

Mathematics Festival: A Broad Dissemination Project

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Because of its duration and intensity, school experience dominates all other possible factors that may influence people in defining their attitude towards mathematics. It is therefore necessary to create opportunities inside and outside the school environment to show the usefulness of the mathematics taught, as it appears in different contexts of our daily life, including in the arts and music. Not less it is important to give the opportunity to experience less formal aspects of mathematics through tricks, games and puzzles, for example. Through these actions it is possible to change the conception of mathematics in the popular imagination.

The actions of popularizing mathematics have a long history. In the biography of David Hilbert [2], for example, the author describes disclosure conferences, given in 1921 by this prominent mathematician to students on their return to university after the war, that continued throughout this decade. At present, the reflection on actions of popularization of mathematics gains an increasing space between the community of professors and professional mathematicians. In the site www.mathunion.org/icm, for example, it is possible to consult different published works on this one topic in the summaries of the International Mathematical Congresses, organized by the International Union of Mathematicians (IMU). The International Commission on Mathematical Instruction (ICMI) devoted the 16th ICMI Study Conferences [1] to topics on the popularization of mathematics.

The project "Mathematics everywhere: activities for mathematics festivals in the state of Minas Gerais" was an initiative carried out by a group of professors from the Department of Mathematics of the Universidade Federal de Minas Gerais (UFMG) in Brazil, with the objective to contribute to the popularization of mathematical knowledge and the improvement of teaching and learning of Mathematics through the realization of Mathematical Festivals. It was partially supported by CNPq in response to the Edict MCTIC/CNPq02/2017 in support of activities of dissemination and popularization of mathematics, during the National Science and Technology Week in 2017.

In its history, the Department of Mathematics of UFMG has worked with mathematics teachers and students of Middle and High Schools in Minas Gerais, through various extension projects. These projects have always had a common purpose, which justifies their existence: to disseminate Mathematics, making it accessible to a wider public, and to contribute to the improvement of Mathematics teaching and learning in both Middle School and High School.



Figure 3: Mathematics Festivals in Belo Horizonte and Iapú Minas Gerais

giving priority to public schools and promoting a closer articulation between these Schools and the University. This is part of the work plan of this department and its actions are included in the Extension Program for Teachers and Students of the Basic School, created in 2005 and registered in the Extension Information System of UFMG in 2010.

The Mathematics Festivals, held within the framework of this project, involved a variety of activities such as mathematical games, workshops, cinema, storytelling, exhibitions and speeches of dissemination, always seeking to foster a positive attitude towards mathematics and promoting a closer articulation between students and teachers of the Middle and High School and the University. The different actions offered to the general public, and in particular to students of the Elementary School, the opportunity to experience math in a playful way. In addition, activities aimed at adults were focused on divulging of mathematics and its applicability in daily life and interesting facts of its history and its relationship with other areas such as art and music.

The success of the first edition of the festival, held in October 2017 in Belo Horizonte, was followed by the great participation in the festival held on March 1 and 2, 2018 at UFMG (about 3 thousand students from 75 middle and high schools participated in this festival) and other math festivals in 2018 in various cities of Minas Gerais. The participants stayed at the festivals for about two and a half hours and were able to think and discover the mathematics by performing activities such as: observation of the night sky, math magic, movie session, board games, logic mazes, plane tilings, construction of kaleidoscopes, origami, flutes, tensegrity, etc.



Figure 4: Mathematics Festivals for teachers

There was also, the participation of about three hundred teachers from public and private schools at a festival dedicated to primary and secondary school teachers, who sought to acquire knowledge, methods and references that allowed them to organize this type of activity in their classes. This was a good indicator of the fulfillment of one of the objectives of the project: to increase the articulation between students and teachers of the Elementary School with professors and students of the UFMG Course of Mathematics.

It is noteworthy that other projects of the Department of Mathematics of UFMG, such as the "Projeto Visitas" and "PET", contributed with the offering of workshops and ludic activities in the various editions of the festivals, thus extending its reach.

In addition, due to the development of this project the "Museum of Mathematics of UFMG" was inaugurated, currently located in Room 4011 of the ICEx-UFMG, with the goal of promoting mathematics through ludic activities, puzzles, strategy games, presentation of formulas and theorems with concrete objects, exhibition on mathematics and art, and logical challenges that encourage the interest of visitors, especially teachers, leading them to a reflection on proposals of compelling activities that pass a positive vision of the teaching and learning of mathematics.

Finally, throughout the development of the project we were able to:

- Contribute to the dissemination and popularization of Mathematics.
- Promote a close articulation between the students and teachers of mathematics of basic education with teachers and students of UFMG Mathematics Course and other teacher-training institutions, bringing the University closer to the public system of Basic Education and the population in general.



Figure 5: Museum of Mathematics of UFMG

- Present mathematics as a dynamic and accessible content, instigating the search for new knowledge, thus contributing to motivate teachers and students of the Elementary School to study Mathematics and encouraging them to the continued formation of Basic Mathematics teachers, enabling access to new educational techniques and practices.
- Provide the participation of students of the Mathematics course in research, teaching and extension activities enriching their academic training of those who will participate in the project.
- Introduce to the public the subjects of recreational mathematics that contribute to arouse the interest in mathematics and to improve the acceptance of this discipline among the students.
- Ensure that the activities developed by the extension and undergraduate projects of the Department of Mathematics of UFMG can benefit a wider public.

References

- [1] Barbeau, E. J.; Taylor, P. J. *Challenging mathematics in and beyond the classroom*. Springer, 2009. [Online; accessed April 3, 2017]. Available in: link.springer.com/content/pdf/10.1007/978-0-387-09603-2.pdf
- [2] Reid, C. *Hilbert*. [S.l.]: Springer Verlag, 1970.