UP TO THE GARDEN FENCE OR THE WORLD AT PRIMARY SCHOOL

DANIELA SCHMEINCK

Department of Social and Scientific Studies in Primary Education,
University of Education Karlsruhe, Germany

Abstract: *Up to now only few empirical studies have focused on the development of children's spatial cognition. The study examines the map-drawing abilities of an international sample of ten-year-old children by examining the nature of world maps they have drawn. It explores the extent to which different factors of influence, e.g. the presence of media, travel activity, handling of cartographic media, individual interest and family or school factors of influence are correlated to the enhanced ability of the children to represent their spatial cognitive structure of the world as a drawn map. The paper discusses the implications of the findings for the creation of learning environments which support the development of map-drawing using both ways - the way "from local to global" as well as the way "from global to local".*

Key words: *experiences, factors of influence, geography, mental maps, cognitive perceptions, primary school, world*

Introduction

If one examines the field of experience of today's primary school children regarding Europe, foreign countries or the world, one can basically distinguish between five different fields:

1. Experiences from living together with people from different countries and cultures

In Germany, foreign citizens have led and continue to lead us to a multicultural society, where people from different countries with different ways of life[7] (e.g. ways of interpretation, attitudes, habits, religions, values) live. Children face these different ways of life in their everyday life, e.g. at local parties and events, at stores

7 In 2007 the share of foreign nationals in Germany was 8.8 % and thus clearly beneath the average compared to most other European countries (see Statistische Ämter des Bundes und der Länder 2007; see also Eurostat. Statistisches Amt der Europäischen Gemeinschaften 2008a). In comparison to Germany the share of foreign nationals was 41.6 % in Luxembourg, 20.7 % in Switzerland, 19 % in Latvia, 17.6 % in Estonia, 15.2 % in Cyprus and about 10 % in each of Ireland, Spain and Austria (cf. Eurostat. Statistisches Amt der Europäischen Gemeinschaften 2008b).

with exotic-sounding (family)names, in their own surrounding area, through exotically dressed people as well as from what their parents, adults, friends and acquaintances have to say. But the multicultural society is not just felt in everyday life. In the field of school, strong traces can be detected.[8] The situation is very different on the different levels of schooling. Especially primary school, as an educational institution common to all, has a large number of foreign children.[9] In 1991, the average number of children of foreign backgrounds at German primary schools was 8.8%[10]. By the year 2000 the number had increased to 11.8%.[11]

Due to this fact, primary school children are part of our multiculturally compounded society and experience this in their everyday lives. In their so-called "sub-communities", e.g. kindergarden, day-nursery, school, sports associations and their neighbourhood, they gain first impressions of different cultures as well having their first experiences of them. Büker's statement from the year 1998, where she says that living together with people from different cultural backgrounds is *normality* (see Büker, 1998, p. 68) for today's children, remains valid today.

2. Growing mobility and increased travel among the population

In 2006, every German travelled by plane or train (at least one overnight stay) an average of 2.3 times. 43.8% of these flights or journeys by rail headed to European countries abroad. Passengers flew from German airports to European countries abroad 41 million times. The most frequent destinations within Europe were Spain (with 9.9 million flights altogether), the United Kingdom and Northern Ireland (with 4.9 million flights) and Turkey (with 4.4 million flights).[12], [13]

Regarding the consequences of increased travel for pupils' spatial knowledge,

8 In quantitative terms the most significant country of origin is Turkey; in the year 2000 almost 502,000 pupils in Germany had Turkish nationality, accounting for almost 43.4% of all foreign pupils. Another 195,000 (16.9%) came from the member states of the European Union; Italians – with almost 92,000 (7.9%) and Greeks with 43,000 (3.7%) were the biggest groups amongst them. With a total of 149,000 (12.9%), the states of the former Yugoslavia account for a huge proportion of foreign pupils in Germany; of this amount of more than half – 84,000 (7.2%) – are from the former Yugoslavia. Of the remaining pupils whose nationality is not German, 24,000 (2.1%) are from Poland, 78,000 (6.7%) are from other European States and 207,000 (17.9%) are from states outside Europe (see Sekretariat der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland 2002, p. 12).

9 See Analyses from Büker for the year 1990.

10 Asylum seekers and German emigrants who returned to Germany long after World War II are not part of statistics of the KMK (Conference of Ministers of Education and Arts). Due to this fact, one has to assume that the actual number of pupils with different cultural backgrounds in primary schools is a lot higher than the statistics the KMK gives. [Comment of the author.]

11 See Sekretariat der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland 2002, p.11, tables.

12 See Statistisches Bundesamt Deutschland.

13 Journeys by other means of transportation such as bus and/or car are not integrated into the statistics of the German Federal Office of Statistics. One has to assume that the number of real trips to European countries abroad is much higher than the statistics say. [Comment of the author.]

studies show that growing primary experiences through travelling, besides individual and experience-based influences, has an influence on the spatial imagination of primary school pupils (see Schmeinck, 2007a, p. 181; Schniotalle, 2003; Halocha, 1998). Related to this, interviews would show that besides the primary experiences they have in countries in which they spend their own holidays, children have great access to a wide range of travel experiences through their classmates, parents and grandparents (see Schniotalle, 2003, p. 200). Due to this the growth in travel seems to have a crucial role in class with regard to a global dimension.

3. Influences of the different (mass)media

Nowadays the media are *the* information medium for foreign countries and cultures because they can give one an impression of and an insight into the past and the future, the *here* and the *there*, the great diversity of human ways of life and behaviour, where personal encounters are not possible (see Büker 1998, p. 73cf.). Therefore, television has a pre-eminent role in the lives of children.

