

## **C. STRATEGIES AND MODELS OF OPTIMIZATION**

### **C1. Optimization vs. rationalization**

This whole project was initiated as consequence of certain findings and recommendations in the study *Comprehensive Analysis of Primary Education in the Federal Republic of Yugoslavia* (UNICEF, 2001). The said study determined that: a) the Republic of Serbia has a very developed network of primary schools; b) that network's functioning has not been analyzed for more than half a century and as a result of this there have appeared serious discrepancies between the Serbia's network of schools and the country's demographic, economic, social and cultural characteristics; c) it is necessary to thoroughly re-evaluate the network of schools and to bind it to reality.

The reactions to these findings were varied. Several World Bank documents relating to FRY voiced the proposal that small schools, in which schooling was more expensive, needed to be closed. The reasons behind this proposal are quite clear:

In a situation of financial austerity it is necessary to seek out all the possibilities that would lead to cuts in educational costs. Ideas similar to that of the World Bank have surfaced in economic circles in Serbia itself (liberal economists, Ministry of Finance).

Discussions concerning the problems of the network of schools were held among Serbia's education experts and particularly in the Education Forum. These discussions predated the start of the current project. In those discussions, and even more so during the realization of the current project, there appeared the realization of the complexity of the problem. This became particularly apparent once in its solution one took into account not only economic rationale but many other points of view such as social (right to education for all, educational equity) and pedagogic rationale (organization of schools, quality of education, relevancy of educational programs, relation between the school and its social environment).

In addition, we were obliged to use this kind of multi-dimensional approach by the fact that the project was realized in cooperation with UNICEF (Belgrade Office) one of

whose chief mission is the realization of quality education for all (Dakar educational forum, goals of the Special assembly devoted to children – May 2002) within which one of the central requests is for the guaranteeing of access to quality education for all children. A geographically well distributed network of schools is precisely the basic system for the realizing of universal access to education.

All of the discussions and deliberations concerning the network of schools can be condensed into a single opposition of approaches: optimization versus rationalization.

By rationalization of the network of schools we mean the creation of a network of schools in a given country, or part of it, that is maximally efficient from the economic (financial) point of view, e.g. from the analysis of all ensuing economic costs and benefits. This kind of a rationalization is a completely natural requirement in any country, and even more so in countries that are in an economic crisis and financial austerity. (The problem of economic rationality, however, appears differently when viewed from a short or long term perspective).

The authors of the current project, however, have accepted a much greater challenge – the one by which they would, while maximally taking into consideration criteria of economic efficiency, at the same time incorporate into the analysis of the network of schools, and the ensuing problem solving, both social (rights to education for all, social inclusion) as well as educational criteria (access to education, quality of education, life skills education, etc.). From this kind of decision has followed the principle task of this project – optimization of the network of schools (on national, regional and local levels). By optimization we mean: reconstruction of the network of schools in Serbia in a mid and long-term perspective in order to attain a network that will maximally guarantee educational quality and relevance for all children irrespective of their geographical, social, ethnical, or cultural background, or of their gender, while at the same time taking cognizance of economic rationalization and the country's economic means.

This kind of formulation of project goals clearly shows that the greatest emphasis is put on the guaranteeing of quality education for all. The reasons for this are more than apparent: a) for the most part we

are dealing with primary education which is the basic precondition of all economic and social development as well as of the forming of citizens with competencies enabling them to take part in societal activities; b) the education of the whole populace is an important prerequisite of economic development; c) the right to education is one of the basic human rights defined at the global level (UN Convention on the rights of the child, global program of Education for All).

Such an approach does not imply that criteria of economic efficiency should be disregarded (both in the short and long terms). A network that has not been evaluated for half a century has many places for cost

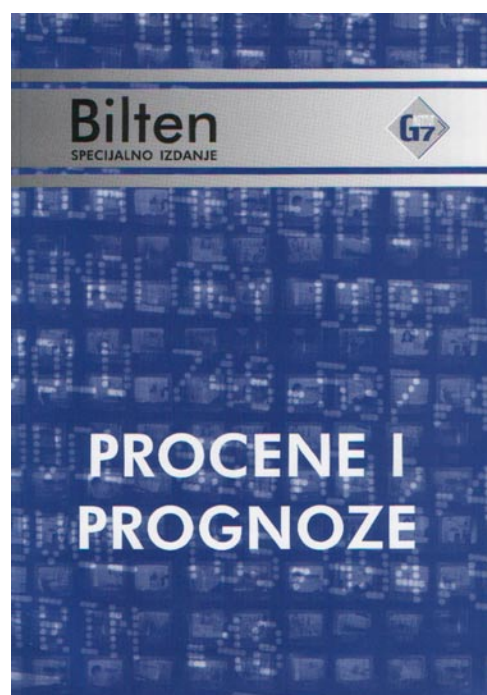
Photograph:

On June 10, 2002 the G17 Institute and the Education Forum hosted a round table discussion "Education and the Marketplace". The meeting was moderated by dr Ana Pešikan (Education Forum) and Milko Štimac (G17 Institute) and co-chaired by dr Miroslava Dinkić (G17 Institute, Education Forum), Prof. dr Ivan Ivić (Education Forum), and Martina Vukasović (ESIB). The meeting tried to find a balance between education needs and economic reality that would work for the country in the current conditions. While the main focus of the meeting was mostly on higher education the issues related to the network of schools were brought up by several participants.

A transcript of the round table discussions appeared in the June 2002 special edition of the G17 Institute's Bulletin (Bilten G17, broj 30). The cover page of the Bulletin is shown on the right.

cutting and saving, both through direct financial savings (closing of certain schools, selling of school buildings, finding more efficient economic solutions for the schooling of children from small rural communities, savings coming about through the linking of primary education with other sectors) as well as by enhancing the effects of education (increased educational outcomes, increased relevancy of the acquired knowledge and skills, greater contributions of schools to their local communities, etc.) even if the costs of running the network of small schools remain what they are.

What ever the case may be, the searching for solutions to the opti-



mization of the national network of schools must not be based on illusions. The running of that part of the national network that relates to

small rural schools in under populated areas, costs more in all countries, if as indicator one takes the per student costs.

The finding and defining of strategies and models of optimization by this project were solved through a combination of several different approaches and with the use of different sources needed for the problems solving.

The basic approaches used were:

- Widespread discussions within the project teams, between the Education Forum's members and associates and with the project's consultants.
- Individual consultations with experts in specific fields.
- Analysis of information about the network of schools amassed by this project, defining of specific problems and seeking out of the solutions to them through group discussions.
- Analysis of the experiences of the author team of the project Active teaching/learning in their work with a large number of schools and their teachers.
- Analysis of specific literature and the experiences of other countries.
- Discussions with people working on the problems of rural development (representatives of FAO, of the Faculty of Agriculture, of the rural NGO "Šlos" in the village of Golubinci).
- A specific role in the searching for solutions of the optimization of the network of schools was that of the cooperation with Norwegian partners possessing a rich experience in the solving of the problems of networks of schools in their own, as well as in other countries. The study of Norwegian sources regarding these problems, the visit of dr Jan Solstad, the lectures he gave as well as the long and fertile discussions that followed, the visits with him to certain local communities as well as the talks there about the specific conditions in those communities - all of these were exceptional opportunities to find out about Norwegian experiences. At the same time, they were a great challenge as well as a support for our search for solutions that would be adapted to economic, social and cultural conditions in Serbia.

## **C2. Optimization strategies**

By optimization strategies we understand the general approaches in the solving of major problems facing the national network of schools. More precisely this means the following: a) the solving of the problems of the network of schools in the mid term and long-term perspectives; b) the systematic solving of problems (i.e. solving the problems of the network at the level of the whole educational system, on the regional level, on the level of municipalities and on the local level, and the coordinating of solutions on those levels); c) the problem solving strategy is a way by which one integrates particular parameters (demographic, economic, educational) needed to make decisions regarding the network of schools. In this sense the current project analyzed and used the following strategies:

### **Harmonization**

Harmonization of the network of schools with demographic, economic, social, cultural and educational reality;

### **Horizontal coordination**

Horizontal coordination which

consists of: the overcoming of sectorial closure and the isolation of education; overcoming of sector barriers and the interconnection of different sectors (education, culture, economy, regional development, etc.);

### **Vertical coordination**

Vertical coordination of the education system which consists of the harmonizing and meshing of the education system's varied hierarchical levels. At the current time in educational reform that strategy almost exclusively translates into decentralization which is an approach fraught with many risks as a result of the great disparity in the level of economic development of different municipalities and as a consequence of the fact that Serbia's educational system was, for a long time, highly centralized and its lower hierarchical levels are currently not able to competently embrace and realize the authority that is given them. The decentralization process is necessary for the functioning of the educational system, however, one has to be extremely careful when implementing it. (For example, when dealing with the network of schools, all-out edu-

cational decentralization, and decentralization is conceived as one of the mechanisms of democratization, can lead poor municipalities to close the schools in their small rural areas. In this way, paradoxically, one brings about the centralization of the network of schools and the ensuing decrease in the democratic right to education of certain segments of the population);

### **Modernization**

Modernization of education, e.g. change in the education system that bring about the modernization of school programs, organization of schools, professional teacher development, that introduces greater school autonomy and that changes methods of teaching and of learning (child-centered school, school centered on the teaching process, participatory/interactive/active methods). From the modernization of education as a general strategy that is important for the solving of problems related to the functioning of the network of schools it is possible to derive the following specific strategies: a) strategy of life-long education; b) strategy of quality education

for all; c) strategy of the creation of multi-functional schools (educational institutions). d) strategy of the creation of schools as community development centers.

It is understood that optimal results of the optimization process may be obtained through a well balanced combination of these (and some other) strategies. The goal is the finding of solutions that will be adapted to the state of the education system as well as the regional and local characteristics of the surrounding to which the decisions regarding optimization are applied.

### **C3. Optimization parameters**

Decisions regarding the optimization of the network (on national, regional and municipal levels) need to be based on a large number of parameters about which there exist reliable data. The introductory sections of this report have already documented many of the problems that were encountered with respect to the accuracy and reliability of data necessary for informed decision making regarding the optimization of the network of schools. This project is the first systematic attempt in Serbia to create a database of parameters that must be taken into account during an optimization decision making process.

The project has in this sense been very seriously conceived. The initial phases of the project's implementation saw the organizing of widespread consultations with experts of diverse profiles (demography experts, statisticians, economists, sociologists, culturologists, psychologists, experts on pedagogy, experts from the Ministry of Education, etc.). On the basis of those consultations, and of discussions regarding the setting up of the project's teams, was drawn up an exhaustive list of parameters that needed to be looked into.

Of course, it was not possible to amass the data regarding all of these parameters. There are two main reasons for this: for many parameters there is no available data in Serbia (or the existing data is not reliable) and it is necessary to organize long term data gathering activity in the field (particularly at the municipality level) in order to acquire this data, second, it was determined that the project's findings were needed as soon as possible so that the project, which was originally conceived to last two years, was given a one year duration – that time scale determined what data could and what couldn't be gathered and processed.

Still, having said all of this, the project was able to collect a truly impressive body of data. The complete list of the data accumulated at the school, municipality, regional or country level is given and discussed in Appendix F1.

The project also relied on data gathered during its field work phase. This data does not cover all the schools or municipalities, however, it gave a very important additional component to the information in the project database and represented an additional check of the accuracy and reliability of gathered data.

