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Some prominent personalities of Slovak Mathematics

Abstract: We focus on mapping, analysis and capturing the life and work of some personalities of Slovak mathematics in the 20th century in our contribution. They are mathematicians, teachers and their knowledge and experience can be useful in teacher training of the future maths teachers and as an added value to education knowledge of these group of students. From a methodological point of view, case studies will be developed to connect the available bibliographic resources and narrative sources directly from living mathematicians, their students.

Key words: history of mathematics, famous Slovak Mathematicians, biography, education

Modern Slovak mathematics as a scientific discipline is very recent. The founder was Jur Hronec (1881-1959) and he also published the first Slovak academic textbook of mathematics. He suggested the idea of building Slovak universities (Slovak University of Technology, University of Economics, Slovak University of Agriculture, Faculty of Nature Sciences CU, Faculty of Education CU). He laid the foundations of the Slovak Committee of Union Czech and Slovak mathematicians and physicists, in which he immediately became chairman. Because of his unfaltering work, the Slovak mathematics has been enriched with important mathematicians like Štefan Schwartz, Milan Kolibiar and Tibor Neubrunn, whose biography and the work are being processed. These prominent personalities raised a whole new generation of mathematicians. Some of them died in the last year such as Beloslav Riečan, Pavel Brunovský, but many of them are still alive to these days such as Lev Bukovský, Pavol Kluvánek, Roman Frič, Anatolij Dvurečenskij and others.

The project “Prominent personality of Slovak Mathematics” (idols for future generations) was launched in the middle of 2018 in cooperation with 4 universities, which aim is to map and create a database of all significant employees in education and science of Slovak mathematics. We are trying to popularize mathematics as a school subject on behalf of their life stories, thereby maintain its heritage and preserve their authentic heritage and life philosophy for next generations.

The aim of our contribution is to point out some important moments, but also personalities in Slovak mathematics. One of the prominent personalities not only of Slovak mathematics, but even of the world mathematics was prof. Igor Kluvánek. In the 1960s, his major contribution was crucial to the

development of the Slovak school in the area of the theory of peace. His first major success happened in 1961 in Prague at the 1st topological symposium devoted to prof. Eduard Čech, that continued after 5 years in Moscow at the World Mathematical Congress. Since there was greater interest in his lecture, than it was expected, participants of the Congress had to move to the cinema hall. His Seminars (in Bratislava in 1964-65 (Seminar of Information Theory) in Košice in 1965-66 (Seminar for gifted students)) are also considered as significant.

In 1967, prof. Igor Kluvánek left to become a lecturer at The University of Adelaide, Australia. Originally one-year guest teachership stay on influence of revolutionary conditions in Czechoslovakia in August 1968 became a 23-year stay. In this period of his life he had become a world mathematician in the vectors measure and integrals. The concept of Course Mathematics Analysis was developed during that period of time. This course was completed into a unique trilogy of mathematical analysis textbooks (Introduction to Differential and Integral Calculus, Differential Calculus of Functions of One Variable, Integral Calculus of Functions of One Variable) between 2005 and 2008. In this case it is crucial change in the conceptual apparatus (introduces the concepts of summability of sequence, the regulated function, the new type integral of the Lebesgue type), but also in the various procedures and definitions (continuity definition, limits, chainrule for calculating the derivation of the composite function). The most revolutionary idea is the definition of the integral that covers the Lebesgue class of integrable functions, but without using the complicated theorems of measure:

Definition 1. *A function f defined on an interval I is called Kluvanek integrable if there exist real numbers $a_i \in \mathbb{R}$ and intervals $I_i \subseteq I$, $i = 1, 2, \ldots$, such that the following conditions are satisfied:*

$1^\diamond$ $f(x) = \sum_{i=1}^{\infty} a_i \chi_{I_i}(x)$ *for all* $x \in I$ *that* $\sum_{i=1}^{\infty} |a_i| \chi_{I_i}(x) < \infty$;

$2^\diamond$ $\sum_{i=1}^{\infty} |a_i| \lambda(I_i) < \infty$.

The Kluvanek integral of an integrable function f on I is defined by the formula

$$\int_I f \, \mathrm{d}\lambda = \sum_{i=1}^{\infty} a_i \lambda(I_i),$$

Integral defined in this way is called Kluvanek integral (Prof. Kluvánek called it Archimedes integral). Its most important attributes and identity with Lebensgue integral are listed [Riečan, Tkačik].

The Kluvanek definition of integral is preferable to the Riemann integral in a basic course on integration not only because of its greater simplicity but also because it leads directly to important application. The Kluvanek integral represents an advantage, because the restrictions on the usage of methods of calculation are less stringent. Because families of function defined in term of the Kluvanek integral are usually substantially richer than those defined in terms of Riemann integral, there are important problems in mathematics and in its applications which are not solvable in terms of the Riemann integral but could be solved if the Kluvanek integral is used.

This is just a little example of what important steps the contributors of Slovak mathematics contribute to improve the preparation of future mathematicians. A lots of research shows, such as [Gunčaga, Tkačik, Žilková], there are great shortcomings in the conceptual confusion that lead to various conceptions and misconceptions of pupils and students about mathematical concepts.

Let us mention one major event for Slovak mathematics. It could be named Nicholas School of Mathematics. Many names are associated with Nicholas School of Mathematics, but first of all we mention prof. Beloslav Riečan, prof. Frantisek Kopka, prof. Anatoliy Dvurecenskij, prof. Radko Mesiar, prof. Roman Frič. These mathematicians stood at the birth of diffusion sations, which significantly affected the whole mathematical discipline of quantum logic and fuzzy sets. It was about refining the mouse to introduce uncertainty based on the fuzzy set in quantum structures so a theory of probability could be built up on. This created the D-Poset, which covered two seemingly unrelated areas - multi-valued logic and quantum logic.

Definition 2. *Let $(P, \leq, \ominus)$ be a poset with a difference, and let 1 be the greatest element in P. The structure $(P, \leq, \ominus, 1)$ is called a D-poset.*

A D-poset $(P, \leq, \ominus, 1)$ satisfying the condition:

(4) *if $(a_n)_{n=1}^{\infty} \subseteq P$, $a_n \leq a_{n+1}$ for any $n \in \mathbb{N}$, then $\bigvee_{n=1}^{\infty} a_n \in P$.*

is called a D-σ-poset.

Italian and Slovak Mathematicians (Robert Giuntini, František Kopka and Ferdinand Chovanec) were awarded the with IQSA International Quantum Structure Award for contributions to the quantum structure. Nowadays it could lead to the extension of the classical Kolmogorov theory of probability.

Our aim is to capture a number of significant events that have happened in Slovak mathematics, in the publications that are infused by the already mentioned KEGA project 020KU-4/2018. At the time when young people are

influenced by mass media and mathematics is perceived as unpopular and doomed science, our goal is to publish publication, that match with their form and content to the young people and to show beauty and excellence mathematicians and people who have sacrifice it all their lives. Therefore, each publication will contain an official biography of the personality, in the next part will be biography and important breakpoints in the life interpreted by the personality. The third part of the publication will be supplemented by questions and answers that will complement important events in the person's life. The fourth part of the publication will be questions, that personalities were asked (current issues of mathematics, tuition of mathematics and education system). This will lead to the sending transfer of their life experiences and insights into improving the teaching of mathematics, different approaches and pedagogical models.

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