

Action-research Teacher Training Course for in-service Chemistry teachers using a Flipped Classroom- IBSE approach.

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INTRODUCTION

The course was designed for Natural Science teachers, most of whom are not chemistry graduates and therefore have difficulty in examining chemical concepts more closely and in adopting a cross-sectoral approach involving the general scientific context. All this has a negative impact on pupils' skills and on their motivation for enrolling in Chemistry university courses.

Moreover, questions regarding safety and waste management also hinder the most willing teachers in their effort to plan and conduct experiments in a real science laboratory environment.

The course, hosted by University of Camerino's Moodle platform and funded by the Scientific Degrees National Plan, provided high school teachers in the provinces of Ancona, Ascoli Piceno and Macerata (Marche Region) with multimedia materials as well as technical and methodological skills for their training and use in class.

AN ACTION RESEARCH PROJECT BASED ON A FLIPPED CLASSROOM - IBSE APPROACH

During the course, two teachers designed an action-research pathway on the reactivity of metals involving two third-grade classes (Applied Sciences option). A combined Flipped Classroom and IBSE approach was adopted following the 5 E model.

In the Explore phase, the videos and forms on the UNICAM Moodle platform and a virtual lab were used and inserted in an EDMODO virtual class to offer students the opportunity to study at home.

The action-research was constantly monitored and, at the end, questionnaires were administered to the pupils and teachers to assess their degree of satisfaction with the specific training received and with the experimentation carried out with the pupils.



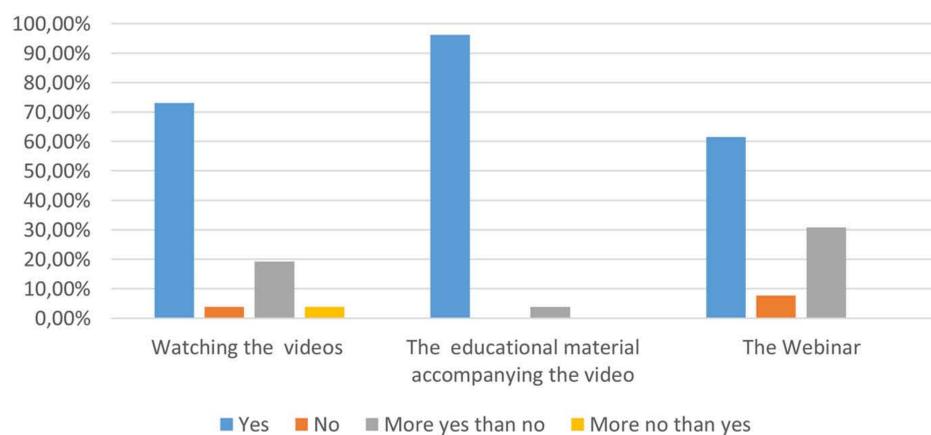
THE "ON-LINE CHEMICAL EXPERIMENTS: INSTRUCTION FOR USE" COURSE

TEACHER-PARTICIPANTS 39
SCHOOLS INVOLVED IN THE PROJECT: 12
IN-CLASS TIME: 5 hrs
DISTANCE TRAINING: 10 hrs
INDIVIDUAL STUDY: 10 hrs
1 INTRODUCTORY SEMINAR ON THE USE OF THE PLATFORM AND ON THE USE OF VIDEOS IN TEACHING
1 FINAL WEBINAR ON NEW METHODOLOGICAL APPROACHES TO CHEMISTRY EXPERIMENTAL TEACHING
12 CHEMISTRY EXPERIMENTS VIDEOS 6 OF WHICH IN ENGLISH
EXPERIMENT FACT SHEETS (ITALIAN AND ENGLISH)
THEORY REFRESHERS
EXAMPLE OF PROBLEM SOLVING
REAL LIFE CONNECTIONS, TECHNICAL APPLICATIONS, CROSS-SECTORAL APPLICATION OF CONCEPTS
EVALUATION AND SELF-ASSESSMENT OF ACQUIRED COMPETENCES TEST
1 ACTION-RESEARCH PROJECT BY 2 TEACHERS USING FLIPPED CLASSROOM-IBSE APPROACH

