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Integrating Food Education in Everyday Life of Young People

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Abstract

Nutrition and food education measures should be applied starting from early education, in order to encourage and to sustain the adoption of healthy and sustainable diets, which will materialize in the citizens' quality of life and society welfare. These measures should primarily be targeted at students both during the formal and informal activities. Theoretical aspects learned in the framework of the lessons in classrooms can be well integrated in practical educational approaches, based on meaningful experiences, which increases overall effectiveness. Science snacks laboratories and Cooking laboratories were proposed to the primary and secondary level students, in close cooperation with the higher education students, with the aim to: achieve practical skills; better understand what means "nutrients" and how they influence the people life; urge them to think every day life on their dietary choices; better understand the messages of the label related to a certain food; sustain the transgenerational education and improve the communication and the networks creation among the young people; give the first information concerning the entrepreneurship in food production as viable solution for the family prosperity in economical and work satisfaction terms; to draw them near to a career in science and technique. The production of food was the response of the Needs Analysis, being a request of the students from all the six countries of the EduforHealth partnership. The young people enthusiasm and the knowledge acquired were to a great extent, encouraging the teachers to sustain the increasing of the number of practical activities in school education. The particular case of implementation in Romania is described below.

Keywords: Food, nutrition, Health Education, EduforHealth project.

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1. Nutrition Education and its role in the school curricula

As part of the actual changes in the Romanian education, *Health Education* is going to play an important role, being included in the structure of the primary and secondary school curricula. In this framework, *Food Science (Nutrition) Education* will have its key-place, due to the fact that teaching nutrition to young children is an important channel to develop healthy eating habits. In fact, “*eating behavior* learned at school may play a significant role in ensuring that ‘health-enhancing’ eating behavior is practiced into adulthood” (Drummond, 2010).

As proper didactic methods, using interactive exercises and live demonstrations with children in the audience, it is possible “to provide simple explanations of the scientific principles” related to food and what happens when we eat it (Rowat, Rosenberg, Hollar, & Stone, 2010).

In our demarche, students ages 9 and older, together with their teachers, higher education students and teachers from Valahia University Targoviste, participated in the morning activities designed in the frame of the special week (national programme): “*School in another way: To know more, to be better!*”.

1.1. Sparking curiosity about food

The students were asked different general aspects about food, and what people needs from the nutritional point of view. Thus, in the beginning they were eager to connect the term “*food*” with the term “*life*”, and moreover to justify their answers. They appreciated that students need to eat in order to be healthy, to grow, to be able to play and learn. To the question: “*What kind of food do you know?*”, the students made a classification according to food origin, in animal food products and vegetable food products. A lot of examples from each category accompanied the previous response. With a view to encourage and to involve each child in this activity, the schoolmistress nominated successively the students to answer. *Milk, honey, eggs, meat, cheese* were identified by students as animal food products, while different kind of *fruits, cereals, vegetables* and *legumes* as food by vegetal origin.

The introductory session continued so that to build the scientific part of the activity, teacher asking students about their habits in relationship with the daily meals. Breakfast was mentioned by all the students as the first and very important moment of the day in the abovementioned context, due to the indispensable energy intake, mostly if the meal is well-balanced. “*What do you like to eat at breakfast time?*” was the question to whom the general answer was “*cereals*” in a great measure. Chocolate-based cereals are in the

top of the children's preferences, due to its "good taste". Few students answered that they like to eat fruits or to drink fruit juices, home-made by their mother in the morning. The sensorial attributes of food (taste, color, smell, flavor, shape and so on) were identified as being important for choosing the main "pieces" of the breakfast. Pleasantly surprising, the higher education participants found out that the students justified their preference for a food or another at the breakfast time, adding also information concerning the organoleptic profile or (in several cases) the chemical composition. *Carbohydrates* and *vitamins* were the key terms of the debated topic. At that moment, the teacher decided that the core point of the lesson was reached from the scientific point of view - the bridge to the major players in *Food Science Education* being built!

Thus, in the next step, the students were asked about the origin of the carbohydrates.

1.2. Carbohydrates in food

"Are they good or are they bad, are they used direct in the digestion process, are different the needs of the people concerning the carbohydrates intake?" were the main questions in discussion. The schoolmistress remembered to the students a biology class and their voices were active, expressing the keyword: "photosynthesis"!

