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# The Romanian Mathematics Education, 2003 – 2004[1]

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This article represents a survey on the Romanian mathematics education. we emphasize not only some of recent, specific and significant Romanian methods concerning the teaching and learning of mathematics, starting from the pre-school and primary level to the university mathematics education, but also the role of the national and international mathematical competitions, the education of mathematics teacher, the formation of the researchers in mathematics, their contributions and perspectives, the mathematics education in society and culture, the technology in mathematics education, links between research and practice, topical developments and for the future and other related topics.

*Keywords*: pre-school, out-of-school and the university mathematics education, Romanian mathematical competitions, teachers education, scientific research in mathematics, mathematics education in society and culture.
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## 0. INTRODUCTION

First of all, we present some pertinent opinions of Marcus (2003b)[2] concerning Mathematics.

"In Mathematics the memory effort is minimal while the feeling of certainty is maximal. No other discipline can challenge Mathematics is this respect."

"Mathematics is a part of the cultural heritage of the mankind";

"Mathematics is a potential bridge between different disciplines..."

"Mathematics has a kind of the universality and this fact should be exploited by any education..."

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[1] This article was presented at the 10th International Congress on Mathematical Education (ICME-10) held at Denmark Technical University, Copenhagen, Denmark, July 4–11, 2004.

[2] Academician Solomon Marcus, Romanian Academy 1994, 2003

"Mathematical education will succeed as a cultural enterprise only when people will discover in it something to enjoy, playing, to contemplate, to relate with any other fields of the life, to know and to see the world and reconsider our life..."

"The general problem of Mathematical Education is to send teachers that are able not only to develop syntactic abilities, but also to bridge Mathematics with understanding the natural and social sciences, the philosophy and the arts and to form the mathematical way of thinking as a tool occurring in any possible field..."

"A good teacher is a kind of actor, he simulates, he is discovering spontaneously the things he is teaching, despite the fact that he already taught them about hundred times before..."

Therefore,

"To be a mathematician today is a very demanding job and we should try to educate this feeling to the young generation..."

"We are obliged to explain that the mathematical ways of thinking are universal and, as a consequence, they are very useful for anybody, irrespective his professional interests... "

The following sections show the significant details regarding the current Romanian Mathematical Education and the corresponding scientific studies, as well as the previous and permanent scientific education of the author.

In Romania, mathematics is taught and learned by inter and trans disciplinary related applications, honouring both the pupils and the teachers, aiming at succeeding at properly synchronizing the traditional forms of education and the international ones, in particularly those corresponding to the forms existing in the European Community, starting from the pre-education given in the family.

## 1. PRE-SCHOOL MATHEMATICAL EDUCATION

By law, the Romanian pre-school mathematics education is included in the structure of the national system of education, having the following forms of organization: young, medium, big and preparatory groups (see below their explanations):

- the pre-school instruction is organized for children between 3 and 7 years of age in normal, prolonged and weekly schedule kinder-gardens;
- there is a warranted continuity between pre-school education and the primary school education through the gradual generalization of the preparatory-for-school groups, for children of 5 to 6–7 years old;

The *general objectives* of mathematical education in this context are:

1.1 the development of the pre-mathematical mechanisms (spatial relations; perceiving of time; the making of classifications, arranging; selection and comparisons);
1.2 increasing the ability of understanding figures and numbers (counting, followed by recognizing the corresponding groups of objects and the usual order relation; adding and subtracting numbers made of 2 digits, from 1 to 10);
1.3 recognizing, naming, drawing and using some geometrical shapes (the circle, the square, the triangle);
1.4 using some measurements (standard and non-standard ones; measuring time; the use of currency as a measurement, etc.);
1.5 solving exercises and problems, using the proper strategies (making up a simple problem using adding/subtraction with numbers from 1 to10, using mathematical sing to present the data of the problem; finding various solutions; learning from one's own mistakes);

## 2. MATHEMATICAL EDUCATION IN PRIMARY SCHOOL

The *general objectives* are the following.

### 2.1. Knowing and using the specific mathematical concepts

2.1.1. understanding the positional system of comprising numbers of units and tens; writing, reading and correctly comparing the natural numbers from 0 to 100; adding and subtracting, with or without going over 10; recognizing and classifying some plane geometrical shapes and solid ones; establishing the relative position of objects in space;
2.1.2. understanding the positional system of comprising numbers of units, tens, hundreds; writing, reading and comparing the natural numbers from 0 to 1000; adding and subtracting numbers from 0 to 1000 ,with or without going over 10; multiplying numbers up to 100 and dividing numbers lower than 50; recognizing plane geometrical shapes and solid ones and classifying them; establishing the relative positions, measuring and comparing lengths, volumes and weights, using non-standard and, respectively, standard measurements: meter, centimetre, litre, the use of time measurements and the divisions of money;
2.1.3 knowing and using the significance of the position of the components in comprising natural numbers at most equal to 1000, writing, reading, comparing and properly arranging the natural numbers up to $10^6$, a strict solving of adding,

subtractions and multiplying, using numbers lower than 1000; dividing numbers lower than 100 with numbers made up of 1 component; estimating the arithmetic dimensions of the results; sorting and classifying the drawings according to their shape, knowing the standard measurements of lengths, volumes, weights, time and the monetary divisions, *i. e.*, the types of relationships established between the primary measurements units and the common multiples and submultiples;

2.1.4. knowing and using the significance of the position of component in numbers equal to at least 1 billion; writing, reading, comparing and properly arranging the natural numbers; using fractions in order to express the subdivisions of the whole; understanding the significance of arithmetic operations and using the proper algorithms, including those used with some types of fractions, estimating the arithmetical dimensions of the results; recognizing both plane and solid geometrical shapes while identifying and describing some typical traits; knowing the standard measurements for lengths, volumes, weights, area, time and money subdivisions, and also the relations between measurements corresponding to the same size.

## 2.2. The development of probing and problem solving abilities

2.2.1. probing for methods of decomposing natural numbers, that are lower than 20, in sums and differences; creating sequences based on fixed rules; estimating the number of objects in a finite set and checking by counting; solving some problems put under the form of an arithmetic operation; making up exercises and problems using numbers ranging from 0 to 20;

2.2.2. probing for various methods of decomposing natural numbers equal to 100, at the most; estimating the arithmetical dimensions of the results and limiting the calculation errors; the correct solving of problems, adjusted to the requirements of the pupils' age, that imply at least adding and subtracting; making up exercises and problems using natural numbers, ranging from 0 to 100, that can be solved by applying only one arithmetic operation; perceiving the rules of association between natural numbers, from 0 to 100, and sequences made up with them and the making up of these sequences;

2.2.3. exploring and learning some decomposing methods of natural numbers ranging from 0 to 1000, using current arithmetic operations; dividing and correlating the results with the fundamental theorem of arithmetic; discovering, recognizing and using some basic functional relations and using mathematical symbols when solving exercises and problems;

2.2.4. assimilating some of the methods of decomposing natural numbers equal to 1000, at the most, by current arithmetic operations and proper combinations; basic propositional and functional calculus; assimilating the mathematical formalism in solving exercises and problems; making up and solving exercises and problems; selecting, sorting, classifying and synthesizing the data.

**2.3. Modeling and developing the abilities of mathematic language communication**

2.3.1. the ability of putting into appropriate words the calculation methods used when solving exercises and problems.
2.3.2. concisely and correctly expressing the significance of the calculi made when solving exercises and problems.
2.3.3. specifying all the steps made to investigate and solve problems.

**2.4. Stimulating the interest for studying and applying mathematics in various circumstances**

2.4.1. increasing the tendency of using natural numbers also by mathematical games, adapted to the specificity of the pupils' age;
2.4.2. enhancing the curiosity for finding the correct results;
2.4.3. stimulating the initiatives regarding various ways of arranging and of solving exercises and problems; continuing applying the error $\leftrightarrow$ mistake $\leftrightarrow$ correct result-formulated approach and optimizing the stimulation of proper behaviours between classmates regarding the solving of exercises and problems in organized or not work groups;
2.4.3. making up basic mathematical models, with projections and with surpassing the possible difficulties that occur during study, typical for the pupils' age and always promoting the team spirit.

