SPATIAL KNOWLEDGE ACQUISITION IN CHILDREN OF DIFFERENT CULTURES

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ABSTRACT

The aim of the present study is the investigation of how students of fifth and sixth grade of elementary educational level with different cultural backgrounds conceptualize the geographical space of their residential country. A set of cut-outs of the shape of the thirteen geographical units that could be arranged to form the map of Greece were used in a test. Each child had to recognize and identify the cut-outs and match them to form the map of Greece. For each participant, all the answers from the different stages of the investigation were recorded and the map produced was photographed. The evaluation of the produced maps was based on the conservation of topological relationships among the geographical units and their orientation. Comparisons were made between the performances of students attending intercultural and mainstream schools.

1. INTRODUCTION

The transformation of Greek society into a multicultural society, which has taken place mainly in the last two decades, has the analogous impact on the synthesis of student population in many schools. As it is well known, elementary school activities build on the child's everyday skills and concepts, which have developed through activities connected to practice tradition in the context of the family and community outside that of the school (1). Teachers try to base their teaching on what should be "common knowledge", learned through every day home and community practice. The view of Spencer and Blades (2, p. 367) that "geographic education should build upon and shape the child's own experiences of the world" is in accordance with the above-mentioned teachers' method. Today, the appreciation of children's experience or what is "common knowledge" is not a simple case for the teachers in Greece, as an increasing number of elementary schools admit students from various countries with different cultural backgrounds. What is considered to be "common knowledge" to indigenous children may not be to children coming from other countries concerning the geographical space of the country. Hedegaard et al. (1) cited that the teachers need a more extended concept of common knowledge and stressed their responsibility for creating a shared knowledge in the classroom that subject-matter learning can build upon.

Today in Greece there is an increasing interest on behalf of the state, the academics, and the teachers for the treatment and the integration of culturally and linguistically different children into public schools. There are three ongoing large-scale projects on intercultural education funded by the European Community Support Framework II through the Ministry of Education, which deal with the children coming form emigrant families, Roma/Gipsy and the Muslim minority children. To this endeavor, for the enhancement of intercultural education, geographers and cartographers could contribute both to the research and to the design of education and instruction for the students of several different backgrounds. The lesson of geography, undoubtedly, could have a multicultural orientation and offer the teacher a chance to build on the different experiences that children from different cultural background bring with them into the classroom. On the other hand, geography teaching should help children develop understanding of the local place. From the psychological point of view, enhancing children's understanding of the place they live in may contribute to develop place attachments and social integration (2). The characteristic of maps to communicate graphically spatial information becomes even more important in classes with students who are not equally fluent in Greek.

The aim of the present study is the investigation of how 11-12 year-old students with different cultural backgrounds conceptualize the geographical space of their residential country. Spatial knowledge acquisition is an obvious target of school geography. Recognition of the administrative subdivisions, as well as understanding of their size and relative locations of the students' residential country can be considered basic prerequisites that enable them to establish a framework in which further knowledge can be accumulated. Boehm et al. (3) noted that only by mastering location and place could the student proceed to higher order geographical concept. Investigating children's development of understanding of their country's geographical space is important for cartographers as this small-scale spatial information, which may be stored into the children's mind, comes mainly from maps.

In the last decade there has been a renewed interest in children's, as well as adults', recall and understanding of the geographical units. Most of the studies used freehand sketch maps as a means of investigating knowledge of shape, size, and relative locations of geographical units, mostly at a global and, to a more limited extent at, a country level. Wiegand (4) investigated 8-11 year-old children's free recall maps of the world on a spherical surface. Chiodo (5) assessed the cognitive status of junior high school students' mental map of the world and attempted to improve these mental images through a series of lessons. Metz (6), as well as Wise and Kon (7), used sketch maps of the world as means for assessing students' geographic knowledge. In Pinheiro's study (8), sketch maps of the world drawn by Brazilian university students were coded for frequency of inclusion of nations. Thomas and Willinsky (9) examined how students, in grade 8 to 10, from regions around the Pacific, see the world, and specifically the Pacific region, in relation to themselves and their understanding of nation and community, using students' freehand sketch maps. Kong et al. (10) using mental maps of the world examined how Singapore university students view the world, and conversely, how university students from the rest of the world view Singapore. At national state, Wiegand and Stiell (11) examined the free recall sketch maps of the British Isles as drawn by children aged 6 to 18. The maps were assessed according to their representation of shape and the relative location of political units. The authors conducted an analogous study to examine the development of children's mental map of Greece through free-recall sketch maps of the country (12). Filippakopoulou (13) set out a comparative analysis of the two studies. In an attempt to overcome free recall sketch maps methodological shortcoming of relying on the subject's drawing ability, a complementary approach was followed by Wiegand and Stiell (14, 15). They used cut-outs of the continents and asked the children to identify continent shapes, to arrange then to form a map of the world and to estimate the sizes of the continents. From the above short analysis it comes out that the researchers are interested mainly in how students understand the geographical units of their country or the world, or how students from different countries understand a region or the world. As the societies are becoming increasingly multicultural, the researchers could also examine how people from different cultural backgrounds understand the geographical space of their living country.

