

Children's Maps in GIS: A Tool for Communicating Outdoor Experiences in Urban Planning

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ABSTRACT

Since 2002 the authors have successively developed "Children's Maps in GIS", a method for children's participation in spatial planning. Their studies show that 10-15 year-olds are capable of reading maps and using a GIS-application for communicating their interests in a stable and useful manner. The purpose of this article is to discuss the first stages of implementation in a real world project, in relation to ICT. The authors report experiences from a Swedish municipality using Children's Maps in GIS in a survey with over 600 children as part of a comprehensive planning process and give examples of how data can be visualized. A significant digital divide between different parts of the administration is noted. In the ongoing development into an Internet version of the method the authors aim to increase the access to the GIS-application and develop standard procedures for categorizing and analyzing data.

Keywords: Children, Communication, GIS, Maps, Participation, Urban Planning, Visualization

INTRODUCTION

It is considered that children (0-18 years) should be afforded the opportunity to influence those matters that affect or concern them, as outlined in Article 12:1 of the UN Convention of The Rights of the Child (UNICEF, 1990), a convention signed, and in effect implemented, by most countries around the World. The local environment is such an issue concerning children, this is identified in the UN action plan Agenda 21 (United Nations, 1993) where it is stated that young people's participation is vital to the realization of a sustainable society.

Therefore there is an expectation for young people's experiences and wishes to be included in local-authority planning.

In the background section of this article we report on our theoretical framework and describe the method Children's Maps that we have developed through our research. In the result section we document how this method was used outside the research-context in a municipal as a part of a comprehensive planning process. In the discussion section we comment on the results and make comparisons with experiences from previous research-pilots. Finally we draw conclusions on further development of the method.

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BACKGROUND

This paper reports on research carried out within the discipline of Landscape architecture although the theoretical framework shows an interdisciplinary approach including planning theory, social theory as well as theory of environmental psychology, geography and GIScience.

Children, Planning and Participation

In today's construction of childhood, children are acknowledged as active social and cultural actors (Holloway & Valentine, 2003; Christensen & Prout, 2002). According to Christensen & O'Brian (2003, p. 2) they are also recognized as informants and participants in research, having "emerged as key source for understanding their everyday life". Christensen further stresses the relevance for planning of children's "emplaced knowledge [...] full with personal and social meaning, built up through their everyday encounters" with their local environment" (Christensen, 2003, p.16). The overall idea of governance using communicative planning (e.g., Healey, 1997; Healey, 1999) with reference to Habermas' theories on communicative rationality and communicative action (e.g., Habermas, 1984) today is widely practiced in developed countries. However, this practice is criticized for lacking strategies for handling of biased power relations. This means that less powerful stakeholders, and especially those whose perspectives deviate from existing policies, are at risk of being unable to achieve the influence that their arguments call for (Flyvbjerg, 2001; Sager, 1994; Sager, 2006). Children and youth tend to fall into this category, putting their participation at risk of being reduced to pseudo-democratic practices, such as manipulation, decoration or tokenism, the lower steps in the "Ladder of Young People's Participation" (Hart, 1997). Case studies in various European countries highlight tendencies towards superficial participation resulting in little real influence (Rogers, 2006; Tonucci, Prisco, & Horelli, 2004) and unwillingness or

inability from decision-makers to take children's interests into account has been noted by many researchers (Chawla, 2002a; Lynch, 1977; Matthews, 1998; Wilhjelm, 1999; Woolley et al., 1999).

Conversely, literature shows a strong support for the idea that planning and design of the physical environment attracts the interest of young people and it is therefore possible to include them in society's democratic processes (Horelli, 1998; Percy-Smith & Malone, 2001; Urban Green Spaces Taskforce, 2002; Norsk form, 2005.) Furthermore, following our personal experiences, there is a desire among many planners to engage children and youth to a larger extent. We, as well as Freeman & Aitken-Rose (2005) have noticed a growing interest toward child-focused and youth-focused methodologies for working with adolescents.

There is an obvious need to find solutions to the dilemma of how to incorporate young peoples' perspectives into local planning processes (e.g., Christensen & O'Brian, 2003; Driskell, 2002). A model for enhancing children's participation in decision-making is the "Pathways to participation", developed by Shiers (2001). Shiers, drawing on Hart (1997), identifies five levels of participation. The model can be used as a tool for planning for participation. Level 3, "Children's views are taken into account" is the minimum you must achieve if you endorse the UN Convention on the Rights of the Child. The higher levels of participation require that children are involved in decision making processes (level 4) and children share power and responsibility for decision-making (level 5). A method aiming to enhance children's participation should be useful at least at level 3.