In order to see the complexity of the array of parameters needed for informed decision making regarding the optimization of the network of schools we will give here an overview of the most important categories of parameters:

*Demographic data* (number of citizens per municipality, age distribution of the population, birth rate and death rate, distribution of various ethnic groups, gender distribution, demographic changes: migrations, refugees, level of depopulation, etc.);

*Geographical data* (by municipality: type of terrain, size of territory, size of cities, towns and villages, mutual distances between all of these, state of the roads infrastructure and its categorization, average weather conditions throughout the year, location of all schools and the distances between them, etc.);

*Economic data* (level of economic development of the municipalities given as the average per capita GDP of that municipality, number of employed, level of unemployment, level of budgetary spending - particularly that part which goes for education, trends and

plans for economic development, if they exist, and so on);

*Cultural data* (development of cultural infrastructure, level of cultural development, location of cultural institutions and their type, regional and local cultural tradition, etc.);

*Educational data* (educational level of the population, data on access to schools, graduation rates, data on educational infrastructure: school buildings and educational institutions, characteristics of schools, school space, equipment, numbers of teachers and students, teacher qualifications, etc.).

As a consequence of the above mentioned reasons the project could not collect reliable data on some key parameters. Here are some examples of what is still not available: the level of economic development of municipalities which would include data on economic transition such as the level of development of the private sector; there is still no information regarding plans for future regional and local economic development; assessment of the economic value of school real estate and of other educational infrastructure is not possible without detailed information about

the present state of every object (in many regions even with this detailed information it is still not possible to assess the economic value of real estate to any reasonable level of accuracy); there is no municipality level data regarding the level of development of cultural infrastructure, etc.

Notwithstanding all of this, it is important to consider the complete list of needed parameters as a reminder that will deter decision makers from reaching one-sided conclusions. This is even more important as many of the key decisions regarding optimization will be made at the municipality level at which point it is possible to collect the missing data and enter it into the project's information system.

As we have already said, strategies for the optimization of the network of schools consist of the integration of available data about the parameters that need to be looked at during informed decision making. This integration implies: the set of parameters that will be considered, the parameters within this set that will be given greater weight, parameters that have an eliminative character (for example, minimal criteria or standards that serve to throw out

some solutions from the optimization scenario), etc. Of course, the determining of such "winning" and "losing" combinations for certain solutions within the optimization process depends primarily on the goals of optimization. In this respect it is useful to be reminded of the optimization vs. (economic) rationalization dichotomy. As we have already stated, this project rests firmly on the choice of optimization (in the meaning that was given earlier) over rationalization.

Details regarding the ways that the above mentioned optimization strategies were used as well as the ways that parameters were integrated will be presented in the section on optimization models. Before getting into that it is necessary to look into problems related to the hierarchical level at which optimization is carried out.



#### **C4. Hierarchical levels on which to implement network optimization**

In the existing education system decisions regarding Serbia's network of schools are brought at the central level (in the Ministry of Education). There are many valid reasons why this is the case, and there were even more reasons for this kind of a situation during the phase of the creation of a well developed education system and its geographically branched out network of schools and educational institutions. In fact, the school building activity and creation of the network of school institutions represented the crucial part of the development of modern education in Serbia. This kind of product needed large investments and, in a time of great regional disparities, it could only have been guaranteed by the centralized state

However, all the failings and deficiencies of the use of such a centralized decision making process on the network of schools are also clearly apparent. First of all, there still hasn't been developed an information system that would continuously track demographic and other changes at the local level. Second, the decrease in public budgetary

spending for the running of the network was not balanced out by the finding of alternate sources of funding, resulting in the overall state of disrepair that the network of schools now finds itself in. Third, each local school is perceived in the local community as being only a branch of the central (Republic level) system of education, and not as something belonging to that community. Fourth, as a result of the lack of participatory decision making regarding the network of schools and of each individual school, decisions that were made, and that are still made, took no cognizance of the interests of municipalities, local communities, parents or of students.

At this point, at the time of the fundamental re-evaluation of the functioning of the network of schools in Serbia, the central level (the Republic Government and its Ministry of Education) still plays a crucial role. This level must guarantee the realization of the constitutional right to education for all the citizens. At this level must come the country wide guarantee of an equitable geographical distribution of the network of schools. The Republic Government needs to determine what level of development of the network the country can afford at its current

level of economic development. The Republic level also needs to develop information regarding the state of the network and its harmonization with relevant parameters mentioned earlier (this project and its products represent the crucial step in the development of such an information system).

A specially important role that needs to be played at the national level is in the defining of the network of special schools (if they indeed remain as a solution for children with developmental impediments), the network of art schools and, in particular, the network of secondary schools that to a large extent extends outward of

municipal (or even district) boundaries.

However, centralized decision making at the level of the Republic Government can in no way solve all the problems or even all of the crucial problems of the network of schools. The only possible solution is in a system of participative decision making, i.e. the kind of procedure of dealing with the network of schools in which central, regional and municipal levels take part in the decision making. These kinds of solutions are partially incorporated in the new laws on local self government and, to a certain extent, in the new laws on primary and secondary education.

Photographs:

On March 19, 2002 the Education Forum hosted a public debate on the status of children with special needs in Serbia's education system, e.g. in its "special schools". The meeting was co-chaired by Prof. dr Sulejman Hrnjica and Prof. dr Ivan Ivić. Present at the meeting were experts in related fields, parents of special needs children, representatives of Save the Children and of several local NGO's, as well as representatives of the media.

Prof. Hrnjica gave a detailed exposition of the many problems facing children with special needs in Serbia's schools. One of his conclusions was that Serbia needed to seriously rethink the idea that the network of special schools should be the generic way of incorporating special needs children in the education system. The discussions that followed further illustrated specific problems with special schools. Parents of special needs children described the setting up of ad hoc parent networks for exchange of information.



When dealing with primary education a particularly important role in making decisions about the optimization of the network of schools is to be played by the municipalities. This means: municipal government, local communities within the municipality, the schools themselves, parents and, to a lesser degree, the students. However, the roles of the municipality level, and even more of the local level (local communities, local schools, parents) are not clearly defined in the laws.


A particular problem is that, at this moment, municipality and local levels absolutely do not possess the necessary competencies (qualified persons, specific knowledge and skills) that are needed for the making and enforcing of well-founded decisions.

A truly democratic procedure for the discussing of problems related to the network of schools at the municipality and local levels, and based on initial data from the information system that has been developed during the course of this project, would make a suitable decision making procedure and would serve to prime those levels for the roles they need to play in the future. This kind of democratic procedure would allow: the addition-


al checking and inputting of all data that has not been gathered (particularly, for example, on projects of regional and municipality level economic development during the ongoing transition process), it would also be a chance for all local partners to voice their opinions on the fate of the schools in their local communities and in so doing to perceive the optimization process as something of great importance for them and their children, as something that cannot be solved without their active participation.

An important part of the decision making concerning the optimization of the network of primary schools need to be agreements of inter-municipality cooperation. The reason for this is that certain parameters (for example, geographical separation of schools, the roads connecting them, etc.) do not coincide with the administrative boundaries of municipalities.

Discussions on the relative merits of particular optimization models (or of particular components of those models) to a given local community would represent a strong challenge for the enabling of municipal and local levels for taking part in democratic participative decision making on the



optimization of regional, municipal  
level and local networks of schools.



## C5. Optimization models

On the basis of the analysis of the state of the network, on the basis of expert literature and of the analysis of the experience of other countries, on the basis of consultations with experts for specific aspects of the network's functioning and of discussions within the project's teams we have defined a series of optimization models.

These models are the outcome of the afore mentioned optimization strategies and the list of relevant parameters.

### *Model 1:*

*Continuing the maintaining of an existing school or group of local schools*

This model would be implemented in those municipalities or parts of municipalities in which there do not exist serious reasons that the school or group of local schools should be fundamentally changed since there do not exist either demographic or organizational reasons to do so.

Within this model optimization would consist of the use of the strategy of the modernization of the education process, the goal being to increase

relevancy, efficiency and quality of education. The basic ideas of how to do this are explained in the following section of this report.

### *Model 2:*

*Closing down of a local school*

This model may be applied in all periods of the development of the network of schools in Serbia, but only in a well thought out and systematic way.

The model would be implemented only in cases when it is not possible to apply another model, i.e. it represents a case of last resort. The key parameters for the use of this model would be the demographic parameters – if there are no enrolled students, or if the total number of enrolled students is very small and there exists an alternate applicable educational solution for them.

There is also the possibility of the temporary closing of the school in case the demographic prognosis is such that it is expected that there will be new students in the local community in the years to come.

The basic benefit from applying this model is the possible financial saving (teacher's salary, possible sale of the

building and the land it is on).

The following problems appear as consequences of the application of this model: the small number of students for whom alternate educational solutions must be found, the problem of finding employment for the teacher who loses his job, the negative effect of the closing down of a school - the only public institution in the village.

*Model 3:*

*Transportation of students to a nearby school*

This model may be applied if there exist adequate roads, if these roads are passable during all parts of the year, if there exists the possibility of adequate transportation through the use of local bussing or if there is a possibility of the cost effective organizing of a school bus (minibus) and if the costs of acquiring, maintaining and using it for student transport are lower than those of maintaining a local school.

The basic benefit that follows from the model is a potential financial saving (if precise calculations, on a longer term basis, show this to be more cost effective taking into account teacher's salaries, sale of

building and land).

The possible negative side to the application of this model are the following: possible problems with maintaining the transportation over a longer time scale, student fatigue (from waiting for the bus, or from the ride itself if it lasts a long time), the teachers and additional school employees that are left without a job, the negative consequences of the closing of a local school as the only public institution in the village.

*Model 4:*

*Mobile teacher(s)*

This model is already used in many small settlements. What is often a problem is the non existence of quality transportation for the teachers or of funds for the reimbursing of teachers for their use of public transportation.

