

A Comparative Study on Math Education Rendered in the Educational Systems in the Two Societies on the Island of Cyprus

Mehmet Çağlar
Eastern Mediterranean University
Faculty of Education
Department of Educational Sciences
Famagusta, North Cyprus
mehmet.caglar@emu.edu.tr

ABSTRACT

There is no doubt every country has its own unique education system which complies with the demands of society, culture, values and vision for the future. Math education is a long process starting with the first years of the elementary school, and continuing throughout one's education. The Island of Cyprus embodies two distinct societies having their own systems of education. But on the road to the EU certain parallelisms need to be set and it is the goal of this study to shed light on the math education rendered in the two societies.

This paper will concentrate on K1 to K12 math education. The topics to be dealt with will cover math curriculum at all levels; weekly distribution of math classes as well as their proportion to the other courses offered. The present century demands experimental teaching and learning, therefore, this study will aim to bring out the teaching/learning strategies in math education, as well. Students are expected to be more creative in class rather than resorting to rote-learning even in math education. The study will also try to shed light on class size

These points will be treated from the standpoint of the math education systems carried out in the two societies that form the Island of Cyprus, and the main goal is to bring about similarities and differences, and to come up with a compromise. The study will end with the recommendations to establish a better and a more harmonious education that will break the barriers between the educational systems of the two societies.

Introduction

“In the broad sense of the word, education refers to the entire social process by which individuals acquire the ways, beliefs, and standards of society” (Smith, et al. 1950). Almost half a century ago, education was viewed in this manner and now in the third year of the twenty first century, nothing has changed. The effects of education on society is symbiotic; therefore, in a sense society induces changes in education as well (Çağlar, 1984). This interaction is maintained through schools which function as agencies of education where the patterns of interaction are decided and are realized under controlled conditions (*ibid*).

It has been noted that education is the intended and desired process of behavioral changes of individuals through their own experience (Ertürk, 1979: 12). In retrospect to this definition of education, how does math education fit in? Cockcroft Report dating from 1981 puts forward the question “Why teach mathematics?” The answer gotten to this question states that, “mathematics is useful for everyday life, for science, for commerce, and for industry, because it provides a powerful concise and unambiguous means of communication, and because it provides means to explain and predict”. This response actually reflects the realities, as we need and resort to even the basic arithmetical concepts like the four basic operations (addition, subtraction, multiplication, and division) in everyday life, not only at school but when we go out shopping as well.

A Glimpse at Education in Cyprus

Based on all these varied assumptions and attitudes toward education in general, and math education in particular, education proves to be an issue which cannot be treated trivially by any nation, by any country around the globe. Utmost attention needs to be given to education so as to enhance the quality and standards of the society/societies concerned. Education is a general issue concerning all countries yet it has its unique characteristics owing to the educational problems, application, and system that vary from region to region. The common denominator though, despite all the variations, is quality education. The educational services rendered in one society should comply with the demands of that community, inform of culture, values, and last but not least vision for the future. Hence, these requirements and expectations explain the reasons as to why the two distinct and independent communities on the Island of Cyprus have their own systems of education. However, at a time when the prospects of entering the European Union is so close, a uniformity and parallelism should be established between the systems on the continent and on the island for better collaboration, as education is the key that opens the way to all mutual undertakings.

As stated in the Educational International Publication *ei Barometer* (2001), which focuses on Human and Trade Union Rights, separate educational systems are maintained by the Turkish speaking and Greek speaking communities on the island. In both communities primary education is free and compulsory as of age five. Boys and girls enjoy the same educational opportunities in both communities, and furthermore academic freedom is respected throughout the island.

Table 1. Statistical data on figures pertaining to two societies

	Turkish Cypriot Community	Greek Cypriot Community
POPULATION <15 years of age	21.6%	24%
ILLITERACY	10.2%	3.1%
PRE-PRIMARY GROSS ENROLMENT	100%	60%
FIRST LEVEL NET ENROLMENT	100%	96.5%
SECONDARY GROSS ENROLLMENT	100%	95%
PRIMARY PUPIL TEACHER RATIO	14%	15%
GNP SPENT ON EDUCATION	4.5%	10.6%

(*ei Barometer*, p.153)

Table1 helps show the actual figures as regards population, literacy, enrolment in schools, teacher population as well as government allocations from the budget on education.

