PROFILES

Professional Reflection-Oriented Focus on Inquiry-based Learning and Education through Science

Biology ... What a Pizza!!!

A grade 9-10 chemistry module on
biology and biochemistry

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Abstract

This activity promotes observation and reflection skills of students who are encouraged to deal with a practical problem (how to cook a good pizza) by using an inquiry scientific methodology and an experimental approach. We also want to attract young people to the study of chemistry through everyday life phenomena, overcoming the hostility that often makes difficult the learning of complex concepts. We are sure that there can be no learning without the motivation.

Introduction

Pizza is a food very popular among teenagers and, together with pasta, is a typical food in Italian gastronomy. The aim of this work is to start from a known food to analyze, from a scientific point of view, the chemical transformations that take place during its preparation. Students are also encouraged to reflect on the parameters that can affect the final product.

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Overall Objectives/Competencies

- To use the inquiry scientific method to study a phenomenon (the leavening);
- To identify the parameters that influence the transformation in a complex phenomenon;
- To study the effects of some parameters, keeping constant the others, identifying the most suitable experimental test to verify the initial hypotheses

Curriculum content

Fermentation, chemical reactions

Methodology

Problem solving, cooperative-learning, web-quest, experimental activity, guided tours.

Means

Computer lab, science laboratory, a space dedicated to the preparation and cooking of the pizza (the kitchen).

Key concepts

The alcoholic fermentation, the properties of the flour, the yeast.

Type of activity

Research team-work (web-quest, cooperative learning), laboratory experiments, final production

Anticipated time:

- Presentation, problematization and research work: 2 hours for each of the three phases;
- analysis of the phenomenon, conceptualization, cognitive map and flow chart: 1 hour;
- experimental work in the laboratory, observations (qualitative inquiry), data collection (quantitative inquiry), photographic documentation, written report (4 hours);
- visit to a laboratory specialized in the analysis of meal ;
- preparation of the pizza (in a Hotel Management School or at home individually) and preparation of an assessment sheet of the pizza (color, cooking, taste): 3 hours;
- final comparison, final report of the groups: 3 hours.

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In-depth study and subjects involved

- The origin and diffusion of the pizza (**food history**)
- The European quality seals, local products and production rules (law, economics): from February 5, 2010 the Neapolitan pizza has been designated the brand TSG (traditional specialty guaranteed) from the EU, in 2011 it was presented by Italy as candidate for the award of the UNESCO Intangible Heritage of humanity.
- Cellular metabolism: comparison of alcoholic, lactic and propionic fermentation (**biology**);
- The classification of organisms: yeast (**biology**);
- Role of organic macromolecules in the leavening of the dough: interactions of gliadin and glutenin proteins, structure and function of proteins, role of lipids, the reaction of caramelization, the Maillard reaction (biochemistry);
- Sensory evaluation and the panel test: how the sense organs and the brain reprocess the information (**biology, anatomy and physiology**);
- Gluten intolerance (celiac disease): Causes, effects, diagnosis (**biology, physiology and pathology**)
- The pizza in the world (the capital of the pizza is Sao Paulo where there are 6000 restaurants that cook pizza!), diffusion and different tastes of an Italian product (pizza by the meter, pizza cone, sweet pizza, pizza with ice cream ...) (**foreign languages**)
- The pizza and franchising (**economy and law**).

Sections included		
1.	Student activities	• map of the ideas • the dough • the leavening • the cookin
2.	Teaching guide	Suggests a teaching approach: theoretical study and laboratory activity
3.	Assessment	Gives suggested formative assessment strategies
4. 5. 6.	Teacher notes	A. The saccharomyces B. the flour C. the leavening

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7.		D. the cooking
8	Planning of activities	

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