

THE UNIVERSITY GOES TO HIGH SCHOOL

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ABSTRACT

In Brazil the number of students in high school interested in mathematics has been decreasing in the past ten years. In this paper, we address the way we tried to deal with this problem at the Institute of Mathematics of Federal Fluminense University, Niterói, Rio de Janeiro. In 1998 we had 3.8 applicants for each vacancy. In 1999, we formed a team of three teachers in order to develop an educational research called "The University Goes to High School". The objective is to attract better students in mathematics.

The main activity is to give explanatory lectures in high schools, to students who had not yet made a decision about their career. We address issues as varied as the presentation of problems in Topology, the possibilities of obtaining support of financial agencies during the course, the job opportunities, the University's Distance Learning of Mathematics etc.

An unexpected favorable by product of this action is the return of the high schools teachers to the University. Indeed they begin to pay more attention to continuing education, in order to update or broaden up their knowledge in our University's Specialization Course on the Teaching of Mathematics. The number of regular students has steadily increased since our project was set up.

Another goal we pursue is to detect gifted students with an outstanding talent for Mathematics, and to put them in contact with teachers of the University in order to develop a study program as earlier as possible.

In 2001, we had the greatest number of graduate students with major in mathematics, 6.78 applicants for each vacancy, and we strongly expect to achieve, with this research, a better selection in the coming years.

In the world, there are, nowadays, around 50 million undergraduates, out of which, 4% belonging to Brazil. This number is quite irrelevant if we regard our potentialities as an emergent nation as well as a leader in our continent. Some experts estimate that we should have, at least, triple the present number of undergraduates in order to catch up in percentage terms, with nations such as Argentina and Chile, which are, at least quantitatively, in a superior and better position than ours.

At Federal Fluminense University - UFF, a university which is located in Rio de Janeiro and counts on around 20000 students nowadays, some courses, including the one in mathematics, received new students in 1998, with averages around 3.5 - out of 10 - or even lower, and the number of candidates interested in the mathematics faculty had reached a level - 3.8 candidates per vacancy -, which is considered very low. Believing that there students who present a better educational achievement, and that they would need some encouragement in order to accept their vocation to a technological field, especially in mathematics, the project "The University goes to High School" has been more effectively planned. In the beginning, we thought of the procedures of how to support the high school, stimulating the students, with mathematical vocations, to enroll in courses related to the technological area at UFF, especially in the course of mathematics. This procedure, in our opinion, would permit an efficient growth of the level of demands by the professors throughout the courses, implying, this way, a better formation of professionals heading for the job market.

Considering that professors, researchers and citizens are constantly worried about the continuity of the technological development of our society and, therefore, concerned about the constant improvement of our new undergraduate students, three professors of our Institute of Mathematics (IM-UFF) have begun, thus, to develop the project "on screen", since 1999, beginning with the course of graduation in mathematics, at plenty of establishments of both public and private high schools in the cities of Rio de Janeiro, Niterói and S. Gonçalo.

We have been looking forward at providing, through this educational research, the access to information as a fair way to promote the university education for all citizens, based on exclusive reasons, not being admitted, therefore, any sort of racial, sex, language economical, social or physical prejudices.

The project has been developed by its basic activity, simply stated, through explanatory lectures (normally one in every two months) of about one hour and thirty minutes in the educational institutions cited above. We intend, among other things, establish a bigger contact with professors and students at that level of knowledge, presenting, despite of the brief way, a scope of this University, by professors inserted in the academic life, as an institution that develops its critical and social roles, which is fundamental to any country that aspires to development. Seventeen institutions were visited until the end of 2001, and four other schools have already been set up for visitation during March of the present year.

It is possible to say that the aim of the project "The University goes to High School" promotes the integration education/service/society, due to the fact that the conferences are, principally, dedicated to students of both introductory grades (the first and the second years of high school) who, most of times, have not decided about a university career so far, and would not have access to this kind of information of a strictly academic concern.

This conference/lecture also emphasizes the quality of the course of mathematics at

UFF, the meaning as well as the goals of the courses of licentiate and bachelors degrees, highlight the methods of work of the graduation field together with the post-graduation one on IM-UFF - which refers to the high level of those courses of mathematics at UFF together with Brazilian Ministry of Education; presents the wide scope of professional opportunities and the current and future job market yet to be reached by the mathematicians; and divulges the criteria for financial support offered by fomentation institutes of the government for the best students of the course (training, monitory and research scholarship).

In each conference, the lectures present mathematical problems emphasizing topology and geometry in order to encourage students to get into the challenge and make the exhibition more interesting. The meaning of what has been done in mathematics is also taught to the young students. Picturesque aspects of mathematics are shown in a very accessible, easy and convincing language. Questions are always welcome.

Another important aspect of our research, and perhaps at a medium period of time that can produce excellent results, is related to the recognition of precocious young students with extraordinary skills for mathematics, which, as a matter of a fact, already counts on two students (aged 15 or 16 years old) who are effectively participating in the tutorial program, another part of the project. Concerning this activity, the cooperation of teachers who work at the visited institutions has been extremely worthy and relevant when it comes to pointing out the skillful students. These students receive the necessary orientation of tutors at the Mathematics Institute, chosen by Professor Celso José da Costa (PhD - IMPA), ex-coordinator of post-degree in mathematics at UFF, current coordinator of the licentiate course of distance learning in mathematics, and member of this project.

Another participant in this research, Professor Marisa Ortegoza da Cunha (PhD - PUC-Rio), is works on the assessment of Extension's projects at IM-UFF and works on an extension program of the Institute, headed for licentiate undergraduates, because during the lectures, we also intend to encourage students to take up the opportunity of working at schools, which is a totally needy area lacking competent professionals, in our State, mainly concerning high schools.

At each conference, we begin establishing a closer communication, at times, intense, between IM-UFF and the visited schools.

At first, we attract teachers and students of that field in order to make part of academic events (such as conferences, lectures, etc.) in our Institute.

It is also revived, in teachers who work in high schools, the will to get down to study again. In our Institute, we have, for years, besides the Masters course, another post-degree course (Lato Sensu) in specialization in Mathematics in activate process. This course had, in 2000, the greatest number of registration of all its history, some of which related to the teachers who have attended to the conferences of the project "The University Goes to High School". It is also important to highlight that, among other accomplished goals, during the last college entrance exams of UFF, we have observed a considerable raise of candidates interested in the course of mathematics (6.78 applicants), who have registered to this area of knowledge.

During these meetings, we have divulged other activities organized and coordinated by IM-UFF, and also with a great deal of emphasis, since august 2001 in the course of licenciante in Mathematics (Distance Learning), formed by five public universities of the state of Rio de Janeiro, which has already organized its first contest of enrollment

in September of 2001, and it is already activate in four municipal districts of the state, initially with about 160 students. The Institute of Mathematics, is the institution which is responsible for the coordination, for the enrollment of professors, for the didactic material and for tutors of this kind or category of education, pioneer in the area of mathematics in our state and in our country.

The next challenges of the university, for the coming years, regard the application of new technology of information; however, it is essential establish new criteria not only concerning the triangle education/research/extension to form responsible citizens, but also the improvement of the quality of human material which will make part of the university at the moments of globalization and Internet, and which will cooperate in the process of development of the country. The scholars of this subject one engaged in order to make these new students be the main actors of this process of learning. The project "The University Goes to High School" is, thus, head for this direction and it seems to be in perfect harmony with those ideas.

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