Mathematics Education

Humanity needs educated and creative people who can keep abreast with the technological developments and who can contribute to these developments. The role of mathematics at this point comes to the forefront as it helps people to create and solve problems, think objectively and independently, be self-confident, and explain the relations. All these combined affect the school programs making them attach special emphasis to math education. To this end, this paper will primarily focus on math education rendered at schools, from K1 to K12 levels, in the two states that constitute Cyprus, the North and the South.

The reason for the scope of the paper to be so extensive, i.e., starting with K1 stems from Piaget’s theory which states that concrete operation stage is highly significant in elementary school years as most of the operations in this stage are mathematical operations and concepts such as classification, seriation numbers, topology, length–distance, area, volume, time and motion. This stage demands, claims Piaget, the extensive utilization of concrete materials and experiences.

It is wrong to think of additive structures as being established first and then generalised, so producing multiplicative structures of two or more dimensions. In point of fact, at every level we find children using some form of classification, however rudimentary, and each of these can be applied to several criteria simultaneously as well as to one alone. In the first case the structure is multiplicative, in the second it is additive, but there is no essential opposition with the two...That these two structures developed through parallel stages, and in close mutual dependence, shows that they constitute a single, operational organization, in spite of differences in graphic power and in complexity. We shall also find a genetic relationship between the system of ordering and that of classification. In our opinion, this sort of genetic connection constitutes one of the weightiest arguments in favour of an operational conception of intelligence (Inhelder, Piaget, 1969:195).

The twenty first century will undoubtedly be more challenging compared to the twentieth as the technological developments increase at a very fast pace. Space explorations, developments in nuclear energy, computers, electronic inventions, genetics, new discoveries in medicine as well as biological sciences reflect the utmost

significance of mathematics. It was the case yesterday, so will it be today and tomorrow that the world needs people who understand, comprehend and interpret mathematics (Çağlar, 1993). Mathematics is the best tool in explaining not only natural phenomena, the universe and nature but also the extra-ordinary, supernatural and chaotic events that have occupied our minds for centuries.

Standards needs to be developed in mathematics parallel to the changes in the world, as there is more demand to understand, analyze, and use data. A commitment to mathematics as a whole is the central issue in education which implies that pupils need to be engaged more in math so as to be able to build on their previous knowledge and their interest reflect this assumption to be valid.

NCTM (National Council of Teachers of Mathematics) puts forward the following goals that need to be achieved in math education to help pupils gain skills that are universal. The council proposes the implementation of these goals as of pre-kindergarten stage through grade 12 (NCTM, 2000).

- Numbers and operations
- Geometry
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Correction
- Representation

As in every field, there are principles in mathematics that need to be built up on, and according to NCTM (2000, 11) these are namely equity, curriculum, teaching, learning, assessment, and technology (NASSP Bulletin, 2001).

Educators need to provide students with a challenging and coherent curriculum emphasizing conceptual understanding, problem solving capability, skill mastery, and competence in communicating mathematical ideas. Furthermore, students must further develop “higher order” mathematical skills by investigating mathematics, making and testing conjectures, and learning to develop convincing arguments and proof (NASSP, 2001).

It is an undeniable fact that mathematics develops logical thinking, and that it has an aesthetic appeal. In view of the Cockcroft Report (1981), comprehending mathematical concepts is unlikely without understanding the concepts on which it depends that are lower in the hierarchy:

Mathematics is fundamental to the study of the physical sciences and of engineering of all kinds. It is increasingly being used in medicine and the biological sciences, geography and economics, in business and management studies. It is essential to the operations of industry and commerce in both office and workshop (Cockcroft Report, 1982: 2).

Therefore math education should start from the very first grade. When children learn mathematics, they need to play with and explore real objects that interest them. To solve real problems, we need to understand mathematics, and hence mathematical concepts. Concept is a term which is used at all times to refer to a set of objects determined by properties common to elements of the set (Çağlar, 1993). It can be asserted that concept formation is a primary indicator of mental–cognitive development, which helps the child access information easily through his education. Children, Piaget claims, advance through certain sequences of concept development determined by maturing, experience, social transmission and equilibration (1952, 1960).

The IEA (International Educational Achievement) study of mathematics analyzes the mathematics curricula and emphasizes the significance of math education throughout the world:

... mathematics occupies a central place in the school curriculum. In most school systems between 12 and 15 percent of student time is devoted to mathematics. The only other subjects allocated as much time are those associated with language, particularly the mother tongue and reading... The importance of mathematics in the school curriculum reflects the vital role it plays in contemporary society. At the most basic level, a knowledge of mathematical concepts and techniques is indispensable in commerce, engineering and the sciences... From a societal perspective, mathematical competence is an essential component in the preparation of a numerate citizenry and it is needed to ensure the continued production of the highly-skilled personnel required by industry, technology and science. Beyond these practical considerations, it is fundamental to an effective education. It

provides an example of precise abstract and elegant thought (Traves, Westbury, 1989; 1).