According to the KIM-study from the year 2005, television is still the most important medium for children. Almost half of children have their own set, and 78% watch television almost daily (See Medienpädagogischer Forschungsverbund Südwest 2006, p. 19). The computer is an important medium at primary-school age, too. In the year 2005 83% of households with children had a computer or laptop and 12% of children already had their own equipment. 63% of children use a computer at least once per week (see Medienpädagogischer Forschungsverbund Südwest 2006, p. 26). Besides television and computers, children's print media such as children's books (e.g. Pipi Longstocking, Emil of Lönneberga, etc.) and special magazines for children (e.g. Mücke, Geolino, etc.) provide impressions of foreign countries, nations and their cultures. Judging by this one can assume that even children of primary-school age have a media-generated knowledge and experience of foreign countries and the world.

4. Increasing European and international consumption

As early as 1989 Bausinger detected that Lacoste and Benetton were often firm terms associated with the youth (see Bausinger, 1989, p. 7) and also Büker found that the clothes that originated from different nations and the typical ways of dressing were becoming more and more mixed-up, crossing over into folklore and becoming more and more part of international fashion. Examples of this development are kilts, traditional costumes and Norwegian pullovers (see Büker, 1998, p. 72). But not just in the area of fashion are we confronted with Europe and different countries of the world. Danish bed depots, Swedish furniture shops, Italian furniture design, French, Italian and Polish makes of cars, Italian ice cream and pizza, Spanish paella, Turkish doner kebab, Dutch tomatoes, Greek olives, Spanish grapes, etc. have become a big part of our daily lives and within this a big part of the (daily) reality of primary-school children. Therefore children grow up

with an international range of goods on offer which seems natural to them. Given that this is so one has to assume that these enormous amounts and all the special offers are not viewed as such through the eyes of children. One should be aware that children are not aware of the foreign origins of certain products because they were not yet born when international goods were integrated into the local network of supply (see Büker, 1998, p. 72).

5. Officially supported programmes for the support of the growing together of Europe

Especially in recent years there has been an increasing range of officially supported programmes for the support of the growing together of Europe, even for primary schools. Supportive measures from the European committee surely are of particular importance for this growing together. So not only partnerships between schools are supported (e.g. COMENIUS projects), but also the forming of networks for partnerships between schools. Numerous European competitions for pupils of all ages are advertised and organized by the Centre of European Education, the Council of Europe, the Federal Ministry of Education and Research, the Department of Foreign Responsibilities of the KMK and/or the German-French Youthclub.[14]

To summarise, children nowadays can fall back on extensive experiences of different kinds with regard to their idea of seeing the world. With reference to Negt (1998, p. 22) the understanding of the changes in the world as well as the detection of aspects concerning one's own personality are not just superfluous luxury, but essential requirements. The necessity of the implementation of a European or rather global dimension in class has been emphasized for years not only at a political level but in primary-school-related didactic discourse.[15]. Analysing the current guidelines and school curricula of Germany, we detect in most of the federal states of Germany an orientation towards the principle "from close to far" (see in detail Schmeinck, 2008). In spite of the different decisions from the Council of Ministers for the education system, the resolutions of the KMK on the topic "Europe in class" or rather "Teaching Europe in school" from the years 1990 and 2008, the reports of the Gesellschaft für Didaktik des Sachunterrichts (GDSU) in their "perspective frame general sciences" as well as different didactic discourses and the ministerial declaration of intent from 1992, to integrate the European dimensions into the new school curricula (see Büker, 1998, p. 38), in many federal states region-related learning is still taking place in the home region.

But what ideas do ten-year-old children have of the world? Which kinds of influences on the development of three-dimensional ideas of the world are of crucial importance? What does "distance" mean to the primary-school children of

14 The list of programmes and measures is just an example, not an attempt at completeness [Comment of the author.]

15 See Schmeinck 2008, also see Amtsblatt der Europäischen Gemeinschaft 1976 and 1988, Sekretariat der ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland 1978, 1990, 2008 and Gesellschaft für Didaktik des Sachunterrichts 2002.

today and the future? Which preconditions are needed by learners in the future? Empirical research on the origins of the three-dimensional ideas of primary-school children are rare. But an overview of children's ideas of the world, how these ideas are created and under which circumstances they change, would be very important.

The study presented in this paper therefore examines how ten-year-old primary-school pupils perceive the world, the cognitive map they have in their minds and which factors may have an influence on the development of their perceptions. The paper discusses the implications of the findings for the creation of learning environments that support the development of pupils' spatial representation.[16]

Theoretical background

The necessity of helping children to develop spatial perceptions of the world and an understanding of the ways in which societies and environments are connected has long been recognised as desirable (see Gould & White, 1974). Previous research has therefore focused attention on children's perceptions of the world as well as on the development of spatial cognitive structures (see Cohen & Schuepfer, 1980; Tanner, 1999; Bourchier et al., 2002).

Despite the fact that recent research has focused attention on children's perceptions of the world, we know relatively little about children's perceptions and the reasons for their development. Nevertheless, this aspect of geography education is highlighted as very important by Holloway and Valentine (2000, p. 7) who refer to the "small, but significant literature about children's spatial cognition and mapping abilities." Likewise, the manner in which travel experiences, exposure to cartographic media, personal interest as well as familiar and school influences interact in the development of spatial cognition and mapdrawing ability is not fully understood. Thus Poria et al. (2005) identify this as an area where additional research is still required.

In 1950 Piaget concluded that children aged 7 to 11 are at a 'concrete operational' stage of development. According to Piaget children at this stage use symbols to represent objects and can solve problems that have a concrete, rather than an abstract basis. In terms of examining children's spatial awareness of the world Piaget's work suggests that at the age of ten children are still developing the ability to represent in maps things like countries and places that they may not have visited and of which for that reason they may have only an abstract knowledge.