In this study, the methodological approach of Wiegand and Stiell (14, 15) was adopted in order to investigate how children with different cultural backgrounds understand the geographical space of Greece, their residential country. In this paper, a brief reference to the demographic transformation of the country, along with a short description of the profile of foreign students are cited. An outline of the characteristics of the Greek educational system and the initiatives taken by the state for the education of the multicultural population of the elementary schools are given. A description of the synthesis of school population is given along with information about student population distribution within the educational system. The description of a preliminary investigation follows (description of sample and the test) and finally, the analysis and discussion of the results.

2. MULTI-CULTURAL CHARACTERISTICS OF GREEK EDUCATION SYSTEM

2.1 Demographic characteristics

The Greek society can be characterised as multicultural. The local population of Greece is estimated to be 10,000,000 people whereas the number of foreigners living in the country exceeds 1,000,000. The only minority formally recognized in Greece is a religious one: the Muslim, which was given recognition in the 1923 Lausanne Treaty. The minority is estimated to be approximately 120,000 people and is composed of three ethnic groups, specifically 50% of Turkish origin, 35% of Pomaks, and 15% of Roma/Gipsy. A governmental agency, the General Secretariat for Adult Education (GSAE), estimates the Roma/Gipsy population to be 150,000 to 200,000 in 1998 (16). The Minority Rights Group-Greece claims that the number of Roma/Gypsies may even exceed 300,000 (17). Almost half of the Roma people are permanently settled mainly in the area of Athens, whereas the others move around the country.

Over the last 20 years Greece gradually received a surge of repatriates, mainly from the former Soviet Union and Albania, and foreigners, mainly from Albania. A lot of foreigners have not been legalized and so only estimations can be made about their number. Albanians constitute the high majority of foreigners in the country and are estimated to be 600,000 to 1,000,000 people. The number of people from the former Soviet Union is considered to be high too, but it is difficult to be estimated. Rumanians and Bulgarians exceed 18,000. Poles are estimated to be 80 to 100,000, and Egyptians about 55,000. Of the approximately 15,000 Philippinos living in Greece, the majority are women working as housekeepers. Small communities, as those of Iraquis, Palestinians, Kurds from Turkey and Iran, Armenians from Iran and Iraq, Turkish people, Latin Americans, Japanese, Vietnamese, also exist (18). Almost half of the emigrants live in the prefecture of Attica and most of the others in big towns and affluent rural areas. They usually stay in underprivileged areas of the cities and coexist with local people of low socioeconomic status.

2.2 The profile of foreign student

The change in the synthesis of the population of Greece had analogous impact on the synthesis of school population. The educational system and the educators had to adapt to the new situation and to the students' needs. It is established that language minority students have a more difficult time in school and, consequently, achieve lower levels than their native speaking counterparts (19). In addition to the limited proficiency in Greek language and the difficult problem of the adaptation to a new country compared to the indigenous schoolmates, the young foreigners face a lot of other

problems regarding their education. Such problems are: their different cultural and educational background; the economic hardship of their families and very often the need for their contribution to the family income; the irregular attendance at school because of the seasonal movement of their family to places that work can be found; their enrollment in classes with younger children due to late enrollment or falling behind; and sometimes prejudice and discrimination. Many researchers concluded that the obstacles, which are faced by language minority students, have as much or more to do with their family background status (i.e. education, income, etc.) than with the language they speak (19). In Greece, a lot of foreigners such as Poles and a significant number of people from Albania and the former Soviet Union, having a high educational background themselves, tend to show the analogous interest in their children education. The perspective of permanent residence in the host country also influences parents' attitude towards their children's education (18).