Math education holds a very significant place, and a heavy duty falls on the shoulders of math educators. They are the ones who can only implement the role of mathematics in society and technology into the minds of the pupils.

The Educational Objectives and Principles:

A) North Cyprus

In North Cyprus it is the responsibility of the state to provide the citizens with institutionalized educational services the aims of which are to promote national unity, good citizenship, professional teaching, preservation and appreciation of cultural and moral values as well as keeping abreast with the demands of the new century.

According to the constitution, pupils receive compulsory education up to age 15, and these educational services are rendered free of charge. In addition, primary school books are distributed free of charge as well.

Turkish Cypriot education system shares the structures of modern educational systems; however, the demands, values and special characteristics of the Turkish Cypriots have not been put into oblivion during the preparation and implementation process.

The Ministry of National Education and Culture identified the general aims of education by taking into account the special characteristics of North Cyprus society and listed them as follows:

1. The attainment of a national consciousness by the individual, catching up on modernization.
2. Educating citizens to be loyal individuals, attached to the history, culture and national values, dutiful to their families and society.
3. To educate all individuals scientifically minded, to attain a strong personality and character, to develop humanistic values, and attain a universal world view, and to be constructive, creative, productive citizens.
4. To equip the individual with knowledge according to his/her area of interest and abilities (Yaratan, 1998).

According to the equality in national education principle, the state provides:

- equal opportunity and facilities in education and training to all individuals.
- the needy but successful students with the necessary financial help to attain to highest level of education.
- Special programs for those in need of special education.
- Programs and courses for adult education to ascertain education to be everywhere and continuous throughout the lives of the community members (Yaratan, 1998 :611).

The educational system is comprised of formal and adult education, the former covering pre–school, elementary, secondary and tertiary levels whilst the latter refers to all other educational activities beyond the formal system.

Children aged 4–5 are offered pre–school education at state nursery schools, at nursery classes functioning under the umbrella of the elementary schools or at private nursery schools. The main objective is to prepare the children for elementary education in a consistent education medium, to help them acquire good habits and skills, and enable them to use their mother tongue, i.e., Turkish fluently as well as correctly.

Pupils receive free and compulsory elementary education between the ages 6–11 where they are subjected to a 5-year long education. Toward the end of the fifth grade, pupils are confronted with some choices which they will have to make and this choice affects their whole lifelong process of learning. Pupils, and families should not be forgotten as they are among the decision making bodies, and they have these options before them: going to a state junior high school without even worrying about the entry requirements; going to junior high state maintained Turk Maarif College (implying English medium instruction) provided they succeed in the entrance examinations; to a private junior high school (college) which also administers placement rather than selection exams. Due to the high demand but lack of contingency, pupils have to compete in a very tough exam so as to be eligible to enter the junior high Türk Maarif Colleges rendering services at four different regions of the country.

The exam stress at such a young age has a negative impact on the mental growth of the child, and the pupils become test oriented so much so that they have difficulty in comprehending and answering traditional type of exams as they have lost their sense of creativity.

Entry requirements for private schools are not difficult as the purpose is for ranking rather than eliminating the weak ones except for at Eastern Mediterranean College where the exam is on a selection basis. The exams administered by the Ministry of Education and Culture consist of questions based on prior knowledge of pupils on math, Turkish and English. The breakdown of these are 40, 40, and 20 indicating that the significance attached to math education is parallel to that of mother tongue education.

Junior high schools offer three-year education and lead the pupils to high schools (lycees) depending on the kind of junior high school they are in. In lycees and Türk Maarif Colleges first year programs are the same. However, when it comes to the second year, pupils are again confronted with a problem: what section to choose? Science, Social Sciences, Mathematics, Foreign Language or Turkish. Mathematics are the options they have. Their choice will indicate the kind of major they would like to pursue after graduation.

Whilst State high schools offer the above mentioned sections, Türk Maarif Colleges have a different structure as they often an English medium instruction and follow the British Curricula. There are primarily two divisions: the GCE (General Certificate of Education) section and the ÖSS (Student Selection Exam). Similar to state high schools, ÖSS classes offer 5 different subject groups while the GCE classes have three sections. The GCE classes are attended by those who wish to pursue their education in English speaking countries.