In the last few decades arguments have raged in respect of exactly when children develop the ability to represent their spatial cognition of the environment or the world as a map (see among others Blaut, 1997a, 1997b, 1999; Catling, 1979; Cook et al., 1998; Goodnow, 1977; Newman & Newman, 1978, Rivlin et al., 1985). Some authors report the development of this ability in children as young as four (see Blades et al., 1998). According to Blaut even children as young as three can make maps with

16 The results of a study published by the Julius Klinkhardt house under the title "Wie Kinder die Welt sehen. Eine empirische Ländervergleichststudie zur räumlichen Vorstellung von Grundschulkindern." (ISBN 978-3-7815-1541-3).

toys (see Blaut, 1997a; Blades & Cooke, 1994; Blades & Spencer, 1990). Other authors confirm the statement that a basic requirement for the understanding of maps – the understanding of symbolical representations and/or the understanding of objects as representatives of other objects – is already developed at the age of three (see e.g. DeLoache, 1987, 1989, 1991, 2000; DeLoache, Miller, & Rosengren, 1997; DeLoache, Uttal, & Pierroutsakos, 1998). Children who are five years old can both reorientate maps that are not aligned correctly (see Blades & Spencer, 1990) and interpret aerial photographs (see Sowden et al., 1996). Nevertheless, some authors still assert that only when children have entered the 'concrete operational' phase can they start to represent their spatial cognitive structure of the world in the form of a (mental) map (see Towler & Nelson, 1968; Towler, 1971; Stückrath, 1963).

Aims of the study

Bruner states that new knowledge (in or out of school) is taken up and memorized significantly (see Bruner, 1960). In order to avoid placing excessive or insufficient demands on pupils it is necessary for teachers to become aware of the knowledge and the personal and individual experience of their pupils. The understanding of how children develop cognitive structures of the world and a profound knowledge of their ability to represent these structures in maps is required to help develop effective pedagogical strategies for the teaching at school of mapping skills and spatial abilities. Additionally, an understanding of how children's spatial cognition of the world grows may also help deepen knowledge of how operational thought develops in children.

In order to be able to examine the different factors of influence (e.g. school or cultural influences), in addition to the German sample corresponding international samples were taken. The results of these smaller studies offer explanations as to whether the results of the German study deviate from those of other countries, or whether they can also be confirmed at an international level. In accordance with this the aims of the present research were to:

- identify representative samples of ten-year-old children from Chile, Germany, France, the UK, the US, Spain, Sweden and Switzerland;
- collect data from the sample regarding ability to represent spatial cognitive constructs of the world in mental maps;
- collect data from the sample in respect of previous travel experiences, personal interests, school and family influences, out-of-school-experiences and exposure to cartographical media.

In order to address the overall aim the following research questions were investigated:

- How do children represent the world in a mental map?
- Were there observable differences in the mental map-drawing abilities of the children?
- What influence do different experiences have on children's ability to represent the world in a mental map?

Method

Sample

The sample for this study comprises 724 ten-year-old primary-school children from Chile, Germany, France, the UK, the US, Spain, Sweden and Switzerland. In the selection of the countries various criteria were taken into account:

- geographical boundaries (e.g. UK) vs. political boundaries (e.g. Switzerland)
- special settings of the countries (e.g. Australia = country and continent)
- role of geography in the school system
- curricula differences

Table 1: Numbers of children from each country in the sample

	Number of children*		
Country	Boys	Girls	**Total**
Germany	188	191	380
Switzerland	43	39	82
France	33	38	71
Spain	34	28	62
United Kingdom	31	20	51
Sweden	12	10	23
Chile	19	14	33
USA	10	12	22
Total	**370**	**352**	**724**

* Whilst the data set may be unduly influenced by the variance in sample size between each country, it should be noted that analyses between countries are not attempted within the data set. With regard to the purpose of the study it would have been desirable to be able to collect data by randomly chosen, homogeneous and identically sized samples. However in conjunction with the actual data acquisition in the international parts of the study this proved to be unrealisable because even the identification of comparable schools and/or classes turned out to be a practically unsolvable task. Given the fact that the international parts of the study were performed mainly for purposes of comparison and examination, the results of the underrepresented countries (Chile, the USA and Sweden) are also considered in the analysis of the results.

The last two points in particular appeared to be highly relevant, as it was assumed that the framework of a separate subject or an early start in the teaching of geographical or cartographical input accompanied spatial abilities and/or mental map-drawing abilities. To ensure the best possible comparability of the data local contacts were asked to select schools that might yield a sample representative of their educational system and which were based in an urban location with an associated population of between 10,000 and 25,000. In addition the schools had to have a roll of between 200 and 240 students. The classes selected for study were composed of ten-year-old students. The number of students per class in the classes selected was in the range of 20 – 25. Therefore, schools were not randomly selected

for involvement in this project and a convenience – rather than probability – sample albeit with specific design parameters, was selected for the study. However, within the schools a full study of all fourth graders (age 9/10) was accomplished. Table 1 presents the numbers of children from each country in the sample.

Instruments

For the collection of the different data from the sample the pupils were asked to draw a mental map of the world. This data was gathered from a free map-drawing exercise with no reference to cartographic media. This technique was developed from methods previously reported by Schniotalle (2003), Matthews (1992) and Gould and White (1974). The children in the study sample were assigned the following task:

> Draw a world map.
>
> Draw and write on your map anything you can think of with regard to the world.

The mental maps drawn by the pupils were interpreted by a method of coding. This was done in order to allow comparisons to be made within the data set. Codes were developed on the basis of criteria that described the nature and qualities of the mental maps. These codes resulted in each map being assigned a numerical score. Increasing scores were awarded to maps of increasing complexity and quality (see figure 1 and table 2).

