

Teachers are feeling an uprising need to face the everyday problems of learning they observe in their classes: that's why they are making use of didactic strategies suitable with the context. To a former kind of learning, is counterpoised a significant one, in which the focus is put onto the student, on its previous knowledge and on its motivation to learn. At the same time, in a complex and globalized world, creativity, lateral thinking and enterprising spirit are being increasingly appreciated compared to more classical specific knowledges. An experience led in a third year class of secondary school is here reported, where the teacher has proposed a focus on sustainable food and hydro/ecological footprint of everyone's diet. Developing sensitivity and interest towards environmental issues is a priority for teenagers to become responsible citizens of tomorrow. These complex problems must be faced resorting to innovative didactic strategies, which make the student architect of his own learning by helping him to construct a life-linked meaning of the knowledge through assimilation mechanisms: we believe that authentic assignments and concept maps would be a valid tool to help them reaching this ambitious goal.

**1. Introduction**

In a similar context, building up concept maps in order to accomplish an authentic assignment, represents an highly stimulating didactic strategy to the students and gives them the opportunity of interpreting, organizing and restructuring the information coming from different environments of their lives (classroom, home, television, internet): we believe that this process is fundamental for them to face new situations autonomously.

**2. Concept maps help significant learning (J.D. Novak)**

Significant learning can be simplified by the use of concept maps (both drawn with a pen or using a specific software): they represent a powerful cognitive tool, which support students find out key ideas and organize their knowledge. On a first stage scholars make their own maps, which will later be shared with the other group members. After the debate phase, they all start working on group concept maps. The comparison phase is one of the most important since students are required to make a deal, realizing a map which would be representative of the cognitive styles of the whole group. Verbal communication has an important role: it allows the language to improve, becoming more and more specific and well structured.

**3. Technologies and significant learning**

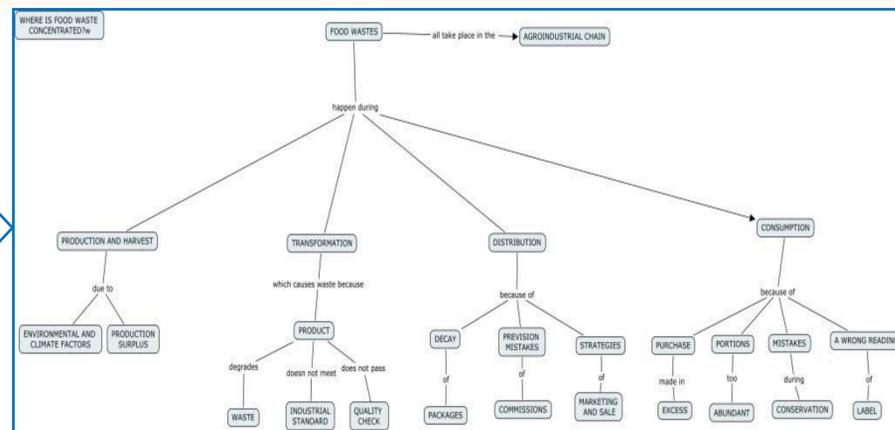
Technologies can sometimes be a support for significant learning: they are not used as a distribution vehicle of contents but as cognitive, collaborative, construction and sharing tools or as representation of knowledge tools. Such kind of support is given by CmapTools (developed by the Institute for Human and Machine Cognition of the Florida University) which is provided to students since the first years of primary school. They build group concept maps using a versatile device such iPad is: they are also able to work in a cooperative way at home, using Cmap Cloud, specifically created by the teacher. In this way everybody (students and teacher) can archive and share their concept maps anytime, anywhere and from any device they're working with.



Figure 1-2. Students working individually or divided into groups, storing their maps on the Clouds. At home, they will then download, edit and share them: everything is tracked and available to the teacher.



Figure 3. Example of a concept map, realised in group, shared by different groups simultaneously and stored on the Cloud.



**An example of authentic assignment**

The goal of an authentic assignment is to test student's ability in real (or almost real) operative contexts, testing their cognitive and metacognitive competences.

**Introduction**

Every year in Italy, up to 8 millions of tons of food are thrown away: this amount includes still edible products that claimed energy, water and natural resources to be transformed and packed for the supply. Since this process takes place mainly in our houses, we believe that everybody should revise its own life style, for instance by purchasing food in a responsible way.

**The assignment**

"During the *International School Week of Cooperation* you have been asked to organize a public event, to attract children's and adults' interest on sustainable nutrition and food waste themes. You will now work individually and in groups: on every stage you will have to build a concept map that will help you defining the ideas you have received and link them together. Our school have made computers and iPads available to you, which you can use to realize presentations, multimedia games and concept maps".

**Ways of working**

Class is firstly divided into six cooperative groups and a role is assigned to every member. They will have to work out how to organize the event day and represent their project idea onto a group concept map. All the maps have then been posted on the classroom's walls and explained by the respective group: this phase have been followed by a debate, aimed to get to a final concept map, which represented the core of the entire event. Seven cooperative groups are now formed, everyone with different assignments to accomplish.

**Resources**

Every group is furnished with a short list of two/three websites indicating which information they were supposed to look for and where to find them.

**Evaluation**

Every group is equipped with:

- Student auto-evaluation questionnaire
- Group auto-evaluation questionnaire
- Evaluation section, in which every ability is verified using one of the following indexes (the applicable score ranged from 1 to 4):

- Organization and team work
- Participation and involvement
- Information seeking
- Final product elaboration

**Conclusion**

All the maps realized for this project have been exhibited in a showroom. Using concept maps to tell and explain the different stages of the experience has an high meta-cognitive value. The authentic assignment provided to the class is real, strictly linked to reality. The public event actually took place, turning out to be a real success in terms of participation and visitors' interest.