In addition to these categories, vocational and commercial Lycees render education in different fields such as computer hardware, electronics of Industrial vocational schools; vocational lycees offering courses in the field of child rearing, sewing, hair dressing, handicraft, and the like. Furthermore, there are commercial lycees with sections like Hotel Management and Tourism; Secretarial Studies, and accountancy. Students may wish to work in the commercial profession or pursue their higher education after completion of the program.

Last but not least and to make the list complete, it should also be mentioned that there are industrial vocational practical lycees with departments like auto mechanics, carpentry, metal works and vocational practical lycees with departments like ceramics, handicraft, hairdressing that train students more through practice rather than theoretical information where one day of the week is allocated to theoretical work, and the remaining four to workshops at industrial establishments, or on school grounds depending on the facilities available.

B) South Cyprus

The education policy of South Cyprus relies basically on the legal framework, the structure, the material, and building infrastructure, the curriculum, and the staffing (UNESCO, 2002). The main objective of the system is to raise the quality and create the necessary background needed to respond to the demands and challenges of the society (*ibid*).

The main determinants of the education systems are the challenges in the international contact which include developments in Service and Technology; the government's policy and orientations as regards the need for stability, restructuring the economy, upgrading of international center of services, quality of life, environmental consciousness, and the information society.

Education is considered as the one factor that reinforces social mobility. The Ministry of Education and Culture reinforces education laws; the Education Service Commission, a five member body appointed by the president for a period of six years, is responsible for carrying out duties like appointment, secondments, transfers, promotions, discipline of teaching personnel and the inspectorate.

It is the responsibilities of the Ministry of Education and Culture to build the schools, however, their maintenance is the responsibility of the Local School Boards in collaboration with the Technical Services of the Ministry. However, providing the equipment needed in these schools is done jointly by the ministry and the local school boards.

The policies and the practices of the ministry are open to suggestions to be made by the Educational Council, the Church, parliamentary committee for education, the Parents' association, the teachers' association and seven community masses dedicated to education.

The government finances public education directly and through allotment to local authorities and school boards. There are also schools offering private education and there are run by individuals and governing bodies. In addition, with the help received from overseas organisations, private foreign language schools are established offering mainly English, German, and Russian programs.

It is the government's responsibility to give compulsory education up to age 15 which implies elementary school and lower secondary school. This way education carried out at public schools is free including free provision of books. Students, who go to public secondary schools, also receive free education. The financing of these schools as well as the technical and vocational secondary schools are the responsibilities of the government. Text books are mostly distributed at no cost to these students.

The principles, aims and objectives of the educational system in South Cyprus are as follows:

- Education must constitute part of the wider socio-economical, cultural, and traditional characteristics, and values of Greek Cyprus, which should be transformed successfully into educational objectives.
- Education should have internal and external coherence, an educational planning system and a democratic structure of educational administration.
- There should always be a strong link and mutual influence between education and life.

More specifically the principles of the system and of the educational process are the following:

- Free movement of students from one level of education to the next, with the exception of tertiary education.
- Comprehensive schools to cater for all pupils coming from an area, irrespective of abilities and aptitudes.
- Mixed-ability teaching.
- Coeducation.
- Flexibility of the system to enable horizontal transfer of students from one course to another.
- Emphasis on general education as a means of:
 - ✓ providing a common culture and maintaining the coherence of society and
 - ✓ offering the basic skills, knowledge and understanding required for specialization.

The general aim of education in the South is the development of free and democratic citizens; with a fully developed personality, being mentally and morally refined, healthy, active and creative citizens who contribute generally with their work and their conscientious activity to the social, scientific, economic and cultural progress of our country and to the promotion of cooperation, mutual understanding, respect and love among individuals and people for the prevalence of freedom, justice and peace (Ministry of Education of South Cyprus).

Comparison between the North and the South in terms of the education rendered

This study will examine the math education in both societies in retrospect to the whole education system. One of the objectives of the Ministry of National Education and Culture of the Turkish Cypriots is to educate all individuals scientifically minded with humanistic values and as constructive, creative and productive citizens. Similarly, the main objective of the Ministry of National Education and Culture of the Greek Community is to raise individuals who can meet the challenges of the century in the international context which includes developments in science and technology as is the goals of the Turkish Community in North Cyprus.