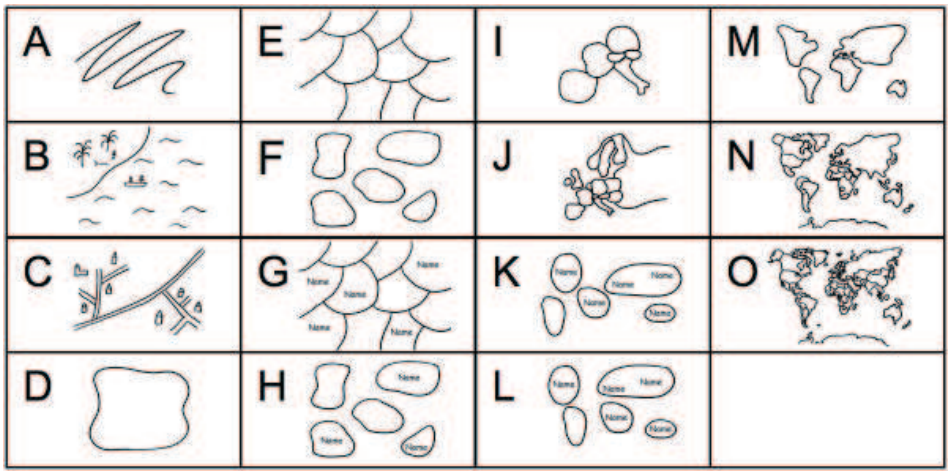

Figure 1: Qualitative categories for the maps shown in characteristically ideal form (source: Schmeinck, 2007b, p. 37)

Table 2: Index of the quality of the mental maps drawn (Schmeinck, 2007a, p. 178-183)

Type A	No classification possible	0 points
Type B	Picture of a situation; frequently pictures of houses, humans, plants and animals	1 point
Type C	Regional maps, e.g. single towns with streets and houses	2 points
Type D	Single isolated country island surrounded by water or without surroundings	3 points
Type E	Continents stuck together; randomisation; no labelling of the countries; no land and water discrimination	4 points
Type F	Isolated islands; randomisation; no labelling of the countries; no relationship between the countries; with land and water discrimination	5 points
Type G	Continents stuck together; randomisation; with labelling of the countries; no land and water discrimination	6 points
Type H	Isolated islands; randomisation; with labelling of the countries; no relationship between the countries; with land and water discrimination	7 points
Type I	Single countries identifiable by size, shape, labelling or distributions	8 points
Type J	Parts of the world identifiable by size, shape, labelling or distributions	9 points
Type K	World map identifiable by labelling of the continents; continents partially misrepresented	10 points
Type L	World map identifiable by labelling and location of the continents	11 points
Type M	World map identifiable by labelling, location and shape of the continents	12 points
Type N	World map identifiable by labelling, location, shape and size of the continents; parts of the world map are represented in detail	13 points
Type O	World map identifiable by labelling, location, shape and size of the continents; most parts of the world map are represented in detail	14 points

To give valuable clues as to the correlation between the mental maps drawn and the different factors of influence related to the development of spatial conception, additional data were collected in the form of specially developed questionnaires from the children, their parents and the teachers. Both the children's and the parents' questionnaires combined open and closed questions with *a range of*

possible answers, with the closed clearly outweighing the open because of their higher objectivity (see Bortz & Döring, 2002, pp. 194f). The cognitive capabilities of the children were measured both by the estimation of the class teacher and by the awarding of school marks (Mathematics, German, General Studies {Sachunterricht in German}).

In accordance with the objectives of the present study the children's questionnaires were divided into two parts. In the first part the focus was set on the different factors of influence and awareness of foreign countries and continents. The answers are used to investigate which factors of influence have a notably positive impact on the perceptions of the children and which sources of information are used by the children. Within the questionnaires the following content areas were pursued:

a. social statistics
b. travel experience
c. out-of-school factors of influence
d. school factors of influence
e. familiar factors of influence
f. individual factors of influence
g. impact of cartographical media

The second part of the children's questionnaire focused more on the perceptions and competences of the children. The following content areas took centre stage:

h. competencies in working with cartographic media
i. awareness of one's own country and continent affiliation

The questionnaires were developed, examined and optimized beforehand in numerous pretests and by two different methods of cognitive laboratories regarding the cognitive processes during the question-answer process: on the one hand by the use of the retrospective-think-aloud method, in which after answering the question the respondent is asked to explain why he/she chose that particular answer (Prüfer & Rexroth, 1996, p. 105), on the other hand by the methodology of paraphrasing, where the respondent is asked first to answer the question and then to reproduce and/or formulate the question in his/her own words (Prüfer & Rexroth, 1996, p. 108). The finished children's questionnaire contained 20 questions from the various areas mentioned above. In order to assign questionnaire data according to family, class and country affiliation whilst respecting privacy, all questionnaires were completely coded and completed anonymously.

In the available survey, for the children's and teachers' questionnaires a response rate of 100% was achieved. However, in this respect this is not surprising as all the students' surveys took place during a school day. With 81.3% for the German survey and 73.7% for the survey as a whole[17] the response rate for the parents' questionnaires is pleasingly high.

17 In general the response rates of corresponding surveys are between 10% and 90% (see Bortz & Döring 2002, p. 257).

Data Analysis

Non-parametric statistics were used to analyse the data. This decision was justified on the basis of the following factors:

- Samples were not randomly selected from countries and the sample size from each country varied.
- Although the data set for quality of world maps was numeric in nature, the scale developed was non-parametric.
- The use of weighting factors in the development of index scores meant that it was appropriate to use non-parametric statistical analyses.

For the reasons given the use of non-parametric statistical analyses was less likely to give anomalous results of positive correlations as a result of the statistical processes. The Kruskal-Wallis test, a non-parametric equivalent to ANOVA, was therefore used to determine statistical differences between the sample means. Kendall-Tau-b and Spearman-Rho tests were selected to explore evidence of correlation between variables.

With the aid of cluster-analytical proceedings, additional enquiries about the markedness of the groups' characteristics were conducted to test how groups with the same or similar characteristics were perceptible within the survey. Afterwards an analysis was performed to discover whether conclusions about the quality of the mental map drawn, gender or nationality could be drawn on the basis of membership of a cluster based on markedness of characteristics.

