

# MATHEMATICAL EDUCATION IN WALACHIA, MOLDAVIA AND TRANSYLVANIA IN THE 18<sup>th</sup> CENTURY. EUROPEAN MOBILITY OF HIGHLY CULTIVATED PEOPLE

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*Abstract.* The paper brings arguments and examples to emphasize three aspects of the mathematical education in the 18<sup>th</sup> century: the mobility of European people of culture, interweave of scientific activities with humanist and religious ones, the link with the development of the scientific life in the Romanian countries. The content refers to occidental books which had a wide influence on the mathematical education in the East of Europe, including Walachia, Moldavia and Transylvania, to teachers of mathematical knowledge in these countries and to their European studies. A special paragraph is dedicated to Chrysant Notara, illustrative personality of the cultural mobility in the 18<sup>th</sup> century; another paragraph tells about contributions of certain statesmen to the education development in Romanian countries till the year 1800.

## 1. INTRODUCTION

In the journal “Studies in the History of Natural Sciences” volume 24 (2005), the Beijing Declaration on Economic Globalization and Cultural Diversity at the 22<sup>nd</sup> International Congress of History of Sciences, asserts: “However, globalization does not necessarily mean the even distribution of material wealth and natural resources. Rather, the sharing of knowledge and culture should constitute a short-term goal, the fulfillment of which mankind must strive to achieve”.

Studying the evolution of the educational process during the 17<sup>th</sup> and 18<sup>th</sup> centuries, we find that the mobility of scholarly people, acting like as a very globalization in the frame of the European extent of knowledge, led to the raising of the scientific level of some countries, among these being Transylvania, Walachia and Moldavia. At that time a strengthening communication between scientists and humanists existed, and many times the mathematical, physical, geographical knowledge belonged to philosophers.

The content of this paper refers especially to the 18<sup>th</sup> century, reflected in the circulation of professors, books, mathematical knowledge, in the geographical area of the Romanian countries. Sometimes it is necessary to mention sources from the prior centuries.

As a general remark, in Walachia and Moldavia functioned professors of Greek origin, with studies in European cultural centers such as Padua, Bologna, Paris, Vienna, Constantinople, Halle. Here the languages in schools were Greek and then Latin. In Transylvania the first books with mathematical knowledge were

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written in Latin, translated from German (mathematical books published in Greek were translated from German, too). In the 18<sup>th</sup> century began the education in the Romanian language in the three countries, but only the 19<sup>th</sup> century brought the development of the education in a greater measure.

## 2. OCCIDENTAL BOOKS WITH A WIDE INFLUENCE ON THE MATHEMATICAL EDUCATION IN THE EAST OF EUROPE

Books of Christian Wolff (1679–1754), especially “*Anfangs – Gründe aller mathematischen Wissenschaften*” (Basis of all mathematical sciences) published at Halle in 1710–1711, and “*Compendium elementarum matheseos universae in usum studios inventulis*” (Elementary shortening of universal mathematics for the use of young students) published at Halle in 1713, were wide-spread, used as an inspiration source or simply just translated. In 1773 this Wolff’s Compendium was printed in Latin language at Cluj. A manuscript belonging to Nicolae Cercel (Zarzulis), translated according to Wolff’s book, is found in the Library of the Romanian Academy (Șt. Andonie, 1965). In English translation, the title of this manuscript could be the following: “Very introductive treatise in elementary mathematics of the very mathematician and very learned Wolff Christian, a German, with the endeavor and the study of Nicolae Cercel, then with the Ilie Nicolae Rosseti’s transcription and setting in order. In Moldavia of Dacia, in the Hellenic school science, in the year 1801”.

An older mathematical book with a large use was “*L’Almanacco Perpetuo*” published by Rutilio Benincasa in the year 1587. According to this book, which was also edited later in Beltrano (1720) Amfilochie Hotiniul published “*Arithmetica gheometriei*” which circulated in Moldavia till the end of the 19<sup>th</sup> century. The French philosopher Petrus Ramus (Pierre de la Ramée, killed in the Saint Bartholomé’s night in 1572) reformed the teaching of geometry and so his books had the greatest influence on the writings which followed in this domain.