Math classes comprise a highly significant part of the curriculum applied at elementary schools in North Cyprus and this is evident from the fact that out of the hundred questions asked at the entrance examinations to English medium schools, 40 are solely on mathematics, 20 on foreign language and the remaining 40 are on Turkish and

social sciences. Precise, abstract and elegant thought can only be achieved through proper math education and to this end, starting off with the first grade children are exposed to arithmetic at a graded level so that by the end of the fifth grade they will be competent in problem solving skills as well. Upon checking into the curricula applied at lower secondary schools called Gymnasium in South Cyprus, we see that students are continuously assessed on Mathematics and the final examinations which are externally organized by a body of examiners assigned by the Ministry of Education at Lykeion, i.e., high school are again centered around mathematics.

Needless to say had it not been for the educators there would have been no math education at all let alone other forms of education. For that matter the role the educators play in the school systems is undeniable and it is worth mentioning the number of schools, pupils and teachers as well as the pupil/teacher; teacher/school and pupil/school ratio at elementary schools as in neither of the communities mathematics education is carried out by subject area teachers. In the Greek Cypriot community, the total number of elementary schools is 346; total number of pupils 61,042 and the total number of teachers is 3,630. (see table 2). When it comes to pointing out these figures in ratios, the pupil/teacher ratio is 17, teacher/school ratio is 11, pupil/class ratio is 23.5 and pupil/school ratio is 176 (see table 3).

The primary schools system bears similar significance in the North as well. The total number of elementary schools is 113, pupils are 19,055, teachers 1370 and classes 874 (see table 2). The ratio of these totals turn out to be thus: pupil/teacher: 14, teacher/school:12, pupil/school:169, and pupil /class: 21.8 (see table 3)

Table 2: Primary Schools in numbers¹

	Number of schools	Number of pupils	Number of teachers	Number of classes
North (N)	113	19055	1370	874
South (S)	346	61042	3630	2599

Table 3: Primary Schools in ratios

	Pupil/teacher	Teacher/school	Pupil/school	Pupil/class
North	14	12	169	21.8
South	17	11	176	23.5

Upon examining the case of the secondary schools in the South, we come up with the total number of schools, teachers, and math teachers. The total number of secondary school students is 52,980, total number of classes is 1996, total number of teachers is 4695, total number of schools is 99 and total number of math teachers is 549 (see table 4). These figures help us find the following ratios as regards the Greek Cypriot community: student/class ratio is 26; pupil/ teacher ratio is 11, pupil/math teacher ratio is 97, class/math teacher ratio 3.6, teacher/class ratio 2.35, teacher/school ratio is 47, math teacher/school ratio is 5.5, math teacher/teacher ratio is 11.7 and pupil/school ratio is 535 (see table 5).

When we have a look at the situation in the Turkish Cypriot community, the total number of schools are 30, math teachers 166 and over all total of teachers is 1420. On the other hand, the total number of pupils is 14,431 and the total number of classes is 505 (see table 4). These numbers yield the following ratios as regards the secondary schools: pupil/teacher: 10, pupil/math teacher: 87, class/math teacher: 2, teacher/class:47, math teacher/school:5.5, teacher/ math teacher:8.55 and pupil/school is 481 (see table 5).

Table 4: secondary schools in numbers²

	Number of schools	Number of pupils	Number of classes	Number of teachers	Number of math teachers
North	30	14431	505	1420	166
South	99	52980	1996	4695	549

¹ Annual Report 2000, Ministry of Education, South Cyprus; Annual Report 2002, Ministry of Education North Cyprus

² ibid.

Table 5: secondary schools in ratios

	Pupil/ class	Pupil/ school	Pupil/ teacher	Pupil/ Math teacher	Class/ Math teacher	Class/ teacher	Teacher/ class	Math teacher/ class	Teacher/ school	Math teacher/ school	Teacher/ Math teacher
N	28.5	481	10	87	3	0.4	2.81	0.3	47	5.5	8.55
S	26.5	535	11	97	3.6	0.4	2.35	0.3	47	5.5	8.55

According to the statistical data the given by Educational International in their publication called *ei Barometer 2001*, the population in the South is around 750.000 while the population in the North is around 200.000. So the population ratio of North/South Cyprus is 0.27. When we look at the school, pupil, teacher and class ratios between the two communities as North/South Cyprus, it is possible to see that the figures are very close to one another: ≈ 0.3 . This approximate percentage shows that there is a correlation between the population ratio and school, pupil, teacher and class ratios in the two communities. This percentage still remains the same when we look at the ratio of the mathematics teachers in both communities as the ratio we find pertaining to math teachers will still be 0.3 in table 4.