## 3. MATHEMATICAL EDUCATION IN SECONDARY SCHOOL

The *general objectives* are the following.

**3.1. Knowing and understanding the typical mathematical concepts, terminology and calculus**

3.1.1. marking the numbers on the axis; assimilating the proper calculi, including the rules of calculating with powers; using number approximations; using some elements of logics and from the theory of sets to justify the steps made in

solving problems; using primary equation; recognizing and drawing some geometrical shapes; trough the agency of symmetry and translation to build up geometrical shapes; localizing the integer coordinates in a system of coordinating axes; making the transformations between the multiples and submultiples of the major measurements for length, area, capacity, weight, having immediate applications; recording and classifying in simple statistic tables and diagrams.

3.1.2. making the common calculi using positive integer and rational numbers; using elements of logics, of the theory of sets and of the divisibility relation to justify the truth value of some enunciations, equations in Q, properties and plane plotting of some known geometric bodies; recognizing the pairs of geometrical shapes obtained through symmetry, translation or rotation; localizing the integer coordinates in a system of orthogonal axes; measuring lengths, angles and estimating perimeters, distances, areas, and capacity of geometrical shapes; recording, processing and plotting inn statistic tables and diagrams and determining the probabilities of some lavatory events equally probable;

3.1.3. marking the real numbers on the axis; calculating and approximating in R set; using elements of logics, of the theory of sets and of the divisibility relation to justify the truth value of some enunciations; using the qualitative and metrical proprieties of geometrical shapes and bodies to solve problems; using symmetry, translation, rotation and geometrical localizations; determining and estimating lengths, angles and areas; using some elements of statistics and probability;

3.1.4. understanding the concept of real number and the relations between the studied sets of numbers; applying the proprieties of the operations in various calculi in R; approximating the real numbers and the solutions of some equations and systems of equations; adequately using elements of logics and of the theory of sets; identifying and plotting the primary polynomial functions, the corresponding algebraic calculi; using the proprieties of geometric shapes and bodies in demonstration and calculus problems; localizing geometric shapes in plane and space; actual usage of some calculus methods for lengths, angles, areas, capacities and transforming measurements, statistics and probability elements in shaping some phenomena.

### 3.2. The development of probing and problem solving abilities

3.2.1. probing for methods of decomposing natural and decimal numbers, using the studied operations; probing the truth value of the statements by making up examples; discovering, recognizing and filling up the number sequences by

applying rules identified through observation; recognizing the truthfulness of some results, obtained by measurement or calculus, making up problems from a partial enunciation or a model;

3.2.2. probing for ways of decomposing integer and rational numbers by common operations, examples and counterexamples in evaluating the truth value of propositions; discovering, recognizing and completing number sequences made by applying given rules or inferred by observations and comparisons; analyzing the truthfulness of the results, obtained by measurement or calculus, making up problems from proper models;

3.2.3. identifying some effective methods of organizing the calculi, and exploring, by the operations studied, the possibilities of decomposing numbers; formulating the possible consequences of a series of hypotheses, making the proper generalizations and checking the truth value of the enunciations; identifying the rules of making up sequences of numbers; selecting the relevant data for solving problems; making up the corresponding problems;

3.2.4. identifying the problem-situations; putting into mathematical language and effectively organizing the ways of solving; making the proper generalizations and checking the truth value of the enunciations; identifying the rules of making up sequences and, respectively, of formulas of defining some functions; making up problems from a model; extracting from a set of data the relevant ones for solving respectively making up problems.

### 3.3. Developing the ability to communicate through the mathematical language

3.3.1. identifying the essential data in an mathematic enunciation, presented under various forms; clearly, correctly, concisely presenting, orally or in writing, the methods respectively the operations used to solve problems; assuming the various learning roles in a group;

3.3.2. differentiating according to their nature the data in mathematical enunciations; using the terminology, the proper notations and operations to solve problems and clearly, correctly and concisely expressing, debating upon and motivating the correctness of the mathematical approaches;

3.3.3. identifying and differentiating the steps of the mathematical judgments presented under various forms; correctly presenting the solutions of the problems by different ways of expression; logically motivating the mathematical ideas and methods in a group; using different sources of information when checking and sporting one's opinions;

3.3.4. extracting mathematical data from various sources and understanding their

overall significance; correctly presenting the solutions of the problems by colligating the various ways of expression; debating upon the benefits and drawbacks of using the methods of solving respectively of presenting the mathematical approaches.

**3.4. Stimulating the interest for studying and applying mathematics in various circumstances**

3.4.1. shaping and developing the habit of expressing through mathematic operations actual problems; showing perseverance in solving problems and coming up with new ideas for finding solutions;

3.4.2. modelling the habit of putting into mathematical language every day phenomena and relations; using different and alternative methods to solve exercises and problems with continuous perseverance;

3.4.3. stimulating the continuous concern and interest to find new solutions to solve problems; using the informational technologies in mathematical study;

3.4.4. identifying the use of studied mathematical concepts and methods in different field; lingering perseverance and developing creative thinking when solving problems, with a special interest in using informational technologies in mathematical applications and studies.

## 4. MATHEMATICAL EDUCATION IN HIGH-SCHOOLS

Mathematical education in high-schools with all Projections on the Immediate Preliminary Specific forms of Mathematical Instruction in Vocational an Apprenticeship, Post-High Schools and Foremen.

Mathematical education in high-schools is structured as follows: theoretical high-schools and colleges, industrial high-schools, agromountain high-schools, veterinary high-schools, economic, administrative and services high-schools, informatics high-schools, pedagogical high schools, art high-schools, sports high-schools, military high-schools, theological seminaries, special high-schools being base on 4 levels, having the next *general objectives* (M1–M3) and, respectively, the specific objectives and contents, the cognitive areas, the structures and the specializations concerning algebra, mathematical analysis, euclidean plane and solid geometry, analytical geometry, the theory of diagrams, combinations and applications, probabilities and statistics, issues of programming, optimization and many important related topics.

**M1**

(i) the correct use of the typical mathematic terminology in various contexts of

application;

(ii) processing the quantitative, qualitative, structural and contextual data from the mathematical enunciations;

(iii) correctly using mathematical algorithms to solve problems with different degrees of difficulty;

(iv) correctly and coherently expressing and drafting solution or the solving strategies, using formal or informal language;

(v) analysing the problematic situations and determining the necessary hypotheses to reach the conclusions;

(vi) generalizing some proprieties by modifying the initial context of defining the problem or by improving or generalizing the algorithms.

**M2**

(i) correctly identifying some mathematical data and interpreting them according to the context in which they were defined;

(ii) discovering (selecting) the optimal algorithms that allow processing the mathematical data;

(iii) using algorithms to solve practical problems;

(iv) expressing actual situations and their processing algorithms with the help of mathematical data;

(v) interpreting the results of some actual actions that can be expressed mathematically;

(vi) mathematical modelling of some actual situations by integrating knowledge from various fields;

**M3**

(i) identifying the relations between the studied mathematical concepts;

(ii) interpreting quantitative, qualitative, structural or contextual data from the mathematical enunciations;

(iii) using mathematical algorithms and concepts to locally or globally characterize an actual situation;

(iv) analysing problematic situations to discover strategies to optimize solutions.

### A. The Theoretical Field Specializations

Philology (M3);
Social sciences (M2);
Mathematics-Informatics (M1);
Natural sciences (M1).

### B. The Technological Field. Structures. Specializations

*B.1. Technical*

Electronics and Automatizations (M1);
Electro-technical (M1);
Telecommunications (M1);
Mechanics (M1);
Public works – Constructions (M1);
Textiles (M1);
Leather goods (M1).

