



Broadening the horizon of science teaching and learning in Hungary

Project proposal



## Broadening the horizon of science teaching and learning in Hungary

### second wave

*PROJECT PROPOSAL*

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### Contents

Executive summary .....	2
Background .....	3
Objectives .....	4
Proposed intervention: the second wave .....	5
Project timeline .....	6
Success criteria .....	7



## Executive summary

### **Hungarian Research Teachers' Association partners with teachers and parents to highlight the need for diversity in science learning in Hungary.**

Inclusive approach in science teaching is promoted by campaigns, workshops and online trainings. Students taste inquiry-based science learning in extracurricular student circles, and share experiences at science expos and camps. Networking with parents raises public awareness to sociocultural inclusion in science education.

"Broadening the horizon of science teaching and learning in Hungary" is needed as the Hungarian educational system is polarized, segmented and very selective. In science education, talent support has century-old traditions, but with a very segregating approach. This way, science education in Hungary loses a number of potential aspirants. While keeping the most fruitful elements of the first wave, the second wave of this project aims to focus on collaboration between key actors for inclusive science learning, hence increasing accessibility, parity and equity in science education, going beyond self-evident excellence.

The project has three strands:

(1) The first strand is "*Promoting sociocultural inclusion - focusing on students*", which includes organizing regional science expos for students aged 13-19, inviting students to a science camp and supporting extracurricular student circles which have inclusive pedagogical approach.

(2) The second strand is "*Empowerment - focusing on teachers*", which includes a campaign for collaborative knowledge building and sharing good practice, linked to a series of webinars by practicing teachers.

(3) The third strand is "*Collaboration and going public - focusing on parents*", which includes organizing a national science expo with parallel events such as an interactive conference and workshops, in collaboration with scientists, industry, and science education partners.



## Background

HRTA nurtures fruitful collaboration with AMGEN: this has contributed to introducing a public dialogue about the state of the art of the science education in Hungary, and formulated policy recommendations. The first wave of this project, in 2015, drew public attention to creating inclusive science learning environments. This was a very important step, as recruitment to STEM education and jobs in Hungary is mainly focusing on self-evident excellence (usually manifested in classroom work), excluding potentially able students (especially girls and students with different sociocultural background) from science learning. Science education in Hungary has a rich tradition in talent support, but these opportunities are only available for the most excellent students and are often biased: students with disadvantageous sociocultural background are often discouraged to participate in these. There are also challenges with gender parity. Lacking suitable didactics and teaching materials, teachers themselves are not confident to address these groups. Moreover, the general public (including parents) has not yet realized the value of diversity in science education in Hungary.

This practice has resulted in huge inequities in the past decades: while Hungary is among the best achieving countries at International Science Olympiads, these results are originating from less than 10 top secondary schools. Science competency assessments such as PISA also indicate the gap between high achievers and the majority left behind. Teacher training still focuses on outdated concepts, while it fails to train teacher trainees for collaboration (with teacher colleagues, parents, universities or industry partners). Teachers are also left without tools and knowledge for dealing with the diversity of students. As a result of this, many potentially talented students are discouraged, left behind and never enter science learning at a higher level.

The first wave of the project succeeded in raising attention to this phenomenon, while offering ways to tackle with the problem: a series of webinars introduced good practices by teachers and outreach activities induced social discourse: these inception activities need to continue. However, it also highlighted several challenges, such as the lack of collaboration between teachers, the need for change in the culture of assessment, and the urge to invite parents to the discourse. This will be the main foci of the second wave.

Other national approaches differ however. Governmental institutes engaged in curriculum implementation mainly focus either on basic technical details (preparing and providing textbooks, tools, infrastructure for schools, preparing teachers for the change via trainings on the content of new curricula) or on assessment of implementation (creating a new framework of science competence assessment or school leaving exams). This means that at this point, they concentrate less on parity than on making key stakeholders realize and apply changes and establishing necessary circumstances for that.

The Hungarian talent development movement has long traditions, but typically it operates with a selective approach: most organization serve the most talented (and already motivated) students



## Broadening the horizon of science teaching and learning in Hungary

### Project proposal



and award teachers whose students show high results at international and national contests. This leads to teachers' sorting the most gifted students very early, and even in classroom work, concentrating on their development, while not inviting others to activities.

At this point, we propose a different (somewhat inverse) approach: inclusion means creating equal opportunities for all students to join science inquiries, and then attempting to develop them due to their interests, motivation and abilities. We are convinced that this way science education in Hungary can broaden its horizon, and re-discover the value of diversity through which research and economy may gain new resources.

The first wave of the project highlighted that there are excellent initiatives by individual teachers: however they never become innovations but stay isolated and unknown even in the science teacher community. We wish to act for science teachers to acquire the culture and tools for collaborative and cumulative knowledge building and networking with various partners. We encourage them to run extracurricular student circles as these are suitable terrains for experimenting with the freshly adapted ideas and innovative practice. Students participating in these will have opportunities to present and share results in the national science expos, with chances to get inspiration and motivation from their peers and to deepen their knowledge as well as to enforce their dedication by meeting academics and practitioners of science. Teachers will have learning opportunities at webinars offering peer learning, networking and support. Inclusion will be strengthened by workshops at the national expo. Parents will get involved at the interactive conference sessions at the national expo and also via social media, which will establish open dialogues about the role of diversity in science education.

Tangible results include a collection of webinars, brochures and a brief video, all available online. They will further broaden the horizon of science education in Hungary, offering accessible programs and inviting all students to join.