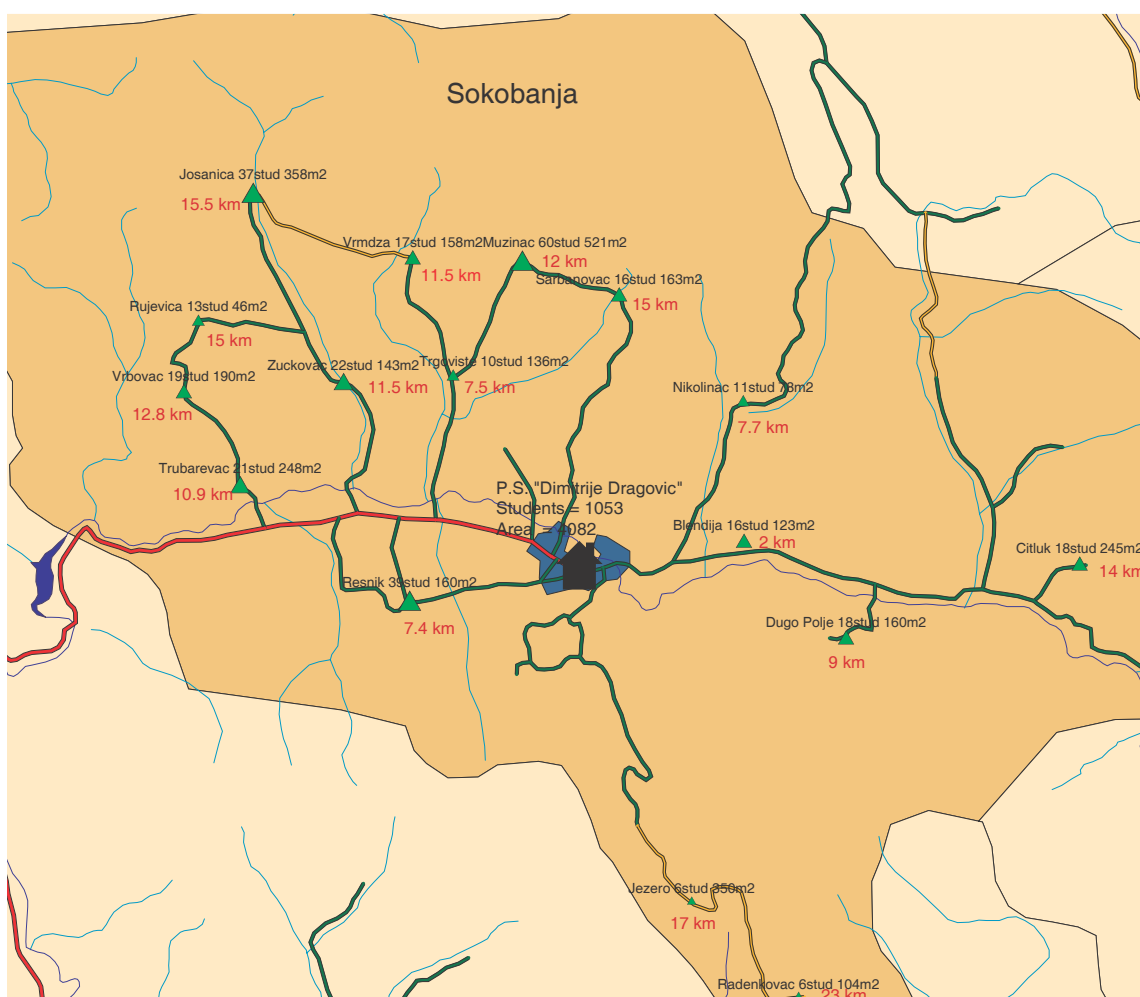
Possible variations of this model include: a) the combining of teacher transportation and of a flexible work schedule (change in the structure of the work week or of the yearly school calendar); b) forming of a small mobile team of teachers that would alternate in several small local schools depending on their professional competencies (for example, a

teacher who is better trained for the delivery of new program material or new teaching methods would realize that new content in all the schools covered by the team of teachers. Some ideas tied to the realization of this model can be seen in the following section.

The basic advantages of this model are the following: it is not necessary to find accommodations for teachers

in the same place where the school is located, the right to education is guaranteed even for children from small villages, there is an increase in the quality of teaching/learning as a result of better utilization of teachers' professional competencies.

The problems with the application of this model have to do with: financing the transportation of teachers and the loss of teacher time spent



Map 24:  
Schools and roads in the Soko Banja municipality. All the satellite schools in the municipality are attached to a single central school (2001/2002 school year).

in transportation, teacher fatigue resulting from transportation, splitting a teacher from his family (which can result in the fluctuation of teachers), the teacher is absent from the village when school is out, reduced role of the school in the community.

*Model 5:*

*Extending class teaching to the sixth grade*

This can be a good solution for a four grade local school to increase its student enrollment above a critical number. It is particularly apt if the nearest eight year school is far away. This model does away with transportation of fifth and sixth graders and there would be some financial savings when compare to the opening up of subject teaching in that school for a very small number of students. Also, children would stay with their families until they complete sixth grade and there would be a continuity in their school development from grades one through six.

The problems associated with this model are related to: the competencies of classroom teachers for teaching certain subjects (this problem can be solved through specific training of these teachers), and the increased complexity of the problems

of organizing multi-grade classes resulting from the increase in the number of different grades in one class. More about the overcoming of the problems of multi-grade classes and even about some advantages of this kind of organization of teaching/learning is given in the following section of this report.

*Model 6:*

*Primary school – boarding school*

This solution could be implemented very rarely and even then only for students of later grades of primary school in those cases when it is possible to organize room and board for them in a way that is financially less costly than the maintaining of a local school for children in later grades, or is less costly than the transport of these students (Model 3) or of their teachers (Model 4).

A less strict variation of this model might be the organizing of a boarding school with a change of work week (under some conditions students could in this way, in addition to the regular weekends, spend one further day each week at home).

The basic problems with this model are: splitting of students from their families can have, as a consequence,

the weakening of the family's effect on the socialization of their children, alienation of the children and the weakening of emotional ties, possible high price of boarding and the ensuing additional drain on family and/or municipal budgets.

*Model 7:*

*Widening of the educational functions of a local school.*

In this case, optimization would consist of the local school expanding its function to other age categories: older pre-school children, adolescents that have dropped out of school, the entire adult population with identified educational needs.

*Model 7.1:*

*Primary + preschool education*

Already in some places there exist practical solutions by which primary schools deliver education for the 6-7 age group (one year before the obligatory start of primary school). The integration of pre-school education within the education system of Serbia which will be realized by the start of 2003 will facilitate this kind of integration of functions (up till now pre-school was the responsibility of the Ministry of social affairs). Here we propose that existing

practice be expanded to encompass children belonging to the middle pre-school group (ages 4 to 6) in those cases when the local school can facilitate them. Variations of this model are possible (primary school also undertakes education of pre-school children, combining of activities of school and pre-school teachers, spatial integration, sharing of administrative and auxiliary staff, etc.).

The main advantages coming from this model are the following: the possibility of significant savings on salaries, cost cuts due to decrease of number of administrative and auxiliary staff, saving of utilized space. Another advantage would be the easing of the transition to obligatory primary education.

Problems that will appear through the application of this model are: difficulties in overcoming sectorial barriers and various forms of resistance that can result as consequences of that (often small local schools and small pre-school facilities have their principles and it is to be expected that they will resist the cutting of one of the two administrative positions), some technical and auxiliary staff may lose their jobs, there is a potential danger of the playing down of specific forms of pre-school up-

bringing (if teachers take the place of pre-school teachers, e.g. the danger of the school taking over pre-school), increase of the complexity of the problem of organizing multi-grade classes in those classes that would now encompass pre-school children.

Some of these problems may be solved fairly easily through the cooperation of teachers and pre-school teacher and through a good division of their functions (if indeed it is a rational solution for both to remain in school) or through the specific training of teachers that are to work in such schools.

*Model 7.2:*

*Primary education + adult education*

In this model the local school would, in addition to the educating of primary school children (be this a four or eight year school), expand its function to the educating of all adults from the local community having clear and specific educational needs.

This kind of adult education can be: remedial education of adults that have not completed primary school, general adult education (educa-

tion of adults that have completed primary school but that show some specific educational needs such as: education for use of information technology in developed communities, art education of the form often organized in "third age" schools, education for various roles as citizens – particularly for those that hold leadership roles in the local government, foreign language and related courses, health education, "schools for parents", professional education (ecological food production, collecting and processing of medicinal and culinary herbs, of various forest products, budding of shoots for various cultures in orchards, etc.).

The possible benefits from applying this model would be: increase of impact of local schools on the educational, cultural and economic development of the local community, increase in teacher earnings since adult education would be financed from different sources (from municipal budgets, from special innovative programs, from individual participation of enrollees, etc.), efficient use of school space and resources. An important contribution of this model would be to the strengthening of social cohesion of the local community.

Problems that can result from the

implementation include: questions of professional competencies of teachers for some forms of extended educational activity (if conditions exist for the implementation of the model teachers could receive additional training for these new roles), problems of activating the adult population in the local community and growth of the awareness of their educational needs (this could be compensated in part through the use of specific local competencies of adults that would take part in joint activities with children).

*Model 8:*

*Local school and nature classes*

Many small schools are located in pollution free areas (most often in mountainous terrain) that have significant potential for tourism. Important financial gains for the school and local community could come from using those schools as places for conducting nature classes. Such a model can be realized if there exist the necessary boarding capacities (in local tourist objects or in families).

Additional gain in the quality of teaching/learning may be realized as a result of well thought out small projects dealing with this within project teaching/learning and of

topic planning of curricular content organized in the form of exploratory excursions. The increase in quality of teaching relies here on the simple idea that in such rural and natural settings one can use all locally available educational resources (historical monuments, natural reservations, specific biological communities, traditional local culture, language dialects, etc.) in order to, within active and inquiring teaching/learning, better understand parts of the school curriculum. Of course, an additional benefit for students from city schools would be the time spent in nature and in recreational activity.

The local rural school would benefit in many ways: professional cooperation with teachers from city schools, incorporating of certain innovations, exchange of experience, holding of joint classes. Joint classes for students from the local school with students from city schools would be particularly advantageous for the children to be exposed, in very concrete terms, to the differences between the two environments (differences in culture, language, general living conditions, life styles and values, natural activities of people, etc.) and to have them mutually interact and develop a tolerance for

differences and enhance the skills for communicating with people not like them. In time, this kind of cooperation could grow into a traditional contact between schools and organizing of joint teaching/learning activities.

It is to be expected that certain problems may also appear in the implementing of this model. For example: problems of the capacity of local community to accept a certain number of children from city schools, problem of financing nature classes, possible conflicts between teachers and students coming from different backgrounds, problems related to the ability of schools and teachers to optimally think through (joint planning) the activities within nature class and to maximally use this kind of environment for the realizing of certain educational and socialization goals (objectives).

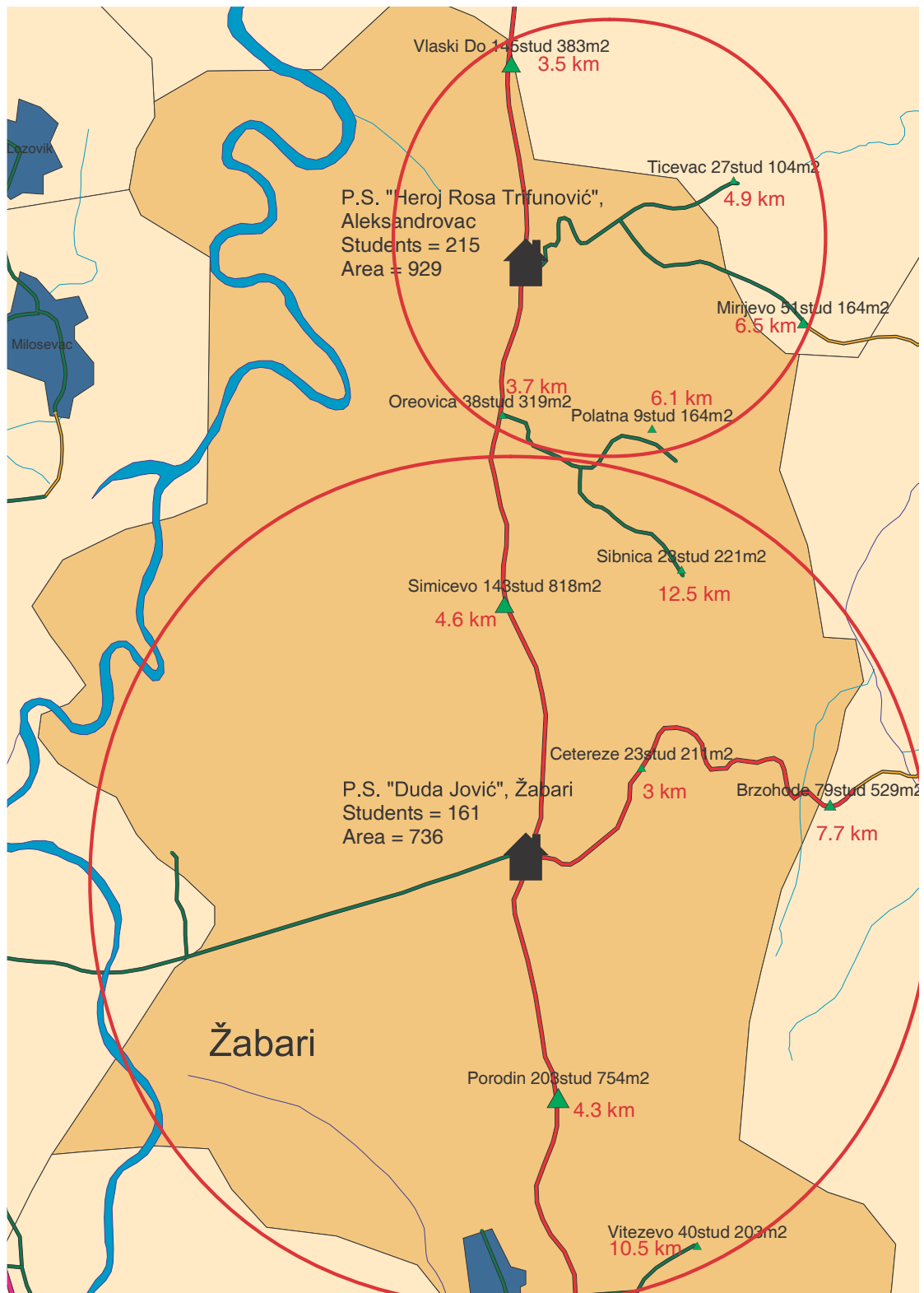
*Model 9:*

*Local school as local cultural center*

Primary school in small communities has always been a multi-functional institution and often (in addition to the church) the only institution with a cultural mission. Through well conceived projects, that mission can be significantly enhanced.