Several initiatives concerning the empowerment of children within spatial planning and related issues have been influenced by the UN Convention of the Right of the Child. Among these are the "Town of Children Project" started in 1991 which has engaged more than 200 Italian municipalities (Baraldi, 2003), the UNESCO Project "Growing up in Cities" (Chawla, 2002b; Driskell, 2002), and the "Children as Community Researchers", initiated by Roger Hart

and launched by UNICEF (UNICEF, 2001). These varied approaches highlight the diversity of methodologies available for children's participation in planning of cities.

The changes brought about by globalization and the diffusion of information and communication technology (ICT) is gradually opening up new opportunities for the involvement of young people in planning and development of cities (Horelli & Kaaja, 2002). One such example is a tool in the form of an Internet-based design game "The Adventure Forest" invented by Finnish researchers (Kytä, Kaaja, & Horelli, 2004); other example is the sharing of knowledge on the Internet site "The FreeChild Project" (The FreeChild Project, 2008);

There are several reports concerning the institutional constraints of adapting new methods and technologies within the planning practice (Horelli & Kaaja, 2002; Vonk, Geertman, & Shot, 2005). An assumed reason for this is that most current tools are too inflexible and incompatible for most planning tasks, being oriented towards technological problems rather than planning problems (Vonk et al., 2005)

A method for communicating children's outdoor experiences into every-day planning practices should be an easy-to-handle method that can collect, store, analyze and visualize data that is relevant and trustworthy to all participants in a planning process. The first step is then to make data concerning children's use and perceptions of the outdoor environment available in a planning decision system in a way that is true to the child's own views.

Geographic Information

Geographic information, often represented in the form of maps, plays an important role in planning practice; today almost all of this information is digital and part of a geographic information system, GIS. Although the use of GIS has increased in Sweden in the public sector since 2003, there is still a gap between those who can and those who cannot use GIS for more advanced applications. To look at static

digital maps is still the most common use of GIS (ULI, 2008).

MacEachren (2004, pp. iii-iv) points out that the map is evolving as an interactive interface to geospatial information, not just a static representation of information. He states that understanding the processes of map-making and the perceptual-cognitive processes through which these representations are understood are of importance in decision making and the enhancement of the role of maps in collaborative activities.

Maps and cartography has been critically discussed since the 1990's with relation to linking geographic knowledge with power (Crampton & Krygier, 2006). They note drawing on Pickles (1995) that "Maps are active: they actively construct knowledge, they exercise power and they can be powerful means of promoting social change" (Crampton & Krygier, 2006, p.15).

Geovisualization of data enhance visual thinking in exploring data and in collaboration processes (Jiang, Huang, & Vasek, 2003). Children tend to develop a visual competence in an early age. Of special interest is specifically children's understanding of a map as a representation of the real world. Plester, Blades, and Spencer (2006), describe how children during the first school years learn to master correspondence and to interpret direction and distance, i.e. skills needed to understand the representation of an environment in an aerial photograph or map.

If we focus on GIS as a data collecting tool, is it useful when collecting information from children? When it comes to drawing on digital maps the competence of children above 10 years of age concerning interpretation of symbols, scale etc can be expected to be as good (or bad) as that of adults (Plester et al., 2006). Positive experiences of the use of digital maps with children are reported by for example Kytä et al. (2004) and Berglund (2008). Holloway and Valentine (2003) in their study of children and ICT comment that children on the whole tend to be more technically competent in the use of computers than their parents are.

Elwood (2006) points out that GIS has a history of being an expert tool in a rational, expert-driven planning process. Information that can be displayed visually is privileged as are the use of quantitative techniques for spatial analysis. This may implicate that other forms of knowledge may be excluded from processes in which GIS is used. The widespread use of Internet and mobile GIS makes it important to discuss the digital divide with aspect to access to GIS and to spatial data (Elwood, 2006). So why use GIS? "Elwood answers (2006, p. 693) "In spite of its limitations and challenges, GIS is tremendously important because it is such a powerful mediator of spatial knowledge, social and political power ..." The use of such an expert tool as GIS, can give the information from the children some legitimacy (Elwood, 2002).

