

## Newsletter

Nr. 1/2019

### A Word from the President

Dear WPhC-Members, Colleagues and Friends,



About one year ago there was our WPhC-Congress-2018 in Vienna/Austria with the topic: "Student Competitions and their Role in (Gifted) Education". The participants enjoyed a lot of very interesting speeches and workshops. One of these speeches was about the so-called "Sir-Karl-Popper-Schule" (= Sir Karl Popper school) in Vienna. This secondary school is based on the special needs of highly gifted students and was erected with the will and based on the philosophy of education of Sir Karl Popper himself. During the Congress there was a very interesting key note speech on the way of education in this school, given by Eleonore Steigberger and Josef Pürmayer. Both are teaching at this school for youngsters who are gifted in a cognitive way, not in e.g. music or sports. (For those youngsters there are other specialised schools in Austria). The development of the school in question is based on the background of sciences and humanities, e.g. the work of Renzulli on the one hand and the experiences of the teachers of this way of education, which is very important in everyday teaching at school, on the other.

You will find an article about the Sir-Karl-Popper-Schule and its basic philosophy of teaching in this Newsletter.

I myself had the pleasure and the honour to teach physics at this school up to my retirement. One of the very important experiences of teaching highly gifted students was that a lot of them did not have the aim to get the best marks in one specific competition up to the highest (international) levels. A remarkable number of these students wants to take part in different competitions at the same time, e.g. in mathematics, physics, chemistry, old and new languages, philosophy and similar ones. Their goal is to get top marks in all the chosen competitions up to an "Austrian level", but not up to an international one.

This may be an important insight into the way of thinking of gifted youngsters, if you, dear reader, are responsible for any high-level-competition for gifted youngsters.

We as Federation would like to be a platform for all being involved in competitions for secondary school students all over the world and we are cordially inviting you to send us an article.

Enjoy the article about "Sir-Karl-Popper-Schule" and have a look into the English version of its homepage: <https://www.popperschule.at>

With best regards



(Helmut Mayr – President of the WPhC)



### **Upcoming International Competitions**

- ▶ International Conference of Young Scientists (ICYS) in Kuala Lumpur, Malaysia  
*April 19 to 25, 2019*
- ▶ 17. European Union Science Olympiad (EUSO) in Almada, Portugal  
*May 4 to 11, 2019*
- ▶ 20. Asian Physics Olympiad (APhO) in Adelaide, Australia  
*May 5 to 13, 2019*
- ▶ 3. European Physics Olympiad (EuPhO) in Riga, Latvia  
*May 31 to June 4, 2019*
- ▶ 32. International Young Physicists' Tournament (IYPT) in Warsaw, Poland  
*July 6 to 13, 2019*
- ▶ 50. International Physics Olympiad (IPhO) in Tel Aviv, Israel  
*July 7 to 15, 2019*
- ▶ 13. International Olympiad on Astronomy and Astrophysics (IOAA)  
in Keszthely & Heviz, Hungary  
*August 2 to 10, 2019*
- ▶ 7. International Young Naturalists' Tournament (IYNT) in Minsk, Belarus  
*August 18 to 24, 2019*
- ▶ 24. International Astronomy Olympiad in Piatra Neamt, Romania  
*October, 2019*
- ▶ 16. International Junior Science Olympiad (IJSO) in Doha, Qatar  
*December 3 to 12, 2019*

(Stefan Petersen – WPhC secretary)

## Sir Karl Popper Schule

<https://www.popperschule.at/>

*Eleonore Steigberger*

*Josef Pürmayer*

*Sir Karl Popper-Schule*

*Wiedner Gürtel 68*

1040 Vienna



*Figure 1: Front view of Sir-Karl-Popper-School*

Sir Karl Popper Schule Vienna is a special school for highly-gifted young people aged 14 - 18. It has existed for twenty years and is part of a regular Viennese Gymnasium (i.e. high-school or grammar school) named Wiedner Gymnasium. Popper Schule comprises grades 9 - 12. It has two new classes per year and eight classes altogether. The maximum

number of pupils in one class is 24. More than 400 pupils have already graduated from this school.

The school is named after the philosopher Sir Karl Popper, who expressly agreed to have a school bear his name provided that it would be a school

*... in which no unwanted answers to unasked questions would have to be listened to; in which one did not study for the sake of passing examinations.*

*(Popper, 2002, pp. 40-41)*

Pupils wanting to attend Sir Karl Popper Schule go through a battery of standardised tests conducted by an external expert, in which the verbal vs. figural vs. numerical, fluid vs. crystallized intelligences of the applicants as well as their individual working styles, their durability, stress resistance and motivational resources are assessed.

Among the guiding principles of the school is the deep conviction that giftedness is a potential which can be developed provided that the learners are individually supported and taken care of, or, as the International Panel of Gifted Education puts it:



*Giftedness is the ability to achieve ... it cannot be reduced entirely to intelligence. There are further person-related factors of giftedness, such as the will to achieve, subject-related interests, discipline at work, self-confidence, and self-regulatory abilities. These factors, in concert with reasoning abilities, enable a person to learn and achieve. The overall interaction of these factors can be subsumed under the concept of personality, so that in a larger sense, gifted education also means character building and thus personality development as well“.*

The focus of our pedagogical efforts is on the learner as a person. Personalised learning implies seeing learners as constructors of their own learning, which means handing over responsibility to the individual learner whose self-awareness and notion of self-efficacy need to be fostered.