At this moment, a camera was used to project and demonstrate the phenomena to the auditorium. Fruits and vegetables by different colors, bought from the local grocery were also used in the frame of this activity. The students were familiar that the plant converts small molecules (water and carbon dioxide), using the energy from the sun, into larger ones, named sugars. Figure 1 shows the core image used in the discussion held with the students, able to begin one of the major scientific themes in *Food Science Education*.

The teacher explained to students that glucose is a relative small molecule by organic origin, found in free state in big amounts in fruits, giving them a sweet taste. In plants, a part of glucose is converted in another small carbohydrate, fructose, which is the sweetest sugar, found in honey for example but also accompanying glucose in grapes and other fruits. Glucose and fructose turn in sucrose, the main constituent of the sugar beet and sugarcane. The students asked why the milk is sweet, and when they found out that lactose is the sugar responsible for this specific feature, faster connected the term with a health disorder namely "lactose intolerance". The entire auditorium was familiar with the disease manifestations, this moment

of the lecture being appropriate for teachers to launch a new topic, concerning the enzymes and digestion.

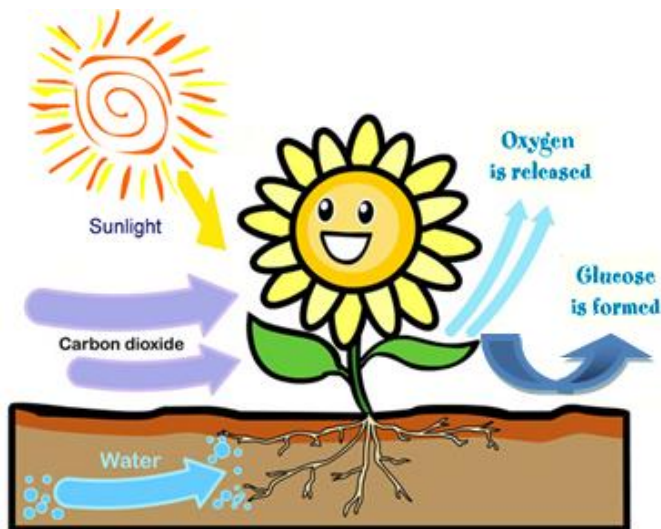


Figure 1. How sugars are formed during the photosynthesis phenomena.

The teacher informed the students that although the whole cereals are not sweet, they contain higher amount of carbohydrates known as *polysaccharides*. Repeating units or many units of saccharides are linked by specific bonds to form those constituents, in plants specific enzymes being responsible for that. Cereals are rich in starch and also in fibers (such as cellulose) if they are not intensively processed. In this part of the discussion, the teacher projected a movie to illustrate the importance of the moderate consumption of dietary fibers (both from vegetables and cereals) on intensifying the intestinal peristalsis and finally for a normal digestion.

The teacher underlined that in the living world the enzymes are responsible both for cross linking and network formation but also for the cleavage of the long molecules into small ones in the frame of the digestion process. Using the camera, the teacher projected another presentation, in order to explain in everybody's language the action of the hydrolytic enzymes which act as scissors (figure 2).

The students asked how many carbohydrates should be ingested per day by people and how they can calculate this intake. They found out that the need of carbohydrates is about 4-5 g/kg of body daily, and it depends, directly, by the intensity of the energy consumption.

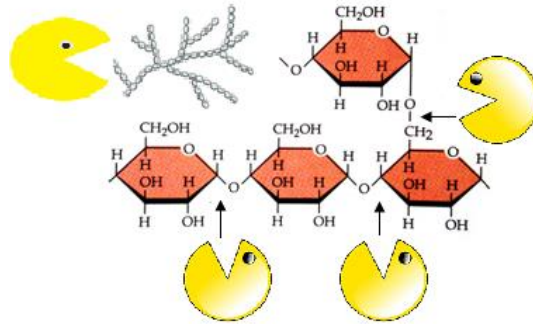


Figure 2. The starch degradation under the enzymes action

1.3. Vitamins in food

The students identified fruits, vegetables and home-made juices from fruits as important sources of vitamins. Vitamin C seemed to be the most known by children 9 and 10 ages - they stated that vitamin C is very powerful on fighting with the coldness, especially in the winter season. Almost each child remembered that mother advised her/his to eat oranges, kiwi or to not avoid the lemon consumption despite its sour taste, because all have higher content of vitamin C (figure 3), important for a healthy immune system, for absorption of iron, for the calcium metabolism and so on.

