

## THE ADULT WORKER STUDENT: a reality in the Brazilian Society

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Based on what is today considered fundamental instruction in our country, and added to the fact that this subject constitutes one of the most important objects of discussion in Brazil and in meetings and congresses all over the world, due to the extent and importance of the problem, we have concentrated, on particular aspects which were considered the most provoking among all, such as:

- basic education and the number of illiterates in Brazil are a constant concern, since the quality of teaching now transmitted to our students does not completely satisfy individual needs as required by participation in modern society: understanding, participating in and acting on this society;
- it is only now that the majority of adult population is looking for new learning opportunities;
- basic education never was a national priority, being more an instrument for discrimination than of social integration, without an obvious solution to the question;
- a large number of adults goes back to university courses, without any academic training in Exact Sciences, especially in Mathematics;
- students entering government universities are, in most cases, those who had the opportunity of paying for the best private elementary and secondary schools;
- the adult worker student could only attend evening elementary, secondary and graduation courses, where offering of places is not sufficient to satisfy the large demand of students who wish to have a continued education.

By taking into account the above considerations, the University of Taubaté looks for ways and means to improve the situation offering:

- evening courses in Civil, Mechanical and Electrical Engineering, Scientific Computation, Data Processing, B.Sc. in Computation, Mathematics and Physics among other courses;
- counselling for high school teachers in Taubaté County;
- special instruction programs for students returning to graduation courses, such as Educational Projects of follow-up and additional instruction, Teaching Techniques Laboratories, Production of Teaching Materials and new technologies used for Teaching and Learning of Mathematics.

In this work authors try to identify problems encountered by the adult worker student, when returning to graduation courses in Exact Sciences and Engineering, their difficulties and the environment where counselling and support activities in Mathematics take place, directly helping students with an Educational Programme called **Rediscovering Mathematics**.

Established by UNITAU in 1994, the *Rediscovering Mathematics* Programme is tuition free and opened to every government and private schools and any interested person, run by UNITAU faculty, voluntary instructors, and students both voluntary or supported by

scholarships. The Programme objectives are to promote and strengthen research works in the educational area, continuing education courses and seminars, promoting improvement and development of students and teachers at all levels of education.

The following projects have already been implemented:

Project 1 - A new approach to Mathematics: Geometric Context

Project 2 - New Technologies and the Teaching and Learning of Mathematics

Project 3 - Continued training of teachers towards a new approach to Mathematics:  
Geometric Context

Project 4 - Arising interest for Exact Sciences among the elderly.

Project 5 - Mathematics Education and the Adult Worker Student.

Project 6 - Arts and Mathematics.

Project 7 - Additional training in subjects of Exact Sciences in Elementary School, High School and College.

Several studies have been made so as to satisfy needs and expectations of adult worker students enrolled in evening courses. The most comprehensive of all by Abud, Camargo (1995: 05) says that *"the student works as a necessity, associated to his support, that of his family and school tuition, the percentage of those who are working as a mean of personal satisfaction being very low. The reasoning for going to school is directly associated to the improvement of social status as a consequence of progress in professional career."*

This fact is a constant in other courses, family being also responsible for the main incentive due to the belief that it is a means of achieving functional ascent in the job. Therefore, one may observe that the main motivation for evening graduation courses are these perspectives of career progress, expecting that the school will offer the necessary background for improved performance in the job.

What are the problems facing these students when they enter one of these courses? First of all we analysed the results of the entrance examination during three consecutive years. This examination involves specific knowledge of Mathematics. The result was that *the worst punctuation in Mathematics in the entrance examination was from students entering the area of Exact Sciences and Engineering*.

In addition to this problem, the students did not succeed to follow basic courses involving mathematical subjects like Elementary Mathematics, Calculus, Analytical Geometry, Vectors, etc., many of them failing to be approved in these subjects several times, causing, in many instances, the evasion from school.

This type of student *"...agrees that the experience acquired in the job – seen as a practical view of the profession – that of doing things – is beneficial to class room work..."* but believes Mathematics, completely isolated from other subjects, is of no use to him.