Results

The results of phase one of the mental mapping exercise show that the children did not produce a uniform spatial cognitive representation of the world as a map. The maps drawn present different and individual spatial cognitive representations of the world. The Data presented in figures 2 and 3 show the number of children who drew a map of each type in the German and French sample. Figure 2 indicates that about 89% of the German children were not able to draw a world map at all. 6.1% drew holiday pictures, regional maps or single countries (type B to type D). The majority of the children (74.2%) drew world maps in the form of countries, continents or cities that were stuck together randomly or were represented as isolated islands without any relationship to one another (type E to type H). Another 17.1% drew parts of the world in the form of single countries which were stuck together in the right form and were identifiable by size, shape or distribution (type I and type J) or islands that could be identified as the different continents (type K and type L). Only 2.1% of the German children were able to draw identifiable world maps with identifiable shape and/or more or less detailed information (type M to type O). In contrast to this data, the results of the French study show that all children were at least able to draw maps (type E). Furthermore more than half of

the French children were able already to draw world-similar maps (see Schmeinck, 2007a, pp. 156-157).

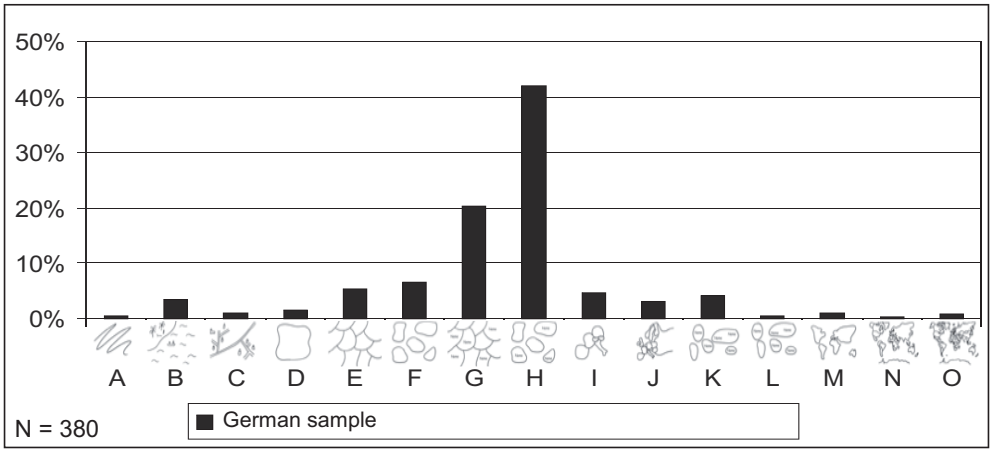

Figure 2: Distribution of the map categories in the German sample (Source: Schmeinck, 2007a, p. 157 – original in German)

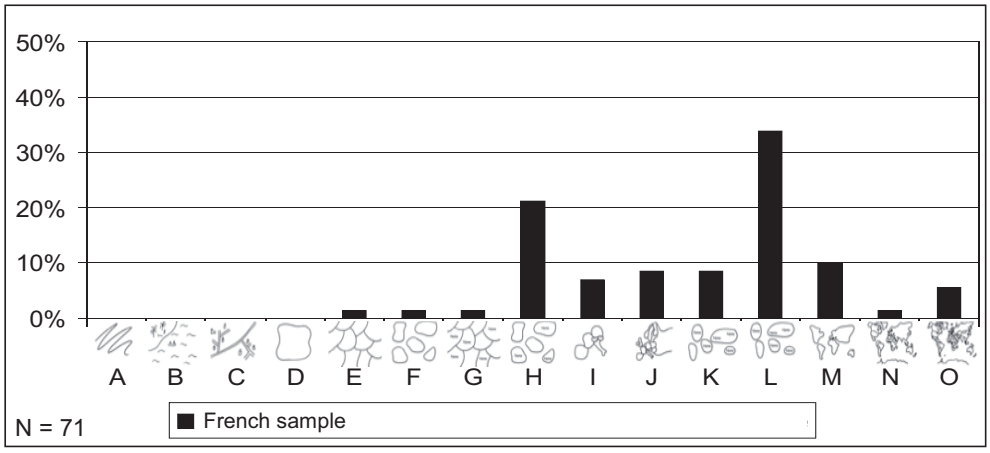

Figure 3: Distribution of the map categories in the French sample (source: Schmeinck, 2007a, p. 158 – original in German)

Also in comparison with the other European sample groups of the present study the average quality of the German world maps is much lower (see table 3). Thus age-related development in the form of common map representations could be diagnosed neither in the context of the study nor in the pilot survey with around 600 children from kindergarten to university (see Schmeinck, 2004).

Table 3: Average quality of the world maps (see Schmeinck, 2007a, p. 159)

Country	**Average**	**N**
France	9.73	71
Sweden	9.00	22
United Kingdom	8.02	49
Spain	7.94	62
Switzerland	7.68	82
Germany	6.71	379
Chile	6.44	32
USA	6.41	22
Total	**7.36**	**719**

Additional analysis of the data set of the German sample using the Kruskal-Wallis test indicated that the average mapping abilities of male students were significantly better than those of female students in the sample (χ^2 =11.8, df=1 and p=0.001). To examine the meaning and effectiveness of the different factors of influence for the development of spatial imagination, index-results of the different aspects of influence were calculated out of the questionnaires' results. In particular the fields of travelling, the use of cartographical media, interest, family influence, school, knowledge and abilities in dealing with cartographical media and a consciousness of one's own country and continent were considered. The survey's results show that the development of space-imagination is very complex and influenced by several factors. On the basis of the data gained it was not possible to identify one single factor out of all those examined and thus to draw a decisive conclusion.