## Objectives

The first wave of the project took the initial steps towards inclusive science education, and the feedback received underlined that some activities need to continue. The extracurricular student circles in the first wave were extremely popular with a diversity of students, and in many cases they brought about tangible results, for example successful entrance exams or awards. This was a proof that opening up to a diversity of learners doesn't necessarily mean a drop in quality, which was one of the strongest concern to the project's mission in the beginning. A renewed campaign for extracurricular student circles built on the supportive online community of the first project wave's 40 student circles, will offer students opportunities to practice teamwork, and then show their projects at a national science fair. Besides providing an inspirational platform for exchange, the science



expo will offer special prizes for exhibiting teams as well as for teachers creating the most innovative curricula.

Empowering teachers includes sharing and reflecting on good practice and online discourse about how to integrate these into daily work, supported by a social media campaign introducing good practice and teachers' hints, parallel to a series of webinars, to which teachers may apply as presenters. The first wave webinar presentations now became part of teacher training programs at several universities, which we hope for the second wave too.

Collaboration emerged as a key issue, where steps need to be taken: as we found that most stakeholder groups have no experience in real, mutual collaboration. Therefore at the science expo and with all activities going public, we plan to accentuate the relevance of collaboration. Open discourse will result in parents' better understanding the relevance of and the opportunities in science learning, while other partners may gain ownership to project aims and possibly contribute in the future to extend the project with a science summer camp.

## Proposed intervention: the second wave

The second wave of the project intends to take further efforts to tackle the challenges identified in the first wave, while continuing the key elements that made the first wave so successful.

The second wave of the proposed project (similarly to the first wave) is organized around three target groups: students, teachers and a variety of different other partners (with special focus on parents, higher education institutions and possible future workplaces). In the second wave, collaboration and going public will get a more focused attention than in the first wave.

The most important target group is evidently that of the students. In the first wave, the project initiated and connected with more than 40 extracurricular student circles, which provided an inviting learning environment for students. In this wave's campaign, we will focus on teamwork within these students circles, while extending the experience already gained with hands-on science inquiry activities. This will be connected to a series of social media posts, where student circles can show what activities inspire them for learning science and why. Student circles can apply for an opportunity to show their activities at the national science expo, where a jury will evaluate their activities based on a selection



## Broadening the horizon of science teaching and learning in Hungary

### Project proposal



of diverse aspect, giving chance for a variety of teams to be awarded. On principle, each exhibiting student circle will get some award, and also a chance to discuss their activities with real academics and practitioners of science. The latter was one of the most rewarding opportunity at the last years' science expo, based on the opinion of the students.

Extracurricular student circles also provided a terrain for experimenting with innovative teaching methods for teachers. Sharing these good practices in a way that provides open access to many colleagues, then discussing the “warts and all” picture of such activities with them, meant an empowering experience for participating teachers in the first wave of the project. Therefore, the series of webinars need to be continued, especially as many of the webinar presentations later became integrated in initial and even in-service teacher training programs. In the second wave, teachers can apply for the opportunity to present at webinars. Connected to the webinars, a social media campaign will be launched, to further promote discourse among teachers about inclusive science education. This also contributes to establishing a culture of collaborative knowledge building in the Hungarian science teachers' community.

Collaboration with partners will result in parents' better understand the relevance of and the opportunities in science learning, while other partners will get involved in an open discourse. We also intend to take this step for the sake of the sustainability of this program. We hope that the external partners will get engaged with the project aims and will offer collaboration for organizing a science summer camp. This strand involves organizing the national science expo: this large-scale event will offer an interactive conference in two sessions on perspectives in science careers, three workshops (for teachers and parents) focusing on new ways of science learning, and parallel to these, the interactive exhibition of the student circles.

## Project timeline

The one-year project will have the following milestones.

- Preparing the project: 05/2017 – 08/2017
- Launching the project 09/2017
- Campaign for extracurricular circles launched 09/2017



## Broadening the horizon of science teaching and learning in Hungary

### Project proposal



- Science expo with parallel events of interactive conference and workshops 11/2017
- Social media campaign with good practices from extracurricular student circles and student voices: 05/2017 – 06/2018
- Video ready: 12/2017
- Brochure for parents ready 01/2018
- Webinar series (from teachers to teachers): 02/2018 – 07/2018
- Social media campaign with good practices from extracurricular student circles and teacher voices: 02/2018 – 08/2018
- Assessing the activities of extracurricular student circles, making an online report on them: 07/2018
- Final report 08/2018

### Success criteria

We expect to have an increase in the number of students participating in extracurricular activities, where they get a chance to engage in science inquiry and practice hands-on activities. Linked to this, we expect to have exemplars of didactically established extracurricular student circles with inclusive approaches, creating equal opportunities for students. We expect to establish a community of practice with those student circles that already participated in the first wave of the project, which will serve as a driving force for the newcomers to this approach.

We also expect to have an exchange community of practicing teachers, who are motivated to adapt good examples and share knowledge about differentiation in science classes. (Measurable outcomes include the number of teachers visiting the platform and following the webinars (at least 360 teachers, which is 10% of secondary school science teachers in Hungary).)



## Broadening the horizon of science teaching and learning in Hungary

### Project proposal



Finally, we expect to raise awareness to the value of diversity and to initiate collaboration for creating inclusive learning environments in science education. We expect to have at least 300 external participants at the science expo, who can learn about the opportunities and perspective of science learning in Hungary.

As a future outcome of the above, we estimate that the number of students opting for science subjects in school-leaving exams will significantly grow in the next 5 years, and a higher number and a more diverse population of students will enter tertiary science education and choose careers related to science.

Another success criterion for this project to prepare future collaborations in science education between institutions. In the first wave, HRTA already established collaboration with Mobilis Interactive Science Center and the University of West Hungary. In the second wave, we expect to involve at least three more partners.