ENERGY DRINKS AND HEART RATE

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Abstract

In education is very important, how to represent the biological problem to be more educational and how teach in classroom for everyday life. For the case study was used biology laboratory exercise Effect of Energy Drinks on Heart Rate. Out of the students' discussion, we can conclude that the topic of the impact of energy drinks on the functioning of the heart was taken more seriously and that before the consumption of different energy substances they or at least some of them would recall the results of the performed exercise. Students were motivated in interested in this laboratory exercise because it was connected with everyday life.
Key words: *biology laboratory work, competences, teaching to everyday life*.

Introduction

The goals for science education include the development of student scientific literacy, where this encompasses providing students with opportunities to develop the knowledge and skills they need to take an active role as citizens in decisions to do with science-related matters (Fensham 2008; Harlen 2010). The premise is that all students, as citizens, need science related knowledge and skills so they can participate in public debates and science-related decision-making processes. The question is how to get such knowledge and skills.

The constructivist theory of knowledge states that knowledge cannot be transferred from one person to another; it must be actively constructed by learner through interaction with the environment (Bodner, 1986). Beside appropriate environment for better learning students need motivation and emotion. Motivation and emotion are essential to education because – together – they ensure that students acquire knowledge, skills and attitudes in a meaningful way. If all classroom activities were interesting in fun, students would engage in them naturally. In this case, teachers need to be aware of how to adapt the curriculum and their teaching so that students find the classroom activities more interesting, purposeful and enjoyable, and feel more competent to do those (Boekaerts, 2013). School activities should be interesting and fun and related to everyday life that can be used in practice. Sperling and Bencze (2010) note that the knowledge and experience that students gain at school is of minimal value if it does not carry forward, both beyond the classroom and beyond the schooling years.

Example of biological laboratory work related to everyday life is the exercise Effect *of Energy Drinks on Heart Rate*. How to include motivation, emotion, developing competences (knowledge, skills and attitudes), interesting and fun related to everyday life is shown in the Figure 1.

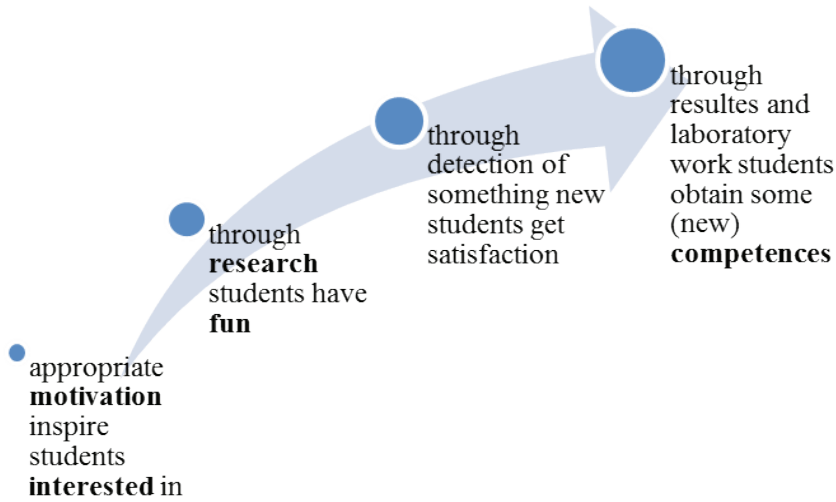

Figure 1: Steps to develop competences related to everyday life.

Such laboratory work does not need to be limited to classic achievement; it can be strengthened by the application of Information Communication Technology (ICT), where students, besides hand skills, can also develop computer competencies (Špernjak & Šorgo, 2009) for everyday life. A computer equipped with an appropriate interface for data acquisition and control allows a completely new and different dimension to education and the teaching of biology (Šorgo, 2006). By using the computer and the necessary accessories, students can do the following:

- carry out updated and more interesting current laboratory work;
- using an innovative combination of various measuring devices, benefit from new demonstrations and independent laboratory work;
- enjoy improved visualization and
- gain a better idea of laboratory results, which can then be transferred to better understanding in situations of everyday life (Špernjak, 2011).