Other authors whose mathematical books were used in Walachia, Moldavia and Transylvania were the Italian Vito Caravelli (1721–1800) with seven volumes of “*Elementi di Mathematici*”, the French mathematician Alexis Claude Clairaut (1713–1765) with his “*Eléments d’Algèbre*” (Paris, 1746), the Italian Alessandro Conti with more editions of his “*Elementi Arithmetici*”, between 1730 and 1780, translated and printed by Amfilochie Hotiniul at Iasi in 1795.

The book “*Methodenbuch für Lehrer den deuchen Schulen*” published in 1775 by the reformer of the children education, Johann Ignaz von Felbiger (1724–1788), a teacher and consultant of the empress Maria Theresa, had a large influence not only in the German lands but in all the East of Europe, in Russia inclusive. It was translated into Romanian and printed in 1777 at Vienna (with Cyrillic alphabet) then in the Transylvanian towns Blaj in 1785, and Sibiu in 1789, the last being printed both in

Romanian and in German languages. Its title, translated from Romanian into English, could be the following: “Taking by hand or advising to the arithmetic for the use of the Romanian non-united children who learn in the little schools”.

The books “*Elementi di mathematica*” of Vito Caravelli (1724–1800) were used by Manasse Eliad at the Academy of Bucharest. The seventh book of these *Elementi* was dedicated by its author to the Walachian prince Alexandru Ypsilanti in 1779. Also the “*Trattato d’astronomia*” of Vito Caravelli, published by Stamperia de Raimondi in 1789, was used in the schools of the Romanian countries.

The notions of astronomy were taken from the works of the French astronomer Joseph Jérôme Lefrançais de Lalande (1732–1807) and also from those of Maximilian Hell (or Höll, 1720–1792) born in Hungary, professor of mathematics in Cluj from 1752 to 1755.

The notions of logics used in the schools in Eastern Europe were inspired by the books of the French philosopher Étienne Bonnot de Condillac (1715–1780).

### 3. TEACHERS OF MATHEMATICAL KNOWLEDGE AT THE PRINCELY ACADEMIES FROM WALACHIA AND MOLDAVIA AND ABOUT THEIR STUDIES IN WESTERN EUROPE

The first school where mathematics were taught to young people was “Scola Latina” at Cotnari in Moldavia, founded in 1582 by the prince Despot, a friend of the German humanist Philipp Melanchthon (1497–1560). The sequel of the education process was intensified in a significant measure in the 18<sup>th</sup> century. Some examples illustrate the development of the mathematical education, under the flow of cultural values from Western Europe to Romanian countries.

For higher education, one academy was founded in Moldavia at Iași in 1640, another in Walachia, at Bucharest in 1679. Before 1776 the lessons were delivered only in Greek language (Neo-Greek and Hellene), but after this year the Latin and French languages were used, and in Walachia the Italian too (Șt. Andonie, 1965).

#### 3.1. IN WALACHIA

During the Constantin Brâncoveanu’s reign (1688–1714) the Academy of Bucharest had more professors of foreign origin who taught mathematical knowledge. We name some of them below.

*Sevastos Kyminitis*, director of the Princely Academy from Bucharest (1689–1702), born at Chimene near Trapezunt (today Trabzon in NE of Turkey) had studies in Constantinople and in Italy. *Ioan Comnen* (died at Bucharest in 1719), whose studies at Constantinople and in Italy allowed him to teach physics, mathematics and natural science, followed as director of this Academy. Also he was a metropolitan bishop of Dristor (today Silistra) and wrote “Description of the

Saint Mountain Athos”, so illustrating a specific feature of the epoch: in the most cases, the education in the field of mathematics, physics, natural science, was not apart from philosophy and religious schooling and activities. *Manasse Eliad* (Eladis), director of the Princely Academy since 1759 till 1785, was Macedonian from Moscopole, with studies in Bucharest and then in Italy and taught mathematics according to Caravelli’s books “*Elementi di matematica*”. *Grigore Constanda* (Constandas), professor at the Academy from Bucharest (1780–1790) had studies in Germany. After 1790 he went again abroad and printed together with Daniil Philippidi a “Modern Geography” in Greek. *Daniel (Dumitru) Philippidi de Méliès* translated and published the Lalande’s Astronomy and the Condillac’s logics and in 1816 he published at Leipzig the Geography of Romania, using for the first time the entitling “Rumania”.