2.3 Greek state policy

In Greece, education is the constitutionally designated responsibility of the state. Education is provided free at all levels of the system from preschool to university and it is compulsory through to ninth grade. There is a central state control over the curriculum and the textbooks, which are followed by all the public schools of the country as well as by the Greek private schools. A relatively small sector of Greek and foreign private primary and secondary schools exists. Education in foreign schools, such as the American Collage, the French-Hellenic School, the German School, the Italian School, etc. is conducted bilingually and a correspondingly foreign curriculum is adhered to. Greece never in the past had experience dealing with emigrations or repatriates. The new situation demanded the development of policies of emigration and integration of the emigrants and the repatriates. One of the issues that would have to be resolved was the education of the foreigners' children with their variability in place of birth, ethnic, linguistic and educational background, religious identity, economic status, and conditions and reasons for their emigrations. Regarding the Greek state policy and attitude towards the education of repatriate and foreign students three periods can be considered:

- In the first period, during the decade of 1970, the first state attempts were made for the education, initially, of the children of repatriates and later of foreigners. The first schools for English and German speaking repatriates were established by states, which exhibited a "philanthropic attitude" or "positive discrimination" attitude towards repatriate students, as Nikolaou (18) remarked.
- The second period, from 1980 to 1996, coincides with the period of the great demographic change, which occurred in Greece as a result of the arrival of repatriates, mainly from the former Soviet Union and Albania, and from emigrants, mainly from Albania. During this period, preparatory classes and classes of special tuition were established, with the target of helping repatriate and foreign children to learn the Greek language and to contribute to their adaptation and assimilation so as to enable them to attend mainstream classes. But the effectiveness of these classes has been disputed by educationalists and controversial conclusions concerning their impact on students' performance have been cited by researchers (20, 21).
- The third period, from 1996 up to the present day, is characterized by the attitude of acceptance and support of the cultural variety as opposed to the dominance of one culture, namely the Greek, or cultural uniformity in schools. Several public intercultural elementary schools have been established with the aim of promoting a form of education with pluralistic orientation. Some of them are considered to function effectively by applying innovative and tailored programs. The intercultural character of the former schools for repatriate students, which have converted to intercultural, is disputed, since the students' population consists of emigrants and repatriates without indigenous students. The institution of intercultural education is new in Greece and the development of new curriculum and new textbooks are in progress.

The education of children belonging to the Muslim minority in Thraki takes place in special minority schools. The structuring of minority education is presently based on reciprocal education agreements between Greece and Turkey (22). Minority schools have a partially different curriculum and the taught languages are Greek and Turkish. Greece is responsible for the curriculum and textbooks that relate to the Greek language, geography, history and civic education, whereas Turkey is responsible for the Turkish language, religion, mathematics, physics and arts. The reality for Roma/Gipsy children with regard to education is rather discouraging. Illiteracy among Greek Roma/Gipsy children is estimated to be approximately 80% and among adults 80%-90%. In the last decades initiatives have been taken by the government and different programs are in progress, as the university of Ioannina "Education of Roma children" program, which focuses on providing continuous education to teachers of Roma/Gipsy children, publication of teaching materials, strengthening intercultural schools, etc. The General Secretariat for Adult Education program, targeting the age group 4-14 years, aims to combat the Roma/Gipsy children's illiteracy, to integrate them into the mainstream educational system, and to ensure their social integration as well. In addition to the government's activities, a number of non-governmental organizations and foundations are also working to improve the living conditions and to provide social and educational services to children.

2.4 School Population

Even though the population of elementary school students is decreasing in Greece there has been an increment of 391% of foreign students between the academic years 1995-96 and 1999-2000. The total number of students in public elementary schools was 601,186 in the academic year 1999-2000 according to the Department of Primary Education of the Ministry of Education. From those students, 45,598 (7.6%) were foreigners and 19,299 (3.2%) were repatriates. The high majority (37,707, 82.7%) of foreign students were from Albania followed by foreigners form the former Soviet Union (3,874, 8.5%) and students from the rest European counties (2,241, 2.4%). The high majority of repatriates came from the former Soviet Union (11,935, 61.8%) followed by those that came from Albania (5,295, 27.4%). Students from Asia, comprising an increasing percentage, could not be considered a homogeneous group since they are coming from different countries with varying racial and cultural characteristics. Table 1 presents the number and percentage of foreign and repatriate students from different countries in public elementary schools in the academic year 1999-2000.

