

Science Teachers' Training in the Science Laboratory/Training Centers (EKΦE), on/using Inquiry-Based Methodologies



During the science teachers' training on METABOOK

Summary:

During the "METABOOK- Creation and Experimental Application of Multimedia Electronic Book in High School Physics" Minerva Project (90175-CP-1-2001-1-GR-MINERVA-M) and after the creation of National ebook material for Physics, Chemistry and Biology, which use the Inquiry-Based Methodology, Pedagogical Institute followed the official training procedure of the Greek Ministry of Education to train the Greek science teachers into the new material. In this procedure the teachers are trained in the science laboratory/training centres (EKFE) by the members of Pedagogical Institute, the science school counsellors and the EKFE responsible.

Aims:

To train the science teachers into the supporting digital and laboratory material

Main activities:

Using precise parts of the new material (e.g. METABOOK) the science teachers make precise applications under the guidance of the school counsellor and/or the course responsible of Pedagogical Institute.

Narrative:

Pedagogical Institute is part of the Greek Ministry of Education and uses the national training procedure for the continuous education/training of Greek science teachers. For this purpose, there is at least one science laboratory/training centre (EKFE) in every region of Greece. They are well equipped with the necessary science instruments and computers. The typical procedure is the following: During the implementation of a training program, the member of Pedagogical Institute collaborates with the science school counselor of every Greek region (who supervises an EKFE) and the EKFE responsible to undertake a necessary number of training activities. The last ten years, we used this procedure for the training of the involved science teachers in the Minerva project METABOOK, and the digital material on Physics, Chemistry and Biology created to support the ordinary books of secondary education. Besides the above main procedure, the science school counselor of a region may call to EKFE some groups of teachers for additional training. The evaluation of every training day is made by asking the trainees to fill in a certain questionnaire. The last ten years Pedagogical Institute focus on the implementation

of Inquiry Based Science Teaching (IBST). All the created official didactic packets in Science (Physics, Chemistry and Biology) and the supporting digital material have been created to facilitate the IBST. For this purpose the number of EKFE has been substantially increased. But it is not clear that all this effort has reached the students. According to the annual reports of the school counselors no more than 5% of Greek science teachers use IBST

in the classroom! Important Remark: While the training procedure may be considered EXCELLENT, it has not yet been measured, whether this training improved the classroom teaching. The non existence of any teachers' evaluation procedure in the Greek educational system does not permit the PI members and the school counselors to enter the classroom and objectively measure the effect of any training program!

Methods of learning/training:

This belongs to the teachers' continuous training procedure of the Greek Ministry of Education.

End user: Science teacher of secondary education.

Involved actors: Members of Pedagogical Institute (which are creators or supervisors of the new digital material), the school counselor and the EKFE responsible of the region where the training activity takes place.

Location: It takes place in the science

laboratory/training centres (EKFE) of each region of Greece

Languages available: Greek

Where to find the application:

The METABOOK at http://1ekfe-anatol.att.sch.gr/metabook/metabook_gr/initial.htm, the Physics supporting material at www.pi-schools.gr/software/gymnasio/fysiki_b_c/, the Chemistry at www.pi-schools.gr/software/gymnasio/ximeia_b_c/ and the Biology at www.pi-schools.gr/software/gymnasio/viologia/.

Evaluation parameters:

This is the official training procedure of the Greek science teachers.

Duration:

It starts with one day for each group of teachers, but the school counselor may call on additional training for some teachers.

Optimum number of participants:

No more than 20 teachers for each training day

Teachers' Competencies

1	subject matter/content knowledge	x
2	nature of science	
3	Multidisciplinary	x
4	knowledge of contemporary science	
5	variety of (especially student-centred) instructional strategies	x
6	lifelong learning	
7	self-reflection	
8	teaching/ learning processes within the domain	x
9	using laboratories, experiments, projects	x
10	common sense knowledge and learning difficulties	
11	use of ICTs	x
12	knowledge, planning and use of curricular materials	
13	Information and Communication Technologies with Technological Pedagogical Content Knowledge	x

Mapping best practices with main principles

1. Building interest in natural science phenomena and explanations:

All the chapters of METABOOK start with "student" motivation", they continue with a very short description of the subject concepts/senses and continue further with precise animations and hands on experiments. The other three materials, which have been created to support the official books, are more dedicated to animations.

4. Understanding students' concepts and learning style about of science phenomena:

The most common students' misconceptions are known. The digital supporting material takes into account this knowledge in the choice of the motivation questions (for example see METABOOK). During the training we urge teachers to rather guess the possible misconceptions and not trying to discover them, because the "discovering" questionnaire itself may create new misconceptions.

5. Relevance of the content to daily life of students:

The supporting material motivation part is always from the everyday life. The teachers are persuaded that the motivation phase is as important as the activity itself.

8. Doing science: experimenting, analyzing, interpreting, redefining explanations:

All the chapters of METABOOK contain a digital laboratory application. The other three supporting materials are based on digital applications. During their training in EKFE, the science teachers perform the digital experiments.

9. Assessment: formative ~ of students' learning and the summative ~ of their progress:

The hands-on activities of the Laboratory Guide and the digital simulations contain precise questionnaire for the students. During the training, the science teachers are urged to use these filled questionnaires to create a formative assessment for each student.

10. Cooperation among teachers and with experts:

The trainers are experts of the Pedagogical Institute and the school counselors. On the other hand the school counselor of each Greek region may repeat/extend the training of some science teachers, whether it finds it necessary.