### 3.2. IN MOLDAVIA

The academic education was reorganized in Moldavia in 1714. We name some important professors of mathematics and sciences from this Princely Academy, emphasizing the mobility of the learned men.

*Nicolae Cercel* from Metsovo (NE of Greece) had studies at Ianina and Constantinople, professed at Tricala in Greece, then, between 1750 and 1759, continued to study in Occident, especially in Venice, came back at the Mountain Athos and finally came at Iasi, as a director of the Princely Academy between 1760 and 1773. He died at Iasi in the year 1773. N. Cercel taught for the first time in Romanian countries experimental physics and Newtonian theory of gravitation. He translated in Greek the German books of Christian Wolff and collaborated at the Greek encyclopedia “*Thesaurus linguae graecae*”.

*Nechifor Theotochis* (1736–1806 or 1731–1802) from Kerkira (Corfu) with studies in Corfu, Padua, Bologna and Leipzig, taught philosophy, physics, mathematics and geography. A manuscript of Theotochis with Euclidian elements of geometry, dated 1764, containing trigonometry and conic sections, is still kept. In 1765, Theotochis imprinted at Leipzig two volumes in Greek of “Elements of Physics” and in 1798, 1799, at Moscow, three volumes of “Elements of mathematics, gathered from the old and new”. The third volume contained differential and integral calculus, chapters which were not taught in the academies from Iasi and Bucharest (Șt. Andonie, 1965). Already these disciplines were studied in Italian universities of Padua and Bologna. Leibniz himself stayed in Italy from 1689 to 1690, after he published his *Nova methodus pro maximis et minimis*, in 1684 (M.T. Borgato, 2006).

The activities of the two academies were appreciated by educated people who traveled in the Romanian principalities in those years. Remarkable are the notes made by the renowned Ruggero (Rudner) Boscovic (1711–1787) philosopher, mathematician, astronomer, geodesist, author of over 150 books and treatises, founder of the Astronomical Observatory in Brera (H. Holland, 1815). In his travel

from Constantinople to Poland, he passed by Walachia and Moldavia. Encyclopedia Yugoslavia registers at the page 156 that Boscovic found in Iasi astronomical instruments for studying eclipses and planets. It is known that some graduates of the two Princely Academies were professors at different schools from the South-East of Europe, and the academies themselves began centers of education in this part of world. So, the czar Peter I the Great (1672–1725) of Russia sent in 1705 two scholars in Walachia to learn the Latin and Romanian languages (Șt. Andonie, 1965). A graduate of the Academy of Moldavia, who became a bright personality of the world culture, was Nicolae Milescu Cârnu (1636–1708). Dimitrie Cantemir (1673–1723) was not a graduate of the Academy from Iasi, but he was educated in the spirit of this higher school.

### 3.3. CHRYSANT NOTARA – OUTSTANDING AND ILLUSTRATIVE PERSONALITY OF THE CULTURAL MOBILITY IN THE 18<sup>th</sup> CENTURY

A scholarly man of Greek origin, Chrysant Notara (Hrysanthos Notaras), died in 1731 in Bucharest. He had studies at Constantinople, Padua, Paris and Moscow (it seems in England too). His activity was carried on as an astronomer around the known astronomer Giovanni Domenico Cassini, in Paris (M. Stavinschi, V. Mioc, 1998), professor of the Prince Brâncoveanu's children in Bucharest, orthodox patriarch of Jerusalem since 1707. His scientific creation comprises the treatise "*Introductio ad geographiam et spheram*", published at Paris in 1716 (in Greek) and at Venice in 1718, this being the first work with scientific character published for Walachia and Moldavia, and was dedicated to the prince Nicolae Mavrocordat. The library of the Romanian Academy keeps an exemplary of this treatise (Șt. Andonie, 1965). It is a book of geography, geodesy and practical astronomy, with elements of applied mathematics, proposing methods of calculus for the observations in astronomy. For the first time Notara determined the longitude and latitude of the cities Bucharest and Târgoviște. In 1700, at Padua, Notara published the "Geographical map of Principality Walachia", mentioning the riches of the soil and subsoil of this country. This map, dedicated to the prince Ioan Constantin Basarab, was identified at British Library (no. 44170) in 1926 (M. Stavinschi, V. Mioc, 1998).