Interviews with students are numerous and those presented below clearly show the problem:

*...the way it is taught, by means of classroom lectures, with lists of problems to be solved, without any relation with real world, Mathematics only contributes students to flunk and to become another object of the Brazilian educational context.*

(3<sup>rd</sup> year - out of six - student of Civil Engineering, who has failed twice in Elementary Mathematics)

*...the instructor of Calculus I, in the initial years, is not prepared to teach. He believes that we already know everything...*

(2<sup>nd</sup> year – out of six – student of Mechanical Engineering, who has failed twice in Calculus I)

Under these circumstances, knowing that the adult worker student needs to be counselled, helped and powered as an active participant of our society, we tried through the *Rediscovering Mathematics* Programme, to find ways to minimise these problems, directing counselling activities, trying to reintroduce the adult worker student into the academic word without traumas and psycho-emotional consequences.

Considering the large number of problems involving the teaching and learning of Mathematics, especially Geometry, at the three levels of formal education, our objectives in the Project “The Adult Worker Student and Mathematics Education” within our *Rediscovering Mathematics Programme* have been:

- to provide conditions for the majority of students to understand that their greatest difficulty in learning Mathematics may lay in the widespread but incorrect view that Mathematics is a highly complex and hard to understand science;
- to encourage students to find their own ways and means of development, reassuring themselves in their learning ability;
- to create an Experimental Laboratory for Mathematics in order to equip the student with his own instruments by way of activities and models built or carried out by himself during the learning process;
- to stimulate students whose interest and vocation for Mathematics will enable him/her to continually develop his/her knowledge, rather than merely attend to the formal pre-requisites of regular courses;
- to provide mathematics teachers in research with courses and to develop means of improving teaching and learning of Mathematics efficiency, especially Geometry, mainly by experimental work carried out with students who are not forced to satisfy formal bureaucracy, but rather as participants in a truly experimental Mathematics Laboratory.

In order to achieve these objectives, the following premises were established:

- knowledge is not necessarily passed from teachers to students;
- knowledge is built up by students as long as he/she feels encouraged by favourable conditions.

We have developed our work considering that:

- interest is one of the first rules of learning, having the world as a mediator to a process by which man learns about himself and others;

- learning operates as a part of a system of conceptions worked out by the student himself/herself and cannot be reduced to a number of motor-perceptive techniques, and that the student, upon entering school, is already equipped with knowledge. Thus, the educator must build pedagogical practice on these earlier stages.

We have essentially sought to propiciate the learning of Mathematics by way of a context of Geometry establishing a correlation among many different disciplines through each experiment, integrating objectives and actions in such a way as to develop structures in the minds of students.

We have employed a historical-epistemological approach, where Mathematics has a wealth of meanings, and we have sought students of all three levels of schooling in Brazil and for these we have used experiences from the real world for a *Rediscovering of Mathematics* which is more intuitive in its form and thus more apt to break traditional barriers.

The significant variables in this process have been the qualification of teachers and monitors of the Course, planning and preparing lessons, organization of practical activities and evaluation of class response in order to guide subsequent work.

Our teaching practice has given priority to interaction among students, monitors, teachers and course supervisors, all participants actively ensuring that his/her individual needs are to be met. Indeed, it is essential that costumers be known and that each student be personally motivated and be kept in a state of mind and attitude favourable to the learning and assimilation of mathematical concepts.

Interaction between these people and their environment, plays a decisive role in the process of learning and we know that attitudes developed in the adult during the first years of schooling, when they return studing, are the determining factor in his/her intellectual growth and future fulfillment of his/her creative potential for personal as well as collective benefit - the individual and society.

Thus it is imperative that the Mathematics contents be worked out with students by way of activities designed to put him/her face - to - face with situations likely to trigger his/her interest and which may also contribute to his/her development. The principal aim of such activities is to break the barrier of myths which usually comes with the teaching and learning of Mathematics, discouraging the student to think that Mathematics is *difficult* and *akward* but, instead, to awake in him/her the desire to experiment and discover for him/herself.

Our aims are:

- to lead students to arrive at the concepts by him/herself, expressing such concepts as a consequence of an actual understanding;
- to seek new curricular propositions geared to provoke real change in the Mathematics contents and teaching approaches of each course;
- to organize training for teachers and monitors in different regions of Brasil, bringing together teachers and instructors interested in the adult worker student and in the teaching and learning of Mathematics;
- to introduce the new technologies present in student's everyday life in his/her academic

classes;

We believe that by searching for alternative solutions for the teaching and learning of Mathematics and other Sciences, particularly for people deprived of financial support, we should be addressing quite directly the problems appertaining to Education and thus be in tune with all who are interested and concerned with such problems.

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