There are many possibilities for this. The spatial, organizational and staff merging of schools and certain cultural institutions (local library, culture center, culture-art society) is one such possibility (for example, there are no reasons that school and local library should not be united, or that the school library may not open its doors to all citizens from the local community, and not only as a place to borrow books but also as a place for the organizing of various cultural activities such as hosting meetings with local writers or with children engaged in literary activity, public lectures, etc.). Another possibility is for the school to be the center of community life (as it was in the past – a tradition that has almost disappeared recently) e.g. a place for exhibitions, for the forming of small local heritage museums, a place to organize movie and video projections, amateur theater get-togethers, etc. Such activities would be particularly intensive during lows in agricultural activity.

The benefits from this model are many: financial savings as a result of spatial merging, savings on salaries of experts and additional personnel, benefits to the developing of culture in the local community, to the



Map 25:  
 Schools and roads in the Žabari municipality. The municipality has two central schools. Circles denote catchment areas for these two central schools (2001/2002 school year).

social integration of the community and, particularly if this encompasses several communities, in the active participation of students in cultural activities and the nurturing of the creativity of young people.

Once again, the application of this model may face many real problems, such as: breaching of sectorial boundaries (resulting from facility, staff and financial merging), boundaries between culture and education sectors, resistance of certain partners whose interests might not be served by this kind of merging, need for teachers to be specially trained for roles that are quite different from the ordinary teaching roles they are used to, resistance coming from people in education (school principals, teachers, inspectors) to accept this form of de-specialization (i.e. the abandoning of a purely sectorial model of behavior), practical problems of culturally animating the local population.

*Model 10:*

*Local school – center of community development*

In the existing educational system each individual school is only an outpost of the national educational system. There is a fairly sturdy

horizontal tie of individual schools with higher hierarchical levels (in the municipality, in the Ministry of Education's regional offices, centered in the Ministry itself). This kind of vertical hierarchical connection (legal, financial, executive, through school inspectors, national curriculum, etc.) is necessary since the education systems in all countries represent one of the strongest levers of national integration (principally through the realization of many national standards, beginning with the language of instruction, continuing with the obligatory national curriculum, certain standards of school achievements of students, standards regarding space, equipment, teacher qualifications, volume of teaching time, rights of ethnic minorities, etc.).

This kind of organization of the educational system in Serbia has very deep roots (although the first schools in Serbia were municipal and communal). A crucial problem with this kind of organization of education is the existence of serious systematic and institutional barriers to the developing of ties between the school and its local community.

The concept of a school as the cen-

ter of community development rests on quite a different philosophy – the seeing of the school as “our school”, a school with branched out relations with all segments of life in the local community. Many countries have a long standing tradition of communal schools. There are whole movements related to communal education/communal schools such as that of the Charles Stewart Mott Foundation. This movement was encouraged in the countries of South East Europe by the Open Society Institute in Budapest. The communal schools movement developed to the extreme the idea of a school as a center of community development.

This idea needs to be very carefully tuned to the reality in Serbia. In today’s Serbia each individual school also needs to be a part of a unique educational system serving the roles of a powerful mechanism of national integration and of the guarantor of equitable access to quality education in all parts of the country and for all social and ethnic groups which would, among other things, allow a horizontal and vertical mobility of the population.

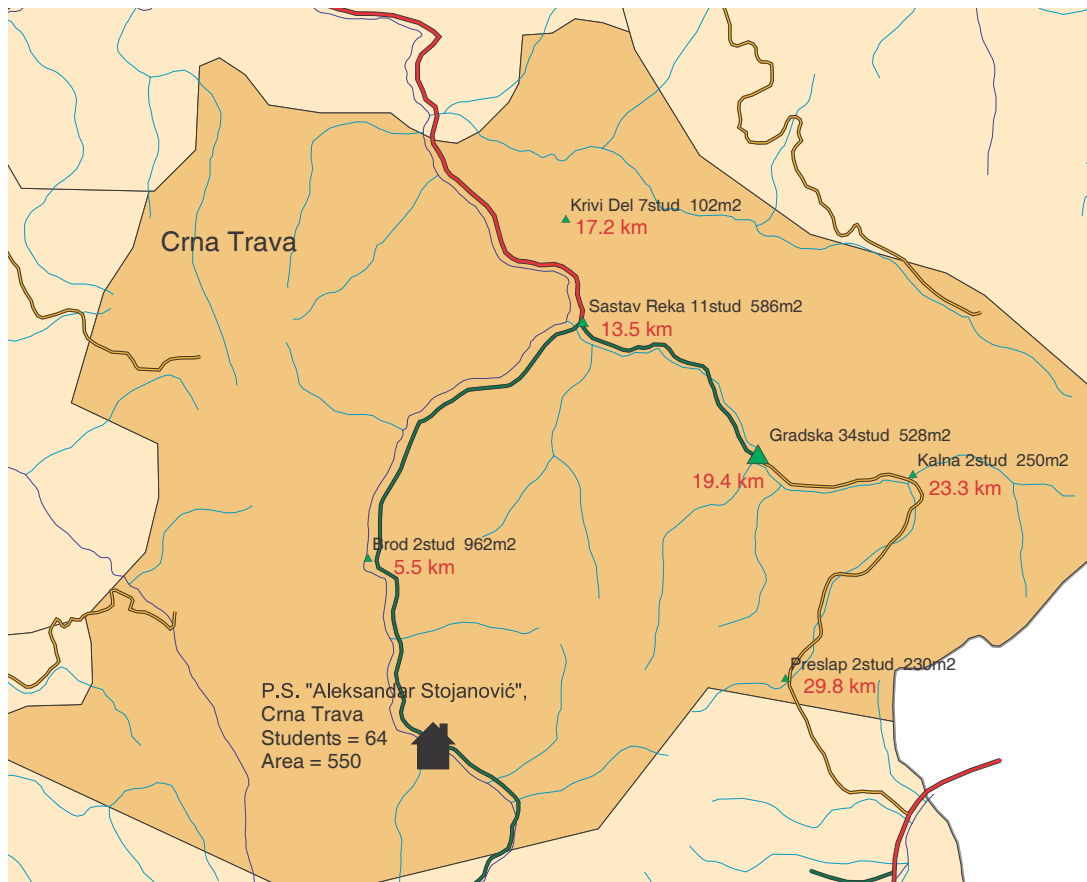
However, within the context of the needed decentralization, there need to be made some radical changes in

the relations of each local school to its local community.

Hence, the creation of the concept of a school as center of community development, and of the practical realization of that concept, could be the most important strategy for optimization because it has the potential to realize maximal economic and educational effects. Some ideas within the framework of FAO ( Johannesburg, September 2002) and the cooperation of FAO and UNESCO regarding rural education for all and the school as center of rural development could become the foundation for a radical transformation of rural schools in Serbia that would have great potential within agriculture.

The model being presented here is in fact founded on certain traditions of Serbia’s schools as well as on some of these modern ideas.

The first thing that is changed within this model is the educational function of the local school or group of local schools. The school becomes a place that reaches out to meet the educational needs of the entire local populace (see connection with Model 7) and which uses all available local educational resources (financial, material, natural, human), includ-



Map 26:

Schools and roads in the Crna Trava municipality. Crna Trava has the smallest population of any municipality in Serbia. The single central school has a third of the student enrollment of the average small central school (2001/2002 school year).

ing all local knowledge, skills and competencies, with the goal of enhancing the quality and relevancy of education (i.e. the incorporating of sense into that which is being taught as a result of the understanding of the connection of that knowledge with ones own life and the life ones community).

We have also expounded on the social function of this kind of school: it helps in the social integration of all generations and all the individu-

als within the community, the school as part of the system of education becomes a link between small local communities and society as a whole, this kind of school realizing two way communication with the community through active participation of students is the best kind of school for the molding of a participatory citizen, to multi-cultural communities this kind of school is a place for joint activities of different cultural groups (see link to Model 9).

A school that develops two way

ties to its local community can give important contributions to the economic development of the community which is the key part of the FAO concept of school as center of rural development. The contributions of that kind of school to economic development are many: it may be the center of professional adult education needed by the local community (see link to Model 7), through joint communal activities (ecological, humanitarian, business) of schools and the community's citizens, in developed communities the school (through teachers possessing some specific competencies) may be the initiator and developer of new modes of business (ethno-business, educational and family tourism, ecologically grown food, etc.) and, in cooperation with those possessing local expertise, it may become an initiator of the renewal of small production technologies (ecological production of food, traditional forms of conserving food without use of chemicals, traditional farm products).

The gain that may be had from the application of this model are potentially great. Foremost is the direct contribution of the school to the economic, social and cultural development of the local community. There are huge potential gains to be had

in the enhancing of the efficiency of education through the increase of motivation for learning (because it becomes relevant and sensible), in the increasing of the quality of the learning environment in school as well as in the holding of much of the learning activity outside the school thus moving it towards the process of active learning, in the enhancing of the quality and permanency of student achievements through the continued linking of systematic knowledge and their application to life outside the school.

Although there exist in Serbia examples of individual schools that have developed a fertile cooperation with their local community, still, because of the nature of the education system (its centralized structure and sectorial isolation) this model asks for the greatest change in the habits of the whole system, of school institutions and of teachers. For this reason it may be expected that the application of this model will be the most difficult and that for its massive application one must count on a longer time scale.

The major problems that will necessarily be met in practice will be: inter-sector barriers (primary education – adult education, education

– culture, education – economic development) and the difficulties in the toppling of the traditional understanding of what a school is, lack of understanding on the side of local governments on the role of education in local development, resistance of large numbers of people to changes in professional modes of behavior (of teachers before all), teachers' fears of losing their existing professional identity, need of teachers for the acquiring of new knowledge and skills, objective difficulties with the coordinating of the activities of the heterogeneous participants in joint activities (resulting from differences in interests and attitudes), slow maturing of the understanding in the members of the local community that they themselves can and need to show initiative and can contribute to the development of their community.

Though few, examples of the application of this model are for that reason even more important. We will conduct a case study of one specific example (Šlos Golubinci) as a follow-up project.