Research with Children in School

There is a significant amount of literature regarding pupils of 11-12 years of age. In our judgment this is due not only to their experience of place but also to their writing and reading abilities and in some cases the fact that technical skills of children from this age group are supposedly developed, providing the researcher with multiple options concerning methodology.

School is a frequently used environment for research with children. In school you find an organization that can assist with information and the permissions needed for research that concerns children. If the aim and the methods of the research can make it fit into the curriculum at school, a win-win situation could be created. If this is not possible it might be regarded unethical to ask for the time of teachers and pupils.

According to the report "Benchmarking Access and Use of ICT" (Korte & Hüsing, 2006), all Swedish schools have access to computers and Internet, but the access is inconsistent across schools, with students and teachers at independent schools having more access to ICT than students and teachers in municipal schools. This includes hardware as well as connection to broadband and software (Skolverket, 2009). Furthermore, most teachers in Sweden do not

feel that they have sufficient knowledge of ICT, and roughly half of the teachers do not believe that ICT encourages learning. That puts Sweden almost at the bottom of the list for ICT use in schools in Europe (Skolverket, 2009).

The Method Children's Maps

Since 2002 we have in our research successively developed "Children's Maps in GIS", a method for communicating young people's outdoor experiences into urban planning. The method Children's Maps consist of several activities: contact with school and parents, information to children, the use of a GIS-application and feed-back to the children and teachers (Berglund, 2008; Berglund, Nordin, & Eriksson, 2009). In the following we refer to the method as "Children's Maps" and depending on the context, we use young people as well as children and youth, students and children for labeling our target group.

We aimed at developing a method that was easy to manage within the school context, and stimulating and fun for children to participate with. We tested the method with and adapted it for children from 10 to 15 years of age. As we were aware of that GIS technology may empower or disempower actors and institutions as described in Elwood (2002) we wanted to build a GIS-application that should not demand technical skills or expensive software or databases. The result should be trustworthy and relevant to a town district level in the planning practice.

We have in several research pilots (Berglund & Nordin, 2007; Berglund, 2008; Berglund et al., 2009) tried to answer the following questions: Can we attain location bound information that is relevant to planning and suitably reliable, with the help of children? Will this information be accepted by planning authorities? Are children able and willing to document their movements using GIS on digital maps that are used within today's planning? Can the children's school become a mediator between the children and the planners; can it be the place for developing and implementing the method?

During the period 2003-2006, the method was tested with children and teachers in several research-pilots in different locations in Sweden. Several tests were carried out in Stockholm; in a high-status inner-city district as well as in a low-status outer-city district with a high proportion of immigrant families within an interdisciplinary research project "Children and Open spaces in the City – Accessibility, Use and Influence". In 2006 we got an opportunity to test the method in a rural context (a village, Örbyhus) as we got funding from the Road Administration. In that project we adjusted the method to better catch questions concerning traffic safety. In all our studies, we supplied computer, software and supervision for the children participating, and did not ask for any IT-qualifications from the teacher. We have through diverse means, evaluated the function and the trustworthiness of the method. We have found no special complications regarding the use of the method in the different research-contexts. Our studies show that 10-15 year-olds are capable of using a GIS-application for communicating their experiences and interests into the local urban planning process in a stable and useful manner. We found it easy to fit the project into schools and to get some teachers to run a special teacher's application. The development and tests are described in detail in Berglund (2008) and supplemented in Berglund et al. (2009).

The GIS-application can be described as a computerized questionnaire. Each student answers seven questions individually. The student answers the question by making a sketch map directly on the screen, and when required, the student includes text information as an attribute to the geographical object created in the sketch map. An overview of the procedure is presented in table 1. The exercise generally takes about 15 minutes and is carried out during class hours. The software is an application built in ESRI ArcView 3. Laptops are used to store the application as well as the data collected.

The teachers participating in a study are using an application that works in the same way as the children's application. They indicate routes and places that are used for teaching by

themselves or used by other teachers of their school.