Table 1. Birthplace of foreigners and repatriates students

	Albania	Former Soviet Union	Other European Countries	Africa	America	Asia	Oceania	Total
Foreigners	37,707	3,874	2,241	401	274	1,096	5	45,598
Percentage	82.7	8.5	4.9	0.9	0.6	2.4	0	100
Repatriates	5,295	11,935	1,245	69	648	33	74	19,299
Percentage	27.4	61.8	6.5	0.4	3.4	0.2	0.4	100
Total	43,002	15,809	3,486	470	922	1,129	79	64,897
Percentage	66.3	24.4	5.4	0.7	1.4	1.7	0.1	100

2.5 Where do foreign children attend?

According to the Ministry of Education, during the academic year 1999-2000, a number of 8,718 foreign and repatriate students attended 500 preparatory classes and a number of 6,147 701 classes of special tuition. In the same academic year, 2,025 children attended the intercultural elementary schools, and more specifically, 346 foreigners, 661 repatriates and 1059 indigenous and minorities (Muslims). The foreigners and repatriates of intercultural schools came from Albania (188), from states of the former Soviet Union (563), from English speaking countries (90), from African countries (52), from Philippines and other Asiatic countries (48) and the rest 25 children from countries of east Europe, other European countries, Middle East and Latin America. So, it comes out that only a small proportion of foreigners and repatriates attended the preparatory classes and the classes of special tuition (22.9%) or the intercultural schools (1.6%), during the academic year 1999-2000. Among the intercultural schools, the composition of students varies and in some of them there is no attendance of indigenous students, so the composition is not really intercultural (indigenous, repatriates and foreigners). The high majority of foreign students live in Attica (24,686, 54.1%) and in Salonica (3,723, 8.2%). Most of these children attend the mainstream elementary schools located in the underprivileged areas of the cities, which are almost abandoned by indigenous population. In these schools, an estimated 50% to 60% of the student population in a class is foreign, which sometimes reaches up to 80%. The indigenous students, who remain to attend these schools usually come from families of low social and economic status that can not afford to send them to private schools or to move to more privileged regions. These schools, which could be characterized as multicultural or multiethnic as their students are, are not defined nor do they function as such, and teachers, despite the students' diverse background, have to teach classes as if the students were Greek (18). Peculiar is also the case of the so-called "Roma schools", which have emerged in areas where settlements of Roma/Gipsy people exist. Non-Roma parents send their children to other schools as a result of their belief that their children's coexistence with Roma/Gipsy schoolmates downgrades the overall level of education (17). Foreigners of high social and economic status, as the cases of the employees of the embassies or European community offices, as well as high-income Greeks, send their children to the foreign, private schools, which are considered to offer a high standard of education. Communities like Armenian, Polish and Philippino have established their own schools (18).

3. THE METHODOLOGY OF THE STUDY

3. 1 Sample description

In this study a total number of 133 students 11-12 year-olds from three elementary schools (A, B, and C) and a non-governmental foundation (D) participated in the test. The students are from the fifth and sixth grades of elementary school and they have already been taught the geography of Greece and the geographical divisions of the country. School A is an intercultural school located in the center of Athens, in an underprivileged part of the city (Gazi). In this school there are indigenous children, children of the Muslim minority of Thraki whose families occasionally stay in Athens, and a smaller number of foreign children, mainly Albanians. The students come from families of the lowest socio-economic status. Many of them have to contribute to their family income and their school attendance is not regular. Their teachers characterize the school performance of the majority of students as low. School B is a typical elementary school, which follows the mainstream educational system, located in a suburb of Athens (Glyfada). In this school the

students are indigenous Greek children, coming from families of middle socio-economic status. School C is another typical elementary school, which follows the mainstream educational system and is located at a provincial town of Greece, Larissa. Most of the students are indigenous, coming from families of middle socio-economic status. A small number of Albanian children (a percentage of approximately 10%) also attend, coming from families of low socio-economic status. Finally, a small part of our sample consists of children from a special type of foundation (School D). This foundation works during the afternoon, and volunteers offer educational services, and entertainment and psychological support to children. Most of these children, mainly from Iraq, attend mainstream educational classes in the morning and come from families (political refuges having illegally emigrated to Greece) of very low socio-economic status. Analytical presentation of the sample is given in Table 2. The columns refer to first-language and the rows to the schools of our sample. The sample is not a representative one and thus, the results of the present study may be characterized as preliminary.