#### *Model 11:*

##### *Combination of different models*

What we have described so far are

relatively "pure" models for the optimization of the network of schools and, in particular, of that part of the network of schools that encompasses small schools. It is to be expected that in real situations what will be more often the case will be the combining of certain models or parts of these models.

Such combinations increase the possibility that each municipality, part of it or local community will find an adapted solution that will take into consideration what are often idiosyncratic combinations of previously described parameters relevant to the selection of optimization models.

Whatever the case may be, due to the large number of possible combinations, it is clear that there is no universal solution for optimization on either municipality or local levels.

The central level (Serbian Government, Ministry of Education) would play a strategic role in the process of optimization, i.e. it would define the policies related to the development of the network: a) building, maintenance and functioning of the information system relating to the network of schools (which would be a part of the general educational information system of Serbia); b) it

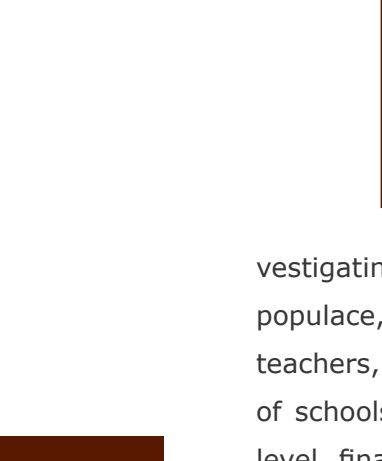
would insure the maintaining of a network schools guaranteeing equity (geographic; for various social, cultural and ethnic groups; work equality; right to the education of special needs children); c) it would find the financial means to help maintain the optimized network in underdeveloped areas and municipalities; d) it would define a level of development of the network that could be maintained at the level of economic development; e) it would define standards of educational quality (quality of school programs, quality of conditions for teaching/learning, quality of the educational process, quality of learning outcomes of students); f) it would agree to specificities in educational work on the part of the sub-network of small schools (specific organization of schools, flexible school calendar, specific ties of school and local community and with various partners in that community).

The regional level (regional offices of the Ministry of Education, districts) could have the following important roles to play: a) the role of intermediary between central and municipality levels; b) optimization of the network of schools at the regional level (particularly of those schools that by their nature extend farther than the

municipality level, such as schools that meet the needs of children with special needs, art schools, secondary schools), with the goal of the optimal functioning of the regional network; c) allowing for the organizational and functional linking with schools from neighboring municipalities; d) with the goal of enhancing the efficiency and quality of education they would offer expert pedagogical assistance to small schools with few teachers and no expert staff (school psychology and pedagogy staff, etc.) through its councilor service and the regional centers for professional development.

Municipal and local levels would have a key role in the optimization of local networks of schools by taking part in the process of participatory decision making along with regional and central levels.

This level would guarantee precise information regarding the parameters important to network optimization at the municipal level (demographic changes, geographic characteristics, plans for municipal level economic development, possible roles of schools in community and municipality development, assessing of educational needs of the whole local population, in-



investigating the opinions of the local populace, particularly of parents and teachers, about the local network of schools, taking part in municipal level financing of the network of schools).

The municipal level would have a special role to play in the defining of models of optimization of the network of schools for municipality and its local communities (including different combinations of models) that best fit local conditions. In cooperation with experts from regional offices of the Ministry of Education and its own education experts they would determine specific projects for optimization of the local networks of schools.

## **D. SPECIFIC PEDAGOGICAL PROBLEMS OF THE PART OF THE NETWORK DEALING WITH SMALL SCHOOLS**

This part of the report concerns itself only with that part of the network that encompasses small schools, however, to an important degree it is also relevant to the functioning of rural schools and schools in smaller settlements.

The specific pedagogic problems of this part of the network of schools are strongly tied with the general problem of the optimization of the network of schools. The reason for this is that rational justification (taking into account financial efficiency) for keeping small schools running can only be made if those schools guarantee equity and access to education, if they guarantee educational quality and efficiency, as well as if they contribute to general local development.

It is well known that, under certain conditions (professional isolation, inadequate teacher qualifications, lack of educational resources, but also of the capabilities of students in those schools which often have one or a very small number of teachers

or that work with multi-grade classes or that realize class teaching even in those cases that call for subject teaching) such schools show lower educational results.

The only existing investigation of the functioning of these small (rural) schools is that of N. Trnavac (1992). This study showed that under prevailing conditions small rural schools deliver an inadequate quality of knowledge to their students. On tests of school achievements in mathematics, Serbian language, knowledge of the natural and social environment, students from these schools reached barely half of the country's average scores. While students from small schools got lower scores in all parts of the country, the study also uncovered statistically significant variations between regions. Do these results inexorably follow for small schools? Is it possible to realize a certain guaranteed level of educational quality even in small rural schools? These questions are fundamental for the problem of the optimizing of this part of the network of schools.

When dealing with optimization strategies, the key strategy in this case is that of educational modernization in addition to the

specific strategies of “adaptive learning” and “equity through diversity” that have been developed in theory and in practice in Norway (Solstad, K. J. 1997, Solstad, K. J. et al. 2002, Sigsworth, A. and Solstad, K. J. 2001), but that may also be found, under different names, in preschool theory and practice in many other countries, including, in part, in the schooling tradition in Serbia.

Some of the ideas that have followed from these strategies have been built into the optimization models M2 to M11 described in the previous section. Here we present only brief overviews of the educational parameters that may be changed in order to significantly increase the probability that this part of the network of schools can be optimized as regards its efficiency and education quality. The detailed development of these specific pedagogic problems was not given as a goal of the current project and will be the content of several specific activities that need to follow from this global project of the optimization of the network of schools in Serbia.

This whole part of the document dealing with specific pedagogical problems of small schools (as

part of the national network of schools) represents, essentially, the applying of the aforementioned strategy of the modernization of education as a powerful strategy of school optimization, (of course, that strategy applies to the whole network of schools, here we only accent problems that are specific to small schools).

This strategy of the optimization of the functioning of small schools rests on a whole series of pedagogic ideas that, if coherently delivered, represent a new and well rounded education philosophy.

The systematic exposition of these ideas and their practical development (operationalization) represents a necessary follow-up of the current school network optimization project. For this reason these ideas will be given here only in the form of a brief sketch.

The basic set of assumptions from which it is possible to develop concrete solutions to pedagogic problems is the following:

- *Local school as an outpost of the national education system or as a community school.*

In a centralized system such as the one that still exists in Serbia, local schools are much more often cast in the role of simple outposts of the central system than of the schools of a specific local community.

In every serious education system this vertical organization of schools is an important and necessary mechanism of national integration, an important instrument of equitable access to all of the country's educational resources and as a prerequisite of the population's geographical and social mobility (some "community school" movements lose sight of the importance of this vertical integration).

However, serious problems appear if in addition to the vertical integration there is no horizontal integration, i.e. two way interaction of local school and local community. The main problems that appear are: dominance of city culture and of the culture of the majority population in a multi-ethnic country, inability of schools to utilize local knowledge and local educational resources, isolation of schools from the

local community, the building of a gap between the culture of the family and of the school, sectorial isolation of education at the local level and, above all, lack of relevance of what is being taught in school stemming from the difficulty in the seeing of the connections between what is being taught in school with the student's personal experiences and needed life skills.

The overcoming of horizontal isolation and the forging of rich two way ties between local school and local community is a powerful instrument for optimizing the efficiency of each school, and in particular of small rural schools (the forms that these ties can take have been expounded on in several optimization models).

- *National school programs and local programs or the programs of individual schools.*

The balance between these two components is specific to each country and to each historical period. Without a national school program the students of local schools would be put in a position that might be called an educational ghetto. For this

reason, local programs and the programs of individual schools may only be an addition to an existing national program. On the other hand, these local programs are of particular importance if the school is to play the role of the center (or one of the centers) of the development of the local community and as a tool for the increasing of relevance and sense of what is being taught in school.

A exceptionally important role in the horizontal integration is the finding of local modalities for the realization of important components of the national school program (identifying of local manifestations of generic events or phenomena, linking of general knowledge with local knowledge, use of local resources and of the local environment for the realization of general program goals, interaction between students' personal life experiences and universal concepts and knowledge). The concept of "adaptive learning" developed in Norway (Solstad, 1997) is a good illustration of this kind of education model.

- *The network of schools and the*

*individual school as an instrument for the delivery of knowledge or as the best environment for efficient and quality education.*

In a traditional school, as part of the national education system, what dominated was the delivery of official knowledge as a powerful tool for state and national integration. Such institutions were less oriented towards children as individuals, children as members of certain specific groups. The manifestations of such a model are: dominance of teaching as lecture delivery, passive role of the child in the school as an institution and in the learning process itself, uniformity and typecasting of the school.

In contrast to this, or better yet as an important correction and addition to such schools, one finds certain modern school concepts – that of child centered schools, schools as places that guarantee quality of school programs, quality of learning environment, quality of instruction material and learning resources, quality of the teaching/learning process and of the quality of learning outcomes (UNICEF 2000a, UNICEF 2000b,

European Commission 2000, UNESCO 2000, Hawes and Stephens 1990).

- *Focusing on school programs or on educational outcomes.*

One of the most important changes in the philosophy of education lies in the change of emphasis from education programs to the learning process itself and to realistic educational outcomes, i.e. focus on the acquiring of knowledge and competencies that are permanent and that may be used in life outside the school in modern and complex societies.

Closely related to this are the systems for the assessing of school outcomes and the evaluation of school systems (PISA in OECD, TIMSS, MLA in UNESCO, etc.).

- *Participative, interactive and active methods of teaching/learning.*

The fundamental component of educational modernization lies in the change of the role of the child in the knowledge acquiring process, in the more

frequent use of interactive and active teaching methods, in the interaction between those that are learning, in the increase in the level of autonomy of children in the learning process, in the greater participation of children in a school as a human community and in the life of the local community (Ivić, et al. 2002).

- *Equity in education through standardization vs. equity through diversity*

With respect to equity in education (equality of differing social, national and cultural groups, equity with respect to the geographic distribution of the network of schools, equality of individuals) in Serbia (like in some other similar countries) there is legacy from the socialist period. The developed and geographically well distributed and branched out network of schools described in this report is one of the most important instruments from that period for the realization of equity.

Educational equity in the socialist period was conceptualized as a problem of equality. From

that were developed national standards (school space, equipment, teaching aids, teacher qualifications, centrally defined and for all schools obligatory program, centralized administration) that led towards the unification of schools and that were, to a large degree, institutional barriers for the forming of intersectorial links between local schools and for the development of two way relations with local communities.

It is important that certain instruments for the guaranteeing of the quality of school programs, qualifications of teachers, etc. be preserved through the process of necessary correction. At the same time it seems quite justified, because of the serious shortages of the previous model of educational equity, to seek to enhance it by adding to it key elements of a model that has been particularly thoroughly developed in Norway under the name "Equity through diversity". Solstad is correct in pointing out (Solstad 1997, Solstad et al. 2002) the old thesis that equal treatment of unequal individuals can only increase inequality. If one doesn't take

into account all the important specificities of a local community the well meaning intentions to guarantee educational equity can in fact lead to completely opposite effects (see Ivić 1991 for some such effects in the case of Serbia).

At the center of our effort to optimize education in small rural schools, and in rural schools in general, is built in the attempt to bring about a balance between the models of equity through standardization and equity through diversity.

These new approaches to the increase of motivation for learning and the relevancy of what is being taught guarantee in a much greater measure the acquiring of permanent usable knowledge, greater personal autonomy, a more efficient process of the forming of young people for the roles of participative citizens and the acquiring of life skills.