Elementary school which is the cradle of all the education pupils get carries the heavy burden as well as the responsibility of raising the pupils according to the demands of the next phase of the education system. Therefore the curriculum has to be in compliance with the demands of the secondary education, actually elementary school subjects are the pre-requisites of secondary school subjects. When we look into the elementary school programs offered in South Cyprus, we come across with the following figures: total number of teaching hours is 31 in Grades 1 and 2, 34 in grade 3, 35 in grades 4, 5 and 6. The number of math hours are 5 in the first 2 years and 6 during the remaining 4 years. Hence when compared to the total number of teaching hours, the percentages of math hours are approximately 16 % in grades 1 and 2; 18% in grade 3 and 17% from grade 4 through 6.

In the Turkish Cypriot elementary education system, on the other hand, pupils go to school for five years and not six. Hence the curriculum is relatively different. In the first and second years, pupils have a total of 30 class hours 8 of which is devoted solely to math education. Hence the percentage of math hours compared to total contact hours, it yields 27%. The total number of contact hours third graders have is 33 while math is again 8 hours per week. This yields a percentage of 24. However, in the 4th and 5th grades, 33 is the total number of class hours they have, and 6 hours of math every week. Then the percentage is 18.

When we look at the programs, and the curricula, we see there are similarities in the ratio of math hours over other subjects, however, as the elementary school education is 6 years in the South, the number of math hours in the first three grades is more in the North.

In North Cyprus, the curriculum is centrally controlled and is geared to meet the demands of the pupils, as their main concern is higher education: whether they will pursue it in Turkey or in the States or Britain. Thus the exams they need to sit differ, and hence the courses they need to take. When we have a look at the lower secondary schools (equivalent to gymnasium in the South) the total number of math classes per week is 4 in all the three years while the total time allotted to all subjects is 34 which means it comprises 11% of the entire weekly program.³

The curriculum of the Gymnasium, on the other hand, devotes again 4 hours per week to math classes while the other subjects add up to 35, hence the percentage comes out to be 11.4.

The duration of compulsory education is 9 years in South Cyprus where as it is 8 in the North because elementary school is 6 years in the South but 5 in the North. In both communities the duration of the junior high schools are three. That is why we have the figures 9 and 8 respectively. To illustrate the percentages of math hours compared to the total number of class hours in a more self-explanatory way, the researcher will put all the figures in a table format.

³ Idil Akcal, *Conflict in the education traditions of the Turkish and Greek Communities in Cyprus*, MA thesis, Univ. Of London, September 1993

Table 6: Percentage of math hours in primary and junior high schools

	Grade level	Number of Class hrs/wk		Number of Math hrs/wk		Percentage of Math hrs.	
		South	North	South	North	South	North
Primary School	1	31	30	5	8	16	27
	2	31	30	5	8	16	27
	3	34	33	6	8	18	24
	4	35	33	6	6	17	18
	5	35	33	6	6	17	18
	6	35		6		17	
Secondary School	1	35	34	4	4	11	12
	2	35	34	4	4	11	12
	3	35	34	4	4	11	12

According to Travers and Westbury (1989), mathematics occupies a central place in the school curriculum and in most school systems, between 12 and 15 % of student time is devoted to mathematics. When the percentages in table 6 are compared in the primary schools in both South and North, it can be seen that they are higher in retrospect to the percentages given by Travers and Westbury. In the South the percentages are between 16 and 18 while it is between 18 and 27 in the North. At the junior high schools, the percentages in the south and north are 11 and 12, respectively. These percentages show the lowest standards given by Travers and Westbury (1989). Upon looking at the Lycee (high school) curriculum in the Turkish community, we see that the number of math hours differ according to the section the pupils are in. In the first year, total number of math hours is 5, but in the second and third years, as they are divided into 3 areas as science, math and arts streams, number of math classes is 7 hrs per week in Math, 6 hrs and 3 hrs in Science lycee 2 and 3, respectively, while in Arts it is 3 hrs in lycee 2 but there are no Math lesson in lycee three⁴. The percentage would be for the math group 20% out of the 35 total hours of classes they have. However when we have a look at science stream it is 17.1 % in lycee 2 and 8.6% in lycee 3; but in art it is 8.6 % in lycee 2 and pupils do not have any math in their final year.

