts the public interest, apparently more than any other scientific discipline, and thus, becomes particularly suitable for the purpose of developing fundamental scientific skills. The key agent here is the excitement generated by people’s own curiosity. Astronomy provides an excellent carrier for an introduction to science and to scientific methodology per se.

But how could the public or students best perceive this exciting information? The Eudoxos approach offered a ‘behind the scenes’ view of what the astronomical pictures and numbers mean. Hands-on access to raw observational data, appropriately explained by accompanying educational material provides the non-expert audience with a unique experience-based method that communicates enquiry-based studies of the size, age and nature of celestial bodies and the Universe as a whole.

The project’s educational goals can be summarized as follows:

- Development of a pedagogical framework that incorporates research methodologies into science teaching. Make the students learn how to acquire new knowledge by re-discovering what is known to scientists but unknown to them.
- Introduction of motivating interactive learning methods by implementing ac-
tive participation and involvement in modern astronomical observations, their careful planning, data reduction, conclusion. Use the real numbers from real data.

- Advancement of critical thinking and understanding the interplay among underlying physical laws and associated scientific concepts.
- Focusing on the connection between physical science and experimental investigation.
- Development of new and innovative educational tools and approaches.

During the last few years a few educational projects have been carried out by NOE-Eudoxos, some of which in collaboration with external partners. Two major projects of such type were Eudoxos I and II (http://eudoxos.snd.edu.gr):

- Eudoxos I (1999-2001) was funded by the Greek Ministry of Education. This project emphasised discovery (i.e. supernovae, microlensing event patrols) and hands-on experimentation. More than 10 self-contained exercises were developed, covering modern astrophysics. For their content, we have adopted the intuitive and pedagogical “near” to “far” approach, starting from the Solar System and moving towards cosmological scales. The exercises and corresponding teaching guides of this phase were written in Greek and have been tested in 5 high schools spread over throughout Greece.

- Eudoxos II (2002-2004) was funded by the European Commission. In this second project, emphasis was given to communication technology, to visual and functional improvements of the user interface as well as to the elaboration of a more comprehensive but less demanding curriculum. Teaching and studying materials in this phase were developed in English, targeting younger audiences in schools throughout Europe. Translations of this material are to appear in other European languages, including Greek.

From the experience gained from the application of Eudoxos-I (Advanced) and II (Normal), two additional curricula are being prepared: Eudoxos-Radio and Eudoxos-Interdisciplinary. They will extend the measurement content to the radio spectral domain and, most importantly, will focus on the synergies of the various scientific disciplines (mathematics, physics, computer science, technologies etc) associated with the modern scientific endeavour.

Modern science teaching requires novel approaches to learning and especially astronomy, for which the distant sky that is outside of any everyday experience is the ultimate learning laboratory. Building an observatory at every school, for example, would require extensive funding and educators with specific technical skills to oper-
ate and maintain it. In most cases funding would be impossible, while in most cities this would just be a waste, taking into consideration the light pollution involved.

NOE-Eudoxos, a dedicated robotic observatory, overcomes these limitations. It offers remotely based observational services and through its curricula introduces secondary education students and the public to research methodologies. It is breaking the traditional barriers of lecture-based teaching and brings the real sky within the classroom, in a cost-efficient way. Globally available through the internet, NOE-Eudoxos and similar projects can be easily characterized as the ultimate public (most easily accessed) observatories.

References