As a result of this series of educational innovations (that can be greatly expanded upon) it is possible to reach very concrete implications for educational practice even in small rural schools. In this way it is possible to increase relevancy,

educational quality and efficiency in these schools. For this reason we will present here a brief exposition of the possible changes in many educational parameters that can bring about an optimization of the functioning of these schools.

### **D1. Organization of schools**

In addition to the dominant education model in Serbia for sparsely settled regions (central school and its satellite schools) that is adapted to some localities, there are possible other optimization models such as: small local stand-alone school integrated with other institutions (preschool, adult education, culture); organizing of clusters made up of several smaller local schools (even from neighboring municipalities) located near each other and that can pool their human and educational resources (exchange of teachers, exchange of didactic equipment, etc.); organizing of joint services for several schools (transport of students, administrative tasks, joint expert staff, common mobile libraries or computer labs, etc.).

What is also possible is a more flexible internal organization of each school (escape from simplistic solutions such as one teacher one

class, or one teacher one subject, more use of the out of school environment during teaching – when ever that can be pedagogically motivated, use of human resources and local knowledge outside the school for the realizing of increased educational effects).

A particular advantage of small schools is that they work in a single shift and as a result have a greater potential for the organizing and conducting of extracurricular and out of school activities.

### **D2. Changes in the school calendar**

In rural areas with specific weather conditions (long and extreme winters, hot summers) or where the activity of the population, as well as of the children, has significant seasonal variations (periods of intensive agricultural activity, seasonal migrations of families, children taking part in seasonal agricultural work) it is necessary to adapt the yearly school calendar to local conditions. The reason for this is simple – the role of education is to guarantee the realization of certain educational outcomes, not to organize classes according to some pre-determined ritual.

Similar modifications of monthly, weekly and daily activities within the teaching process need also to be looked in to. It goes without saying that these modifications must not be detrimental to the realization of sought after educational outcomes.

### **D3. Change of school programs**

This possibility has already been mentioned. First of all, if the standards of students' school outcomes have been clearly set up then there must exist a significant flexibility as to the ways in which those outcomes are to be realized depending on local conditions and on available local educational resources (e.g. it is certainly not required that rural schools that have within their communities varied possibilities for physical activity be given the same equipment for physical education as city schools, as is now very often the case, similarly, the best way to cover many lecture topics in biology in rural schools may differ significantly from the way those same topics should be covered in large urban schools, etc.). This is a place where one could very creatively and productively apply the well known slogan "Think globally – act locally".

Of course, in addition to these kinds

of local ways for the realizing of the national program, there are also many reasons why parts of that program itself should be local (regional) in content. This needs to be done in order to realize a much greater level of the relevance of what is being taught, at the same time, however, it must not be detrimental to the success of the students of these schools on various entrance exams (to higher educational levels or to schools in other regions that students may move to).

### **D4. Specific pedagogy of multi-grade classes**

As a result of the small number of enrolled students teaching is often organized in multi-grade classes (combinations of two, three or four grades). Teachers often complain of the difficulties associated with the work in such classes, and to a certain extent they are right.

The greatest difficulties come up, however, when teachers are not specially trained for work in multi-grade classes and when they attempt to use classical lecturing and instructional teaching in these classes.

Many of these problems significantly

decrease in magnitude once the teachers are adequately trained (UNESCO 2001, Solstad 1977, Sigsworth and Solstad 2001). It may at first sight seem unbelievable, however, in the light of several modern fundamental investigations (e.g. Perrin-Clermont 1996) dealing with the importance of social interaction among peers and among children at different levels of mental development, it turns out that learning and development in such heterogeneous groups may have its advantages.

Whatever the case may be, if the goal of education is not simply the delivery of specific curricular contents, but rather, as we have already stated, true learning then one can make important use of the interaction of children, work in small groups, project teaching, topical teaching, use of older students as mentors for the younger ones, agile combinations of shorter lectures interspersed with independent work by the students, well thought out problem assignments for students at different levels, research projects in nature in which students have well assigned roles corresponding to their grades, etc.

Having in mind all the problems

attached to work in multi-grade classes (one should bear in mind that family upbringing in families with many children always met with these kinds of problems and that, from the psychological perspective, even classes that are homogenous with respect to grade level are, in a sense, "multi-grade classes" when one considers the student's levels of development) one should also consider their potential advantages: intensive use of work in teams, better conditions for some aspects of socialization since there is no age segregation, more potential for personal autonomy, better conditions for the use of dialog in communication, more practical chances for the structuring of children's social groups, possibility of teaching according to role model (older children as models of behavior for younger children).

#### **D5. Local educational resources**

If we transcend the standard scheme for school space and the standard equipment in that school space (with respect to this there is a substantial level of uniformity of classrooms in different countries) and if the teachers are receptive, open minded spirits (and trained for this) then it is possible to find rich

educational resources in each local environment.

Natural reservations, geographic, mineralogical, hydrological and other natural specificities, the local community and its history, local cultural tradition and local cultural differences, historical and cultural monuments, local businesses, available human resources (in and out of school), all of these are examples of local educational resources.

All these local educational resources may also be profitably utilized as a tool for making official school knowledge more relevant and meaningful. Student's out of school experiences represent stable acquired knowledge and the linking of that knowledge with school knowledge may make the learning process more meaningful, may valorize such children's knowledge and may increase the level of student self confidence. Finally, all of this can help the students to more efficiently assimilate the national school curriculum. At the same time, these local educational resources can be used for the creation of a meaningful local curriculum.

#### **D6. Teaching/learning methods**

Traditional teaching methods, with their predominance of lecturing and instructional teaching, become almost a caricature when applied to small classes, particularly when applied to multi-grade classes. One of the reasons for this is that they are less adapted to the nature of human communication in small communities and look artificial. Because of this, as well as a result of their greater inherent efficiency, participative and active methods of teaching/learning must necessarily be used in small rural schools. In the utilization of such methods one can find a one of the most significant sources for the increase of educational relevance and quality. This is particularly true when such methods are connected up with the increased possibility for out of school teaching, for the use of local educational resources, and for the chance of having an almost continued interaction between student and teacher, an interaction allowing for feedback to each and every student.

#### **D7. Grading students**

Work in small classes and the above mentioned possibility of the continuous advancement of each student can have important consequences: grading can in this

case become truly formative grading, it is much more valid since it is based on a greater sample of viewed student behavior, it gives more possibilities to the teacher to assess how the student uses the acquired knowledge (as opposed to how well he or she verbally reproduces that knowledge).

On the other hand, grading in small classes is fully merged into the overall process of learning and student-teacher interaction. As a result, it is possible to make significant saving (relative to larger classes) of the time allotted for the examining of students.

#### **D8. Training teachers for work in small schools**

Teachers play the key role in the improving of educational efficiency and quality in small (rural) schools. However, the standard system of teacher training does not enable the teachers to successfully face specific pedagogic problems related to small schools (professional isolation, lack of standard didactic materials, specific socio-cultural student background, teaching in multi-grade classes, etc.).

For this reason it is necessary to

develop very specific and concrete programs for in-service training of teachers working in small schools. These programs need to be based on the experiences of other countries, but, before that, they need to investigate in the field the experiences of Serbia's teachers working in such schools. In addition, during the course of the development of these programs it is necessary to bring about specific rationalizations coming from newer pedagogical theory (ideas of "learner-centered education" and of "outcome-centered education", ideas of "child-friendly schools", concept of "adapted education", concepts of interactive teaching and active learning, etc.).

When one considers the ways in which such in-service teacher training is to be implemented it becomes obvious that only interactive and participative modes of work can bring about the sought results (mobilization of the practical experiences of teachers, shared solving of problems met in everyday work, simulation of realistic situations, group discussions, development of small projects for the solving of educational problems in a specific local environment, designing of scenarios for active class (particularly outside the school in so called "ambiental

educational workshops”, etc.).

### **D9. Professional assistance to teachers in small schools**

A great problem of small schools is the professional isolation of teachers. For this reason, the offering of systematic professional assistance opens up an important possibility for the advancement of the functioning of small schools.

Professional assistance should not be done haphazardly but should follow from the development of special structures and models for the offering of this kind of assistance. Here we will mention only some of these structures and models:

- Creation of teams within the regional offices of the Ministry of Education that would have a regular plan for assistance (teams made up of individual councilors, experienced teachers, school pedagogues and psychologists, instructors for innovative projects);
- Periodic (e.g. monthly) visits of expert associates from central schools (school psychologist, pedagogue) to small schools that would allow them to solve everyday problems directly in the

field;

- Exchange and rotation of teachers from nearby local schools and/or the organizing at certain times of common classes and activities;
- Organizing of regional and local meetings of teachers with a mind to the exchange of individual teacher experiences;
- Creation of special modules for in-service teacher training for teachers working in small schools.

In this part of the current report we give only sketches of certain pedagogic ideas and of certain forms of education work that could be used to bring about a true optimization of the effects of small (mostly rural) schools.

Some fundamental problems of these schools, above all the cultural specificities of the environments in which they work (specificities of rural culture) are of such a nature that it is necessary to seek out specific and original solutions (for example, in the form of strategies of adaptive education, or of educational equity through diversity not uniformity).

The crucial starting point for the

solving of these specific problems needs to be the understanding that there probably does not exist a universal solution for all these schools but rather that it is necessary to develop specific local/regional projects for their solving.

#### **D10. Follow-up activity related to the optimizing small schools**

When looking at the optimization of education outcomes of small rural schools it is necessary to develop several smaller follow-up projects of the current nation wide project of the optimization of the network of schools in Serbia.

On the basis of the current project's optimization models comes the need to advance the following new projects:

- Specific program of in-service training of teachers working in small schools as well as in central rural schools. As a result of accumulated experience, the most economic way to do this is to develop, within the Active teaching/learning project (which has already encompassed teachers from small rural schools), specific modules such as the module for in-service training of

teachers working in small rural schools, or the module for the training of teachers working in local schools that have set before themselves the goal to become centers of rural development (as well as for the realization of other optimization models described in this document);

- Development and pilot implementation of a teacher manual for teachers working in multi-grade classes. The manual would be developed on the basis of experience from some foreign countries, on the basis of an analysis of the experiences of teachers working in multi-grade classes as well as on the basis of domestic literature regarding these experiences. The key component of this manual needs to describe the practical implementation of participative, interactive and active methods of teaching/learning as well as to develop models of the use of local educational resources and of the pedagogy of cooperative learning in groups of children;
- Defining of models for the organization of schools in the region, municipality and local community (including models for professional assistance to local schools) and the internal organization of

individual local schools or clusters of schools (school calendars, intramural and extramural forms of educational work, use of local knowledge and local human resources).

As a result of these basic characteristics of small rural schools, the evaluation of their work and the ensuing optimization must be based on a multi dimensional model. It goes without saying that financial rationalization of this part of the network of schools is of crucial importance. This document (section dealing with optimization models) has formulated some concrete solutions applicable to small schools. It is also important to emphasize that educational success of these schools, or lack of it, needs to be compared with national standards of educational outcomes.

However, for an appropriate evaluation of these schools and of the optimization process, it is absolutely necessary to take into account two specific indicators: a) the amount of "educational added value" of these schools, i.e. the level to which these schools have contributed to the advancement in learning of their children as compared to their true level (due to the many findings showing statistical correlations linking the

success of a child in school with his or her family's socio-cultural status as well as with his or her individual capabilities), and b) the contribution of local schools (often the only public institutions in small local communities) to the development of the local community.

The set of all of these practical solutions (selection of optimization models, ways of solving specific pedagogic problems) must be specific to each local environment and need to be based on detailed analyses of the parameters through which we describe each regional or local environment.