In the Greek lyceum in all the three years the total hours of math classes pupils have is 3 against the 37 hours of weekly teaching they have. Hence the percentage is 8.1 %. As there is no streaming in the Lyceum the periods per week remain stable. However, pupils in this system are offered a wide range of optional subjects like additional mathematics, physics or chemistry to the core curriculum or art related courses and these optional subjects bring the pupils a load of 13 periods per week. However a new type of comprehensive school implemented as of the school year 2000-2001 called the Eniaio Lykeio offers 4, 3 and 2 hours of math per week respectively in Grades A, B, and C. In Grade A the total hours is 34, while in grade B it is 19, and in Grade C the number of hours pupils have is 13.

As education is the one main factor that reinforces social mobility in all societies and as math education plays the utmost role in raising pupils as learned individuals more and more emphasis should be paid to math curricula, math teacher education and trends in math education. It then becomes possible to say that education is a very dynamic process and as long as the world changes so would educational trends.

Our project is an ongoing one and due to some problems and inhibitions we could not go any further than this point for the time being but our next step is to delve deeper into issues related to math education in both societies and try to find out to what extent they comply with the EU standards as the goal is now to be one of the EU members.

Discussion, Conclusion and Recommendations

Education is the tool that saves people from illiteracy; however, when we consider the situation on the Island, we see that despite the high level education rendered, the illiteracy rates are 10.2% and 3.1% in North and South Cyprus respectively, and the budget allocated to education is 4.5% in the North whereas it is 10.6% in the South. These figures indicate that the North needs more financial resources for education. One reason for the illiteracy rate in the North to be relatively higher stems from the Turkish families who came to the country after 1974 and some of them did not allow their children to go to school due to mostly economic factors.

⁴ Mehmet Korkmaz, *The structure of the national education system in North Cyprus*, the Ministry of Education, 1999.

In the present century education does not only imply high literacy rates. We, as educators, need to raise individuals ready to cope with the demands of the 21st century. Computer literacy is a must just like literacy in the true sense of the word.

It is also a striking fact that the population of the group under the age of fifteen in the North is about 2.5% less compared to the South. The reason for this lies in the fact that there is a tendency for migration in the North.

When we consider math programs as a whole, we can see changes taking place from year to year, however, these changes are not very significant when we look at them at a yearly basis. Subjects covered do show noteworthy changes, however, there could be times when an 8th grade topic could be moved on to the 9th grade.

Upon looking at the education system in both communities, it becomes possible to see there are differences in the elementary schools in terms of the duration of the education rendered at this level. In the South elementary education goes 6 years while in the North it is 5. However, before 1985-86 school year, it was 6 in the North as well.

Given the educational systems of the secondary schools, the different school systems, courses offered and especially the number of electives and must courses are varied depending on the stream chosen by the pupils

We see that some of the objectives set by NCTM are not materialized in the North. OSS (University Entrance Exam) is the reason for this. It is a fact that OSS questions rely basically on what is being taught at lycee 1. Therefore the lycee 2 and 3 math curriculum which involves differentiation, integrals, limits, sequences and series, and trigonometry are not being tested in the OSS. In addition to these subjects, even proofs in geometry, proofs, cause and effect problems, data analysis, probability are not treated in class. As the questions have multiple choice answers, students do not need to learn proofs but rather resort to rote-learning which hinders all kinds of creativity. One major factor that affects this is because of the variety of high schools we have as well as the different options students are offered. We cannot say these subjects are not in the school curricula; they are but do not receive a lot of emphasis. The teacher in a way has to think of the student needs rather the curriculum, as the main goal of the students is to enter a university after high school. Consequently, there is a conflict between the teachers' aims and the students' and families' needs. However, in the South as the curricula applied at all levels are IGCSE oriented, such problems are minimal.

Mathematics is a field that affects the mode of thinking as well as the problem solving abilities. It also finds its applications in other areas as well. Though it appears that some significance is attached to math education, this remains rather superficial.

During the first years of education 20% of the programs are devoted to math education where as in the later years this drops down to 12%, yet we cannot claim that this percentage will raise math awareness in students.

In both communities, as the school system is based on centralization, everything is in the power of the Ministry of education leaving no flexibility to schools in the decision- making process.

Just as the ratio of the population is 0.3, so is the ratio between teachers, students and schools in both societies. And this is meaningful as it is a clear indicator that whether it be in infrastructure or human resources, both go parallel to the rise in population. At this point comes to the forefront the percentile differences in the illiteracy rate. The internal and external migration could be a factor influencing this difference in the North.

