

Project Science with the Caboclas Kirimbaú Auaeté: undertaken actions in the context of Higher in the state of Amazonas, Brazil

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ABSTRACT

The project Caboclas Kirimbaú Auaeté is the result of the initiative of seven research professors from the Department of Mathematics of the Federal University of Amazonas (UFAM). Its main focus is to stimulate women of different ities for the exact scientific area and technology. The project has been carried out with the support of Brazilian agencies for the promotion of scientific research and dissemination, using both the structure of UFAM and the public schools involved. At the higher education level, the activities are aimed at enriching mathematical skills and disseminating scientific knowledge by non-academic women.

KEYWORDS

Women, social project, female empowerment, STEM fields.

1 INTRODUCTION

Research shows that there is a lower percentage of women in the scientific area compared to men. In the areas of Exact Sciences, Technology and Engineering, and in Mathematics, this percentage is sensibly lower [3]. In addition, recent work [2] states that while women are the majority in undergraduate and masters courses in federal universities, they are already in the minority among doctoral students, professors of masters and doctoral degree courses and among the research fellows.

Trying to improve this scenario in our academic environment, a group composed of 7 female PhD professors from the Mathematics Department at UFAM decided to join forces and promote actions that would increase female participation and their permanence in scientific activities. Promoting the development of skills in order to awaken the self-esteem of these women and encourage them to follow their career wishes to the highest degree possible was a priority of this project. The participation of people of all genders is welcome and we try to deconstruct some stereotypes rooted in society, increasing mutual respect and highlighting the protagonism and empowerment of everyone. We count on the collaboration of students from several courses who embraced the project's cause and continue to actively work in the development of the project. The first version of the project had financial support from the National Council for Scientific and Technological Development of Brazil (CNPq) and was executed in 2019 in five schools in different areas of the city of Manaus, in the state of Amazonas. Continuing this

work, of strengthening bonds and establishing good prospects for many women who are inspired by our work, the current version of the project had the financial support of the Amazonas State Research Support Foundation and tried to offer a differentiated vision and experience of education through the development of techniques and tools in mathematics.

The activities of this project were carried out along three axes: in the context of Basic Education, in the University context, and in the interconnection between the two. We highlight here the various initiatives that were carried out within the University context. Namely, scientific initiation projects (PIBICs), workshops and mini-courses. In addition, we have built partnerships with other projects within the University. Next, we will address each of the initiatives carried out within the University context, describing how they were executed.

UNDERTAKEN ACTIONS WITHIN THE PROJECT

Some of the actions carried out during the Caboclas project at the University level were:

- (1) **SCIENTIFIC INITIATION PROJECTS (PIBICs):** In order to employ scientific methodology through research development, we have developed 5 scientific initiation subprojects with undergraduate students as the executors. The developed Scientific Initiation projects are as follows:
 - Academic Genealogical Tree: presents the construction of the family tree of some outstanding or historically relevant Brazilian female mathematicians for the development of mathematics in Brazil, emphasizing on the doctoral students they supervised.
 - Identification of Women's Withdrawal Profiles through Fuzzy Modeling: Case Studies in Exact Science Courses: development of a fuzzy inference model that describes the phenomenon of future withdrawals based on the length of the course, type of withdrawal, and recurring situations that encourage withdrawal.
 - Undergraduate and graduate data survey/Visibility of success stories in Mathematics and Chemistry - data survey regarding the undergraduate and graduate education in mathematics and chemistry of women in the city of Manaus, giving visibility to the success stories in these areas in the city of Manaus.
 - The history of the feminine in the Institutional Program for Scientific Initiation Scholarships (PIBIC) of the Mathematics course: Survey of the participation of women and their contributions in the Institutional Program for Scientific

Initiation Scholarships of the Mathematics Department-DM.

- Survey of data from the Brazilian Public School Mathematics Olympiad: OBMEP Female participation - analysis of the comparison on the amount of medalists in the gold, silver and bronze categories between girls and boys.
- (2) **WORKSHOPS AND MINICOURSES:** In order to bring about activities that could show students mathematical concepts linked to the use of computers, volunteers from the Caboclas project built two workshops that were exhibited in one of UFAM's mathematics fairs.

The first one entitled "Geometries in nature: areas by approximation" approached the concepts of proportion, symmetry and isometries, and, finally, taught students to estimate areas of irregular figures, in practice, using the concept of symmetry as a resource. This was done both manually, i.e., using graph paper, and with the use of Geogebra software [4]. This system is a mathematical tool, with which it is possible to construct and work with geometric figures, showing in a more precise way their behavior in relation to, for example, the calculation of areas Geogebra. Making use of Geogebra turned out to be a way to present a very useful and didactic mathematical technology, which for teacher training is of extreme importance. Since the understanding of new educational technologies aimed at fostering a more dynamic teaching is fundamental.

The second workshop entitled "The muddy city problem", dealt with the minimum path problem, which consists in minimizing the cost of traversing a graph between two nodes. The volunteers explained the theory behind the algorithm and created a model representing a muddy city, which in practice served for the students to test their new knowledge. Furthermore, in partnership with the UFAM Computer Institute, the project was able to promote training courses for the team and this led to the inclusion of workshops and minicourses, such as the Arduino, Introduction to Python, and SQL minicourses.

- (3) **PARTNERSHIP AND INTEGRATION WITH OTHER INSTITUTIONAL PROJECTS OF UFAM:** The school has an important role, as it corroborates with the formation and dissemination of values. Indeed, our main goal is to disseminate the scientific activities developed by the project and by other institutional projects of UFAM, called "Partner Projects", attracting the attention of students and teachers of these schools to the STEM fields, and thus increasing the number of girls and women developing scientific knowledge in these areas. The Partner Projects are part of the extension activities of the Institute of Exact Sciences - ICE and the Institute of Computing - ICOMP, PET Physics, "Chemistry in the Square", "Paper Recycling", "Forensic Chemistry", PET Mathematics, "Digital Cunhantã", "Women in STEAM" and "Cosmos".

CONCLUSION

In conclusion, it is worth noting that in all events organized in the scope of the of the project, the undergraduate students participated

in the organizing teams and also in the idealization of the presented activities, such as workshops, mini-courses, exhibitions and poster presentations [1].

From the initial group of project members, 5 students completed their degrees in mathematics while they were part of the Caboclas project, and today they continue collaborating as volunteers: Ana Júlia Siqueira Amorim who volunteered to performing the PIBIC "*Academic Genealogical Tree*" and is currently a teacher in elementary school; Beatriz Albuquerque who had a scholarship in the project performing the PIBIC "*Academic Genealogical Tree*" and is currently doing a master's degree in Computer Science in the Computer Department of UFAM; Karolline Vitória who was a volunteer in the project and is currently doing a masters degree in Mathematics in the Mathematics Department of UFAM; Brenda Ester who worked as a scholarship student in the project developing the PIBIC "*A história do feminino no Programa Institucional de Bolsas de Iniciação Científica (PIBIC) do curso de Matemática*" and is currently a teacher in elementary school; Simone Serudo who participated as a fellow in the project developing the PIBIC "Survey of undergraduate and graduate data/Visibility of success stories in Mathematics" and is currently taking the leveling course of the Graduate Program in Mathematics-PPGM of UFAM to prepare for the master's entrance examination in 2024.

It can be said that the participation and protagonism of the students in all activities throughout the development of the project was of the utmost importance, thus contributing to their comprehensive training as citizens and professionals. According to their own reports, they were able to develop several skills such as communication skills, leadership, organization, teamwork, and expanded their knowledge about the various topics worked on during the project.

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