



Inquiry based biology education - piloting of unit "Blood donation" in Slovak schools

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Introduction

The teaching of biology based on scientific inquiry according to the project Establish started to implement these lessons in Slovakia in the academic year 2010/2011. Eight primary and secondary schools were involved to verify Disability - the pilot material which was produced for this project. In the next academic year 2011/2012, we started verification of the second unit - Blood donation in 18 schools in Slovakia. Teachers, who have used these materials in learning process in schools, received a training course of 12 hours, to be able to use these materials competently and in accordance with the objectives of the Establish project. The course was attended by 20 teachers of biology, who chose activities from IBSE units by level of schools (lower secondary, upper secondary) and the age of their students, and applied these activities in classes practically. Teachers communicated and exchanged experiences with each other. They documented their experiences, observations and ideas in feedback sheets and they also made the photographic material of the work of their students.

Some students of the schools visited the transfusion stations in their towns. Some teachers called a mobile unit to the school directly. Students so could watch the collection of blood from donors autentially and they could also ask the transfusion station staff questions.

The contribution informs about the piloting of Blood donation units and experiences of teachers with activities related to researching blood as a precious fluid, which means life, its donation, collection and storage conditions.

Participating schools

Participating schools	Participating teachers
Gymnázium Alejová, Košice	RNDr.Henrieta Kampeová
Gymnázium Dneperská 1, Košice	Mgr.Slávka Virasztóová
Gymnázium T.,Akvinského, Košice	RNDr.Darina Dunayová
Gymnázium L.Stoekela, Bardejov	RNDr.Ján Kleban, PhD.
Gymnázium Sobrance	Mgr.Marián Mižák
Gymnázium Gelnica	RNDr.Lenka Škarbeková
Súkromné športové gymnázium, Košice	RNDr.Katarína Jakubíková
ZŠ Abovská 36, Košice	RNDr.Monika Antusová
ZŠ Družstevná pri Hornáde	Ing.Eva Tóthová
ZŠ Janigova 2, Košice	RNDr.Valéria Šmajdová
ZŠ Juhoslovanská 2, Košice	RNDr.Renáta Sýkorová
ZŠ Kežmarská 28, Košice	Mgr.Ružena Cehľarová
ZŠ Považská 12, Košice	RNDr.Marta Žolobaničová
ZŠ Požiarnická, Košice	Mgr.Katarína Krisztová
ZŠ Spišské Podhradie	Ing.Danica Baranová
ZŠ Staničná 2, Košice	RNDr.Viera Petnuchová
ZŠ Starozagorská 8, Košice	RNDr.Ivana Slepáková
ZŠ Maurerova 14, Krompachy	Mgr. Zuzana Lesnická