*B.2. Natural resources and environmental protection*

Industrial chemistry (M2);
Environmental protection (M2);
Forestry and timber processing (M2);
Agricultural, veterinary, agromontan (M2);
Food industry (M2).

*B.3. Services*

Tourism and public nourishment (M2);
Economical (M2);
Administrative (M2);
Postal (M2).

**C. The Vocational Field. Structures. Specializations**

*C.1. Sport (M3);*

*C.2. Visual arts*

Tourism and public nourishment (M2);
Fine and decorative arts (M3);
Architecture (M3);
Ambient arts and design (M2);
Music (M3);
Theatre (M3);
Choreography.

*C.3. Military*

Mathematics-Informatics (M1);
Social sciences (M2);

Military music (M3).

*C.4. Theological*

Orthodox (M3);
Catholic (M3);
Adventist (M3);
Muslim (M3);
Pentecostal (M3);
Baptist (M3);
Unitarian (M3);
Reformed (M3);
Lutheran (M3);
Cultural patrimony (M3).

*C.5. Pedagogical*

Librarian- referent;
Instructor- entertainer;
Instructor for extra-curricular activities;
School educator (M3).

According to the recommendations from (Marcus 2003a) in the 9th grade the time allotted to the 1st and 2nd degree equations and to the systems of such equations could be reduced; in the 10th grade the considerations regarding solid geometry, polynoms and complex numbers could be rethought; in the 11th grade it would be sufficient to emphasize the properties of sequences of real numbers, the numeric series and the real functions of the real argument in Mathematical Analysis: in the 12th grade the issues concerning the vectorial spaces could be eliminated and the methods of calculating the primitives could be substantially reduced.

A cognitive and wider stress should be placed on prime numbers, on the theory and applications concerning the codes, on combinatorial analysis, on the discreet probabilities, on the elements of game theory, on graphs, on the informational theory, on the basis of non-Euclidean geometries, with tracing the effects in science and arts, on algorithms, on automatons, on complexities, on grammars, on Turing-type machines, on calculability, on Fractals, on the ability to make decisions, on the discreet Dynamic Systems, on the Attractors and determinist Chaos. A statistic significant look on the Romanian Education until 2002 can be found in (Baroi 2003).

## 5. VOCATIONAL MATHEMATICS EDUCATION

In accordance with Onisel (2004) and Romanian Statistical Year Book (2003), here we specify the vocational apprenticeship post high-school and foremen mathematical education by type of schools and training profiles.

a) *Vocational Schools*: engineering, electrotechnics and electronics, mines, oil, metallurgy, energy, industrial chemistry, construction materials, mounting construction, wood exploitation and processing, transport, post and telecommunications, food industry, light industry, poligraphy, water management, agriculture, sylviculture, trade, public catering, small-sized industry and rendering services.

b) *Special Vocational Schools*: engineering, electrotechnics, and electronics, chemistry, construction materials, mounting construction, wood exploitation and processing, transport, post and telecommunications, food industry, light industry, agriculture, trade, public catering, small-sized industry and rendering services, other specific industrial activities.

c) *Apprenticeship schools*: industry, small sized industry, services for population, activities in agriculture.

d) *Post high-school*: engineering, electrotechnics and electronics, mines, oil, geology, metallurgy, energy, industrial chemistry, construction materials, architecture-arrangement and mounting construction, wood exploitation and processing transport, post and telecommunications, food industry, light industry, agriculture, sylviculture, water management, trade, finances-accountancy-administrative, tourism, handicraft cooperation, informatics, metrology, sanitary, culture, pedagogy, other fields.

e) *Special post high-school*: post and telecommunications, sanitary, finances-accountancy-administrative, education, other related topics.

f) *Foremen schools*: engineering, electrotechnics and electronics, mines, oil, metallurgy, energy, industrial chemistry, construction materials, mounting construction, wood exploitation and processing transport, post and telecommunications, food industry, light industry, poligraphy, agriculture, pedagogy, others.

## 6. ALTERNATIVE EDUCATION

In Romania there are 5 forms of education alternative to the traditional Romanian instruction. It is estimated that there are 23,360 pupils attending these forms of education and 1,805 teachers. Thus, the step-by-step programme is applied in 122 kinder-gartens and 60 schools in which there are approximately 10,500 pupils from 32 counties and from Bucharest. The Waldorf form of education is attended by 864 children in kinder-gartens

and 2,410 pupils of grades 1–12. The Montessori teaching is applied in 8 kindergartens, the Freinet methods are applied in 9 educational institutions from Mureş and Timiş counties, and the Jena programme includes 12 centres from Constanţa, Botoşani and, respectively, Bucharest.

## 7. SOME RECENT OUT-OF-SCHOOL MATHEMATICAL EDUCATION BY THE COMPETITIONS

Marian Tarina, Turda, the 4th edition, organized by ISJ Bihor, Sălaj, Maramureş, Satu-Mare

Mister Pi, March 14–28 2004

Gh.Ţiţeica, Drobeta Turnu-Severin, May 22–24 2004, organized by ISJ Olt and University of Craiova

Lumina Math, May 14–16 2004, VI–VIII grades, the 7th edition

Ion Ciolac, Craiova, May 17 2004, VI–XII grades

X_OL, Băile Olăneşti, V–VIII grades

ALPHA şi OMEGA, Roman, April 14–16 2004, IX–XII grades

Al. Myller, Iaşi, April 6 2004, VII–XII grades, organized by ISJ Iaşi

Gr. Moisil, Satu-Mare, April 29 2004, V–XII grades

Traian Lalescu, Caransebeş, March 29 2004,V–XII grades

Mihai Viteazu, Sf. Gheorghe, XI–XII grades

Mihai Viteazu, Tg. Mureş, VII–VIII grades

Gheorghe Lazăr, Sibiu, March 20–21 2004, VII–XII grades, organized by ISJ Sibiu

Archimedes, Bucureşti, December 13–14 2004, V–X grades

Petru Moroşanu, Brăila, January 17 2004, V–VIII grades, the 1st edition

Simon Petru, Tg. Mureş, January 10 2004, V–VIII grades

Nicole Păun, Râmnicu-Vâlcea, December 13–14 2004, IX–XII grades

Octav Onicescu, Botoşani1997–2003, V–VIII grades, the1st edition

The Sphere, Băileşti, November 15 2003, IV–VIII grades, the 1st edition

Lazăr's Apprentices, Ploieşti, November 15 2004, IV–VIII grades

Cristian Claude, Galaţi, November 15 2003, VII–XII grades, the 4th edition

Gheorghe Chis, Satu Mare, November 11 2004, V–XII grades

Gheorghe Dumitrescu, Craiova, October 31 2003, the 5th edition

Adolf Haimovici, Iaşi, April 2004, IX–XII grades, the 8th edition, organized by ISJ Iaşi

Laurenţiu Duican, Braşov, May 2004, IX–XII grades, the 12th edition

Rodica Câmpan, Iaşi, V–VIII, organized by ISJ Iaşi

Gh. Vrânceanu, Bacău, December 15 2004, VII–XII grades, organized by ISJ Bacău

The Union, Focşani, January 24 2004, VII–XII grades, organized by ISJ Vrancea
V. Vârgolici, Brăila, IX–XII, organized by ISJ Brăila
Anghel Saligny, Focşani (applied mathematics), IX–XII grades, organized by ISJ Vrancea
Pythagoras, Alba, May 29 2004, IV–VI grades, organized by ISJ Alba, S. C. Vasile Goldiş
Tudor's Pandours, Vâlcea, November 1 2004, VII–XII grades, organized by ISJ Vâlcea
Sanda Nicoliţă, Vâlcea, November 8 2004, IV–VIII grades, organized by ISJ Vâlcea
Steps in Mathematics, Călimăneşti, January 24 2004, IV–XII grades, organized by ISJ Vâlcea
Manole Cojocaru, Roeşti, March 13 2004, IV–VIII grades, organized by ISJ Vâlcea
At the School with a Clock, Râmnicu-Vâlcea, March 20 2004, IV–VIII grades, organized by ISJ Vâlcea
Filofteia Preda, Drăgăşani, April 24–25 2004, IV–XII grades, organized by ISJ Vâlcea
Pythagoras, Rm. Vâlcea, May 7–8 2004, IV–VIII grades, organized by ISJ Vâlcea
The Smart Mathematicians, Vâlcea, May 15 2004, IV–VIII grades, organized by ISJ Vâlcea
Dan Barbilian, Horezu, May 22 2004, IV–VIII grades, organized by ISJ Vâlcea
Louis Funar, Craiova, November 1 2004, organized by ISJ Dolj
Little Archimedes, Craiova, November 29 2004, IV–VIII grades, organized by ISJ Dolj
Acad. Radu Miron, Vaslui, November 7–9 2004, VII–XII grades, organized by ISJ Vaslui

