

INNOVATIVE PATH OF TEACHING / LEARNING DURING THE ACTIVE FORMATIVE TRAINING (TFA) IN AN ITALIAN HIGHER SECONDARY SCHOOL

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ABSTRACT

The training active (TFA), is a preparation for teaching, which lasts one year, set up by the Italian Ministry of Education to obtain the qualification for teaching in the lower and higher secondary school. The authors, the first one as a tutor and the second one as a trainee, report here the didactic activity held in the Institute of Higher Education of San Giovanni in Fiore in Italy. In particular, the choice made was to experiment, with ideas adopted by the school adhering to the movement of Educational Vanguards [1], a movement of 191 Italian schools [2], which aim to innovate school's rethinking in terms of Time, Space and Didactics.

Keywords: TFA, Disciplinary Laboratory Classroom, Spaced-Learning.

INTRODUCTION

The traineeship, (TFA) [3], has the target to allow the trainee to be directly in contact with the world of school before having the qualification. Therefore, it is an activity of orientation and training conducted in an Italian school, which allows knowing how work is conducted. An educational opportunity in which you can experience the teaching methods needed for the teaching profession. At the same time, you can learn the school's organization, its functioning, and the relationship between the different figures that operate within it. During this time the trainee, uses a series of operational tools such as observation, comparison, diagnosis, the approach and problem solving, the activation of rational criticism and the ability to make decisions.

The training is a period of experience in the school, where the trainee acquires professional practice under the guidance of a tutor who supports him in its work. The course of training is an activity aimed at supporting the process of integration between the knowledge and expertise relating to all aspects needed to the teacher: pedagogical, educational and disciplinary ones, acquired theoretically. It deals with a cognitive apprenticeship, a reflective practice of learning from experience, application and verification of theoretical knowledge. You can configure training as an activity centered on the acquisition of the professional role of the teacher, to be carried out under the responsibility of the tutor involved in monitoring and evaluation. In summary, the training is:

- An important learning experience;
- An opportunity to apply and verify models and conceptual schemes to operational reality of the schools;
- An opportunity to gather information material useful for the preparation of the thesis;
- An effective way to deeply understand the logic of functioning of educational institutions;
- A good opportunity to establish valuable professional relationships.

In particular, for what concerns teaching: Chemistry and Chemical Technologies, the author has searched, in the context of the internship, to bring together two different ways of

conceiving the laboratory. The first one as a space-time verification of the laws, to acquire ability of the measure; the second one, as a fertile ground for developing critical thinking, able to fuse manual skills with the mental ones, in order to create the right synergies between thinking and acting, to share theories and concepts with the development and the experimental procedure.

METHODOLOGY

Disciplinary laboratory classroom

The Italian school can boast a consolidated route of methodological innovation through the introduction of ICT (Information and Communications Technology) in teaching practice. The interactive whiteboard has inaugurated the scenery of technology in the classroom, opening it to the use of netbook or tablet. However, when you are using ICT, the temporal dimension of the lesson in class, could be compromised and the physical space of the classroom can result too rigid and standardized.

The fluidity of communication processes, enabled by ICT, collides with the physical environments that are inadequate because they are not adapted to the objectives. To overcome this obstacle you can utilize disciplinary laboratory classrooms [4]. They are a new class environment of teaching. Classroom built to conscious use of ICT and interactive whiteboard, new teaching methods as for example the "Spaced Learning". The traditional configuration of the classrooms, where students live most of their school time, gives an environment in which the student develops a laboratorial approach, by using specific tools. Observing, collecting data, analyzing, experimenting, manipulating, are just some of the few activities; they are, in fact, instruments and equipment that can enable this approach to each disciplinary field.

The disciplinary laboratory classroom is also a space where you can experiment and develop skills, especially provided for a specific and appropriate work setting to the discipline. For instance: chemistry teachers design a setting that integrates the traditional laboratory instruments with technological devices, such as digital sensors and software for processing acquired data. The teacher has no longer, within its service, an undifferentiated environment to share with colleagues of other subjects, because he can also customize their own workspace, materials, books, instruments, devices, software, etc. The specialization of the classroom involves the assignment of class to the teacher: the teacher remains in the classroom while students move from one class to another, depending on the discipline.

Spaced Learning

The "Spaced learning" is a new teaching method developed by the School of Monkseaton, characterized by a peculiarity: the structured repetition, separated from short intervals, which help to incorporate the information into long-term memory [5]. In practice, focusing too much without pausing is not productive! It takes at least 10 minutes between stimulation and the next one in order to determine a path of construction in the long-term memory; Paul Kelley has proposed the Spaced Learning for the first time at Monkseaton High School in Northern England.

The "Spaced learning» is a particular articulation of the lesson time [6], which includes three lessons separated by two breaks of 10 minutes, as follows:

1. Introduction of the key arguments;

2. Recall of key arguments and strong interaction with students, implicated in the development of the active material and inputs previously proposed;
3. Application of key arguments from the student in order to demonstrate the understanding.