For the index-results that have been acquired through the analysis of children's interest, school, cartographical competences, influence of media and travelling it was possible to prove connections between the quality of the *Mental Maps* drawn, but they were only weak or moderate. Even intensive or numerous experiences in one of the fields do not as a rule lead inevitably to a corresponding development of spatial imagination. The clearest correlations were proven in the cartographical competence index, where the connection between the *Mental Maps* drawn and the index-results was comparatively the strongest. For the index family however, it was not possible from a statistical point of view to prove connections, so that it is necessary to assume that family influence is insignificant for the development of spatial imagination (see Schmeinck, 2007a, p. 231).

The analysis of the "competences concerning maps" index indicates that boys have more experience of and more competencies in working with cartographic media than girls and additionally get more benefit from this experience and these competencies. In contrast to this, girls get more benefit out of their experience of travel than boys, whilst their interest in foreign countries affects the quality of their mental maps less strongly than those of boys (see Schmeinck, 2007a, pp. 174-209).

With regard to the question, "To what extent can different types be distinguished within the study by the markedness of their characteristics?", it was possible to identify three different types with the help of cluster-analytical processes. The first type distinguishes itself by particularly low results in the field of cartographical competence. Beyond that, children show only average results in the other index-results; it is likely that as a rule they have less extracurricular access to or contact with cartographical media, less experience of travelling, only an average interest in the world or in foreign countries and received only average exposure about foreign countries at school or used cartographical media in the classroom. 50% of this type's children draw Mental Maps of types G and H, meaning maps within which the land areas are situated absolutely arbitrarily and which with regard to their legend do not show a town-county-continent hierarchy. Furthermore this cluster also shows a great number of extreme values and mavericks, and hence both children who drew plainly better and plainly worse maps. Regarding gender, it is generally possible to say that children from the first cluster tend to be girls. Children of the second type tend to produce lower results than the children of type I, when one discounts cartographical competence. Hence do those children have as a rule both less extracurricular access to or contact with cartographical media and less experience of travelling than the children from the first cluster. They have not heard much about foreign countries at school nor have they used cartographical media, and they show very little interest in foreign countries or the world. Compared to children from the first cluster, type II children show as a rule plainly more cartographical competence. Half of the children of this type draw maps of types G to I, where illustrations are plainly available that show the first countries situated correctly. Type III children tend to have very high results in all fields of index. They have as a rule both extracurricular access to and/or contact with cartographical media, a great interest in foreign countries and the world, have heard a lot about foreign countries at school and/or have used cartographical media, and they have a broad cartographical competence. But even they have not had distinctive experience of travelling. 50% of the children of this type draw maps of types I to L, hence maps in which at least individual countries are situated correctly in relation to one another, with the continents partly shown in the correct positions. Regarding gender it is possible to determine within this type that the children here tend to be male. With regard to the membership of countries and clusters the study's results show, the countries differ significantly regarding the arrangement of established clusters. Especially with girls membership of a country tends to have a greater influence on spatial imagination and/or on the quality of the Mental Maps drawn, whereas locally-available or lack of school influence seems to matter more than the country itself (see Schmeinck, 2007a, pp. 231-233).

Discussion

With regard to the question, "To what extent have primary-school children already developed spatial ideas about foreign countries?" and individual conditions

of learning in this field, as well with regard to the extent to which primary-school pupils are able to deal with foreign countries and/or remote areas and to depict these if applicable in the form of maps, the results of the current study – especially those of the partial studies in France, Czech Republic, Sweden, Great Britain and Spain – show that children at the age of ten are very well able to do this. Also with regard to the knowledge, imagination and interest of the children in the field of spatial learning, the results of the current study show that these are neither restricted to one's own garden, neighbourhood or village nor to one's own country. The results prove rather that the children already know many countries and that their knowledge of countries is not at all restricted to single continents or to communities of states such as the European Union. The perception of remote areas is often regarded as being too abstract; but with the development of the infantile view of the world already starting at primary school (probably even earlier), it should be picked up, supported, used intensively and developed in the framework of a purposeful teaching unit. The view that an understanding of abstract spatial coherence is not yet developed sufficiently at primary school and remote areas could be reasonably covered from a developmental-psychological point of view first at secondary schools seems to be unreasonable (see Schmeinck, 2007a, p. 233).

Based on the present research figure 4 shows a suggested model for the development of spatial conceptions at primary-school level. The individual strands represent different areas, which are – in the context of the spiral curriculum – repeatedly taken up, extended and deepened.

Actual geographical proximity or distance cannot necessarily be equated with pupils' emotional and/or personal proximity or distance. For this reason, the organization of the areas cannot be exclusively bound to real geographical distances. The different areas must be defined individually in relation to the subjective experiences and conditions for learning of the children. Constant movement between areas and perspectives at increasingly complex levels is important for the development of spatial conceptions. Therefore teachers need to provide pupils repeatedly with experience of the different spatial dimensions and with perspectives other than their own. In order to enable an emotional and personal relation between the individual strands, it is crucial that new information always connects to pupils' already acquired knowledge and/or cognitive structures.

Besides the development of topographical knowledge and competences which allow orientation in the world, the development of spatial ideas described in the model comprises the ability to form critical opinions and the children's development into mature citizens. Therefore a positive attitude towards other people is important. The aim of the present examination – as well as those depicted in figure 4 – and of the framework of a spiral curriculum should be to develop spatial dimensions and the consciousness of the children with regard to their own relationship to the world.