Nonetheless, we also implement standard practices of gifted education such as acceleration, enrichment and grouping. Acceleration involves skipping grades and, more often than not, the revolving door model. Specialised courses are offered from year 10 onwards, but also the beginners have to attend more subjects in an enriched curriculum in the context of which new subjects have been developed, e.g. Communication and Social Competency. Six modern languages (English, French, Italian, Russian and Spanish) and Latin can be learned. Additionally, “Science“ was created as a combination of Physics, Chemistry and Biology.

Teaching “Science“ as a mandatory subject in grade 9 introduces the basic principles of scientific methods and describing phenomena (modeling). “Science“ is followed by a course called “NaWi“ (Natural Sciences) in grade 10. It is an elective course with a strong focus on inquiry-based learning as an alternative to a third language. Later on, Physics, Biology and Chemistry can be chosen as elective subjects in a total of 24 hours a week including practice in a laboratory. Students, either in teams or as individuals, create their own products and present the data in their chosen ways.

Science, NaWi and the laboratory build on Renzulli’s enrichment triad (Renzulli, 1976).

## Science

In Science, given topics are addressed in a general explorative way and are confronted with a variety of questions from different disciplines (see Fig. 2, next page). This approach has two distinct purposes.

- 1) The students pay attention to every subject and determine for themselves what field of science they are (most) interested in.
- 2) The students learn to explore topics by using scientific methods and ways of investigation and documentation.

*What kind of animal are you? How old are you?*

*What's your electrical conductivity?*

*How did your metabolism work?*



*Is the material you are made of radioactive?*

*What materials are you made of?*

*Do you have magnetic properties?*

*Can we reproduce the consistency of your shell?*

*What's your weight?*

*Why does your shell have his specific color?*

*Figure 2: Example of questions from different disciplines, students could come up with for a fossil.*

Science naturally helps students to choose between the scientific disciplines (biology, chemistry or physics) in the following 10<sup>th</sup> grade, but in order not to force the students in the field of the assigned teacher, the subject is taught by different teachers of each scientific field simultaneously.



## NaWi

NaWi builds on the explorative nature “Science“ (the course) but has its focus on inquiry based learning. Students pick their own topics, come up with their own questions and form hypotheses. In the next step the students are asked to prove or disprove their hypotheses, which is mostly done by conducting experiments. In NaWi students mostly pick to work in groups and therefore gather experience in splitting tasks. To give an example, in the course of one NaWi project, students investigated how the direction of growth of cress roots is influenced by gravity. To do this, the group of students built a centrifuge using the 3D printer at our school and conducted a series of experiments to thoroughly answer their questions.

## Laboratory

The laboratory (lab) is a mandatory subject, which accompanies the primary subject. Classes of each subject (biology, chemistry and physics) last for three hours a week, whereas two hours are regular course-style classes and one hour is lab. Within the lab students can either choose to complete lab traditional assignments, or they can work on self-assigned project. Students are invited to pick the second option, which then is fixed within the student’s personal learning-contract.

The Tumbleweed-Project is just one notable product of the lab system, where three students designed and built an innovative a wind-driven exploratory probe, intended to be deployed in swarms and designed to pre-select research and landing targets on the Martian surface, map topographical features on large scales, and conduct surface-based measurements. The project won the international Odysseus Contest organized by CNES and Airbus and took part in the Mars analogous Mission AMADEE-18 in the Oman desert. Figure 3 (next page) shows a rendering of the Tumbleweed Rover.



*Figure 3: Rendering of the Tumbleweed Rover, with sails for harvesting Martian winds and the computing unit in the center.*

Consequently, teachers define their role as facilitators, mentors and learning companions rather than as directors of learning processes. At the beginning of every school year and term learners design learning contracts with their teachers. In order to cater for the needs of individual learners, especially in the first two years, groups of four students are guided by a “coach” (i.e. a teacher with special training). Furthermore, senior students as “tutors” provide supplementary support for these groups.

Teachers respect their pupils as unique individuals with specific talents and acknowledge their right to experimenting and asking new questions. This requires a high amount of tolerance and continuous professional development. Teachers see themselves as reflective practitioners. They are provided with school-based training to keep up professional standards and develop as pedagogues. Regular feedback from students, training sessions, attending national and international conferences, participation in EU projects, internal and external evaluation are standard practices. School development is initiated in “quality circles”.

Finally, it must be mentioned that school development has decisively been influenced by cooperating with partner schools and other critical friends from different countries. Popper Schule has welcomed visitors from practically every continent and is more than willing to share its knowledge and keep learning from others.

## *Bibliography*

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- *Popper, K. (2002). Unended Quest. London: Routledge.*
  
- *<https://www.uni-trier.de/fileadmin/fb1/prof/PSY/HBF/iPEGE.pdf>*
- *<https://www.popperschule.at>*

## *Credit of the figures:*

Fig. 1: Photo taken by Stephan Bauer. Published with the permission of the headmaster of Sir-Karl-Popper-Schule, Dr. Edwin Scheiber.

Fig. 2 and Fig. 3: Taken by Josef Pürmayer.