As a patriarch of Jerusalem, Chrysant Notara helped the prince Nicolae Mavrocordat (1711–1716) to organize the princely Academy in Iasi and gave books with dedications to this academy. In 1728 he was in Iasi, during the reign of the prince Grigore Ghica (1726–1733) and presented the book "*Epistolarum Paulii Manutii*", for the library of the academy.

The evocation of the outstanding personality of Chrysant Notara is important from the three points of view: the European mobility of people of culture, interweave of scientific activities with humanist and religious ones, and the link with the development of the education and scientific life in the Romanian countries.

#### 4. UNIVERSITIES, BOOKS AND PROFESSORS OF MATHEMATICS IN TRANSYLVANIA OF THE 18<sup>th</sup> CENTURY

The history of the higher schools becomes earlier in Transylvania: on 12<sup>th</sup> May 1581 a Catholic University was founded at Cluj by Stephan Bathory. Here the theology, law and philosophy were taught. The Reformers closed this university in 1605, but in 1622 the Open Calvin University was founded at Alba Iulia, having three sections: theology, philosophy, linguistic. Professors from Germany, such as Johann Henrich Alsted, Fisher (Piscator), H. Bisterfeld taught in this university, destroyed by the Tatar invasion in 1658.

In 1774 the empress Maria Theresa reorganized the Catholic University of Cluj, with three faculties: law, philosophy – theology and medicine. The life of this university was also short, it becoming a high school only. Then in 1785 the Unit Normal School was founded in Oradea and it became a higher institution for the philosophical education. In 1788 a faculty of law added to this university.

The first book of science (geography and cosmography) was published in Brasov (*Coronae Transilvaniae*) by Honterus (Johann Grass, 1498–1549). He was born in Brasov and studied in Vienna (1515–1525). The printing house was set up by Honterus himself, at a while of 100 years after the first Guttenberg's printing house from Mainz (Germany).

H. Bisterfeld taught mathematics at the Calvin University (*Collegium Bethlenianum*) according to his father-in-law Johann Heinrich Alsted (1588–1638), who was an encyclopaedist with mathematical culture, published 61 works, among these a volume of mathematics having 532 pages, published at Herborn. Alsted himself redacted the mathematical part of his works according to the French philosopher Petrus Ramus (Pierre de la Ramée). A manuscript of arithmetic from 1641, written by Andras Porcsalmi (a professor of mathematics and physics at the Protestant Collegium from Cluj, rector of this college in 1660) is kept in the Library of Romanian Academy, the branch of Cluj-Napoca.

The first mathematical work printed in Transylvania in Latin language was written by Georg Müller, *Compendium arithmeticae vulgaris* (Textbook of elementary arithmetic) in 1681 at Brasov and the first university textbook of trigonometry, having 108 pages, had as an author Iacob Gooden (1670–1730), a Jesuit professor of philosophy and mathematics, whose book was printed at Liège (Belgium) in 1704. Nicolaus Janosi printed at Cluj the second edition of this book. The students of the Jesuitical University of Cluj learned on the book *Introductio facilis in Mathesis* (Easy introduction in mathematics) printed at Vienna in 1746. The second volume of this book belonged to the Jesuit friar Erasmus Froelich.

The third work of mathematics was printed at Cluj in 1749, after the death of its author, the Jesuit friar Ignace Gaston Pardies (1636 or 1638–1679) born at Pau in France, and who taught mathematics and physics at Clérmond in France and at the College "Louis le Grand" from Paris. But this book is the Latin version of the

Pardies' book, printed at Paris in 1671, as a result of the Petrus Ramus' flow to replace Euclid's Elements by a practical textbook of geometry.