Table 2. Sample composition

First-language	Greek	Turkish	Albanian	Russian	Arabic	Chinese	Iraqi	Total
School A	18	11	4	1	2	1		37
School C	49		6					55
School B	30							30
School D	1		1				9	11
Total	98	11	11	1	2	1	9	133

3. 2 Test material description

The test material consists of two sets. The first set refers to thirteen cut-outs of the geographical units −five administrative districts of the mainland (Thraki, Makedonia, Ipeiros, Thessalia and Sterea Hellas), three big islands (Peloponnissos, Evoia and Kriti) and five clusters of islands (Cyclades, Ionia Isl., Aegean Isl., Sporades and Dodekanissa)− that can be arranged to form the map of Greece at a scale of approximately 1:3M, plus one blue colored rectangular background of size 30cm x 40cm. In these cut-outs, the land is colored yellow and the sea blue in order to enhance the figure-ground relationship. All cut-outs and the rectangular were laminated with clear plastic. The second set consists of thirteen label cards naming the geographical units. The two sets of the test material are illustrated in Figure 1 (see in the left side the first set and in the right side the second set).

3.3 Test description

Each child was interviewed individually in a classroom at his school and the test was organized on the basis of four stages. In the beginning, the interviewer explained briefly to the child that the test aimed at the improvement of school methods and purposefully avoided mentioning words like geography or cartography. The cut-outs, which were arranged randomly, but with correct orientation, on the rectangular background, were presented to the child (see Figure 2). Then, the child was asked whether these cut-outs remind him of something. In case he could not give a positive answer, the interviewer provided help by making a reference to the lesson of geography. This stage of the test is further discussed as stage of "overall recognition". In the second stage the child was asked to identify each one of the thirteen cut-outs. This stage is further discussed as stage of "identification". Afterwards the interviewer arranged the label cards vertically, in random order, next to the rectangular background and asked the child to match each label to a cut-out. The interviewer corrected any mismatched labels in order to help the child to perform the next stage. This stage is further discussed as stage of "labelling". In the final stage the interviewer asked the child to match the cut-outs on the rectangular background in order to form the map of Greece in a similar way that a puzzle is composed. This stage is further discussed as stage of "map composition". For each participant, all the answers from the four stages of the investigation were recorded and the map produced was photographed.

Figure 1. The test materials


Figure 2. Subject and interviewer during the test

4. ANALYSIS OF THE RESULTS

Although the present study is preliminary, certain results can come out by comparing the test results of the students coming from different schools. Instead of taking the sample as a whole, the scores of identification and labelling of the students of the typical schools of the mainstream educational system (B, C) were compared and statistically checked, as well as with the scores of the students of the intercultural school A. Just comments are given for the results of school D because of its limited sample size. Parallel to this approach, the composed maps were considered an expression of children's mental representations. In this respect, the results were compared with the ones of a similar study made by the same authors that examined the children's sketch maps of Greece (12).

Table 3 presents the number and the percentage of children at each school that succeeded at stage 1 ("overall recognition") and recognized the cut-outs as being geographical units of Greece. Only 99 children out of 133 named the cut-outs as parts of Greece, or a map of Greece. The others gave answers such as the "earth", "continents", "islands", "countries". There were also a few answers of the type: "they remind me nothing", or "they look like animals", etc. Unexpected differences can be pointed out between schools B and C and, of course attention must be given in the discussion of the results of school D.

Table 3. Number of subjects and percentages that succeed stage 1 ("overall recognition")

School	A	B	C	D	Total
Number of correct responses	28	27	40	4	99
Percentages (%)	76	90	73	44	75

The correct responses given by the students for the stage 2 ("identification"), as well as stage 3 ("labelling"), of the thirteen geographical units were used to calculate the mean scores for each school. The means and standard deviation of each school, for stage 2 and 3 are presented in Table 4. The number of participants from school D did not justify any further comparisons with the other schools performance. Application of Jonckheere-Terpstra test indicated that school (A, B, C) scores for identification were significantly different from each other ($p<0.05$). Subsequent applications of Mann-Whitney test indicated that school A identification score was significantly inferior ($p<0.05$) to the score of both schools B and C. No significant difference ($p<0.05$) came out between the scores of schools B and C. Application of Jonckheere-Terpstra test did not reveal significant difference ($p>0.05$) among the scores of schools A, B and C for labelling the geographical units, although the score of school A was still inferior.