Activity Visit of mobile transfusion unit in school



Activity Visit to the transfusion centre

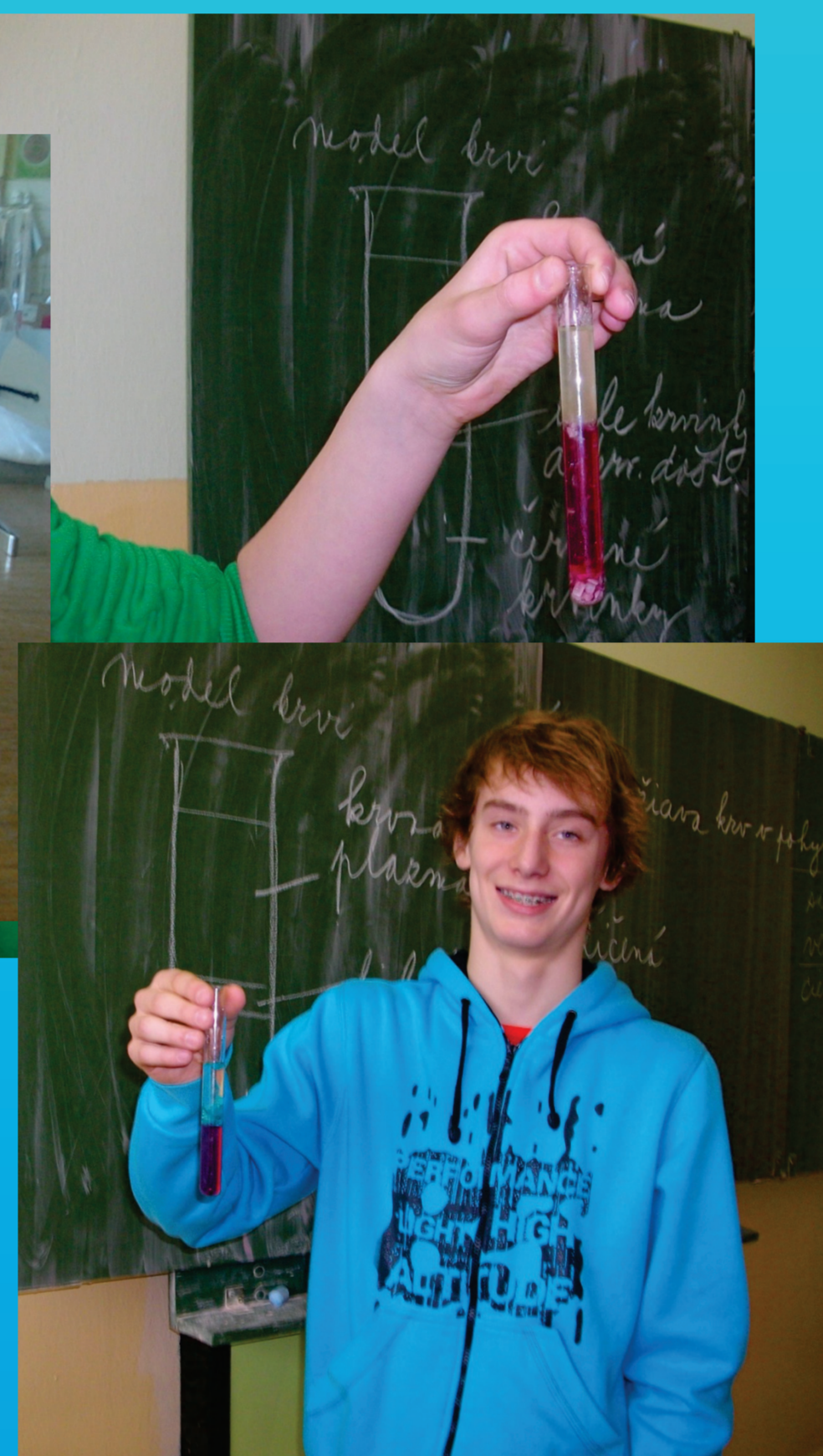


Visit to the transfusion centre allowed students an opportunity to inspect the room and equipment for blood donation and separation of its components. They saw the way of storage of blood components and they could catch blood sampling bags in their hands. Several students during a visit the blood transfusion station said they want to become blood donors.

Activity Separation of blood components



Students designed their own models of the blood sedimentation using a thick fruit syrup, flour and water. Thus students get a better and complete picture of deposition of blood cells in the tube and they will be aware of the effect of density and particle size on the sedimentation rate.



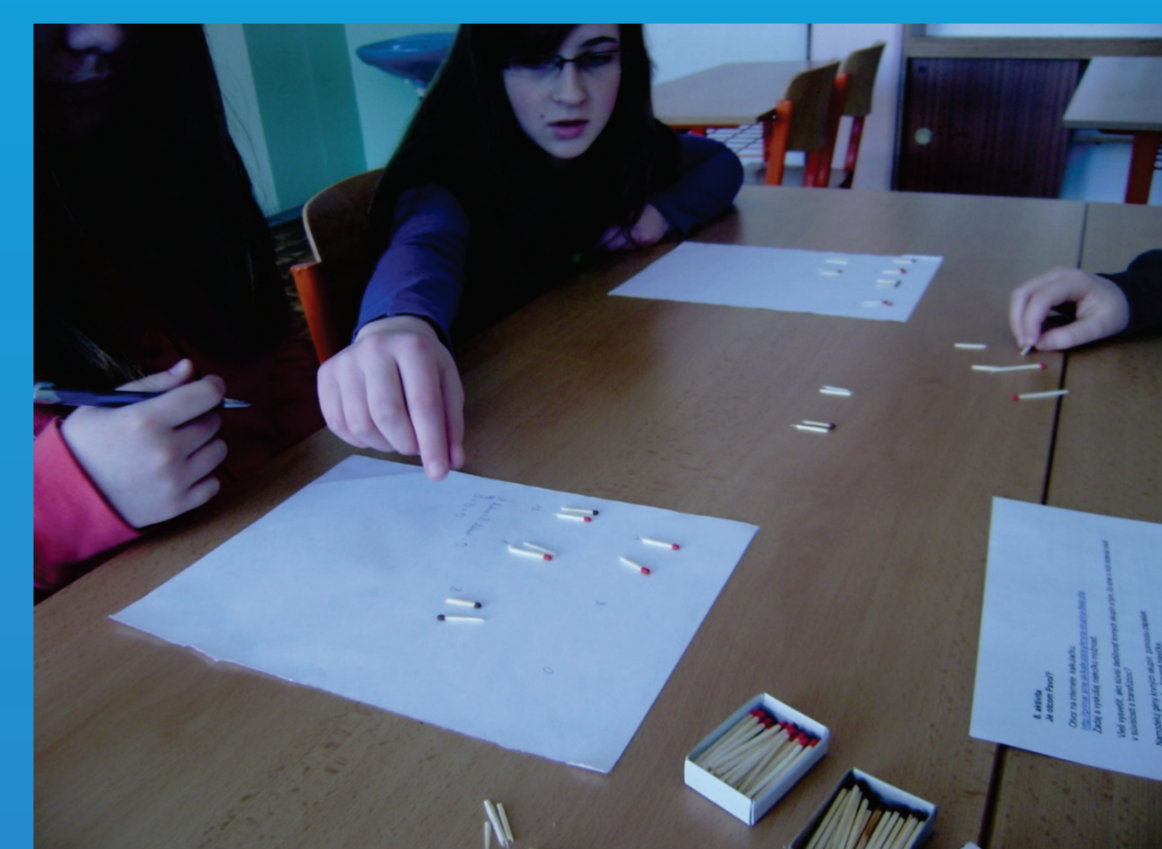
The visit of mobile transfusion unit in school is allowed to involve more students in comparison with transfusion centre. Students could watch the collection of blood from donors and they could also ask the staff the questions.

