The main fall in motivation levels with regard to scientific studies in Italy has been collaboratively answered through the national project (Scientific Degree Project—PLS). Master IDIFO is a project in this framework for in-service teacher formation, a project focused on Didactic Innovation in Physics Education and Guidance, carried out by Udine PER Unit in collaboration with 20 Italian universities. It offers educational innovation, science learning laboratories, formative orientation (problem solving) and teacher training on Modern Physics topics for in-service teachers. It implements a model for teacher training, with an aim to develop formal thinking and to relate associated connection between Computer Science—Mathematics and Physics—Modern Physics topics.

The activities such as educational and experimental workshops in presence, training teachers at a distance and in presence, conducting exhibitions, designing Inquiry Based Learning materials, activities for the orientation training in physics, informal education through conceptual laboratories (CLOE) and use of ICT to overcome the conceptual nodes in physics, teaching laboratories using problem solving and Prevision-Experiment-Comparison strategies and in-depth analysis of learning processes in educational innovation are achieved.

**Activities: the following typologies of activities**

**CERTIFIED OFFER TRAINING FOR TEACHERS**

The project includes an offer of teachers formation on three levels, all certified by the University of Udine: individual training modules for teachers of 3 credits; an annual training program in a graduate course of 18 cfu (CP-IDIFO); a two-year Master of 60 credits (M-IDIFO).

**II LEVEL MASTER M-IDIFO FOR TEACHERS**

It is activated at the University of Udine University, the II level Master Degree in “Innovation in Physics Education and Guidance” (M-IDIFO) proposed as a joint initiative of the Research Unit in Physics Education of the University of Udine and research centers. The teaching is divided into the following areas:

- MP - Modern Physics and in particular quantum and relativistic physics,
- FCCS - Physics and Communication in Contexts of Science,
- RTLM – Lab with on-line sensors and modeling,
- OR - Formative Orientation,
- S & M - Tools and Methods
- SPER - Experimental teaching at school
- FIN - Final examination (Thesis)

**CP-IDIFO COURSE FOR TEACHERS**

It is a short training course that motivates the activities of the Master M-IDIFO. The Project Work should include an activity of experimental teaching or at a distance with boys secondary school or other teachers in the presence of the master M-IDIFO. The Project Work should include an activity of experimental teaching or at a distance with boys secondary school or other teachers in the presence of the master M-IDIFO. It is a short training course that motivates the activities of the Master M-IDIFO.

**LABORATORIES AS A FORMATIVE MODULES OF CO-DESIGNED FOR TEACHERS AND STUDENTS**

The labs are based on the involvement of teachers in the co-design of learning interventions, based on the exploration of problem situations, the implementation of these interventions, with the monitoring of students' learning personally engaged in activities (hands-on and minds-on) based on didactical approaches and strategies and qualified by extensive evaluations in experimental research on active learning. They differ in the duration of the preparatory stages of experimentation and evaluation are developed on different themes of physics both classical and modern physics.

**PLS LABORATORIES**

Teaching labs - 6-10 h of general education and characterizing 4-6 h of instructional design, 16-18 h of experiments in the classroom with students, 4-6 h of data analysis and processing;

LabIDIFO4 - Formative Labs - 14 hours of general education and characterizing, 5 hours of instructional design, 6 hours of experimentation in the classroom with students and 5 h of data analysis and processing.

The following types labs have shorter length to suit individual interventions with the boys:

LabEXPLO - Explorative actions of an operational with students in special and informal contexts (exhibitions, workshops dedicated) 3-6 hours

CLUE on Modern Physics of Operative Exploration – Activities with students of concept exploration for basic school (3-5 ore).

Each module / Laboratory is an educational offer usable independently and integrated into courses Postgraduate (CP-IDIFO) and Master (M-IDIFO) interrupted. Each location offers modules cooperating laboratory in charge of their project or this project for PLS paths and IDIFO4 activities are in three areas:

- In presence Workshops conducted in Friuli Venezia Giulia and in the other sites cooperating
- Teacher education at a distance and in the presence by offering the courses of the Master M-IDIFO (156 credits of which 138 cfu 90 cfu in the presence of distance), the CP-IDIFO and the individual modules of the educational proposal, which can be attended as auditors, the National Summer School for Talents (SENT) aimed at students of classes IV and V of the upper secondary school.

**SUMMER SCHOOL FOR STUDENTS OF MODERN PHYSICS**

The Summer School on Modern Physics was organized by PERG of the University of Udine from 23 to 28 June 2013, in order to offer to excellent students attending courses on topics of Electromagnetism and Modern Physics, Quantum Mechanics which, Condensed Matter Physics and Superconductivity.

The activities of the Summer School include conferences and seminars, taught by teachers at universities and research institutions collaborating on the project IDIFO4 and experts in the field of teaching of modern physics in didactics of physics, in condensed matter physics, in quantum mechanics, in electromagnetic phenomena, in acoustics and in didactic experimental lab - activities of numerical simulations, modeling and problem solving.

The activities will include advanced laboratory experiments: Diffraction and Polarization optics; Mass and energy in classical and modern physics; speed of light, resistivity as a function of 1 superconductors, metals and semiconductors; Phenomenology of superconductivity, EMI induction; Hall effect; Experiment by Frank and Hertz; ratio e/m for the electron; Ramsauer effect.

**LOANS TO SCHOOLS TEACHING KIT**

- The exhibit GEI, consisting of over 250 copies.
- Phenomenology of laser phenomena; D) fluids in balance
- Experiments that allow you to explore birefringent crystals.
- They will be made available to schools 20 kit.
- Fluids in balance
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