## E. CONCLUSIONS AND RECOMMENDATIONS

### E1. Findings

#### *Finding 1:*

Serbia is in the possession of a truly developed and branched out network of schools and educational institutions. This network of schools is more than adequate to service the educational needs of the country's citizens. That network has been built up over a period of 300 years, yet the two principle peaks of school building activity happened in the second half of the nineteenth and the middle of the twentieth century. Paralleling this was the slow process of the training the army of teachers and other professionals needed in these schools. The network of schools (along with the people working in them) represent one of Serbia's principle resources, a resource that took a long time to develop, a resource that many are only marginally aware of. It is imperative that the public in general be made aware of just how valuable a resource this is.

The economic worth of the network of schools may be easily assessed by imagining that the country does not have the schools it has, or the

libraries and other educational institutions, or many of the roads linking these institutions - rather that it has to find the funds to build all of them from scratch. In a similar way it is possible to put an economic price tag on the tens of thousands of teachers and other people working in these schools.

The central educational authorities, and the government in general, need also to learn to view the network of schools as a resource. In addition they need to be made aware of the potential negative consequences that some policies can have on the functioning and long term health of the network of schools. For example, the closing of the smallest schools, brought about as a possible short term cost cutting measure, can have grave consequences in speeding up rural depopulation, in lowering educational equity, even in increasing the price of education in the mid and longer term. One of the best ways to foster this kind of awareness in the policy makers is by showing the many mistakes that have been made in the neighboring countries that have gone through a similar transition process to the one facing Serbia.

*Finding 2:*

Irrespective of many of the problems that plague the network of schools it has not backtracked from some of its most important achievements - particularly those related to educational equity. The network of primary schools continues to encompass a large percentage of the country's school age population, the system continues to be gender neutral, the system offers many opportunities for the education of minorities, etc. The network of schools needs to be made more efficient, the knowledge and skills it delivers must have greater relevance and greater educational quality. However, these future improvements must not come at the price of equity or of outreach.

*Finding 3:*

The network of schools in Serbia currently faces three principle sets of problems. The first set of problems is related to the poor state of most of the school buildings (resulting from their age and the decades long period of little or no investment in their up keeping), poor state of school furniture and basic infrastructure (particularly in smaller school) as well as the low level of school equippedness (didactic tools, books, computers and communication hookups). This set of problems

is directly related to the economic situation.

In addition, one sees a set of related problems that cannot be so easily linked to economics alone - the major ones are the low level of school hygiene (problems with access to drinking water, horrible situation with school toilets) and of school safety (particularly the problem of drugs). Although present for several decades, these problems have markedly increased during the past decade of crisis. They are linked to economic factors, but even more so to the severing of ties of schools with their local communities (result of an extremely central and inflexible educational system), lowering of the social status of teachers and the overall lessening of the belief that education is and will continue to be a principle lever for positive change (this is strongly linked to the feeling that many students share that what they are being taught in school has little relevance to their every day lives). The fact that this set of problems is not exclusively related to economics has an important consequence - the country has the capacity to solve these problems in a relatively short time and in the current economic situation. The positive repercussions of this would be manifold and would

significantly help motivate citizens to more actively participate in overall educational reform.

The third set of problems faced by the network of schools has to do with how efficiently it functions as a system. Today the system is functioning far from economic and pedagogic efficiency. The economic inefficiency has come about principally as a result of the great demographic changes that have swept the country as well of the education system's lack of flexibility to those changes. The principle pedagogic inefficiency of the system may not be seen by looking at such standard indicators as drop out rates, but more by analyzing to what extent the knowledge and skills acquired in school are later used in the workplace. This pedagogic inefficiency ultimately has an even greater economic price, however, it acts on a somewhat longer time scale. Both of these inefficiencies need to be faced and overcome as soon as possible.

The first step in the making of a more efficient network of schools is the gathering of data about its functioning. The second step is to analyze that data and use it to assess possible strategies that may be used for optimizing the system.

The third step is the marking of the chief obstacles to its more efficient functioning, on the one hand, and the chief available resources for its upgrading, on the other. The current project has made significant inroads in all three steps.

*Finding 4:*

The procedure by which the education system in Serbia gathers and analyzes information regarding its functioning is outdated and severely flawed. Important parameters needed to assess the functioning of the system are not collected. Conversely, a huge mass of unnecessary detailed data is collected. The questionnaires that represent the chief tool by which data is gathered are not well structured: key concepts are not precisely defined, the questionnaires are not in the form of true multiple choice queries needed in order to make possible the automatic processing of the data into an educational database, no mechanisms are in place for linking and comparing with other questionnaires (from the same year or from previous years), most of the data that is collected is not compatible with international standards for educational statistics (UNESCO's Institute of Educational Statistics, Eurydice) making comparison with the functioning of the

education systems of other countries more difficult.

The data that is gathered is never checked for consistency. This is particularly a big problem when one considers the high incidence of systematic errors (coming principally from poorly defined concepts and inferior questionnaires) as well as the many standard inputting and copying errors (particularly exacerbated by the fact that the majority of schools do not have access to the Internet and can't check and modify erroneous or outdated data concerning their school).

The data that is collected is not collected for monitoring and future upgrading (optimizing) of the system, but rather for its own sake, in fact the great majority of the collected raw data is never analyzed. On the one hand, the central educational authorities do not seem to truly understand how important it is to base reform on precise and up to date knowledge of the state of the system. On the other hand, the staff employed in the Ministry of Education's statistics section lacks even the basic training to carry through the monitoring. In fact one of the principle priorities of the Ministry of Education needs to be the complete

reorganization of its education statistics section.

Serbia is going through its seventeenth education reform. If the current reform is to have hopes of being more successful than the previous sixteen then the changes in education policy that it brings about need to be firmly based on facts about the state of the system and its functioning, not on conjecture. In its present form the system of data gathering, checking and analysis is not capable of becoming a true monitoring tool. Without basic changes in this sector it will continue to amass data that bares little correlation with the true state of the education system. As a consequence, conclusions following from this data will in no way be superior to pure conjecture.

The gathering and analysis of education data is not something that is only of use to central educational authorities. Just as important is to have this information flow back to the schools, their teachers, students and the students parents - in fact to all educational stakeholders. The lack of this two way flow of information is one of the biggest problems facing the functioning of the network of schools in Serbia. The people and institutions most directly involved in

the education process get no information back telling them about the system, how it functions, how their local school fits into the overall system and into the local community, how it compares with other schools, etc. They are asked to fill out endless forms, but get no feedback. This strongly discourages any kind of initiative. One small consequence of this is that many schools in fact do not fill out obligatory questionnaires, or only fill them out partially. Both of the questionnaires that were the main source of information in the current project were obligatory, yet each had only a little bit more than a 70% response rate from the schools. Luckily the two questionnaires (sent out uncoordinated by different sectors of the Ministry of Education) taken together were able to cover almost all the country's schools.

*Finding 5:*

Throughout the field work phase of the project we were surprised to what extent the central educational authorities are out of touch with Serbia's schools. In this respect nothing much seems to have changed since the democratic change in 2000. The only consistent exception is in the network of secondary schools. Almost all of the primary schools we visited have stressed how rarely

they have any visitors.

Visits to schools are an important source of information exchange. These visits make it possible to track less easily quantifiable information about the functioning of the schools. Periodic visits give an added time dimension to this. In addition, these visits can serve as strong motivators to the teachers and students.

*Finding 6:*

Increased economic efficiency of the functioning of the network of schools is but one aspect of the quest for increased efficiency, yet it is an extremely important one. The system must try to find all possible sources of increased economic efficiency. This is particularly true in the short term. Such direct savings would make possible the funding of the second tier of optimization procedures. In addition, such direct savings would buy time needed to keep the existing network of schools from collapsing (for economic reasons) during the time necessary to jump start Serbia's economy.

The simplified model for per student cost that has been developed in this project represents a straight forward and efficient benchmark that may be used to analyze the economics

of the functioning of an individual school as compared to the average school of the same type that may be found in the network. The uncovered average laws are sensible, yet the economics of the functioning of individual schools varies widely from that average. It is important to analyze in detail the schools that stray in either direction from the simplified formula. There do exist many valid reasons why a given school does not perform according to this simplified formula, still many cases will certainly represent examples of schools where a reorganization can lead to an immediate increase in efficiency.

*Finding 7:*

The majority of primary school students in Serbia attend a school that works in two, and some even in three shifts. The education authorities state that work in a single shift is their (long range) goal, yet this is not stated clearly or forcefully. As a result, many schools that could already work in a single shift do their utmost to organize classes in two shifts. This is particularly true in the centers of some of the larger cities where there has been a decrease in the primary school age population. The reason for this is that there exists a fear that the Ministry of Education will close down such schools.

In fact this fear is well founded - several such schools were closed down in Belgrade during the last couple of months, i.e. at the same time that the Ministry had scheduled the development of the current set comprehensive network optimization strategies.

This naive school rationalization is potentially destructive since it is based on extremely poor information regarding the functioning of these schools and because it only looks at (short term) economic gains. While it is possible that some of these schools indeed should be closed, many could continue working in a single shift. In fact, the several hundred schools in Serbia that already work in a single shift (see Map 8) should be viewed not as a source of inefficiency but as a resource, an ideal places to initiate pilot projects to analyze and compare educational outcomes of students graduating from these schools with the outcomes of their peers that attended multi shift schools. Experience from abroad strongly indicates that work in one shift increases pedagogic efficiency, and it would be quite important to test this in Serbia's single shift schools.

One of the chief goals of the educa-

tion system should be to have its network of schools function without shifts. It is currently not economically possible to meet this goal - this is why it is a goal and not an educational standard. However, it is imperative that this goal be clearly and precisely stated to the general public by the educational authorities.

In addition, this goal needs to be looked into on a regular basis (every few years), and not just by the central but also by regional and municipal authorities. Once conditions make it possible to organize a part (or all) of the network of schools as single shift schools that should be done. The most important role of central authorities (particularly after educational decentralization) will be to monitor this process and offer added economic incentives for it to continue.

## **E2. Recommendations**

### *Recommendation 1:*

The method of gathering statistical data (school equipment, schools, teachers, financial data concerning the networks functioning, etc.) needs to be made compatible with standards set up by UNESCO's Institute of statistics and of the European Union's statistics department

Eurydice. The setting up of this compatibility would allow comparison of national, European and world education data and education related indicators.

### *Recommendation 2:*

It is necessary to gather disaggregated data (according to gender, independently for the sub-networks made up of small schools, central schools, large inner city schools, according to socio-cultural status of the student's parents, etc.).

### *Recommendation 3:*

The detailed inventory of school space, which is made every ten years in Serbia (the last was made in 1994, the next is to be carried through in 2004) should be carried through in a way that is consistent with the recommendations of this report.

### *Recommendation 4:*

It is necessary to create a special program for the training of Ministry of Education staff (in its central and regional offices) as well as the representatives of municipal governments that cover education in order for them to be enabled for gathering, analysis of data and use of information systems that relate to the national, regional and local network

of schools. The Education Forum has the facilities and know-how to develop such a program and to take part in its implementation.

*Recommendation 5:*

The Ministry of Education should use official channels to inform municipality officials of the problems related to the optimization of the network of schools, to suggest to the municipalities the creation of special documents for the optimization of their municipality's network of schools (including inter-municipality linking) and to ensure participative decision making regarding the optimization of the network of schools on regional, municipal and local levels. The current project's findings can be used as a starting point for such a cooperation between central, regional and municipality partners.