## 8. ELEMENTS OF THE RECENT STRATEGY PROPOSED

Elements of the recent strategy proposed for developing the initial and continuous training system of the Teachers and pre-university Education Managers with all its adequate projections on all adjacent levels of mathematical education during the period 2001–2004.

The initial and continuous training of teachers from the pre-university mathematical education has some objectives such as: to make the didactic career be a profession in Romania; to rethink the relation between practice and theory in the teacher training curriculum by extending the period allotted to the initial training till getting the teacher/schoolmaster certificate and by passing the definitive exam.

Other elements concern the developing an "educational market of continuous training programmes" based on a fair competitional system from which teachers to have a wide offer from the continuous training providers, colligating the structures and the stages of the didactic career with international educational standards and warranting professional dynamics also by using transferable professional credits system, and developing some

modern institutional structures in order to optimize teacher continuous training activities, such as the "National Centre for Pre-university Teacher Training."

### 8.1. The Initial Training

The standards of the initial training are designing and implementing the national standards for the didactic profession (2002–2003). From a curricular point of view, we are concerned with establishing some curricular standards for both DDPI (The Department for Didactic and Pedagogic Improvement (possibly long-distance) and the University Pedagogic Colleges, based on the theoretic guidelines proposed by the education experts (2001–2002), with implementing the transferable credits system in the initial training of teachers (2001–2002), and with determining the curricular interdependences between the Pedagogic High-school and the University Pedagogic College by applying the principles of continuity and of transfer (2001–2002).

From an institutional perspective we have to revise the legislative framework regarding the specific activities of the initial training within DDPI and the University Pedagogic Colleges (2002–2003). The data concerning the specific institutions, such as DDPI, University Pedagogic Colleges, needs to be update (2001–2002). The "methodology/ subject didactics" norm has to be implemented in the functional structures of the DDPI and the University Pedagogic Colleges (2002–2003).–We are concerned with introducing the "mentor" function, as a resource person for initiating the pedagogic training activities (2002–2003) and with founding some post-universitary institutions for training and improvement of teachers.

Concerning the probation period/appointment in mathematical education this problem, in 2002–2003, it has been stipulated that teacher training period should be prolonged until taking/passing the appointment exam (1 year probation period, assisted by the mentor and the methodician). In the same period the certification system and the progress in the didactic career have been colligated (the final exam could be taken after the diploma exam-appointment) and a complex assessment system for obtaining the teacher/ schoolmaster diploma (at the end of the initial training process) was introduced by requiring a professional portfolio, "the pedagogic report"; taking the written exam and the diploma paper (having an adequate psycho-pedagogic and methodical content).

8.1.1. *Certification*

In 2002–2003, some levels of qualification were introduced in the initial training and these were: getting a teacher/ school-master degree by attending a institution of higher learning and the DDPI/ University Pedagogic College module; getting a schoolteacher- pedagogue diploma by graduating the Pedagogic High-school and getting the teacher/schoolmaster certificate by

following all the steps of the appointment period and by taking all the specific exams (mentioned above). In addition, it has been decided that every graduate will receive, next to the teacher/ schoolmaster diploma, a improvement brief (for more details, see the 2.6. paragraph)

8.1.2. *Financing*

In 2002–2003 the institutional financing system of DDPI/ University Pedagogic College was improved and in 2001–2002, the financing methodology of the pedagogic training period and the instruction activities was redesigned.

8.1.3. *Application institutions/schools*

In 2001–2003, a permanent network of application institutions (schools and kindergartens) for pedagogic training was developed by bilateral conventions between the higher learning institutions and the local education authorities (LEA).

In 2002–2003, the partnerships with the institutions that provided services for alternative pedagogic training were diversified (advising centres, children clubs, media, speech disorder centres, non-profit organizations)

## 8.2. Continuous Training

8.2.1. In 2002–2003, the main objective of continuous training was to design and implement the national standards for the didactic profession-complex evaluative standards (both normative and of excellence) for dynamic, flexible, performance didactic career.

8.2.2. From a curricular point of view, the concern was the implementation and development of the transferable professional credit system in the continuous training of pre-university teachers.

In 2002–2003, the specialized committee of the National Centre for Training the Pre-university Education Staff established some national standards for the continuous training curricula.

In 2001–2002, the improvement programmes were redesigned by implementing specific activities (*e.g.*, educational technologies assisted by computers) and by curricular elaboration of the training/improvement modules, based on types of subjects of matters is they optional or compulsory.

8.2.3. From an institutional point of view, in 2002–2003, the legal framework regarding the progress of the improvement activities, provided by DDPI and University Pedagogic Colleges, was revised.

In 2001–2002, the data regarding the specialized institutions-Improvement Centres (DDPI, University Pedagogic Colleges) were updated.

A specialized institution for accrediting the continuous training programmes (programmes proposed by training providers, learning institutions, and non-profit organizations) was founded in 2001–2002: the National Centre for Training the Pre-university Education Staff (NCTPES)

An "educational market of continuous training programmes" was developed, based on a fair competitive system that is organized and monitored by NCTPES. In 2002–2003, the teachers were granted some specific mechanisms for promoting the offers of the continuous training providers, such as: publications, offer-fairs, etc.

8.2.4. *Progress in Didactic Career*

In 2002–2003, the methodology of continuous training was redesigned. The progress system, the system of promotion in the didactic career was modified by reshaping the didactic degrees: second degree, first degree and didactic excellence degree.

In 2002–2003, the progress in career was reconsidered by using the transferable professional credits (replacing the seniority criterion with complex psycho-socio-professional criteria and future performances and evolution)

8.2.5. *Professional Progress/Improvement*

In 2002–2003, the programmes of improvement were revised and the role of the institutions of higher learning-continuous training activity improvement centres has been strengthened. The main forms of organized improvement of the teachers, stipulated for in Act 128, were placed în a hierarchy by allotting the transferable professional credits, along with the corresponding transdisciplinary motivation. In 2002–2003, the accredited continuous training providers have been involved in the process of teacher professional development and improvement. The role of Casa Corpului Didactic, as the organizer of continuous training (improvement), was strengthened, in 2002–2003.

8.2.6. *Certification*

The institutions of higher learning- Improvement Centres (DDPI and University Pedagogic Colleges) shall initiate all the certification activities for all forms of continuous training.

In order to obtain the second degree, one must follow these steps: accumulating the minimum credits (the source are the accredited continuous training providers); getting good and very good results at the special inspections; having a professional portfolio (both on specialization and on methodic) and taking a written exam for Pedagogy and Education Psychology, followed by the corresponding assessment.

For the first degree certificate the steps are accumulating the minimum credits

(the source are the accredited continuous training providers) and the evaluation is done by competent departments; special inspections, made by individuals truly competent, methodically and scientifically speaking; elaborating a methodise and scientific paper; presenting this paper, followed by the corresponding assessment.