On the biology laboratory exercise *Effect of Energy Drinks on Heart Rate* students' use Vernier interfaces and monitors to show the functioning of the heart after ingestion of energy drink, which students are likely to consume, even though they are unhealthy. Energy drinks have a beneficial effect on the cardiovascular system, while promoting blood flow to the brain. After the ingestion of energy drink, the students observed changes in measurements that can be directly observed through the slide show of the Vernier computer program.

Based on the media and various studies, one can establish that the consumption of energy drinks in Slovenia is on the rise. Slovenes, on average, drink two cans per person, while average of Europe of consuming is nine cans per person, which contains caffeine, which is extremely dangerous for the organism. The effects of energy drinks include simulation (greater concentration and alertness, more energy for work and well-being), a rapid, short-term effect that is harmful to health. Through explanation and discussion, students may not be aware of this and they are not taking warnings about the negative health consequences seriously, but wish to experience and witness what they are being advised against by the adults (Špernjak, 2011).

The aim of research through the laboratory exercise *Effect of Energy Drinks on Heart Rate* was represent why is important, how to teach the biological problem to be more educational and how teach in classroom for everyday life with opportunities to develop the knowledge and skills they need to take an active role as citizens in decisions to do with science-related matters.

Methodology of Research

The biology laboratory exercise *Effect of Energy Drinks on Heart Rate* was performed by students with Vernier interfaces and sensors. The study included two classes with 37 students who were 15 years of age: 16 (43.2%) boys and 21 (56.8%) girls of primary school Rada Robiča Limbuš.

The first measure was done while student resting and the second after consuming 2.5 dL of energy drink (Figure 2). Student measured heart rate with a computer-supported sensor (Vernier Hand-Grip sensor). Students measured their heart rates for 200 seconds. During the experiment volunteer was seated. Other students observed the functioning of the volunteer heart rate on a dia-projection of the Vernier computer program.

After the laboratory exercise was made group discussion about their opinions and perceptions on the use of energy drinks. The statements are represented in Discussion section.

If the teacher doesn't have the Vernier's´ sensor the exercise *Effect of Energy Drinks on Heart Rate* can be performed with s hand watch for measuring a heart rate.

Results of Research

Students can observe the functioning of the heart rate throughout the experiment.

Due to the clearness of computed results, the students much more easily understand the functioning of the heart by the ingestion of energy drinks. They could witness that the heartbeat can suddenly rise from 20 to 30 beats per minute (Figure 2: Heart Tate vs. Time), which is a high load and shock to the body and can seriously affect human health.

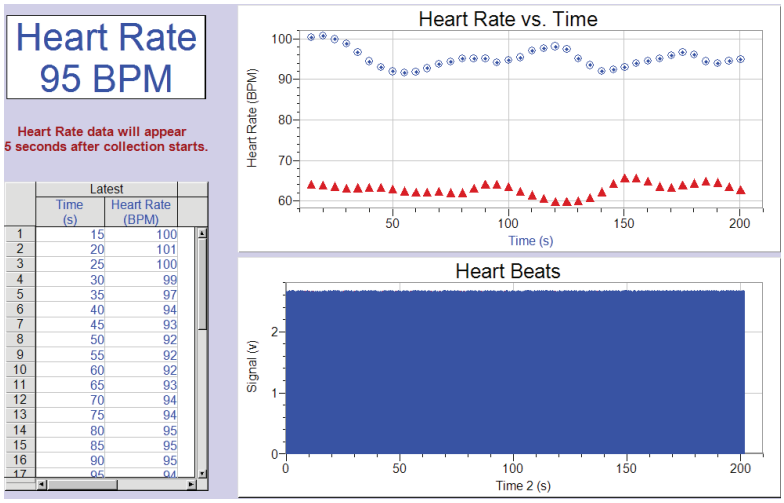

Figure 2: Computer plots of Heart Rate vs. Time from ingestion of energy drinks (legend: (- measurements during rest, (- measurement by ingestion energy drinks).