APPLICATION OF THE METHOD IN REAL-WORLD USE IN TÄBY

We have in the text above described the method Children's Maps through our research-pilots. What was still lacking was the evaluation of the implementation into planning practice. In 2008, the municipal of Täby wanted to use the method "Children's Maps" to get information about how children and young people perceive and use the outdoor environment in Täby. The project was called "Place to grow" (our translation) and a part of the comprehensive planning process. This gave us an opportunity to test if the method Children's Maps could be transferred from research to practical use. We decided to use the version that we had developed and tested in 2006 with special focus on traffic safety (Berglund et al., 2009). Our conclusions from the research-pilots are that this version works well as an over all tool and that traffic safety has proved to be of high interest in local planning with a child perspective.

By participating in the project we wanted to get some answers on the following questions:

- How can the method work outside the research context?
- How can the information be accessed, handled and valued within a local authority?

Täby has about 62 000 inhabitants and is situated 15 km north of Stockholm city. The residential areas consist partly of block of flats and partly of areas with private homes. In the centre of the municipal are a big shopping mall and some sports arenas. The topography is varied, and green areas with woods and lakes are situated close to the residential areas. For an overview, please, look at <http://maps.google.se/maps>, search for Täby.

The initiative for a co-operation came from Technical Office at the municipal administration

Table 1. Questions included in the survey and data inputs that are possible to make. The questions are directly translated from Swedish and not adapted to English speaking children

| <i>Questions on the screen</i> | <i>Geographic data</i> | <i>Attribute</i> |
|--|---------------------------------|--|
| A call to register a new student by writing a unique number | | School, grade, number and sex |
| 1. Where do you live? | Point object(s) | No attributes |
| 2. What routes do you use to school? | Poly-line object(s) | Means of travel: walk, cycle, walk/cycle to public transportation Comments: Free wording |
| 3. What routes do you use in your free-time? | Poly-line object(s) | Movements: walk, run, walk the dog, walk/cycle to public transportation Destination: friends, activity or else Comments: Free wording |
| 4. Where do you go when you are out-doors? | Polygon(s) | Common activities all year around: meet friends, play, play ball, training, sun-bath, barbecue, skate Common activities in winter time: Ice-skating, skiing, play, sliding Comments: Free wording |
| 5. Are there places that are hazardous or make you feel uncomfortable? | Point object (s) | Comments: Free wording |
| 6. Do you have a favorite place? | Point object (s), max 3 objects | Comments: Free wording |
| 7. Do you have any suggestions for improvements? | Point object (s) | Comments: Free wording |

in Täby. Technical Office is divided into five units: Building Permits Unit, Surveying Division, Street and Park Unit, Water and Sewage Unit and Urban Planning Unit. The project leader and the project members came from the Street and Park Unit. The unit works with developing and maintenance of streets, roads, parks and forests. The aims of the project "Place to Grow" were (Täby kommun, 2009b):

- To make the voices of children and youth heard in urban planning in Täby,
- To gather the results into a planning-friendly tool for all who plan and design the public places and out-door environments in the municipality,
- To get concrete maps concerning places and routes that children and youth use, and in what way they use them,
- To get some general information about

- what children and youth see as good or bad about the neighborhoods of Täby,
- To draw conclusions from the answers about which places and routes ought to be protected, developed or changed.

During 2008, surveys were carried out in 28 out of 42 schools in Täby that have students in the age between 11-18 years. The schools were chosen to give a good geographical representation of the municipality. In all a total of 635 children from 34 classes participated. 54% of the children were 11-12 years, 37% were 15-16 years and 9% were 17-18 years old (Täby kommun, 2009b). In Table 2 there is an overview of the schools participating in the project. Schools with children with special needs did not participate.

The Surveying Division of Täby provided the digital maps with detailed and updated infor-

Table 2. Numbers of schools participating sorted on level and school form

| | <i>Total number of schools</i> | <i>municipal</i> | <i>independent</i> | <i>Not participating</i> |
|---|---------------------------------|---------------------------------|--------------------------------|---|
| Compulsory schools Age: 11-16 years | 24 participating of 37 possible | 16 participating of 19 possible | 8 participating of 18 possible | 7 schools with children with special needs, 6 of them are independent schools |
| Upper secondary schools Age: 16-18 years | 4 participating of 7 possible | 1 participating of 2 possible | 3 participating of 5 possible | 1 school for students with special needs, 2 schools with vocational education |

mation. As data were in MapInfo-format (tab) they had to be exported to ESRI ArcView format (shape) and then loaded into the Children's Maps GIS application on laptop-computers.