The easiest way to understand these three phases is when the former focuses on the presentation of information, the second focuses on recall information, and the third focuses on the understanding of information. We have asked students to demonstrate what they had acquired from shared content in the first intervals, applying the knowledge in contexts of problem. The teacher should not guide; in this session, the teacher can move among the students and test their understanding of the content of the lesson. The teacher finally verify the actual understanding of the lesson content from students and eventually makes a recovery phase and individualized realignment or makes use of the peer-tutoring.

Peer tutoring (or peer-education) [7], is a didactic methodology through which more confident and mature students help those who need support and longer times for learning. The teacher shows the necessary supervision of the process; this strategy should enable the faster student to repeat concepts, while the student who listens, should acquire them with a more familiar vocabulary and possibly a less formal one, because the dynamics of the relationship between equals is simpler.

RESULTS AND DISCUSSION

The main obstacle, which we teachers often encounter in teaching chemical sciences, is the limited available time to deal with throughout the lesson in class and the concern that all students sincerely transpose the introduced concepts. The choice of a didactic methodology as effective as the spaced-learning allows to optimize this time and to obtain satisfactory results. Therefore, the authors have constructed a didactic path for students of the fifth year of the "Environmental Biotechnology" articulation. The unit of learning identified as "The wastewater treatment", involves simultaneously specific knowledge of chemistry (general, organic and analytical) microbiology and technologies. Before starting the experimental program, the students were informed about the teaching methods used (the spaced-learning) and the use of an appropriate classroom to undertake this path (the disciplinary classroom). Once clarified the methods, the students were aware of the path to follow; in the meeting, students have been asked to think and to choose how to manage breaks.

The students have been divided in three groups: they have worked separately and then interact in the closing phase in order to promote collaborative learning. In this way, we have tried to share the different experiences among students. In the first part, we have introduced through slides, specially prepared, the concepts related to the topic. In the second part, we have proposed a laboratorial activity for the experimental determination of the BOD "Biochemical Oxygen Demand": the experiment has been prepared and carried out, using laboratory equipment by collecting, on a sample of water from dairy processing in earlier days, the parameter values (see table 1).

After the second break, we have concluded the lesson with an educational cooperative learning as already announced that dealt with the analysis and interpretation of experimental data. The delivery was the following:

1. "For an industrial wastewater (dairy) the following values of BOD have been detected in the table, you are asked to:
2. Plot the data BOD-time t in days.

3. What can you say about the behavior of the BOD in time t ?
4. Speaking of values and in particular to BOD_5 and BOD_{20} what can you say about the biodegradability of the wastewater?
5. Analyze the curve of BOD sections ranging from 5-10 days, 10-15gg, and 15-20gg. What can you say about the rate of oxygen loss and the activity of degradation of organic matter by microorganisms? Do you observe a different trend from the ideal?

The work therefore was:

- Plot the BOD in function of time (see figure 1).
- Identify through the graphic data related to the type of wastewater assigned. This allows you to understand the diversity of the waste but also to acknowledge the characteristics of biodegradability obtained as a function of BOD.

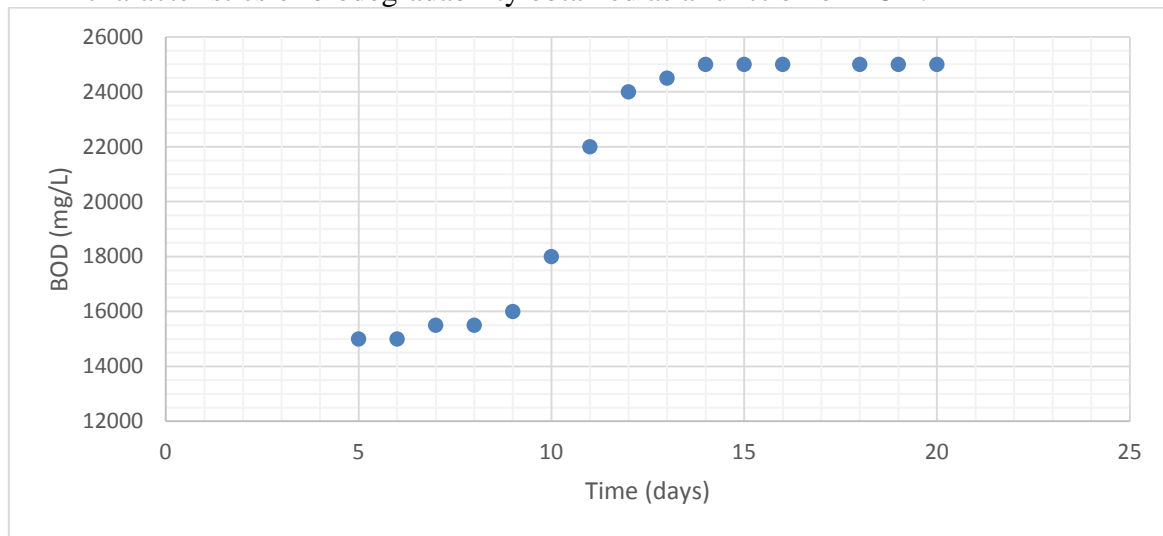


Figure 1 The behavior of BOD vs time for an industrial wastewater (dairy).