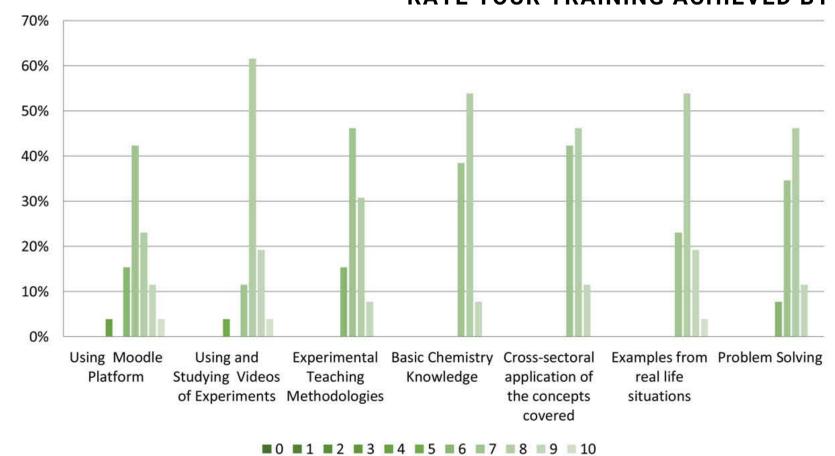


MONITORING THE COURSE

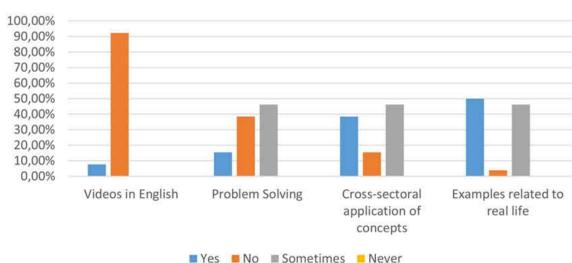
HOW USEFUL THE FOLLOWING HAVE BEEN FOR YOUR TRAINING



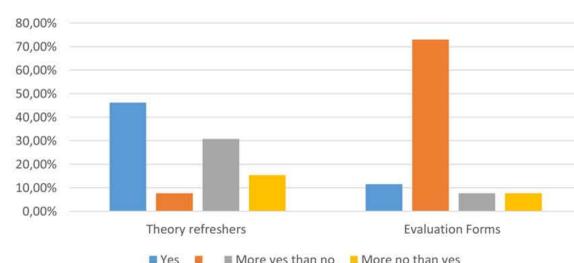
RATE YOUR TRAINING ACHIEVED BY



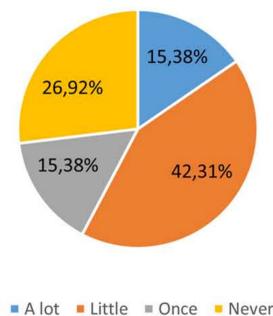
HAVE YOU USED IN YOUR LESSONS



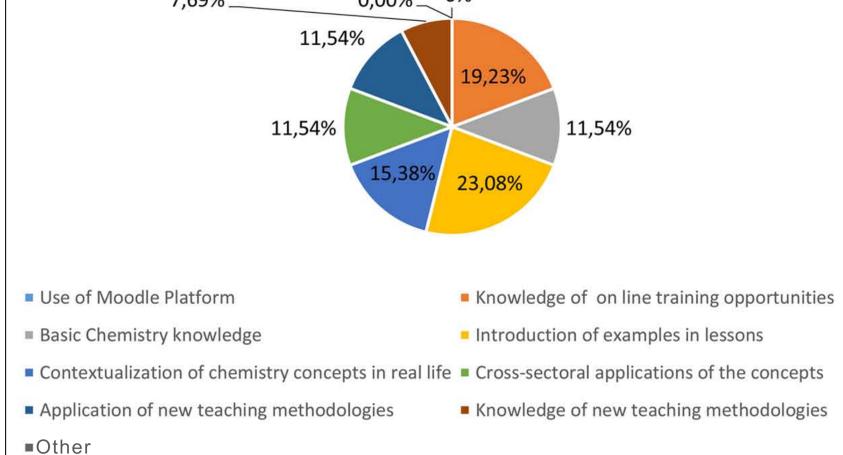
HAVE YOU USED IN YOUR LESSONS



HAVE YOU USED VIDEOS IN YOUR LESSONS



COMPETENCE UPGRADE



CONCLUSIONS

An analysis of the questionnaire's results shows that teachers found the videos particularly useful and interesting. They deem that most of them (92%) are relevant to classroom educational plans and have prompted them to carry out experiments in the Chemistry Lab.

The videos were used by teachers for their training and many (73%) showed them in class as a starting point before introducing an analytical law or as validation after studying an analytical law. Of these, 42.31% teachers included video-related questions in their tests. The opinion regarding the usefulness and correctness of the related didactic material is very positive. The videos (8%) and the materials (31%) in English were little used, also because of inadequate language skills.

Among the topics discussed in the webinar, problem solving in the lab, the creation of authentic tests and the evaluation methods of experimental activities were considered particularly engaging and deserving a follow-up.

The course has been useful as a stimulus for the teachers' active reflection on the benefits derived from adopting an experimental approach to the teaching of Chemistry, for the acquisition of experimental procedures and for the possibility of replacing the "real" Chemistry Lab, in the absence of reagents or suitable equipment. Conversely, lack of familiarity with the Moodle platform, inadequate Internet connection and, in some cases, the impossibility of repeating the experiment in a laboratory with the consequence of having to resort to a virtual version, were perceived as critical issues.

The teachers asked to widen the range of videos available, in particular with the introduction of topics concerning organic chemistry, and to make them accessible to pupils as well.

For next year it is expected that all teachers will receive training in the Flipped Classroom methodology and in the IBSE approach applied to action research and that new experimental teaching pathways will be introduced, as requested.