In order to obtain the Excellence Degree, one has to take part in a national competition on different specializations, having limited available positions (the selection will be made respecting a specific grid).

The evaluation of the periodic improvement activities will be achieved by filling up the specific columns of the improvement report (a document that every teacher/schoolmaster will receive next to the diploma) by the higher learning institutions- improvement centres. And also the special inspection for promoting the didactic degrees has been reconsidered.

8.2.7. *Financing*

The methodology of financing the continuous training activities was redesigned and the possible alternative financing system (fees, sponsorships, personal contributions) was developed. The activities of periodic improvement are supported from MEC's budget, and the ways of financing using foreign capital were identified and used.

The initial and continuous training of the pre-university mathematical education managers, as a constituting projection, has the following objective: professionalizing the managerial career in Romania by: stimulating the institutions of higher learning to develop initial and continuous training programmes for managers during post-university, master and doctoral courses; by developing an "educational market of managerial training programmes", based on a fair competitive system, that has a diverse offer for the candidate teachers, from the training providers; by colligating the structures and the steps of the managerial career with the standards for the pre-university education managers and warranting a professional dynamics by using the transferable professional credit system; by developing modern institutional structures in order to improve the activities of training managers of pre-university education, such as the National Centre for Training the Pre-university Education Staff.

## 8.3. The Initial and Continuous Training of the Managers

8.3.1. The objective is to design and implement the national and international standards for the different types of education managers-progressive standards concerning the dynamic managerial career.

8.3.2. From a curricular point of view, it has been proposed to: implement the transferable professional credit system in initial and continuous training of managers. The curricula of initial and continuous training of the different types of pre-university education managers was established and implemented in the modules.

8.3.3. As for the institutions, the legal framework, regarding the activities of training the pre-university education managers, was revised by updating the information regarding institutions of higher learning that design specialized programmes for training school managers (DDPI). The institutions of higher learning have to be stimulated to develop programmes of initial and continuous training of managers ay post-university, master and doctoral levels A specialized institution for accrediting the continuous training programmes (programmes proposed by training providers, learning institutions, and non-profit organizations) was founded: the National Centre for Training the Pre-university Education Staff and an "educational market for initial and continuous training programmes" was developed, based on a fair competitive system that is monitored by NCTPES.

8.3.4. *Progress in managerial career*

The methodology of the initial and continuous training of managers of pre-university education has been designed.

The system of promoting in the managerial career has been modified and has the following elements: post-university programmes (1, 2, 3 semesters), management mad school management master and on other related story; doctoral programmes for all specializations.

The reconsideration of managerial career progress by using the transferable professional credits was based on the following criteria and indicators:

A. scientific:
- doctor's degree;
- Master's degree;
- post-university courses:
- manager training module, offered by the providers of accredited programmes

B. portfolio:
- curriculum vitae and the list with the written and published scientific works (including books)
- Relevant credentials from important figures in the field, acknowledged both internationally and nationally, and especially scientific certificated
- Managerial projects

C. professional-managerial development:

- accumulating transferable professional credits (for educational management) by attending specific modules offered by the accredited providers.

D. taking mixed test/interview exams, without any discrimination.

8.3.5. *Professional –managerial development*

In 2002–2003, this was achieved by designing professional-managerial programmes and the role of the institutions of higher learning-continuous training activity improvement centres has been strengthened. The main forms of organized improvement of the pre-university managers were placed in a hierarchy by allotting the corresponding transferable professional credits.

8.3.6. *Certification*

The institutions of higher learning-Improvement Centres (DDPI and University Pedagogic Colleges) shall initiate all the assessment and certification activities for all forms of continuous training of the pre-university managers.

8.3.7. *Financing*

The methodology of financing the continuous training activities was redesigned, through relevant and feasible measures; the possible alternative financing system (fees, sponsorships, personal contributions) was developed. The activities of periodic improvement are supported from Mac's budget, and the ways of financing using foreign capital were identified and used.

### 8.4. The Continuous Education

This form of education has the following objectives: implementing continuous education programmes in order to professionalize the different types of jobs, in Romania; designing a integrated legal framework by promoting a legislative initiative in continuous education and through mathematics; stimulating the higher learning institutions to develop adequate institutional structures (an Continuous Education Department) and continuous instruction programmes at post-university, master, doctoral levels; diversifying the offers of continuous professional training of higher learning institutions; developing a "market for continuous education programmes", based on a fair competitive system, that can provide a diverse offer from the training providers for the candidate teachers; colligating the structures and the steps of the professional career with occupational standards and warranting a professional dynamics through the utilization of the transferable professional credit system; continuous adaptation of the new theoretic dimensions of the curriculum to the practical activities developed by the graduates of a institution of higher learning, under the circumstances of evolving to the informational society.

8.4.1. The standard of the continuous education is to design and implement the national standards for professional development-progressive standards for a dynamic and flexible professional career.

8.4.2. From a curricular point of view, it has been proposed to: implement the transferable professional credit system in professional training (specific programmes in the university education); establishing together with the Ministry of Labour and Social Solidarity and with the specialized committee of the National Council for Adult Professional Training some national standards for the continuous education curricula; designing the programmes for adult education for the institutions of higher learning, according to national and local economic criteria

8.4.3. From an institutional point of view, the legal framework, concerning the activities of continuous education, has been revised in 2002–2003. A year earlier, in 2001–2002, the data regarding the institutions of higher learning, that provided specialized programmes for continuous instruction, were updated. These institutions have to be stimulated to develop continuous education programmes for post-university, master, doctoral levels. And in 2001–2002, the Department for Continuous Education, a specialized institutional structure, was founded.

8.4.4. *Authorization*

On a long term basis, it was proposed to develop a"market for continuous education programmes" for the specialized providers based on a fair competitive system, monitored by NCAPT (except the educational programmes provided by the institutions of higher learning).

In the framework of the General Board for Continuous Education, Training and Improvement of Teachers a specialized committee for authorizing the continuous education programmes offered by the universities was founded.

On a medium term basis, it has been proposed to strengthen the role of higher learning institutions in permanent education.

8.4.5. *Certification*

On a short term basis the professional competences, of the adult professional training system, were certificated through a methodology established by MEC together with MLSS.

8.4.6. *Financing*

On a medium term basis, the alternative financing system (fees, sponsorships, personal contributions) was developed. And on a long term basis, the ways of financing by foreign capital (projects) were identified and used

# 9. EDUCATION, PROFESSIONAL TRAINING AND THE YOUTHS

Following (Onisei 2004), Romania continued to be a part of the second generation of European Community Programmes, like Leonardo da Vinci, Socrates and Youth.

Regarding the Direction about the education of the migrating workers' children in December 2002 a Government resolution that contained two elements that were overlooked by the 2002 GR, *i.e.*, the definition of the migrating worker status and free of taxes learning the Romanian language, was adopted.

There are a certain series of initiatives that were taken for promoting reform in the education, instruction and youth system.

The compulsory education was prolonged up to 10 years and the school entrance age was decreased from 7 to 6 years of age, by an amendment to the Education Act from June 2003. The field of vocational education and professional training, nowadays considered to be compulsory education, was structurally and curricular modified in order to allow the students a better access to the labour market. There was little progress in implementing the Strategy of professional initial and continuous training of the teachers and managers of learning institutions, in 2001–2004.

The efforts of integrating the children with special need in the normal school environment were continued. There have been taken measures to improve the access to and the conditions of education for the children living in the country side and for the disadvantaged groups. These measures include: school rehabilitation, transportation improvement, warranting a meal consisting of cheese and bakery products for the primary school pupils, on a daily basis, and improved teaching techniques.

In the period, that is the subject of this report, there has been some progress in founding a coherent legal system for continuous education. The new Labour Code, that became operative in March 2003, compels the employers to warrant the access to instruction of their employees. There has been adopted a national system of accrediting for adults.

## 9.1. General Assessment

Overall, Romania's participating in the communitarian programmes is satisfactory.