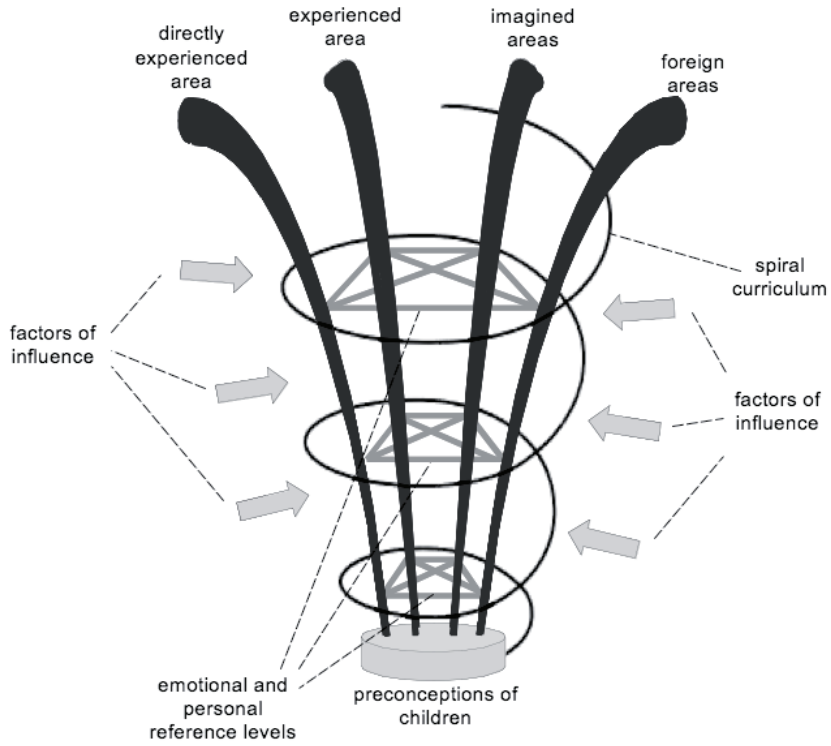

Figure 4: Model for the development of spatial conceptions in primary school (source: Schmeinck, 2007a, p. 237)

References

Amtsblatt der Europäischen Gemeinschaft (1976). *Entschließung des Rates und der im Rat vereinigten Minister für Bildungswesen vom 9. Februar 1976 mit einem Aktionsprogramm im Bildungsbereich.* Amtsblatt C 038 vom 19/02/1976, S. 1-5. http://eur-lex.europa.eu/Notice.do?val=53153:cs&lang=de&list=53153:cs,&pos=1&page=1&nbl=1&pgs=10&hwords=&checktexte=checkbox&visu=#texte; Zugriff am 19.10.2007.

Amtsblatt der Europäischen Gemeinschaft (1988). *Entschließung des Rates und der im Rat vereinigten Minister für das Bildungswesen zur europäischen Dimension im Bildungswesen vom 24. Mai 1988.* Amtsblatt C 177 vom 06/07/1988, S. 5-7. http://eur-lex.europa.eu/Notice.do?val=140191:cs&lang=de&list=140192:cs,140191:cs,140190:cs,&pos=2&page=1&nbl=3&pgs=10&hwords=&checktexte=checkbox&visu=#texte; Zugriff am 19.10.2007.

Bausinger, H. (1989). Das Bild der Fremde in der Alltagskultur. *Welt des Kindes,* 6-13.

Blades, M., & Cooke, Z. (1994). Young children's ability to understand a model as a spatial representation. *Journal of Genetic Psychology, 155,* 201-218.

Blades, M., & Spencer, C. (1990). The development of 3 to 6 year olds' map-using ability: The relative importance of landmarks and map alignment. *Journal of Genetic Psychology, 151,* 181-194.

Blades, M. et al. (1998). A cross-cultural study of young children's mapping abilities. *Transactions of the Institute of British Geographers,* 2, 268-277.

Blaut, J.M. (1997a). The mapping abilities of young children: Children can. In *Annals of the Association of American Geographers,* 1, 152-158.

Blaut, J.M. (1997b). Piagetian Pessimism and the Mapping Abilities of Young Children: A Rejoinder to Liben and Downs. *Annals of the Association of American Geographers, 87,* 168-177.

Blaut, J.M. (1999). Maps and Spaces. *The Professional Geographer, 51,* 510-515.

Bortz, J., & Döring, N. (2002). *Forschungsmethoden und Evaluation.* Berlin.

Bourchier, A., Barrett, M., & Lyons, E. (2002). The predictors of children's geographical knowledge of other countries. *Journal of Environmental Psychology, 22*(1-2), 79-84.

Bruner, J.S. (1960). *The process of education.* Cambridge.

Büker, P. (1998). *Erziehung zu europäischer Verständigung in der Grundschule. Bedingungen – didaktische Konkretisierung – Realisationsmöglichkeiten.* Frankfurt/Main et al.

Catling, S.J. (1979). Maps and Cognitive Maps: The Young Child's Perception. *Geography, 64*, 288-295.

Cohen, R., & Schuepfer, T. (1980) .The representation of landmarks and routes. *Child Development, 51*(4), 1065-1071.

Cook, G., Griffin, D., & Cox, M. (1998). *Teaching Young Children to Draw.* London.

DeLoache, J.S. (1987). Rapid change in the symbolic functioning of very young children. *Science,* 4833, 1556-1557.

DeLoache, J.S. (1989). Young children's understanding of the correspondence between a scale model and a larger space. *Cognitive Development,* 2, 121-139.

DeLoache, J.S. (1991). Symbolic functioning in very young children: Understanding of pictures and models. *Child Development,* 44, 736-752.

DeLoache, J.S. (2000). Dual representation and young children's use of scale models. *Child Development,* 2, 329-338.

DeLoache, J.S., Miller, K.F., & Rosengren, K.S. (1997). The credible shrinking room: Very young children's performance with symbolic and nonsymbolic relations. *Psychological Science,* 4, 308-313.

DeLoache, J. S., Uttal, D. H. & Pierroutsakos, S. L. (1998). The development of early symbolization: Educational implications. *Learning and Instruction,* 4, 325-339.