Table 4. Mean scores for stages 2 ("identification") & 3 ("labelling")

School	A	B	C	D	Total
Stage 2 ("identification")	4.5 ± 4.3	6.4 ± 4.0	7.0 ± 3.8	0.7 ± 1.3	5.6 ± 4.2
Stage 3 ("labeling")	7.5 ± 5.3	8.9 ± 3.8	9.5 ± 3.4	1.3 ± 2.3	8.2 ± 4.6

In the intercultural school A, the mean score of indigenous students, in identification of the geographical units, was 4.0 ± 4.4 whereas of the language minority students was 4.9 ± 4.2. The mean score of indigenous students, in labelling the geographical units, was 6.9 ± 5.3 whereas of the language minority students was 8.2 ± 5.3. A Mann-Whitney test was performed, which did not indicate significant difference ($p>0.05$) between the scores of the two groups for both identification and labelling of the geographical units. In school C the mean score of Albanian students in identification was 6.5 ± 3.3 and in labelling 9.0 ± 5.0, closed to the mean score of the school.

The percentages of students of each school and of the total sample who identified and labelled the geographical units correctly are presented in Tables 5 and 6 consecutively. Of interest is the high improvement of the scores in the labelling stage in relation to the identification stage. In both the identification (Table 5) and labelling (Table 6) stage the island of Kriti was the most recognized geographical unit. Peloponissos shape was the second geographical unit to be recognized followed by Makedonia. The lowest result in both identification and recognition can be observed in Dodekanissa, Sporades Islands, Traki, Aegean Islands and finally to Ipeiros.

The composed maps were quite diverse. In order to sort the maps, two criteria were adopted concerning the positioning and the orientation of the cut-outs. So, the location of a geographical unit was assessed as being correct if it kept all the topological relations with the other geographical units, and the orientation of a cut-out was assessed as correct if it was rotated less then 10^{o} from axis Y of the map.

The correct match of the thirteen cut-outs is illustrated in Figure 3. With the application of these two criteria six types of maps were identified. The maps of type I were the ones in which geographical units were missing and the composed map could not be recognized as Greece. Maps of type II were the ones with two or more mistakes in the topology of the geographical units of mainland, as well as topological errors of the clusters of islands, but the map as a whole reminded Greece. Maps of type III were the ones in which the mainland had one positioning error and there were more than one error in the topology and orientation of islands. Of type IV were the maps with no error in the topology of mainland, up to two errors in the topology of the islands and up to four errors in the orientation. Maps of type V were the ones with no error in the topology of the mainland, up to one error in the topology of the islands and one or two errors in the orientation. Finally the best type of maps, the ones of type VI, were considered those having no error in topology and one to two errors in the orientation. Figures 4, 5, 6, 7, 8 and 9 illustrate representative examples of actual children's maps for each type. The distribution (%) of types of maps formed by students from the four schools is shown in Table 7.

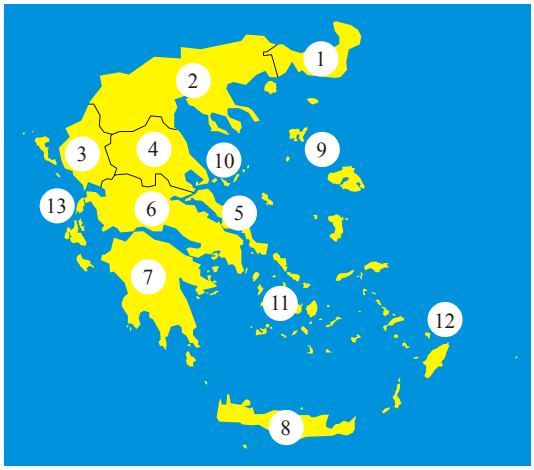

Figure 3. Correct match of the cut-outs

Table 5. Correct answers (%) of stage 2 ("identification") for all geographical units

School		A	B	C	D	Total
1	Thraki	33	17	33	0	26
2	Makedonia	46	77	73	0	61
3	Ipeiros	22	20	29	0	23
4	Thessalia	22	47	62	0	42
5	Evoia	22	37	51	0	35
6	Sterea Hellas	30	57	51	0	43
7	Pelopponissos	68	93	87	2	77
8	Kriti	73	97	91	4	83
9	Aegean Islands	22	33	25	0	24
10	Sporades Islands	11	33	36	0	26
11	Cyclades Islands	40	43	65	0	48
12	Dodekanissa	27	40	42	0	34
13	Ionia Islands	35	47	54	0	43

Table 6. Correct answers (%) of stage 3 ("labelling") for all geographical units

School		A	B	C	D	Total
1	Thraki	54	50	53	0	48
2	Makedonia	65	87	91	0	76
3	Ipeiros	49	57	58	0	50
4	Thessalia	54	63	84	0	64
5	Evoia	57	70	80	2	66
6	Sterea Hellas	57	83	73	2	66
7	Pelopponissos	73	97	96	2	85
8	Kriti	84	100	96	4	89
9	Aegean Islands	49	53	48	0	45
10	Sporades Islands	57	60	60	0	55
11	Cyclades Islands	49	53	78	0	58
12	Dodekanissa	46	57	58	2	51
13	Ionia Islands	57	63	74	0	62