Activity Determination of blood groups

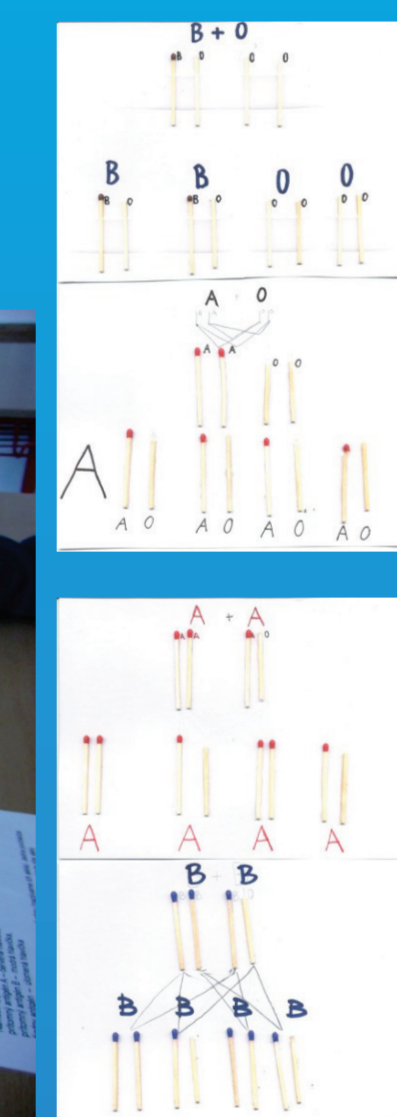


The activity for blood group was conducted with a simulated set, because using living materials and blood is prohibited at Slovak schools. The task of the students was to determine the ABO blood group and Rh factor of unknown samples on the results of knocking down/non-coagulated the blood with simulated anti-A, anti-B and Rh reagent. The students worked in groups and waited impatiently for the results of the reactions. They very wanted to know, how would be looked the result with their blood.