Still, the capacity of the National Agency Leonardo da Vinci needs to be improved, and the quality of the programme implementation has to be increased in some strategic areas.

The efforts of complete implementation of the Direction regarding the education of the migrating workers' children have to be continues until the date of adheration. Although ,in this period, there have been progress, the obligation of the migrating workers' children to take recovering or extra-curricular classes for Romanian language

should be optional.

The priority of the administration has been to widen the access to education for the disadvantaged groups and for those living in the country side. Still, these efforts were limited by the low financing level of education. These problems should be handled in accordance with the conclusions of the European Council in Lisbon. The predominance of school integration for those with low incomes has increased. Prolonging the compulsory education to 10 years is a positive evolution, but additional efforts need to be made to improve the quality of education and ensuring the qualification transparency.

There have been progresses in establishing the legal framework of the adult professional training, although it is not operative yet. There should be made other efforts to increase the participation of adults — including the unemployed — in the professional training.

### 9.2. Conclusions (Onisei 2004)

Since the last Country report some progress regarding he synchronization with the general acquits and regarding the general reform of the educational system have been made.

The limited budget allotted to education inevitably reduces the impact of the wanted reforms. New efforts have to be made in order to increase school attendance, to improve the educational act, and to stimulate the adults to become involved in the professional training.

Romania is fully taking part in the second generation of the communitarian programmes in education, professional training and youth. The efforts regarding the complete implementation of the Direction concerning the education of the migrating workers' children have to be continues until the date of adheration.

The negotiations on this chapter have been temporarily closed. Romania did not request a transition period for this field. Overall, Romania meets the requirements and the commitments derived from the negotiations for adheration on this chapter. At the same time, Romania is a partner in the 6th General Programme of the EC for Technological Research and Development and the EURATOM 6th General Programme since October 2002.

The national Plan for Technological Research, Development and Innovation (RDI) was updated by a government resolution and its period was extended until 2005. One of the priorities of the RDI National Plan was to found the excellence centres as central elements of some high competence networks in technical-scientific areas.

In October 2002, the authorization for founding the first scientific and technologic park was issued. The National Contact Points was reorganized to participate in the 6th

General Programme. However, there are still some difficulties regarding the development of the scientific and research activities. The budget allotted to research and technological development is very poor and should be considerably increased in order to achieve the targeted 3% of PIB, established by the European Council in Barcelona, until 2010.

Romania's participation in the 5th General Programme is not entirely satisfactory and it did not allow the research community to benefit of the entire programme. In order to better use the possibilities provided by this partnership, Romania has to continue the efforts of improving the cooperation between the research field and the economical units and to improve the management and coordination of the budgets for research-development. The circulation of information, regarding the Programmes, should be improved in order to warrant the increase of the degree of knowledge concerning them and of the ability to approach he relevant procedures. Also as final conclusions in (Onisei 2004) there has been noted only a limited progress since the last report.

Romania's participation in relevant General Programmes is not entirely satisfactory. Efforts should be made to keep reinforcing the administrative ability and infrastructure concerning the research in order to successfully participate in the Programmes. Furthermore, Romania should optimize the collaboration between the research area and the economical units. The budget allotted to research and development is still limited.

The negotiations on this chapter have been temporarily closed and there was no transition period required. Overall, Romania meets the requirements and the commitments derived from the negotiations for adheration on this chapter.

## 10. THE ROMANIAN TRADITION OF EDUCATION THROUGH MATHEMATICS

When speaking about mathematical education, we mean not only the mathematic teaching-learning under any form of instruction, but all the methods by which the mathematical culture and, implicitly, the thinking that it promotes, all the spiritual fulfilments and aesthetic emotions of mathematics can be assimilated at different ages, by various social, professional and subject of matters categories.

Following (Iacob 1959, 1972; Marcus 2003; Moisil 1971; Postolică & Niță 1993) and so on, we shall review some reference points of the Romanian Mathematical Sciences Society activities:

10.1 In 1893 the founding of the "Friends of Mathematical Sciences" Society was finished;

10.2. In September 1895, the first issue of "The Mathematic Gazette" appears (a publication issued by a group of young engineers);

10.3. In 1897, the "Friends of Mathematical Sciences" Society fuses with the "Physico-Chemical Sciences" Society , creating the Romanian Science Society, that survives in both world wars, until 1949 when it is replaced by "Mathematical and Physical Sciences" Society. Thus, from the 30th of May 1949, the Romanian Society of Mathematical and Physical Sciences, with the corresponding publications entitled "The Mathematic and Physics Gazette, series A", intended for the medium and higher learning teachers and students, with actual contributions to the process of informing the teacher about the mathematical world in Romania and multiplying their professional level, according to the Education Reform of 1948, and "The Mathematic and Physics Gazette, series B" intended firstly for the pupils. In 1962, as a consequence of the separation of the Mathematics-Physics Faculties of the Romanian universities into Mathematics-Mechanics and, respectively, Physics Faculties, there has been a corresponding separation and organization in The Romanian Mathematical Sciences Society and, respectively. The Romanian Physico-Chemical Sciences Society, that led also to the reorganization of the publications as "The Mathematical Gazette" series A, for teachers and "The Mathematical Gazette", series B, for students and pupils.

In 1964 this society is divided into "The Society of Mathematical Sciences" RMSS, and "The Society of Physico-Chemical Sciences".

The first congresses of Romanian mathematicians were organized at Cluj (1929) and Turnu-Severin (1932), by the most important Romanian researcher in the mathematical history field, Petre Sergescu. He also attended the Congress from 1945, in Bucharest. He died in France in 1954. The 4th Congress of the Romanian Mathematicians was organized in 1956, and the last on the 22nd–28th of June 2003. The tradition established by our predecessors that were passionate about mathematics is continues nowadays by the publications issued by every Romanian mathematical education level.

It is worth mentioning, that in 1953 the translated variant of "The Mathematical Gazette", series B, entitled "Matematikai és Fizikai Lapok" was issued, which starting with 1957 had an independent mathematical content intended for the pupils of the Hungarian teaching schools.

We mention that the international mathematical school contests, known as "olympiads" were initiated in 1959 as proposed by the Romanian Society of Mathematical and Physical Sciences; the "olympiad"-type school contest keep on taking place, even nowadays, at different levels: of learning units, regional, national or to praise different scientists. We enlist below some examples of such contests:

## 11. UNIVERSITY MATHEMATICS

Many of the high school graduate, gifted for mathematics, would have rather became engineers or accountants than mathematicians. On the other hand, the number of mathematical faculties has increased as a result of the number increase of universities, be they private or public; it is useless to add that this increase was only in number not in quality.

Recently, it has been observed a recovery. The oscillation between mass university learning and one of the elites was solved by organizing a first step, of 3 years, that will maintain the "popular" character of higher education, and a second one, of 2 years, for those who will eventually be doctoral candidates. In Bucharest and other university centres, the mathematic faculties have became mathematic and informatics faculties, thus succeeding in attracting more students. But is this association with informatics the only possibility for mathematical higher learning education to survive or there are other ways of attracting the new generations to mathematics? Apart from all the ups and downs, the mathematic faculties of Iaşi, Bucharest and Cluj, respectively, and perhaps some other two university centres (similar to what the University of Cernăuţi has been in the period between the two world wars, that gathered, in the 1920's, the Romanian mathematical elite, from Stoilow and Vrânceanu to Nicolescu and Popoviciu, or what, later, represented the University of Timişoara) are associated, in the history of Romanian mathematics, with the place where the most Romanian mathematicians of the 20th century (including many of those that went in different corners of the world and honour with their performance prestigious Western universities) were initiated in mathematics.