The Use of the Method Children's Maps in Täby

The method used in Täby is very much like the method described earlier in this article, with some exceptions. Besides the spatial information the project "Place to grow" wanted to get as much verbal comments from the children as possible about their perceptions of dangerous or unpleasant places (question 5). The supervisor clarified that boring or weary places could be marked as well. The supervisors also reminded the children to think about the winter aspect (part of question 4) (Täby kommun, 2009b).

This project did not prioritize the participation of the teachers. However, 16 teachers from 11 schools were given the opportunity to take part. All schools, teachers and children participated voluntarily.

The data was transferred from the laptops into the data server administrated by the IT-department of the local government. Before storing the data, some harmful comments on individuals were taken away by the project team. A copy of the data set was sent to us for research purposes and back-up. The administration of data showed to be a time-consuming activity when using the application developed for small-scale research in a large scale survey.

REPRESENTATION OF DATA

The project team had full access to data through an internal digital support system. The team represented data in several maps and charts presented it in a report (Täby kommun, 2009b). The project also produced additional information as field notes, analysis and presentations that have not been published.

A summary of the results is a part of the comprehensive plan (exhibited for consultation until September, 15, 2009), under the heading Public Interests – important out-door places for children and youth. The comprehensive plan highlights the following conclusion:

[...] many popular places have some qualities in common – space, variation, people and vicinity. [...] The biggest problem for children in the local environment is traffic, followed by lack of illumination and worries about other people's behavior. Bad maintenance is another factor that makes places difficult to use." (Täby kommun, 2009a, p. 39).

The results were also presented on a seminar April 14, 2009. Participants were politicians and employees representing the Technical Office, the Child Care and Elementary School and Culture and Leisure. In the seminar and in the report "Place to Grow" (Täby kommun, 2009b), the following aspects were brought forward.

In general there are no big differences noted between how boys and girls are moving

around except in the 9th grade (15-16 years), where there are some notable differences. The boys report more physical activities than the girls. The girls report that they "hang around", looking at activities, talking to each other. When it comes to safety/security, girls 15 years and older, have made more comments than the boys on places that they perceive as insecure. Such places can be where people are gathering at nights, empty places or badly illuminated places like woods and parks. Places to meet friends are a favorite in all ages. Many children have marked places indoors as the shopping mall, training grounds or at a friend's home as a favorite place. Most comments in all ages about insecure places concerns traffic, lack of illumination and suspicious and unsavory people. Places that are often used also have most marks as dangerous or insecure places. The explanation given is that these are places the children know well, and therefore have a lot of information about. An example is the central shopping mall that has most marks for favorite place and as a place that can be perceived as insecure. A closer look at the comments shows that the indoor environment, with a lot of people and activities is perceived as secure, and the parking lot outside is perceived as empty no mans land and insecure. Also, the children have made some comments on rebuilding of parks that in one case has been successful according to the comments, in another case the comment from the children are "it was better before". Some new places for skating and biking are asked for in the survey, and that information is also highlighted in the report.

The participants of the seminar expressed their appreciation of the information of children's use and perceptions on the local environment and saw connections to prioritized issues like on school-road safety and security issues in the outdoor environment, as well as a basis for prioritizing maintenance of streets and parks.

A follow-up meeting was held on May 18, 2009 with one researcher and people in the local administration that were most likely to use the information from the children (the GIS-expert from Surveying Division and employees from

the Street and Park Unit and from the Urban Planning Unit together with Child Care and Elementary School and Culture and Leisure departments). The question was: what part of the dataset is the most interesting, and how do you want to access it? The following alternatives were discussed: a) plain thematic maps (figure 1), b) map visualizing some attributes e.g. places for meeting friends (figure 2), c) summarized maps (figure 3), and d) text information connected to geographical object (figure 4).

The participants from the administration anticipated to use the information in urban planning and in the detailed planning of projects concerning traffic safety, green-structure planning and maintenance of open spaces. The Technical Office had access to data from the survey, through the internal digital support system while the Child Care and Elementary School unit did not have access to the digital information. Because of the character of the information, officials from the Child Care and Elementary School unit expressed their interest in having access as well.

In the report "Place to Grow" there is no presentation of the information given by the teachers although there is some information in the dataset. Figure 5 shows the difference between the information given by the children and the information given by the teachers of one of the schools. It shows the same pattern that we have seen in our research pilots; schools tend to use other areas than the students do themselves, and with less concentration towards central parts of the neighborhoods.