**The authentic assignment**

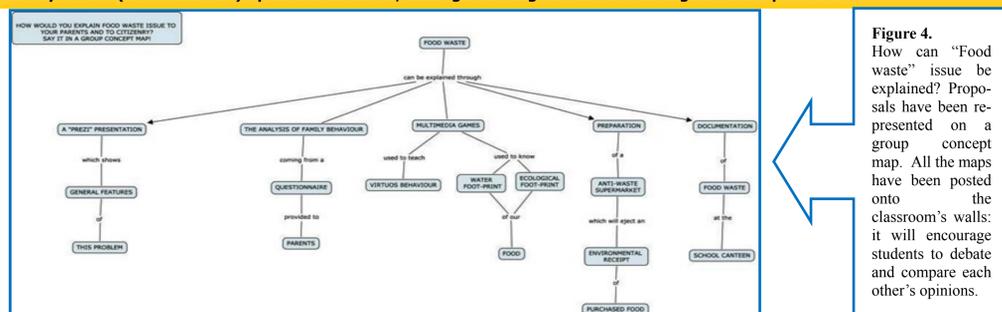


Figure 4. How can "Food waste" issue be explained? Proposals have been represented on a group concept map. All the maps have been posted onto the classroom's walls: it will encourage students to debate and compare each other's opinions.

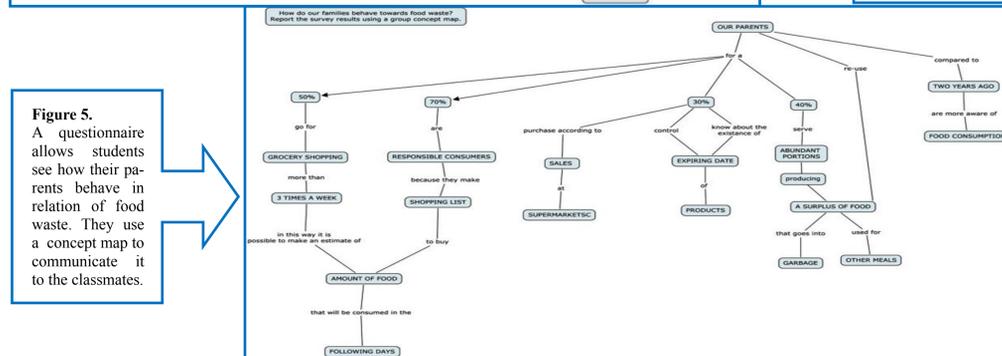


Figure 5. A questionnaire allows students see how their parents behave in relation of food waste. They use a concept map to communicate it to the classmates.

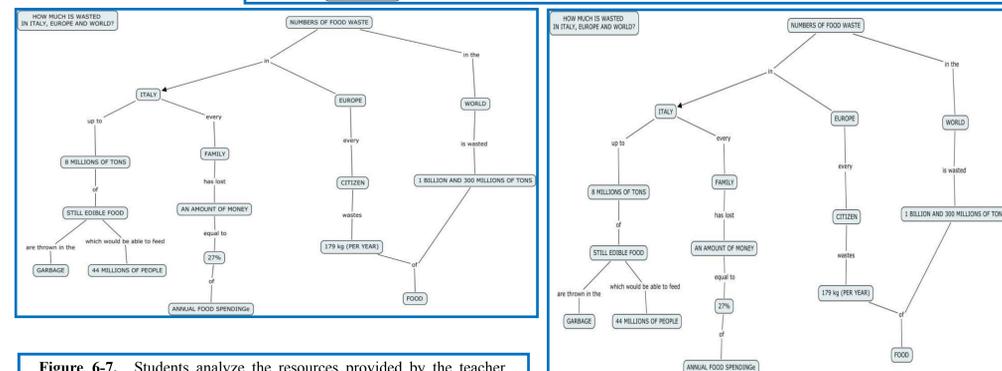


Figure 6-7. Students analyze the resources provided by the teacher, compare themselves to each other and build concept maps to organize their knowledges

**The teacher's role**

The students' behaviour during planning and problem solving stages is carefully observed by the teacher, which eventually makes an evaluation of everyone's abilities and, at the end of the work:

1. Considers auto-evaluation questionnaires (both individual and common ones);
2. Evaluates single groups through the "Evaluation section";
3. Encourages students to meditate on the work done, on gained knowledges and on the way they actually cooperated.

**Analysis of the authentic assignment evaluation**

**Summary**

**Individual auto-evaluation of students**

- 90% of students prefer carrying out group activities rather than in couple (10%);

**Group auto-evaluation**

- Most of the students have judged the work both interesting and demanding;
- The materials and amount of time provided have been considered sufficient to carry out the work;
- Decision making and collaboration turned out to be the easiest social abilities to respect;

**Evaluation section**

Evaluation section is helpful to measure and check the quality of the performance that teacher elaborates and introduces to the students.

Carrying out an authentic assignment and building up concept maps certainly help students to reach their educational success. Most qualifying elements are:

1. Cooperative environment of learning; concept maps and authentic assignment take place in a cooperative learning environment;
2. Solving real problems motivates students, since they are required to put into practice their creative abilities and critical thought;
3. Consciousness of the students in terms of what they know and how they still need to grow as a student and as a human being. Students are also aware of the reasons which brought them to receive a certain education and how they have had it.
4. The students have achieved a self-regulation of the learning process, since they have understood the importance of the knowledge and the uselessness of a coercive approach.