What could explain that? For a long period the students of the above mentioned universities benefited from the best that our mathematics had to offer. What more could a student ,like the author of this report, ask when being taught by Stoilow, Vrânceanu, Nicolescu, Valcovici, Froda, Onicescu, Barbilian, Ghika, Moisil? In Iaşi there was a similar situation, with teachers like Myller, Mayer and Haimovici, the same thing in Cluj-Napoca, with teachers such as Popoviciu, D. V. Ionescu and Călugăreanu. All of them were not only recognized mathematicians, but also creators of mathematical schools.

They have modelled the ones that would be the leaders of schools in the 1970s and the 1980s, and these have, in their turn, modelled the ones that are today's most successful Romanian mathematicians. Many of their names appear in this report and we miss many of them, maybe equally worth mentioning, and we did not have the opportunity of naming them.

But things evolve rapidly. The mathematic departments from the Universities of Timişoara, Constanţa, Braşov and Craiova are quickly catching up, and from any of them we could select at least some that are very gifted. Tomorrow, others, that at this moment

are considered to be in second place, will rise. We hint at the public universities. We do not have too much data on the others, the private ones, but their increasing number is not a good sign. Perhaps Romania breaks some records in this matter. Almost all the mathematicians that I know to have classes at a private university have also classes at state universities or at a research institute. But the increase of the number of classes works against their quality.

## 12. MATHEMATICAL RESEARCH IN THE INSTITUTES OF THE ROMANIAN ACADEMY

There are some institutes of this kind, of which two are in Bucharest; one is in Iaşi and one in Cluj-Napoca. The most important is the one in Bucharest, founded in 1949 and its managers were: D. Pompeiu (1949–1954), S. Stoilow (1954–1961), M. Nicolescu (1961–1973), R. Cristescu (1973–1975), G. Gussi (1990–1999), S. Basarab (1999–2004), Vasile Brânzenescu (2004– ).

In 1975, the institute was abolished under the cynical pretext of tightening the relationship with the production process. The scientists were scattered in different factories and industrial units, thus being unable to do mathematic investigations. As previously mentioned, in 1980 at INCREST a Mathematic Department was founded, where the former research activity was resumed, but the conditions were not the same. The department stood out in the field of the theory of operators, in that of mechanics, in algebraic geometry and complex analysis, but it was rather an exclusivist circle, as it can be understood from the fact that a brilliant 1980s graduate, Şerban Buzeteanu, was not received there because of his preoccupation with theoretic informatics and with combinatory theory. He has been proposed to focus on mechanics (an option impossible to be considered), in order to be received. The abroad travel limitations functioned flawlessly, especially after Dan Voiculescu remained abroad.

Re-founded in 1990 and re-established in a sector of its new building, from 1970, where in the mean while other institutions settled, the Mathematic Institute was named, few years ago, after the great Romanian mathematician Stoilow and, in July 2003, it had a staff of 140 scientists; 20 percent of them are young, under 30 years of age, most of them being doctoral candidates or being, already, in post-doctoral probation period at Western universities, or others having Humboldt Foundation scholarships. Gheorghe Gussi, that was in charge of the Institute for a period of time. played an important role in the process of getting back the building on Calea Griviţei 21. Some years ago, the Institute became an Excellence Centre of the European Community. This fact added to its hot subject oriented programmes of current mathematics the EURROMMAT Project, a priority

programme of the Romanian Academy, financed for a 3 year period by the European Committee.

In order to fully understand what the Excellence Centre of the European Community status means, we shall mention that only 4 other Romanian institutes have been awarded this status, two of them belong to the Romanian Academy. Under these circumstances of making great efforts to meet the requirements of the adheration process, hoping to achieve this goal in 2007, we can say that the Mathematic Institute in Bucharest of the Romanian Academy has already won this competition, being an example worth following for the other research institutes in Romania. In this light, the institute deserves to be protected, avoiding any decision that might reduce the strength of its investigations.

In October 2001, in collaboration with this Institute, the Bucharest Superior Pedagogic School (B. S. P. S.) was initiated, a school that tries to stimulate the best students to continue their studies in Romania rather than going abroad. Recently, B. S. P. S. was temporarily accredited and had a first generation of students. It is too soon to evaluate this interesting experiment, based on a French model. Probably, there should be made some adjustments on the way. Anyway, the concept is a valuable initiative in solving the problem raised by the instruction of the new generation of mathematicians.

The Institute of mathematic statistics and applied mathematics "Gh. Mihoc-Caius Iacob "is managed by acad. Marius Iosifescu and is the result of a gathering of the precedent institutes, one of mathematic statistics, founded by acad. Gh. Mihoc, the other of applied mathematics (especially, in mechanics), initiated by acad. Caius Iacob. The institute has o significant contribution to the development of the theory of probabilities, to mathematic statistics, of the operational research, of the mechanics and numeric analysis.

We should also mention the Mathematic Institute "Octav Mayer" from Iaşi, is led by acad. Viorel Barbu and it develops research programmes in qualitative theory and the control of infinitely dimensioned equations, in Finsler geometry and in the potential theory. Another institute worth mentioning is the Institute for calculi "Tiberius Popoviciu" (led by Ion Păvăloiu) from Cluj-Napoca, that develops research programmes in the field of numeric methods and of approximation in linear analysis and in the non-linear one and in the study of continuous or discreet non-linear dynamic system.

## 13. SOME OF THE ROMANIAN MATHEMATIC RESEARCH PUBLICATIONS

There existed Romanian mathematic research publications[3] in the 20th century but they sometimes wronged by a difficult adjustment to the international rules. A classic

[3] One of the best was "Mathematica," from Cluj, founded by Petre Sergescu.

example is the "Bulletin Math.de la Sociéte Roumaine des Sciences". To show one of their flaws, we shall refer to vol.30 from 1927, fascicle 1, where Gabriel Sudan's article "Sur le nombre transfini omega puissance omega" is published from page 11 to page 30, in which, as it was later observed (see, the article signed by C. Calude, S. Marcus, I. Tevi "The first example of a recursive function, which is not primitive recursive" in "Historia Mathematica", Academic Press, New York , vol. 6, 1979, 380–384), the author gave the first example of a recursive function, which is not primitive recursive; this kind of example was and, sometimes, is attributed to W. Ackermann, who's article was published in a number from 1928 of "Mathematische Annalen".

The editorial staff of "Historia Mathematica" accepted the publishing of the article, on condition that it is supported not that Sudan was the first, but that both Ackerman and Sudan gave in the same time, not knowing of each other, the above mentioned type of result. What is the reason of such a condition? Although Sudan's example is published in 1927 and that of Ackermann in 1928, the fact, that the Romanian publication does not have the date on which the article was received, makes it impossible to establish clearly who was the first. We had to accept this explanation without any possibility of response; here is how an editorial oversight strikes back over the years. But isn't it possible to still find articles published without mentioning the date when it was received at the editorial office nowadays?

In the last part of the 1940s and the beginning of the 1950s, as a consequence of the "fight against cosmopolitanism", the mathematical publications that had Latin title were eliminated and stupid rules of simultaneous publishing in more languages (Russian included) have been introduced. New publications have been founded, such as "Proceedings of the Academy of R. P. R" and "Scientific Bulletin of the Mathematic Sciences Department of the Academy of R. P. R"; these two would disappear after several years. On the other hand, even the name of the country would turn from R. P. R to R. S. R., which immediately led to the changing of the titles of the publications. If they didn't disappear, they would change the name or the periodicity. "Revue de Mathematiques Pures et Appliquees" was shortly after named "Revue Roumaine de Mathematiques Pures et Appliquees". Because of a misunderstanding of Francophone, for a very long period of time the contrast between the language of the title of the publication (French) and the language of the articles of the same publication (English) was and still is maintained.

This fact might have confused some foreign librarians to the disadvantage of the publication. Under these circumstances, few Romanian publications developed certain stability, a necessary condition for achieving some acknowledgement in the mathematical community. A few years ago, when this abnormality was noticed, at the name "Revue Roumaine de Mathematiques Pures et Appliquees" another has been added "Romanian Journal of Pure and Applied Mathematics", fact that considerably lengthens a name that is

long enough already, not to speak about the confusion created among the subscribers of this publication and that don't know if the publication is the same or is a new one (like the known paradox of the knife with a changed blade: is the same knife with a new blade or is a new one with the old hilt?). We should also mention the unforgivable big disparity between the date in our publications and the real date of issue, worsened by delays in sending the articles at the foreign addresses.