DISCUSSION

By reporting on this initial test of the method Children's Maps in a real-world planning project we want to discuss problems and possibilities with implementation into a local government context. We also reflect on empowerment of children and school and on the digital divide within the local authority administration.

On a general level we could ask if the project "Place to Grow" shows that Children's Maps

Figure 1. A thematic map showing all the places marked in a part of Täby without editing afterwards. The attributes are not visualized. Symbolization of the basic map is different from what the children saw on the screen when drawing the sketch map.



Figure 2. A map showing places for meeting friends. It is one of the multiple-choice options that are given in question number 4. Each bar represents one annotation from one child.



Figure 3. A representation using the centroids of each polygon to construct a density map. When there are many centroids of the polygons close to each other, the color gets darker.

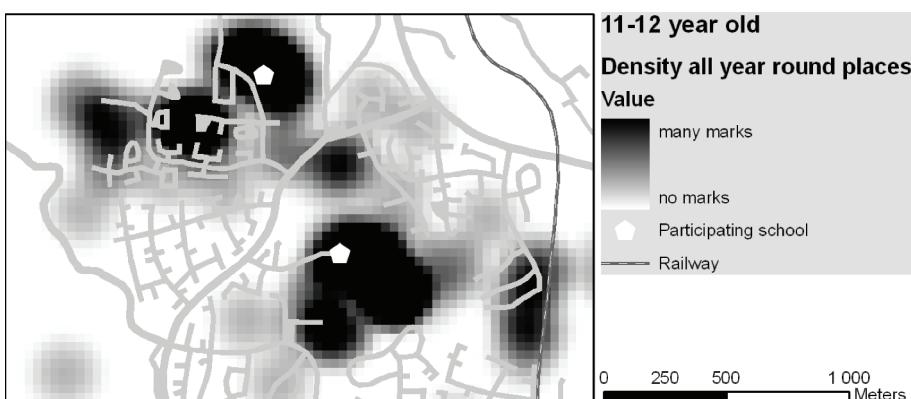


Figure 4. A map showing places that are perceived as hazardous or dangerous. Connected to the symbol are text annotations made by the children. The examples on the right are directly translated from Swedish.

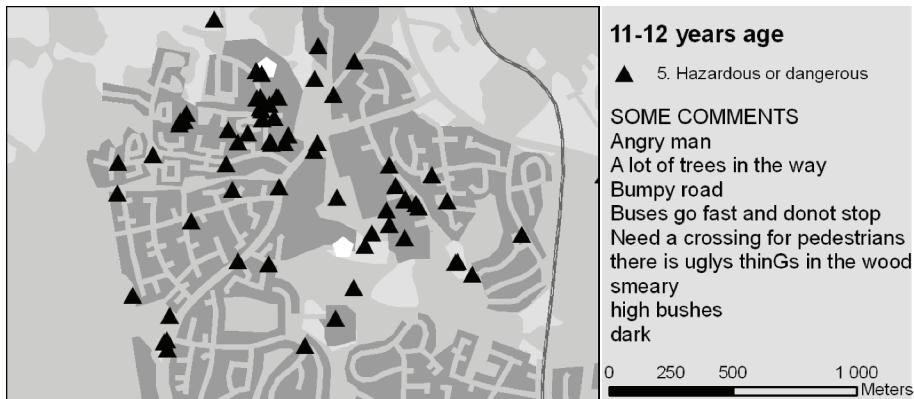
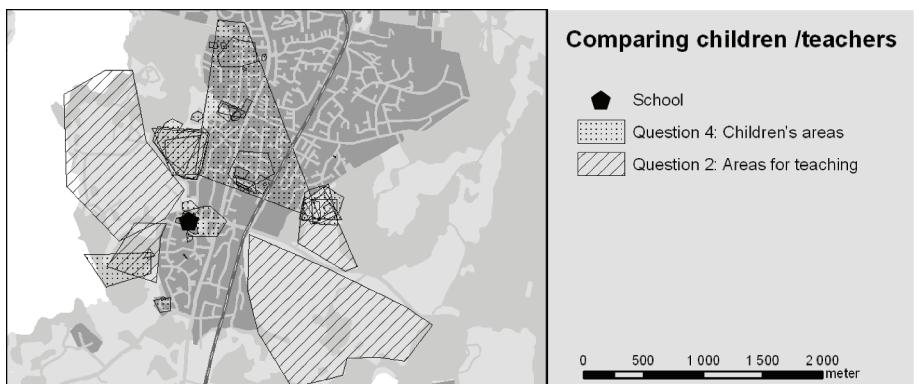


