

МАТЕМАТИКА И МАТЕМАТИЧЕСКО ОБРАЗОВАНИЕ, 2016
MATHEMATICS AND EDUCATION IN MATHEMATICS, 2016
*Proceedings of the Forty Fifth Spring Conference
of the Union of Bulgarian Mathematicians
Pleven, April 6–10, 2016*

**TWO RECENT EVENTS IN BULGARIA IN THE FRAMES
OF SCIENTIX**

Evgenia Sendova, Toni Chehlarova, Petar Kenderov

The authors share their experience as organisers of two events with teachers in the frames of the European Scientix project – a webinar on *Theme of the month* contest and a workshop on *Assessment in Mathematics and IT*. The problems experienced, the added value for the project, the lessons learned and the feedback of the participants are reported with the hope to be used by all the members of teachers' community who are willing to implement the IT environments in inquiry based style.

1. A Webinar on Theme of the month. One of the main goals of the Scientix European project is to create a community of teachers implementing the inquiry based style in STEM education [1].

Although there are multiple forms of teacher communication in Bulgaria within the PD courses, workshops, seminars and conferences, the webinars are still rarely used for various reasons. This is why organising a Scientix webinar was held by the IMI-BAS team with great care and expectations. The topic chosen was the *Theme of the month* [2, 3, 4] – a novel math contest of Viva Cognita [5] (National project of IMI-BAS, UBM and Vivacom, recently uploaded on Scientix).

There was a test on 16th November from 13 to 14 h. Various technical problems were experienced such as slow Internet connection, bad sound signal, difficulties to find a time interval in which 20 teachers from different towns would be free to join the test, and then – the webinar itself, etc.

One of the main developers of the *Theme of the month*, T. Chehlarova, had prepared a presentation on various *Themes of the months* already uploaded on the Scientix platform. She encouraged the teachers to reflect (prior to the webinar) on the change of their students after participating in the contest.

On 17th, the webinar was opened at 14h by E. Sendova, who expressed her sympathy to the French people and referred to the recent attack in Paris as “attacking the human reason itself in a place, which is emblematic for its modern cultural roots and developments”. She quoted Ferdinando Arzarello, President of the International Commission on Mathematical Instruction, saying that “one of our goals as math educators is to produce antidotes against any “sleep of reason”. She pointed out that the webinar was a symbolic *flower* against the guns since our contribution to such a struggle is in supporting and strengthening the diffusion of a “solid scientific and mathematical education rooted in various cultural contexts, but universal in its final content”.

Next, T. Chehlarova introduced shortly the *Viva Cognita* project and the ideas behind the *Theme of the month* contest – in harmony with the principle of “no threshold, no ceiling”. Thus the contest is designed as “being attractive for novices but also for students with research potential”. Some of the problems are accompanied by auxiliary dynamic geometry files so that the students can explore a specific mathematics situation, discover relevant properties, try out various strategies and find a practically acceptable (approximate) solution. Then she entered the *Theme of November (Optimising the area grazed by a laced goat)* in parallel mode with the participants discussing the first problem, while leaving the rest to the students for independent work (that might involve the use of any available resource) during a month.

Next, Chehlarova commented on the *Theme of February (Exploring a Parking entrance model)*, which had provoked a great interest among the students (boys and girls alike).

Finally the *Theme of October (Optimal Cylindrical Containers)* was demonstrated in addition to the dynamic file with a real cylinder with water, and the most difficult part, not solved so far by a single student, was commented on.

She invited the teachers to share their experience in the attitude of the students, their sense of initiative. Furthermore, she asked the teachers how they coped with the temptation to provide help that might deprive the students of deciding themselves how to find solutions. . .

The first feedback came from Rumiana Angelova, a teacher from Pazardzhik, who participated with 3 students of hers. The girls shared their frustration of the slow speed of Internet, but at the same time the generally increased motivation of their classmates to do math in- and out of class, to participate in other competitions. Furthermore, they described the dynamic models accompanying the “ladder of problems” as *very helpful*.

The teacher added that although she had discussed with her students and commented on various strategies for tackling the problems, the students would solve them at home. The preliminary comments were in general mainly around the hypotheses raised by the students. She also agreed with T. Chehlarova that the difficulties were in the last “step of the ladder” . . .

E. Sendova read the letter of a teacher (Daniela Petrova) who was not able to attend the webinar; then she quoted a student from the First English Language School, Sofia who had demonstrated during a PD course for teachers what he had learned from his teacher (Stela Kokinova). Then all the webinar participants gave their support for Scientix by entering the e-book on the project platform.

An active webinar participant was also Konstantin Delchev, involved closely with the gifted education. He shared his idea to extend the *Theme* with theoretical resources for students who have demonstrated a serious research potential.

Although the voice of Neli Stoyanova (a teacher from Razgrad) could not be heard due to technical problems, T. Chehlarova congratulated her for having involved an impressive number of students to participate successfully in all the issues of the *Theme of the month*. The impressions of Stoyanova that her students had changed their thinking, their vision and attitude towards mathematics still reached the rest of the participants thanks to the chat mode.

It was emphasized by several participants that every theme could be used as a topic for a project work.

At the end P. Kenderov expressed his pleasure to participate in this new type of communication. He commented on the necessity of introducing new type of contests since the current understanding of *mathematical competence* includes the competence to use modern technological means. *Our generation is the first which could make experiments in mathematics with various computer systems, to make explorations, to verify conjectures, to study much bigger volume of mathematics. The mathematics problems in the Themes of the month are in this spirit. Bulgaria has a long route to pass, so that its future citizens could overcome difficulties of various nature, tackle problems for which they don't know an algorithm. The prosperity of a nation depends on the education of the nation, and my hope is that with joint efforts we'll be able to become good problem solvers, and to contribute to the progress of the country!*

E. Sendova pointed out that the involvement in education of mathematics researchers of the highest academic rank in our country is an embodiment of the idea that *education is the most essential application of science*.