Students agree that due to the results obtained by using an ICT they could better understand the essence of didactic content, as the content was more clearly presented to them by the direct interpretation of the results shown on the projection screen. Students stressed some points of the experiment:

- We can observe the functioning of the heart rate throughout the experiment.
- We can keep following changes in the heart rate, which is very interesting.
- Simultaneous and final results are relevant.
- Using computers in laboratory work is very interesting.
- After laboratory exercise they finally understand why teachers and some parents dissuade consumed energy drinks.

Discussion

To achieve students' satisfaction, we should prepare problem-based learning which motivates students to work and inspire their interest and curiosity. Students like motivational experiments because they attract them more for learning a school subject. Students suggest that they want more practical work and they like to be actively involved in laboratory work, particularly in those experiments, which are related to everyday life and can be used in practice. In the case of laboratory work students are also actively involved in the educational process; they can create the process and in this way they can absorb more information for quality creation of knowledge (Lunetta et al, 2007), skills and attitudes (competences) about some issues. With this method of teaching, students can develop competence which they can as citizens use in everyday life.

How to motivate, inspire students´ interested for classroom work and develop competencies in the case of the biologic laboratory exercise Effect *of Energy Drinks on Heart Rate*, are represented in Table 1.

Table 1. Biology laboratory exercise *Effect of Energy Drinks on Heart Rate* and development of everyday life competences.

		Developing competences related to everyday life		
Motivation	**Interesting**	**Knowledge**	**Skills**	**Attitudes**
• TV commercial for energy drink: ″Red Bull gives you wings″	• What is happening with our heart rate after ingesting energy drink? • Observing their own heart rate at the moment	• An understanding of cardiac function under the influence of substances; • Knowledge and understanding of the principles of living beings; • Collection of information through digital media; • Use of computers in experimental work; • Ability to analyse and organize information; • Ability to interpret the data obtained;	• Ability to synthesize the conclusions; • Transfer of theory into practice; • Mastery of the basic measurement techniques and their use in the classroom and in the laboratory work of students; • Take care for health.	• Ability to critical assessment of commercial products; • Attitudes to use of ICT in education.

Through ICT students see viability and utility work. From the students' reactions we can see that the topic of the impact of energy drinks on the functioning of the heart was taken more seriously and that before the consumption of different energy substances they or at least some of them would recall the results of the performed exercise. We believe that teachers should use ICT for clearness and tracking the results of ongoing opportunities to provide more educational tutorials and educational results (Špernjak, 2011) which they can use in real life. Students learn more deeply when they apply classroom knowledge to real-world problems. Inquiry and design-based approaches are an important way to nurture communication, collaboration, creativity and deep thinking (Barron and Darling-Hammond, 2013).

While using ICT students developed more competences as they would in a traditional way. The ICT enables students to develop the ability to collect information by means of the digital medium, the ability of analysis and organization of information and interpretation of the data obtained in a tabular and graphical form. Through ICT students certainly develop the competency of synthesis of the conclusions, the theory in practice, the use of computer in the laboratory work and better cope with the basic measurement methods. Because direct observation of results by means of ICT students better understand the functioning of the heart under the influence of substances and have better knowledge and understanding of the principles of living beings (Špernjak, 2011). With this competences and that way of thinking students can participate in public debates and science-related decision-making processes.

Conclusions

The subject matter can be problematized by encouraging students to define problems and treat claims and explanatory accounts, even those offer by "experts" as needing evidence. The teacher should encourage students to question all sources special about citizens' matters (Barron and Darling-Hammond, 2013). With problem-based exercise, students through their own experience comes to knowledge that can be advantageously used in everyday life. If teachers encourage learning through researches and problem-based exercises connected with everyday life, students raise the level of motivation and interested in learning, and get the opportunity to develop competencies for independence and critical thinking.

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