Figure 5. Focus in “Place to grow” has been on children’s mapping. Some teachers have contributed with information as in this example.



can function as a vehicle to facilitate young peoples influence on the local environment. One conclusion is that the project allows the opportunity for children to participate to a degree that corresponds with level 3 “Children’s views are taken into account, and given due weight in decision making” (Shier, 2001, p. 111). A weakness of the method is that young people are delivering data, yet have neither ownership nor control over it. The maps produced are adapted to the conventional planning process, which we judge crucial for the information to be taken into account in real-world planning.

The power of the children is embedded in the fact that their knowledge and perceptions are visualized, and have the same technical significance as other forms of planning information. At this point, the deliberation between different aspects becomes political issue.

Lessons Learned by Stepping Out of the Research Context

The method has shown to function outside the research context as a tool for collecting and storing information. Information from over 600 children concerning their use and perceptions

of the local environment has been collected within the local administration. On the whole the results are consistent with the results from the research–pilots. The seven questions (see table 1) in our research studies are tested in different social contexts and in different age-groups. The development and tests are described in detail in Berglund (2008) and supplemented in Berglund et al. (2009). By using the same pre-formulated questions in every survey we assert that the questions are not biased by any ongoing planning debate or by personal agendas.

The “Place to Grow” project had no procedures to communicate back to the children (and teachers) on the impact of their participation. Even if their information is taken into account, they may not be aware of it and the project did not provide for further communication within the planning process. This must be regarded as a weakness when considering the empowerment of children, making it less likely to positively influence their attitude to future contributions to society. Feed-back is, however, prescribed by us in the steps for the use of Children’s Maps. This is based on numerous studies of participation projects with children stating that being listened to and getting feed-back are cornerstones needed for a fair involvement of children in a participation process (Chawla, 2002b). In this sense the “Place to Grow” project is incomplete, as well as our own research-pilots.

As reported, some of the results from the project “Place to grow” have been integrated in the consultation for the comprehensive plan yet it is too early to assess the real impact on the local environment or on the empowerment of the children. If the administration can not assimilate the information in its different activities, it may be another case of tokenism (Hart, 1997).

The supervisors came from the Street and Park Unit of Täby Municipality. The result indicates that the supervisors have encouraged the children to make comments on favorite places (question 6) and suggestions for improvements (question 7), besides the expressed aim of gathering as much verbal information as possible about unpleasant and dangerous places. The

extent of the comments from Täby is larger than from the research-pilots. The influence from the supervisors can imply that the children are used as a transmitter for the supervisors own views, which could lead others to assess the information as less trustworthy. On the other hand, the Children’s Maps can be seen as a tool for getting on speaking terms with children and youth, and thus gaining information that is otherwise difficult to attain. This is important to consider when choosing persons to instruct the children.

One bias that the Täby case highlights is the choice of schools participating in mapping. If the case is just a small project, concerning one small village this might not be an issue. When the method is used for gaining information about a whole municipality, there needs to be some consideration on how the schools and classes are chosen. In Täby, schools and classes with students with special needs were excluded. We have not reflected or tested how the method can or cannot be used by children with different kind of disabilities. But to exclude these students from the use of Children’s Maps is certainly not our intention.

In the report “Place to grow”, it is noted that most of the children were able to orientate on the map quite well, except from one district with a very hilly topography, where the slopes are not shown in the basic orientation map (Täby kommun, 2009b, p. 16). This is an aspect that we have not encountered earlier and, of course, it is important that the basic map used for orientation represents features in the landscape that are important for children.

Another point to observe is the low number of teachers participating in the mapping. The project leader was reluctant to include teachers’ mapping in the project as the focus was on how children used and perceived the outdoor environment. However, we know from our own pilots that teachers might be reluctant to use the computer themselves to input information. Some have willingly done so while others have preferred to be helped by the supervisor. This observation is in line with the reporting from the Swedish National Agency for Educa-

tion (Skolverket, 2009). We have not engaged ourselves in developing the teacher's graphical interface to the same degree as the children's version. The interface that we have used has still to prove that it functions. As the teacher does not report a personal use but functions as a representative for the school's use of the outdoor environment, it is not considered to be a significant problem that not all teachers are involved. The school's use and need for good environments and safe routes for transportation can be reported by those teachers who are willing and able to do so.