Eurostat. Statistisches Amt der Europäischen Gemeinschaften (2008a). *Bevölkerung nach Staatsangehörigkeit – Ausländer.* Online: http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,39140985&_dad=portal&_schema=PORTAL&screen=detailref&language=de&product=Yearlies_new_population&root=Yearlies_new_population/C/C6/cac15130 [20.07.2008]

Eurostat. Statistisches Amt der Europäischen Gemeinschaften (2008b). *Gesamtbevölkerung.* Online: http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,39140985&_dad=portal&_schema=PORTAL&screen=detailref&language=de&product=Yearlies_new_population&root=Yearlies_new_population/C/C1/C11/caa10000 [20.07.2008]

Gesellschaft für Didaktik des Sachunterrichts (GDSU) (Hrsg.), (2002). *Perspektivrahmen Sachunterricht.* Bad Heilbrunn.

Golledge, R.G., & Stimson, R.J. (1997). *Spatial Behavior: A Geographic Perspective.* New York.

Gould, P., & White, R. (1974). *Mental Maps.* London.

Halocha, J. (1998). The European Dimension. In Scoffham, S. (Ed.). *Primary Sources. Research findings in primary geography* (pp. 42–45). Sheffield.

Holloway, S.L., & Valentine, G. (2000). *Children's Geographies. Playing, Living, Learning.* London.

Liben, L.S., & Downs, R.M. (1997). Can-ism and Can'tianism: A Straw Child. *Annals of the Association of American Geographers, 87*, 159-167.

Matthews, M.H. (1992). *Making Sense of Place: Children's Understanding of Large Scale Environments.* London.

Medienpädagogischer Forschungsverbund Südwest (2006). *KIM-Studie 2005. Kinder und Medien, Computer und Internet. Basisuntersuchung zum Medienumgang 6- bis 13-Jähriger in Deutschland.* Stuttgart. Online: http://www.mpfs.de/fileadmin/Studien/KIM05.pdf [20.07.2008]

Negt, O. (1998). Lernen in einer Welt gesellschaftlicher Umbrüche. In Dieckmann, H. & Schlachtsieck, B. (Hrsg.), *Lernkonzepte im Wandel. Die Zukunft der Bildung* (pp. 21-45). Stuttgart.

Newman, B.M., & Newman, P.R. (1978). *Infancy and Childhood: Development and its Contexts.* New York.

Piaget, J. (1950). *The Psychology of Intelligence.* London.

Poria, Y., Atzaba-Poria, N., & Barrett, M. (2005). The relationship between children's geographical knowledge and travel experience: an exploratory study. *Tourism Geographies, 7*(4), 389-397.

Prüfer, P., & Rexroth, M. (1996). Verfahren zur Evaluation von Survey-Fragen: Ein Überblick. *ZUMA-Nachrichten,* 39, 95-115. Online-Publikation: http://www.gesis.org/publikationen/Berichte/ZUMA_Arbeitsberichte/96/96_05.pdf [03.02.2006].

Rivlin, L.G., & Wolfe, M. (1985). *Institutional Settings in Children's Lives.* New York.

Schmeinck, D. (2004). Außerschulische Einflussfaktoren bei der Entwicklung der geographischen Raumvorstellung von Grundschulkindern. In Müller, P. et al. (Eds.), *Karlsruher Pädagogische Beiträge. Heft 57: Facetten pädagogischer und Fachdidaktischer Forschung* (pp. 89-106). Karlsruhe.

Schmeinck, D. (2007a). *Wie Kinder die Welt sehen – Eine empirische Ländervergleichsstudie über die räumliche Vorstellung von Grundschulkindern.* Bad Heilbrunn.

Schmeinck, D. (2007b). Making a case for maps: The importance of spatial understanding in geography. *Primary Geographer,* 63, 36-38.

Schmeinck, D. (2008). Europa im Sachunterricht – historische Entwicklungen und aktueller Stand in den Bildungs-, Rahmen- und Lehrplänen in Deutschland. *Geographie und ihre Didaktik, 35*(4), 161-177.

Schniotalle, M. (2003). *Räumliche Schülervorstellungen von Europa. Ein Unterrichtsexperiment zur Bedeutung kartographischer Medien für den Aufbau räumlicher Orientierung im Sachunterricht der Grundschule.* Berlin.

Sekretariat der ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (Hrsg.), (1978). *Europa im Unterricht. Beschluss der Kultusministerkonferenz vom 08.06.1978*. Bonn.

Sekretariat der ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (Hrsg.), (2002). *Ausländische Schüler und Schulabsolventen 1991 bis 2000.* Bonn.

Sekretariat der ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (Hrsg.), (1990). *Europa im Unterricht. Beschluss der Kultusministerkonferenz vom 08.06.1978 in der Fassung vom 07.12.1990.* Bonn.

Sekretariat der ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (Hrsg.), (2008). *Europabildung in der Schule. Beschluss der Kultusministerkonferenz vom 08.06.1978 in der Fassung vom 05.05.2008.* Bonn.

Sowden, S. et al. (1996). The mapping abilities of four year old children in York, England. *Journal of Geography,* 3, 107-111.

Statistische Ämter des Bundes und der Länder (Hrsg.), (2007). *Gebiet und Bevölkerung – Ausländische Bevölkerung.* Online: http://www.statistik-portal.de/ Statistik-Portal/ de_jb01_ jahrtab2.asp [20.07.2008]

Statistisches Bundesamt Deutschland. *STATmagazin: Flugzeug oder Bahn – womit geht es auf Reisen?* Online: http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Publikatinen/STATmagazin/Verkehr/2008__2/2008__2Reiseverhalten,templateId=renderPrint.psml [20.07.2008]

Stückrath, F. (1963). *Kind und Raum. Psychologische Voraussetzungen der Raumlehre in der Volksschule.* München.

Tanner, J. (1999). Learning about the world: a global perspective. *International Research in Geographical and Environmental Education, 8*(1), 73-77.

Towler, J., & Nelson, L. (1968). The elementary school child's concept of scale. *Journal of Geography,* 67, 24-28.

Towler, J. (1971). Egocentricism: A key to map-reading ability? *Social Education,* 37, 893-898.