Exploring the composed maps more analytically, no rotation errors were recorded in locating the island of Kriti and in less than 5% of the maps it was slightly shifted towards east or west in relation to the mainland. Pelopponissos was the next geographical unit to be located with success, although there were orientation errors recorded up to 30° clockwise. The greatest degree of uncertainty on orientation was recorded in the cluster of Cyclades Islands that were rotated even up to 180°.

Table 7. Distribution (%) of map types by school

School	A	B	C	D	Total
Type I	41	13	2	73	21
Type II	41	27	4	27	21
Type III	3	17	22	0	14
Type IV	5	27	37	0	23
Type V	8	3	19	0	11
Type VI	3	13	17	0	11

As Table 7 indicates the scores of schools A and D were extremely low compared to the ones of schools B and C in forming the maps. Especially, in school D three out of the four students composed something that did not even look like Greece and the other one fourth of students composed maps that only slightly reminded Greece. The scores of school A were also very low, with only 3% of children composing almost perfect maps, and 82% composing maps of the last two types. Looking more analytically of the results of school A it comes out that there was no difference in the scores of Greek and language minority children. The same conclusion comes out when examining the analytical results of school C, the school that gave the highest scores of all the others. In this school, too, there was no difference in the scores between Greek and Albanian students in the map composition stage. Attention must be given to the difference of scores between schools B and C. An experiment based on a bigger sample needs to be conducted so that we can safely come to conclusions.

5. DISCUSSION

The overall recognition of the geographical units was expected to be successful among all children of that age. The score of 73% correct answers of school C is relatively low compared to the score of 90% of school B and it is not justified by the overall performance of its students in the test. The score of 76% of school A in the same task could be expected, considering the low performance of the students in school lessons as it is mentioned by their teachers.

Figure 4. A sample composition of type I

Figure 5. A sample composition of type II

Figure 6. A sample composition of type III

Figure 7. A sample composition of type IV

Figure 8. A sample composition of type V

Figure 9. A sample composition of type VI

The high improvements of the scores in the labelling stage, compared to the identification stage, were expected, as this had been noticed in a similar study (14). In both the identification and the labelling stage, Kriti ranks higher than any other geographical unit, followed by Pelopponissos as second and Makedonia third. The high scores for the first two geographical units do agree with the ones of a similar study that examined the children's sketch maps of Greece (12). Kriti has a characteristic shape and is located at the southernmost end of the Greek territory, rather isolated, away from the mainland and from other islands. Peloponissos has also a quite characteristic shape and as surrounded by the sea is separated from the mainland. Both Kriti and Peloponissos, producing a rather strong figure-ground effect, draw the attention more than the other geographical units. Makedonia, the third one in scores, in both identification and labelling, having also a characteristic point across its coastline, can be easily distinguished as this has also come out from the study mentioned above (12). The lowest scores in identification and ones of the lowest in labelling are observed for Ipeiros, may be because of its small size and simple shape as well as its location in the mainland. Ipeiros was also the geographical unit that got the lowest score also in the study of the sketch maps of Greece (12). The low scores for Thraki may be attributed to the same reasons. The rest of the geographical units of the main land, Sterea Hellas and Thessalia, as well as Evoia, were identified and labelled by almost the same proportion of students and could rank in the middle of the scores. It has to be noticed that Thessalia and Sterea Hellas are children's home districts. The rather low scores they received, especially in identification, probably indicate that the map as an image and the way it is visually perceived has a strong effect on spatial knowledge acquisition and may be stronger than other factors such as familiarity with places.

Regarding the clusters of islands, many children counted the number of the islands included in each one of the cut-outs in order to name them. It must be mentioned here that the Ionian Islands are also called "Eptanissa", which means "seven islands", and "Dodekanissa", which, in Greek, means "twelve islands". The cluster of Sporades Islands was another interesting point of the experiment. These islands are very small, close together, near mainland, and quite famous. Probably because of their small size they had a very low score in identification, but in the next stage of labelling they got a much higher score, possibly because a lot of children knew them by name, without having their figure representation in their minds. The Aegean Islands received the lowest score, in both identification and recognition stages, among the other clusters of islands. This result was unexpected since these islands do have characteristic shapes and they are not too small in size not to be noticed. So, two possible explanations can be given for their weak recognition. First is the name of these islands, which is the same as that of the sea (Aegean Sea), but the Aegean Islands are not the only ones being in this sea, since Cyclades and Dodekanissa are situated in the same sea area. The second reason might be their relative distances. These islands are spread and they do not form a perceptual group, they cannot be seen as a figure according to the Gestalt law of proximity, as happens with the other clusters of the Greek islands.