The project "Place to grow" shows that there is a great demand for information from children and from various administrations. In Täby there were demands of information from different units within the Technical Office as well as from the Child Care and Elementary School and from Culture and Leisure. The most obvious demands came from the park unit, from the traffic department and from people involved in "Safe in Täby" (our translation), a project within the local government.

As we have stated earlier in this article, maps (and GIS) represent power and this means that parts of the administration that cannot express their interests in maps (or GIS) have a weaker position when it comes to maintaining their interests in urban planning. Child Care and Elementary School Unit have until now had little interest in geographic information. This may be a result of different approaches toward different sources of information and technologies within an administration.

The seminars showed that the written comments were of high interest. As our focus is on the spatial information, we have not considered how to analyze or categorize the written information. The participants wanted the information to be categorized for easy access. Qualitative analyzes of the text information calls for time and competence to carry it out in a qualified way. One solution is to have standard categories in the questionnaire, yet if we restrict the children to placing information into predefined categories, we are afraid that this will produce biased and incomplete results. By this we mean that it is

better to let children express themselves in their own words in relation to personal feelings such as favorite places, dangerous places and wishes for change. It is then possible to make different interpretations while the source material is kept intact. This ambition may lead to a somewhat less administration-friendly representation, yet the strength of the written text is that it provides an easier medium to hear the voice of the child, than by simple markings on the map.

Digital Divide

The geographical databases produced by local government in Täby are of high quality regarding scope, scale of details and actuality. It is mainly used as a background map for the internal digital system, containing a large amount of different information used in administration. Geographic information was not accessible for Child Care and Elementary School units within the internal digital support system. The preliminary finding from Täby tells us that the use of GIS is still inconsistent across the administration, and that it is still a technique that demands training to master. In Täby, as in many municipalities in Sweden, there are just a couple of people engaged in the technical support of the data system that have the mandate to set up and decide the functionalities that can be obtained by users in administration. The GIS-expert plays a crucial role in deciding what is possible to do or not.

The full potential of the internal digital system with interactive maps seems not to have been used or even requested. The same situation is reported from research on bottlenecks with implementation of planning support system (Vonk et al., 2005). If the information stored in digital information system is not relevant for you, why use the systems? Interactive maps and multimedia representation of data helps the user to construct knowledge. If important information is stored in files, charts and archives or unreadable static maps they have very little influence. If relevant information, such as children's experiences of the outdoor environment, is accessed through an interactive

information system, this will enhance the use of the information, and maybe even transform it into knowledge.

Need for Improvements on Children's Maps

Problems with the GIS-application in its current stage are; access to the GIS application, the adaptation of the maps in the GIS-application to each case and the administration of data. From the very beginning we aimed at an Internet solution, we now have funding for transferring the GIS-application into Internet so we will address issues of unequal access to hardware between different schools as mentioned by the Swedish National Agency for Education (Skolverket, 2009). We will also develop standard procedures for categorizing and analyzing data, making the threshold as small as possible for the user to interactively explore the data.

Parallel to this, we will write a manual describing, among other things, how the supervisors should conduct themselves when using the method and how we consider it could be combined with other means for gaining deeper information and higher levels of participation. We will also develop guidelines concerning feed-back to children and teachers and further explain the role of the teacher's map.

CONCLUSION

The information that young people and teachers can provide is asked for in many contexts, not only in urban planning. The use of GIS as an interactive tool for analyses and presentations is not well established in Swedish local authorities. In Täby it is still an expert tool, and especially the social administration has not integrated the technique in the daily work. Here the representation on static maps still plays an important role in communication processes between the municipal administrations as well as with the public.

We look forward to transferring Children's Maps to Internet. We do not aim for the application to be open for use by everyone, only accessible within projects, to secure that the information given by children and youth is not misused. Besides, local authorities, a school, or an organization with children's wellbeing on the agenda could get access to the tool. As the use of Google maps and Web 2.0 is spreading, we think it is more important than ever that the knowledge and the interests of children and youth are made visible and accessible. We believe that the presence of Children's Maps on Internet will contribute to this and in the end hopefully be helpful in giving young people the influence on local planning and maintenance of their neighborhoods that they have the right to.

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