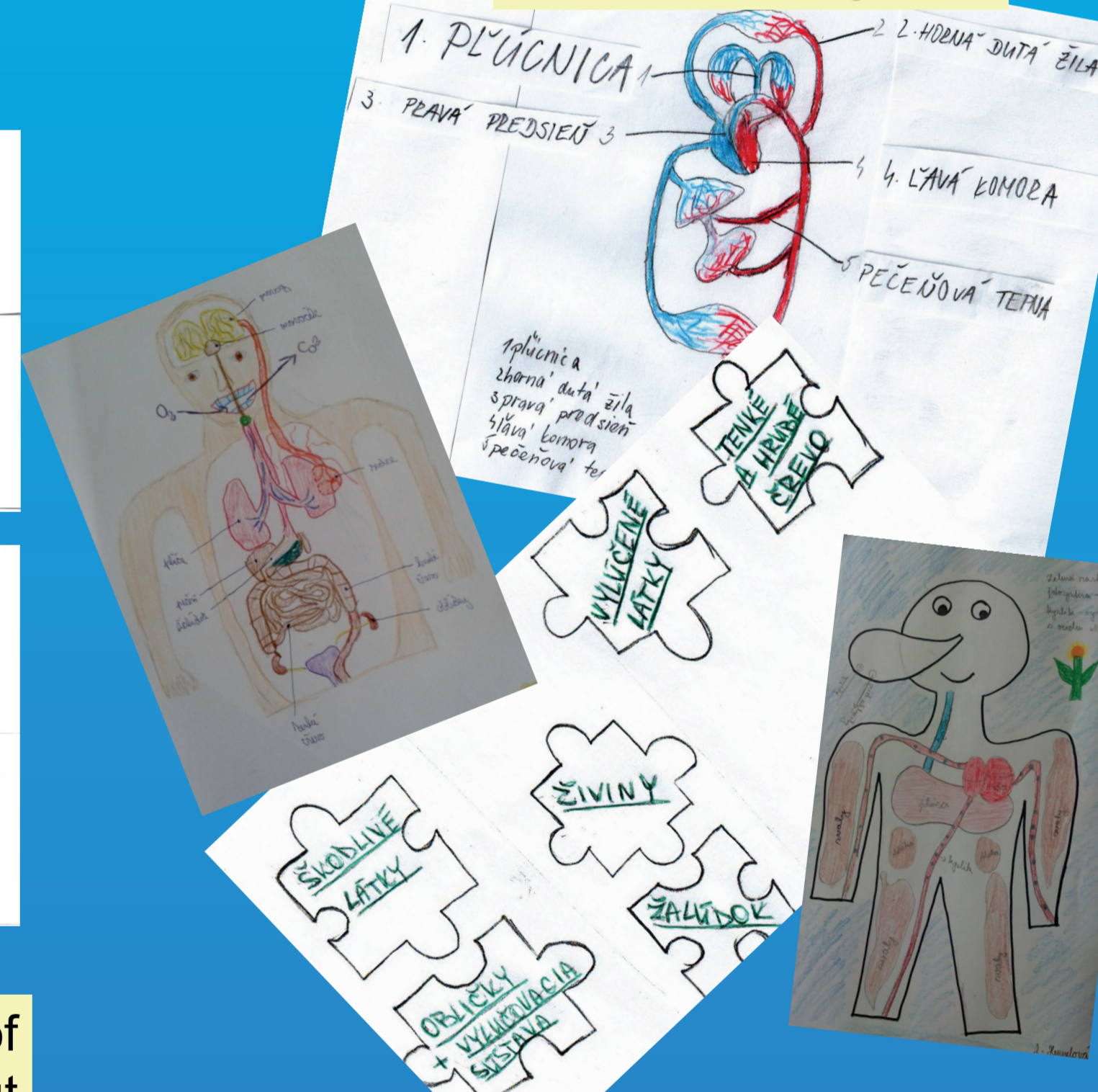
Activity Modeling of blood groups genes



Students divided into groups construct a model of the matches - red, blue and colourless. The input information was, that each gene is composed of two matches. One comes from the mother, the other from the father. In the case of blood groups both alleles manifest themselves together and the result is the blood group A, B, AB or O. Using the IBSE method students used their model to solve tasks, such as to write down the possible combinations of blood groups of a mothers and fathers, who can have a child with the blood group O, can Paul really be the father of Erika's child.



Activity Blood as a transporter



The topic of artworks and puzzles created by younger and older students was a journey of blood in human body. Students have designed and made proof of CO₂ in exhaled air.



Activity Storage of blood



In the storage of blood activity, we used frozen strawberries and raspberries. As actual and for the practice usable theme we used Umbilical cord blood.

Activity The scientific conference



The scientific conference provided a wealth of amusing situations. Students are literally caught on the roles of doctors, experts, journalists and presenters, although they had never been on the conference. The form of the scientific conference we took advantage in an activity Storage of the blood.

Activity Interactive game on the rescuer



Students responded positively to interactive computer simulations, where their task was to predict the outcome and then verify the accuracy of predictions. They draw conclusions and they generalized them. They showed their skills, tactics, logic and combinatorial thinking.

Conclusion

All verified activities of unit Blood donation are very appropriate for primary and upper grammar schools in Slovakia. A benefit of using IBSE methods according to the teachers who have tested the activities is practical utilization of acquired knowledge, linking theory and practice and develop communication skills, creative and critical thinking of students. Warmly welcomes the teachers interdisciplinary connection with other school subjects, namely physics and chemistry. The IBSE activities students reflects their ideas, propose solutions, models, formulation and verification hypotheses. They argued the information obtained with disparate sources - literature, articles, encyclopedias, internet, family relatives, staff of transfusion stations and mobile unit and they inferred a generalized conclusions. Another benefit of IBSE is student's involvement and their proactive approach which was reflected mainly in visiting the blood transfusion centre and mobile unit visit in school directly. Cooperation with the staff of the transfusion station and mobile unit was very good. They were welcoming and willing to answer all students' questions. Inquiry based education change classical methods and traditional learning environment to stimulating environment in classes and activities attracted more interest in students. These learning students really enjoyed and there is more interesting for them - they did not notice that they learn. Students can remember gained knowledge easier and especially they are useful for them in their next life.