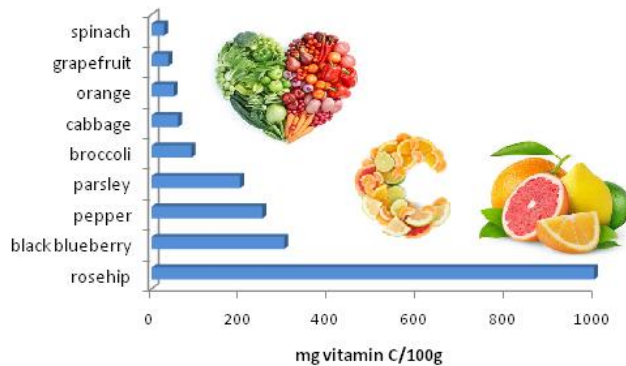


Figure 3. The content in vitamin C of some vegetable food products

Using again the camera, the teacher introduced to students and auditorium - as a whole - the miraculous world of vitamins - a class of natural organic substances with very different and complex chemical structures, which are indispensable for the normal metabolism. Thus, the children found out that the animal food products, such as milk and dairy products, liver, beef meet are rich in A and K vitamins, but also in group B

vitamins. Good sources from the last ones are also the whole cereals and the yeast brewery. Milk and dairy products, fish, eggs are rich in D vitamin, while the nuts and veggies are very good for the intake of E vitamin. The teacher advised the auditorium not only to have a balanced nutrition but also, in support to this one, to have a varied alimentation, because, generally, each food is rich in a certain vitamin.

With the aim to have a pleasant final of the meeting and to put in practice the debated players in Food Science, a practical training was proposed by involving the higher education students that acted as tutors.

1.4. Practical training with children from primary school

Fruit juices and “*the train of vegetables*” (figure 4) were the themes of the practical training who embraced the form of a *cooking laboratory*. During this activity, the teacher discussed with the children another important topic for each of us, but also for the food producers: *the hygiene*. In the above mentioned context, a lot of rules were debated and applied in practice: the hygiene of the hands and the personal hygiene as a whole, the hygiene of all the surfaces and tools coming in contact with the food, the hygiene of the room where the food is prepared, the hygiene of the packaging.



Figure 4. Results of the practical activities made by students from primary school

In the end, the children enjoyed to relish the fruit juices prepared by them, bearing in mind that it is very important to not keep this kind of food for long time in contact with the air and the light, and also to avoid drinking later the juice, due to the chemical deterioration of the good constituents discussed previously.

2. Designing the six hours' activity with students from secondary school level and higher education students

Nowadays the food industry offers to us a lot of food products, often being difficult to choose a product or another in the frame of the same category. Part of them are processed, less or more, and also enriched with additives - more or less. Often the children cannot resist to the impact of the advertising in relationship with a certain food or to the general appearance of such a food that has attractive sensorial attributes far from their natural status, asking to parents to buy them or buying oneself, without reading the label, without being interested to know about the content of the package or the bottle with drink. A lot of additives are recognized today as harmful for health, so that the art of choosing the food and the food behavior as a whole, should be an imperative of the nowadays education. Food Education in family and also in school can minimize the effect of the undesirable substances, contributing to the people wellbeing.

But how can we educate the students so that to acquire the necessary knowledge, starting from their early life and to not abdicate from a right food behavior in a society confronted by a number of transforming factors? At least an answer to this question is to provide to students some unforgettable experiences. In the area of Engineering and Life Sciences, the practical training is an important and indispensable part of education. Although ICT instruments and web based technologies are well developed, the direct contact of the learners with a certain topic cannot be designed out of the real laboratory. The laboratory component is a vital tool used to reinforce classroom based lecture concepts (Crandall, Corliss, O'Bryan, Killian, Beck, Jarvis & Clausen, 2015), while Gallego, Fortunato, Rossi, Korol & Moretton (2013), considered that "one of the fundamental aims of education is the integration of theory and practice".

According to Collins & Halverson, 2010, there is a need to provide students with methodologies, tools and skills that allow them to fruitfully live in an accelerated and complex world. This one was the starting point of the cooking laboratories designed with a view to offer to participants' not only practical skills but also a meaningful experience.

The teacher considered that it is compulsory to have a theoretical debate - 50 minutes long - before starting the activity. This part was divided in three themes: a) food labeling, b) food chain: from farm to fork approach, c) general overview on food processing.

In the beginning, the students from secondary level of education were asked if they read the label and what means different terms mentioned by producers on label, in agreement with the European law. An interactive session was opened in this way, through the intervention of the higher education students and under the careful supervision of the teacher. The students were informed that at the end of the activity they should be able to design their own label for a certain food, because they will be in the position of an entrepreneur interested to launch a new product on the market.