This situation is particularly embarrassing in the case of a publication founded some years ago, "Proceedings of the Romanian Academy" having as main goal to operatively communicate some significant data. Should we be surprised that in the 1994 assessment elaborated by the "Institute of Scientific Information" (I. S. I.), Philadelphia, USA, Romania was on the 40th of 55 positions in the world and on the 24th of 30 in Europe? There aren't any signs that the situation improved significantly meanwhile. Years ago "Revue Roumaine de Mathematiques Pures et Appliquees" was on the main flux of scientific publications; nowadays, none, except one that we shall reveal below, of the Romanian mathematic publications is in that position, despite the fact that some of them are very good. The reasons of this situation are the financial and management deficiencies, already mentioned.

A special place among the Romanian mathematic publications is occupied by "Journal of Operator Theory", issued in collaboration with the "American Math. Society" and edited by "Theta" Foundation, created to support this publication and to warrant the necessary financial means for the Mathematic Institute Library. With its prestigious editorial board and by the manifesting scientific exactness, this publication remains in the main international flux.

As I have already said, this is the only one among the Romanian mathematic publications that achieves this performance. Still we can't hide the fact that this publication was created as a manifestation of the powerful school of operator theory, initially established in Bucharest by Ciprian Foiaş; this is probably the most important school of research generated by Romanian mathematics, a school that was periodically invited to participate as a rapporteur at international mathematic congresses. "Revue Roumaine de Mathematiques Pures et Appliquees", belonging to the Romanian Academy, is the second, from the point of view of prestige; the Romanian Academy issues "Mathematical Reports" (in Bucharest), although it also issues articles in different languages, "Mathematica" and "Revue d'Annalyse Numerique et de Theory de l'Approximation" (in Cluj-Napoca), with articles written only in international languages, English almost all the times (again the abnormality mentioned).

As it has been said, there are some years since a new publication of the Romanian Academy, similar to "Comptes Rendus" from Paris: "Proceedings of the Romanian Academy". It is organized in three series, together with Physics, informatics, and

technical sciences. In addition to the publications of the Romanian Academy, there are many university publications, but they are under the today's standards applied in mathematical research. However, we should mention the ones that appear in Bucharest, Iaşi, Cluj-Napoca and Timişoara. Another publication that is also issued is "Bulletin Mathematique de la Societe de Sciences Mathematique de Roumanie", again a French name contrasting with the published articles, mainly in English. A large part of the original mathematical production of the Romanians appears in foreign publications and is quite frequently quoted.

## 14. GENERAL AND RECENT CONCLUSIONS IN ROMANIAN EDUCATION

General and Recent Conclusions in Romanian Education, with Appropriate Projections in Mathematical Education and Related Topics.

Following (Onisei 2004), the Ministry of Education and Research together with the World Bank have organized in Bucharest, on the 6th and 7th of May 2004, the international conference, the first of this kind in South-Eastern Europe, on "The Relation between the Educational Policies and Actions and the Their Results". The Minister of education and research, Mr. Alexandru Athanasiu, stated that "the World Bank representatives have chosen Romania for the first conference on education, because they considered that our country had the best results of any other country applying the programmes of the institution.

However, at the opening ceremony, Romanian Minister of education and research said that "the majority of the western European countries showed willingness to provide grants, technical assistance and expertise in applying the reform of the Romanian education "

The manager the Education for Europe and Central Asia sector of World Bank, Mrs. Maureen McLaughlin, stated that there are sufficient evidence in the Romanian educational policy the targeted results and goals of the education reform are known. This issue was also mentioned by the manager of the Bureau for Romania of World Bank, Mr. Owaise Saadat, which said that Romania could be given as an example for the manner in which it linked the educational policy with its results.

The main aspects that were presented and discussed by the participants referred to emphasizing the role of the internal assessment of learning facilities, to the importance of national implementation of the international assessments, like PISA, PIRLS, CIVED, etc., to the necessity of establishing an optimal balance between the national evaluations and the exams of a functional educational system, to the implementation of a quality

management in high school and pre-high school education and the effective use of the education results in the process of counselling both students and parents.

The World Bank representatives and the other foreign guests, as well, have admitted that a reform in education "is a long term process that presupposes large financial investments, as well as cohesion in strategy management" and they agreed upon the fact that the following reform steps have to take in account three essential aspects:

- initiating some active regional partnerships;
- regional promotion of the successful applications and experiences;
- national stimulation and support (including additional sources and funds) of those initiatives that could be generalized.

"These couple of very intense days of this first international conference have achieves its desired goals. On one hand, a series of ways through which the stress on the results could improve the educational policy and specific decision making were identified, and on the other hand, it has been created an open environment for debates, so that all those involved in initiating and development of educating reforms to be able to report and share their experiences and achievements", stated the minister of education and research, Mr. Alexandru Athanasiu, at the end of the conference.

At the same time, the minister announced that beginning with this fall our country will benefit from a new loan from World Bank, of 60 million $, and of an additional 30 million $ from the Romanian government, amounts that will be used to continue education reforms.

There have been over 200 representatives of education ministry, educational agencies, as well as of institutions cooperating with World Bank, from 28 countries from Europe, Central Asia and U. S., attended this conference.

## 15. PERSPECTIVES AND RELATED TOPICS

15.1. launching adequate programmes concerning education through inter-and transdisciplinary differential mathematics in the context of educational culture;
15.2. developing the long-distance mathematical instruction;
15.3. enhancing knowledge through mathematics under the circumstances of globalization, including wider and easier access to virtual libraries;
15.4. the just support of mathematical forms of instruction, both public and private;
15.5. the use of the mother tongue in teaching mathematics, according to the needs of the communities and of their members, to the democratic traditions and to the international scientific recommendations;

15.6. developing and implementing some programmes concerning the instruction and education through mathematics according to the requirements of some firms and companies, that contribute significantly to the development of technologies and increasing competitive value of our products;

15.7. making the natural connections between scientific mathematical research and general education, with immediate applications in national, regional and local evolution by adequate structural implements;

15.8. introduction of agreement-based scholarships and of credits for pupils, students, master of arts and doctoral candidates;

15.9. continuing to synchronize the overall Romanian mathematical teaching, based on the results obtained by specific traditional methods, and the international mathematical instruction;

15.10. applying the transferable credit system to the continuous training and remunerated acknowledgement of continuous training also in the field of mathematical education;

15.11. promoting a mathematical teaching targeting the student and directed towards the development of cognitive, actional, competitive abilities by relevant projections of informational and communication technologies in the Mathematics ↔ Science ↔Technology triad;

15.12. generalizing the grants financing and supporting the multi... system (colleges, institutes, research departments of firms and companies) of scientific research by increasing the experimental scientific research;

15.13. selecting management also from the mathematical instruction field, will be based on professional and managerial competence evaluated by committees comprised of competent teachers, students, parents and the representatives of the local communities;

15.14. using the double-legitimacy system- democratic and managerial- for all-level management and continuous training of managers;

15.15. continuing to warrant the competence and public evaluation accessibility for instruction and education;

15.16. applying international scientific collaboration by generalizing joint activities, joint research units, at least double degrees and so on;

15.17. stimulating the Romanian investigators to participate in the general programmes from the E. U. and by re-establishing a component of the central public administration, having a role and responsibilities in elaborating, applying, monitoring and evaluating the policies of the research and development field (as it is found in the structure of E. U. institutions- the Committee for Science and Research- and as it is stated in the Declaration from

Lisabona, concerning the European research space) creating technological parks, scientifically parks and technologies transfer centres.

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