The most important point to be mentioned at the stages of identification and labelling of the geographical units is the results of comparison between the scores of indigenous Greek-speaking students in school A and the scores of language minority students of the same school. There is significant agreement between these two groups of children, and although the sample is very small to extract conclusions, it probably means that the low standards of living have a stronger influence in learning procedures of the children than the language difference. A similar opinion has been expressed by other authors (19) and this is a very serious point that needs further investigation, because it must be considered in the planning of intercultural schools. The scores of the minority children (Albanians) in school C could not be statistically compared to the scores of indigenous Greek-speaking children, since the sample was very small, but it can be noticed that their scores are not different. Considering that children of school C totally achieved high scores in the experiment, it is interesting to notice the agreement between the two groups. A possible explanation could be the interest of people from Albania in their children's education.

In view of the results of stage 4 ("map composition"), as are presented in table 7, it comes out that 94% of students of school C, 60% of school B, 12% of school A and none of the students of school D formed maps of the types III-VI. Once more, the results show that students of school C have a more enhanced spatial knowledge of Greece. This result is in accordance with a general conclusion that students from this specific district achieve a high performance in their studies as it is shown by the high proportion of students entering the university. The low level of performance of students in schools of multicultural character, like school A, needs further investigation. It is possible that all the attention is focused on language learning difficulties and subjects like geography are not taken into particular consideration. The extremely low scores of correct answers of school D in all stages is an indication of the difficulties the children of refugees, without the prospect of permanent residence in the host country, are facing in acquiring spatial knowledge, and more generally in their education. This is a socio-political problem that has to be addressed.

The adoption of the criteria to assess the composed maps in relation to their characteristics is an interesting point to be discussed. Actually the criteria (location and orientation), according to which the composed maps were assessed, were applied according to weights based mainly on the size of the geographical unit. So, the topology of mainland had the bigger weight. After that it was Pelopponissos, followed by Kriti, and Evoia. Then, all the clusters of islands were assessed as carrying the same weight, except for Sporades that had the smallest weight. The considered weights determined actually the six types of maps composed. But, the geographical units of Greece are characterized by extreme differences in shape and size. The five geographical units of the mainland differ in sizes at a ratio 1:3.5. Some of them have characteristic shapes (Makedonia), others not (Ipeiros). The big islands are in different positions in relation to their distance from the mainland, and in different orientation, whereas each of the five clusters of islands has different number, density, distribution, and size of islands. As a consequence of the differences in number, size, shape and orientation, the Greek geographical units can be visually perceived in different ways. Some geographical units can be seen more readily than others because of the figure that they form against the ground. A more analytical look at the composed maps indicates that the geographical units that form strong figure-ground effects were the ones where the students achieved the highest scores and not the ones of the mainland that were parts of the puzzle. Most of the children did not even notice the common edges of the puzzle parts and focused their attention on the shape of each cut-out.

Examples to indicate the above are cited:

- Ipeiros, being the smallest geographical unit of the mainland and without having any characteristic shape, was the only cut-out of the mainland puzzle to be missed in 10% of the maps.
- Kriti was the only geographical unit that had no rotation in all the composed maps. This may be due to the already mentioned strong figure-ground effect it produces as it is far from other islands, and to the east-west direction that Kriti has, along with its elongated shape.
- Evoia, which is an elongated island too, but located very close to the mainland and being at a north-west to south-east orientation, doesn't make a good "figure" and maybe that was the reason why they did not get a high score in the composed maps.
- Pelopponissos, having a rather rounded shape, was sometimes tilted up to 30°.
- The most rotated cut-out was the one of Cyclades, which has a rounded shape as a whole, and the islands are very small and their shape distinctions are not readily seen.
- Aegean Islands were located with the greatest shift towards the east, away from the mainland. Children might have in their minds the image of these islands in relation to the coastline of Turkey, and in the absence of this point of reference, they located them close to the border of the outline.

A further investigation on these points may give interesting results.

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SPATIAL KNOWLEDGE ACQUISITION IN CHILDREN OF DIFFERENT CULTURES

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