In her concluding words T. Chehlarova expressed her satisfaction that the community of teachers and students working on the Theme of the month have been extended with university students who recently joined the team.

The main contribution of this first webinar for the IMI-BAS team in a Scientix setting was the overcoming of our initial scepticism that such a form could play an essential role in establishing, developing and supporting the STEM education community in Bulgaria. Despite the still existing serious technical and logistical problems to be solved, the main conclusion is that the feeling of an on-going support is what matters the most for teachers having embraced innovative strategies as an important part of education.

Here is the feedback of some participants:

- *The experience was wonderful, the only disappointment being that my student could not say what he wanted because of technical problems. Still he felt happy of being part of the webinar.*
- *I participated for a first time in such an event, in which you see the people, the slides and listen to the presenter. This is much more concentrated than being in a big room and not able to see well and to hear well, due to neighbors in the audience, too busy to discuss world problems in parallel . . .*
- *The Internet connection was broken at school and I had to go home to join the webinar. I regret that I could not speak due to technical problems with the sound. My students gave the answer to the first problem of the Theme of November immediately. Although I missed the beginning, I liked what I heard from the webinar – well organized, on the point, interesting, the best in which I have participated so far.*

2. Workshop with teachers on Assessment in Mathematics and IT. An assessment model for IBMSE based on the opinion of different groups (teachers, students, parents, experts and business) was considered and presented within a Scientix workshop as a satellite event of the National seminar on mathematics education held in IMI-BAS on December 4, 2015 [6]. The leaders of the workshop were E. Sendova and T. Chehlarova.

Its purpose was to propose a workable model for assessment of the IBL in a Bulgarian setting based on the style of the Scientix workshop: *Collaboration in STEM education*



led by Dr. Àgueda Gras-Velázquez (Scientix Project Manager) within the Eminent 2015 conference in Barcelona [7]. The participants were split in 5 groups – teachers, students, parents, experts and business representatives. Each group discussed the current problems experienced of the people they represented and came up with ideas what an appropriate model of assessment in math and IT would be. Then the groups appointed a presenter of their respective models. The ideas of each group were reflected on cards being distributed and then collected by the leaders of the workshop. They will be presented to policy makers for further considerations.

The workshop was a valuable demonstration of how collaboration of different social and professional groups could be facilitated in an attempt to contribute to more relevant assessment methods in STEM education. The participants expressed their optimism about achieving better assessment of IBL provided they are able not only to formulate and defend their ideas but also to take into account the arguments of other “players”.

REFERENCES

- [1] K. IVANOVA, E. SENDOVA, T. CHEHLAROVA. (2015) Bulgarian Trace in Scientix. Proceedings of the National Conference on “Education and Research in the Information Society”. Plovdiv, May 2015, 011p-020p, ISSN1314-0752, <http://hdl.handle.net/10525/2441>.
- [2] T. CHEHLAROVA, P. KENDEROV. Mathematics with a computer – a contest enhancing the digital and mathematical competences of the students. In: UNESCO International Workshop: Quality of Education and Challenges in a Digitally Networked World, Za Bukvite, O’Pismeneh (Eds E. Kovatcheva, E. Sendova) Sofia, Bulgaria, 2015, 50–62.
- [3] P. KENDEROV, T. CHEHLAROVA, E. SENDOVA. A mathematical theme of the month – a web-based platform for developing multiple key competences in exploratory style. *Mathematics Today*, **51**, No 6 (2015), 305–309.
- [4] G. GACHEV. Online system for assessing of mathematical knowledge. In: UNESCO International Workshop: Quality of Education and Challenges in a Digitally Networked World, Za Bukvite, O’Pismeneh (Eds E. Kovatcheva, E. Sendova) Sofia, Bulgaria, 2015, 117–122.

- [5] T. BRANZOV. Viva cognita: virtual community software and e-learning software as a framework for building knowledge sharing platform. In: UNESCO International Workshop: Quality of Education and Challenges in a Digitally Networked World, Za Bukvite, O'Pismeneh (Eds E. Kovatcheva, E. Sendova) Sofia, Bulgaria, 2015, 75–81.
- [6] National seminar on mathematics education, IMI-BAS, 4.12.2015 <http://www.math.bas.bg/omi/nso/?cat=15>
- [7] Eminent 2015 conference in Barcelona. <http://www.scientix.eu/web/guest/live/eminent-2015>

Evgenia Sendova

e-mail: jenny@math.bas.bg

Toni Chehlarova

e-mail: toni.chehlarova@math.bas.bg

Petar Kenderov e-mail: kenderovp@cc.bas.bg

Institute of Mathematics and Informatics

Bulgarian Academy of Sciences

Acad. G. Bonchev Str., Bl. 8

1113 Sofia, Bulgaria

ДВЕ СЪБИТИЯ В БЪЛГАРИЯ В РАМКИТЕ НА SCIENTIX

Евгения Сендова, Тони Чехларова, Петър Кендеров

Авторите споделят опыта си като организатори на две събития с учители в рамките на европейския проект Scientix – уебинар върху състезанието *Тема на месеца* и уъркшоп *Оценяването по математика и ИТ*. Преживените проблеми, добавената стойност към проекта, поуките и някои впечатления на участниците са представени с надеждата да бъдат полезни на всички учители, които желаят да внедряват в учебния процес дигиталните технологии в изследователски стил.