In the next step, the students were divided in four groups, so that each group, having as trainer a higher education teacher, to prepare bread with seeds, fresh cheese with dill, mushrooms in brine and blueberries sweetness.

The general framework of each cooking laboratory, unconcerned of the group to whom it belongs, was the minimal processing. The addition of the additives was also excluded. A video projector was used by each trainer to explain in detail the technology of the food product. The technological flow, the working parameters, the equipments needed, the characteristics of the raw materials and of the final products too, notions of hygiene and notions related to protection and security in work were described in detail by teacher. A special attention was paid to the question ‘*What it can happen if ...?*’. Thus, the students found out that the biological active food constituents will be destroyed if the heat treatment will be too intensive, the shelf life of cheese and the health of the people will be endangered if the milk is not pasteurized in a correct way, the higher concentration of salt in brine protects the firmness of the product but it is a risk factor for the health of the heart, the prolonged contact of the sugars and viscous food products with the heated surfaces lead to their deterioration and potential to the formation of some toxic compounds.

Printed materials describing step-by-step the sequences of the technological process were provided to each student. The graphics of those materials was designed so that, on the basis of diagrams and drawings, to be suggestive and useful as much as possible.

In the next stage, all the groups were actively involved in production of a certain food, as it was mentioned above. On paper, it is hard to render the delight and the satisfaction of the students who felt how from their own hands a real food product was born. Regardless if girls or boys participated to a specific activity, the interest, the curiosity and a lot of idea could be considered the drivers of this one. Different questions were launched by participants, such as: “*What is the role of the seeds in bread?*”, “*What is the intimate*

mechanism of transformation of milk in curd?”, “Are valuable the mushrooms from the nutritional point of view?”, “Why the sugar is replaced with concentrated apple juice to obtain the sweetness?”, and so on.

At the end of the activity, when the product was packed, each team designed the label, bearing in mind the previous discussion with the teacher. An example is shown in figure 5, including the nutritional information mentioned on the label located on the opposite side of the package.

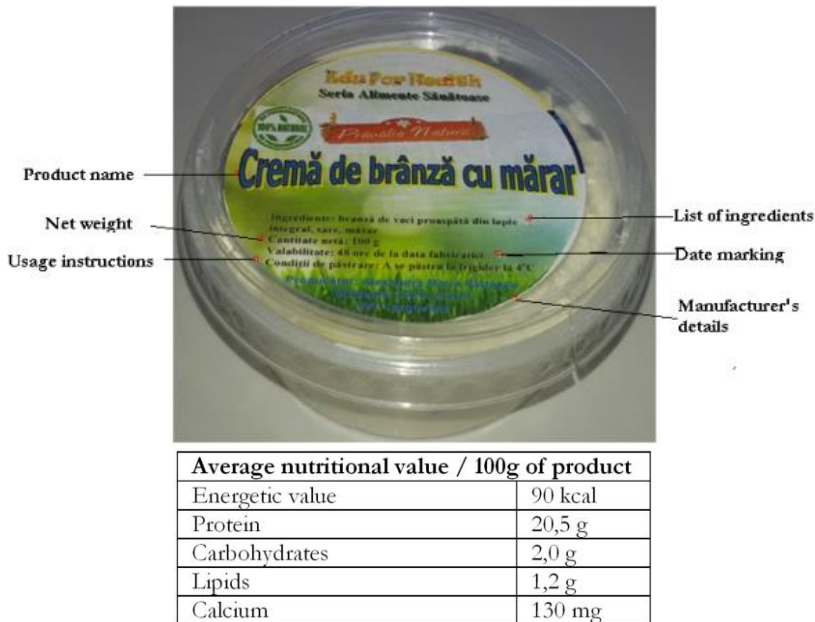


Figure 5. What is mentioned on a food label?

The highest moment of the cooking laboratory was the sensorial analysis of the obtained food products. Thus, the students found out that this one is a science in the true meaning of the world, although it seems to be easy to appreciate a certain food as *pleasant* or *unpleasant*.

3. Conclusions

Raising the level of the engagement and positive learning outcomes were the main results of the experiential learning approach that aimed to develop and to spread the knowledge in Food Science Education. Students from primary level of education proved enjoyment although the length of activity was higher for their age. For the students from the secondary level of education was observed a potential to increase their interest for higher

education studies in the field of Engineering and also for entrepreneurship in the area of food services.

Further evaluation of this approach is compulsory in order to improve and to extend this kind of activities.

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