Finally, in the 18<sup>th</sup> century, in 1755, "*Elementa mathematica*" was an original book written by Maximilian Höll (Hell, 1720–1790). He studied at Vienna, professed at the Jesuit University of Cluj from 1752 to 1755 and after that he came back to Vienna, as a professor of mechanics and also as a researcher at the Astronomic Observatory.

At 1773 the Christian Wolff's "*Compendium elementarum matheseos universal in usum studiosae inventuti*" was published at Cluj in Latin language.

The education in Romanian language began in 1754 at a primary (public) school under the bishop Petru Pavel Aaron (1709–1764), at Blaj. Although the school from Blaj developed with a gymnasium and then with a school of theology, which became later a Theological Academy, mathematics were taught only to primary school (elementary arithmetic) and the teaching language was the Latin, excepting the primary classes.

##### 5. STATESMEN WHO GAVE AN IMPULSE TO THE EDUCATION DEVELOPMENT IN THE ROMANIAN COUNTRIES TILL THE YEAR 1800

Beginning with Despot Voda, who founded in 1562 Scola Latina at Cotnari (Moldavia), then Vasile Lupu, the founder of an Academy at Iasi in 1640 and Serban Cantacuzino, the founder of an Academy at Bucharest (in 1679 or 1694), a series of princes and dignitaries were implied in the development of the education in these countries and the enlargement of the relations with the culture of Western Europe.

Passing in the 18<sup>th</sup> century, we name the princes Nicolae Mavrocordat, the founder of the Princely Academy in 1714 at Iasi and the re-organizer of the Academy of Bucharest during his second reign, then Grigore Alexandru Ghika, with his contributions to the raise of the level of this Academy, the Walachian prince Constantin Brâncoveanu, the organizer of higher studies at the Academy of Bucharest. Constantin Cantacuzino Stolnicul (the High Steward, 1640–1716) was the most erudite man in Walachia before the 19<sup>th</sup> century. He was not ruler, but had an important state function, brought from abroad books of mathematics written by Pietro Antonio Cataldi Bolognese (printed in 1600 and 1625). Constantin Cantacuzino Stolnicul learned mathematics with the professor Valerianuos Bonivinicinuos Veronese, philosophy with Antonio Dall'Aqua, logics with Albanio Albanese. He wrote books of geography and history (a History of Romanian Country) and drawn a map of Walachia. Alexandru Ypsilanti Ruler enforced a series of reforms at the Academy of Bucharest, after its organization made by Constantin Brâncoveanu in 1707. The dedication of the "*Trattato della trigonometria sphaerica*" by Vito Caravelli to the prince Ypsilanti is a proof of the appreciation that the great Italian mathematician had for the ruler of the Romanian

Country (Alexandru Ypsilanti ruled in Walachia 1775–1782, 1796–1797 and in Moldavia 1786–1788).

Dimitrie Cantemir (1673–1723), this prince of Moldavia and outstanding personality of European culture, the author of “*Descriptio Moldaviae*” and of the “History of the Growth and Decay of the Ottoman Empire”, had also a mathematical education. About 1670, Dimitrie Cantemir learned mathematics with Ieremia Cacavelas (Ieremia the Greek) a native of Greece, with studies in Leipzig and Vienna. Antioch Cantemir (1708–1744), the son of the Moldavian prince Dimitrie Cantemir, is considered to be one of the more erudite men in Russia of those times, with a great contribution to the integration of Russian culture into the world classicism.

We could say that the mathematical education constituted a fundamental cell in the thinking structure of the great personalities along the history. And many statesmen contributed themselves to the development of the educational level in their countries.

## 6. FINAL REMARKS

The purpose of this paper is to put an emphasis on the role of the circulation of scientific books, professors and students across frontiers, the beneficiaries being all the parts. Eastern Europe has known this privilege especially beginning with the 18<sup>th</sup> century. Mathematics was meant for learning together with the humanist sciences, especially with the philosophy and theology.

The 19<sup>th</sup> century brought an intensification of the cultural relations in Europe and the Romanian school came into a new era, due to the knowledge accumulation, realized by scientific exchanges and absorption of cultural values.

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