Another difference in education system is based on the duration of the entire school years. In the North, primary school education is five now therefore the total years at schools is 11. When compared to school in the EU, this total is low as it is 12 or 13 depending on the location. In terms of math education, one year less signifies a lot. If we assume there are 5 hours math per week, and if the total weeks per year is 40, this will yield a total of 200 hours. The implication of this is that the subjects to be taught need to be squeezed into the curricula rather than treating them at a slower pace which fosters better learning.

An overall evaluation of the two educational systems as regards math education has been the main concern of the researchers. The researchers are of the belief that once such scientific studies are initiated jointly by scholars from both communities, they would help with the efforts in the road to peace. Once such undertakings are well underway, joint math meetings, math clubs, math competitions could be arranged and these could lead to more extensive organizations where Turkish and Greek Cypriots could compete jointly or individually against their counterparts in math competitions against European countries. Joint publications would help bring the math

scholars closer and thus a bridge will be built between the educational systems. In short math programs should be more parallel to one another thus a homogeneity can be achieved.

REFERENCES

- AKÇAL, IDİL. (1993). Conflict in the educational traditions of the Turkish and Greek Communities in Cyprus, unpublished MA Thesis, University of London.
- Annual Report 2000, Ministry of Education, South Cyprus.
- Annual Report 2002, Ministry of National Education and Culture, Northern Cyprus.
- Cockcroft Report. (1981). Mathematics Counts. Report of the committee of inquiry into the teaching of mathematics in schools. Her Majesty's Stationary Office, London
- Cockcroft Report. (1982). Mathematics Counts. Report of the committee of inquiry into the teaching of mathematics in schools. Her Majesty's Stationary Office, London
- ÇAĞLAR, MEHMET. (1984). The effects of different types of feedbacks on science achievement of eighth grade Turkish Cypriot students. Unpublished MS thesis. Middle East Technical University, Ankara.
- ÇAĞLAR, MEHMET. (1993). The acquisition and development of basic mathematical concepts in Turkish Cypriot students ranging from 5th to 11th grades. Unpublished PhD Dissertation. Middle East Technical University, Ankara.
- CYPRUS. *Structure of Educational System*. Department of Higher and Tertiary Education, Ministry of Education and Culture, 2001 (except for data on Turkish Cypriot Education) International Association of Universities
- CYPRUS EDUCATION, 2001, Ministry of Education of South Cyprus. <http://www.moec.gov.cy>
- Development of Education, National Report of Cyprus by the Ministry of Education and Culture, 2001, International Bureau of Education, Nicosia.
- Education Profile: Cyprus, 1983. The British Council Report
- Educational Reforms in Europe, 1998. Le Magazine, v.10
- Ei Barometer 2001 *On Human and Trade Union Rights in the Education Sector*, Education International, Belgium. p153
- ERTÜRK, S. (1979). *Eğitimde Program Geliştirme*, Ankara.
- INHELDER, B., PIAGET, J., 1969. *The Early Growth of logic in the child*, New York: W.W.Norton and Co.
- KORKMAZ, MEHMET. (1999). The structure of the National Education System in Northern Cyprus, A Report prepared for the Ministry of National Education and Culture.
- NASSP Bulletin, (2001). "Math and Science Education", v.85, no. 623, March, p.2-65.
- NCTM (National Council of Teachers of Mathematics) 2000. Principles and standards for school mathematics. Reston, Va.:NCTM
- PAPANASTASIOU, C., SOTERIOU, A.C., DIAKOUKARAHANNA, E., RAKIS, M.S., 1995. The efficiency of secondary schools in Cyprus, (unpublished paper)
- PIAGET, J. (1952). *The child's conception of number*, (New York, Humanities Press)
- PIAGET, J. et al. (1960). The child's conception of geometry, (New York, Basic Books).
- SMITH, B.O., STANLEY, W.O. AND SHORES, J.H. (1950). *Fundamentals of Curriculum Development*, (World Book Company, USA).
- TRAVERS, K.J., WESTBURY, I. (1989). The IEA study of mathematics : Analysis of mathematics curricula. Pergamon Press, Great Britain : BPCC Wheatons Ltd, Exeter.
- UNESCO Higher Education System Database, 2002, Cyprus Education System, <http://www.unesco.org>
- YARATAN, HÜSEYİN. (1998). "Education in the Turkish Republic of Northern Cyprus". A Report prepared for the Ministry of National Education and Culture, Nicosia,.