The sharing of the results was the last phase of the teaching activity; in particular, we have asked to compare the characteristics of the wastewater studied experimentally with the trends of wastewater with different characteristics, civil wastewater (see Figures 2) and mixed wastewater (see Figure 3). Each group has drawn up its conclusions by sharing the analysis performed.

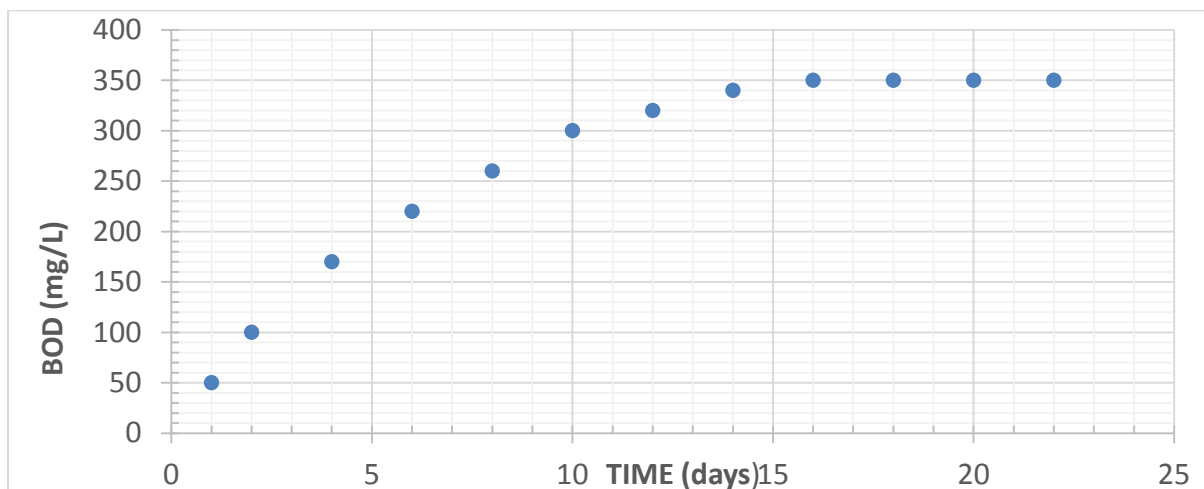


Figure 2. The behavior of BOD vs time for a civil wastewater

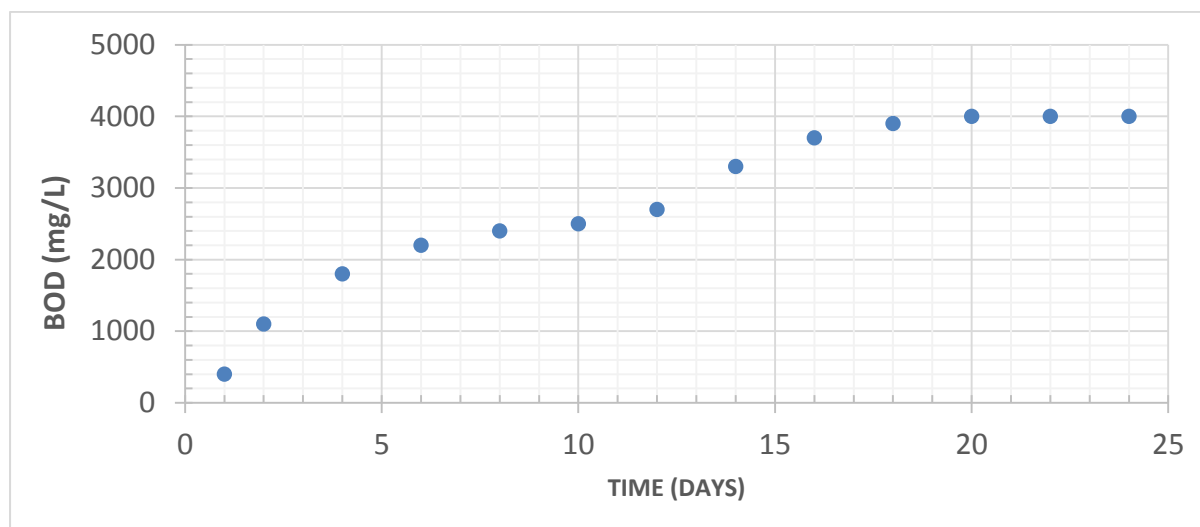


Figure 3. The behavior of BOD vs time for a mixed wastewater

Finally, we evaluated students, both individually and as groups, to verify in real time the understanding of the proposed topics in the slides.

CONCLUSIONS

During a training active, (TFA), as a preparation for teaching, we have implemented a process of learning/teaching. The author is the referent for his school for the realization of some of the ideas of the Educational Vanguardists manifest, a movement of innovation that leads to system the most significant transformations of the organizational and teaching of the Italian school. The activity proposed is part of an apprenticeship developed by Dr. Checchetti during the “Professione Formatore in Didattica delle Scienze” Master, which takes place at the University of Calabria.

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