During the making of decisions regarding optimization it is necessary to take into consideration: demographic indicators; status of the local economy; regional, municipal and local programs of economic, social and cultural development; interests and views of local partners (municipal authorities, local business, local population, parents, schools and teachers).

*Recommendation 5:*

Education authorities need to define realistic standards related to the functioning of the network of schools. The few standards that do exist are severely out of date and are not in step with the new economic, demographic and social reality. Standards need to be set with respect to almost all aspects of the functioning of the network of schools:

- Space (classroom area, labs and specialized classrooms, gymnasiums and auditoriums, school yards, etc.);
- Hygiene standards (clean toilets, standards on how toilettes should be equipped, standards on school cafeterias, standards for schools as non-smoking zones, etc.);
- Safety standards (school as drug-free environment, standards on school monitors and safety officers, school yard safety standards, traffic standards in the vicinity of schools, etc.);
- Connection to utilities (electricity, drinking water, sewage, phones, Internet, etc.);
- Equipment standards (general, didactic, ICT equipment, etc.);
- Employees and student enrollment (employee/student ratios, number of employees and their profiles, optimal student enroll-

ment for a given school, number and profile of school administration, etc.);

- Standards regulating joint activities, joint administering or even merging with other local institutions (e.g. preschool, local library, local theater, etc.);
- Clustering of satellite schools (when should a school be central and when a satellite, to which central school should a satellite school be linked, can satellite schools cluster among themselves without a central school, etc.);
- Standards with respect to the rental of school space.

*Recommendation 6:*

It is not enough to define realistic standards - these must be followed by the prescribing of concrete mechanisms for monitoring, evaluating and correcting. In addition, it is necessary to precisely define chains of accountability and responsibility. One of the important reasons why the network of schools in Serbia is in the state it is in today, why it is not functioning efficiently, has to do with the lack of well thought out monitoring, evaluation and correction mechanisms.

*Recommendation 7:*

The educational system in Serbia needs to find a quick solution to the several dozen schools working in three shifts (Map 9). This number of schools is not high enough to make the problem intractable. The problem is the worst in Novi Pazar, where all of the city's six central schools work under these conditions. The opening up of only a small number of well positioned new schools in cities like Novi Pazar and Novi Sad can once and for all solve the problem of three shift schools.

*Recommendation 8:*

The several hundred central primary schools that already work in a single shift need to become the locations of pilot projects whose aim would be to probe the relative increase of pedagogic efficiency that results when switching from two shifts to one. These schools can become important "breeding grounds" for schools that are more completely integrated into their local communities.

*Recommendation 9:*

The public needs to be better informed about the problems facing the network of schools, as well as about the steps that are being taken to solve those problems - steps taken by central, regional and local educa-

tion authorities, by various educational institutions and representatives of civil society, by international agencies and foreign donors.

To do this it is important to organize the enabling of members of the media covering education issues and working at both the national and local levels. Through this widening of the number of journalists giving in-depth coverage of important educational issues it will become possible to sensitivize the population on such things as quality of education, hygiene in school, school safety, etc.

The imminent process of the legalization of local TV stations throughout Serbia has the potential of being very important for the education system. To be able to continue broadcasting these stations will be required to spend a part of their broadcast time on education issues. Education institutions need to be prepared for this moment. The widening of the number of capable journalists covering education is the first step that needs to be taken in order to make use of the opportunity that is opening up.

*Recommendation 10:*

The process of activation of the

population to take part in the bettering of the education system would be enhanced through the organizing of several campaigns that would be strongly backed by the media and that would have broad appeal to a large segment of the population. Several such public campaigns could immediately be organized, for example:

- "Clean Schools";
- "Schools on the Net";
- "Drug-free Schools".

*Recommendation 11:*

Some sought after change is possible on a short time scale, while other changes will take more time. It is imperative that the education authorities define an explicit plan of actions for those changes that can be done immediately. In most cases the role of the central authorities would be only to initiate the process, and to monitor where it is going. The majority of the work would be done at the local level (schools, local communities, local NGOs). An additional role of central authorities would be to inform the general public on these local initiatives and the individuals carrying them through.

### **E3. General conclusions regarding optimization**

The analysis of the state of the network of schools, and in particular that part of the network that deals with small schools (mostly small rural schools), as well as the concept of optimization strategies (strategies and models of optimization) that were developed within the current project make it possible for the reaching of a series of general conclusions and recommendations for the reconstructing of the network of schools in Serbia.

- (1) The creation of a network of schools in a country as the basic infrastructure of its educational system is a long lasting historic process. In Serbia it has lasted three centuries. By far the greatest intensity was from the 1860's to the 1970's.

An in-depth reconstruction of the existing network can also not be speedy. At least one decade is needed for a complete optimization process, however, the elimination of certain extreme anomalies in the functioning of the network can be achieved

in the next 2 to 3 years. Some speedy solutions, such as the decision to close down all or the majority of small schools because their per student cost of schooling being high, could be quite bad choices, even from a purely economic point of view, if one considers mid or long-term time scales.

- (2) Very precise calculations of the cost of education in all parts of the network of schools (gigantic inner city schools, small rural schools, special schools) are necessary and possible (this project has also developed certain formulas for the determining of associated financial cost and benefit). These precise calculations are also a very urgent need of all countries undergoing transition as well as of countries in economic crisis (as is Serbia). Taking into consideration all the parameters that need to be collected and analyzed in order to conduct informed decision making regarding the optimization of the network of schools, Serbia's Government needs to define

the level of development of the network of schools that the country can afford at its current level of economic development.

(3) The reduction of the concept of the optimization of the network of schools to that of the problems of its economic and financial rationalization would, on a longer time scale, have very negative economic consequences (a new impulse for the migration of the rural population, depopulation of some regions as well as the ensuing pressure on nearby cities, pause in the development of some parts of the country).

(4) However, already in the next couple of years it is possible to realize significant economic and financial savings (they may be calculated for each municipality) that include: a) the closing of a smaller number of schools when there exist clear reasons (particularly demographic) to do so, and b) application of several strategies defined in this project such as:

- Vertical linking of sectors

(pre-school education, primary education, education of adolescents and adults, even education for the "third age") which would bring about savings in space, administrative jobs, auxiliary staff, adequate use of human resources, etc.

- Territorial linking (inter-municipal linking, optimization plans for certain schools in the region): better use of space, savings in transportation costs for teachers and students, more efficient use of human resources (primarily of teachers), creation of unified regional mobile structures for professional assistance to local schools.
- Inter-sector merging (primarily spatial, staff and program merging of education, culture, sport and social welfare institutions).
- Modernization of educational concepts and, before all, the development of the concept of the local school as a center of local community development (school as local cultural center, school as a factor of social integration of all generations and all social, ethnic and cultural groups, school as the center of rural

development a role that it takes through the organizing of professional education of the local populace, taking part in the forming of the concept of local economic development, for example, in the development of ethno business, of the production ecological healthy food, in the development of rural, educational and family tourism, etc.).

- (5) This project has developed an extended concept of the optimization of the network of schools and includes some political and, above all, key education parameters.

In all the modern democratic societies the school must make possible equity and access to education for all of its citizens because in doing so it realizes one of the fundamental human rights. A well developed diverse and geographically spread-out network is the basic infrastructural instrument through which the universal right to education is guaranteed. In Serbia there exists that basic precondition to the

fulfilling of education equity and in the process of the reconstruction of the network of schools that achievement must not be seriously compromised. Through the reform of education that right to education would be extended to the universal right to quality education.

The extended optimization concept means that during the reconstruction of the network of schools it is necessary to significantly enhance educational effects, including the educational effects of that part of the network of schools that includes local networks of small schools (mostly located in rural areas). The educational effects of optimization would primarily be related to the enhancing of the quality of educational outcomes of those being taught as well as to the contribution of schools to local cultural, social and educational development.

- (6) This project has defined the goals of the optimization of the network of schools, the parameters that need to be taken into consideration

during optimization, strategies of optimization, specific possible models of optimization as well as the hierarchical levels on which decisions regarding optimization need to be made (including the model of participative and coordinated decision making in which each of those levels has a specific role to play and specific responsibilities).

In this way the project has defined quite a precise scheme (almost an algorithm or program) for reaching of optimal decisions regarding the optimization of the network of schools in Serbia.

If political decentralization (as defined in the law on local self-government, as well as, to a degree, in the current school legislature) and Serbia's spatial plan are taken as the basic frameworks for the optimization of the network of schools then it may be said that the conditions have been created for the reconstruction of the whole national network of schools, but also of regional, municipal (local) networks (in conjunction with

the maximally precise defining of locally relevant optimization parameters).

The next logical steps towards the practical application of this general scheme for the optimization of the network of schools would be the organizing of test case studies in certain municipalities in Serbia.

- (7) The project has defined specific optimization models of that part of the network of schools made up of small rural schools - the subnetwork most often targeted when discussing questions of economic efficiency and rationalization. On the basis of the optimization concept developed within this project, which take cognizance of both economic and educational efficiency, as well as of the contribution of schools to the development of their local communities, the project has defined the following optimization models: Continuing the maintaining of an existing school or group of local schools; Closing down of a local school; Transporta-

tion of students to a nearby school; Mobile teacher(s); Extending class teaching to the sixth grade; Elementary school – boarding school; Widening of the educational functions of a local school; Local school and nature classes; Local school as local cultural center; Local school – center of community development; Combination of models.

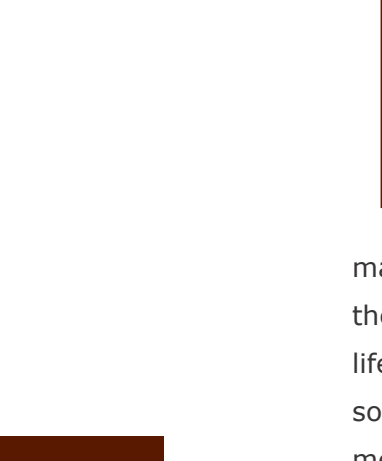
- (8) The application of the strategy of modernization of education (which was clearly explicated in section D of this report) as part of the conceived reform of education in Serbia would need to bring about changes within the educational system whose effect would be to increase educational efficiency and quality in all the parts of the network (and in a specific way described in this report to that part of the network that encompasses small rural schools).

The basic component of those changes within the education sector are:

- Guaranteeing of equity of access to quality educa-

tion through the defining of certain realizable national standards as well as through the application of models of “equity through diversity”.

- Enhancing of the quality of education in all its components (quality and relevancy of educational programs – including the flexible realization of national programs as well as the developing of local components of school programs; quality of learning environment – including the use of rich and diverse out of school environments; quality of educational resources – including both standard produced resources as well the creative use of local resources; quality of teaching staff – including the necessary level of teacher qualifications as well as specific forms of expert training; quality of teaching process – which implies the use of participative, interactive methods of teaching/learning and, above all and as a result of the previously mentioned components – quality of learning outcomes, e.g. the acquiring of stable and lasting competencies and life skills that



may be actively used in further education as well as in life outside of school, in personal life and in the development of the community).

In the concept of optimization that has been developed in this project quality education for all (as defined above) is the fundamental component of the optimization process even when dealing with economic and financial optimization on all but the shortest time scales.

**Briefly one can say that we are here dealing with a developmental, not a restrictive, concept of the optimization of the network of schools in Serbia.**

## F. APPENDICES

### F1. Education parameters in the project database

#### *Basic school parameters*

The following data is for the 2001/2002 school year and was gathered for all schools in Serbia excluding the territory of Kosovo. All of this data is available on-line on the project web site. It forms the on-line part of the project database. Each parameter may be searched or used to generate thematic maps via the GIS interface.

#### *Basic information:*

1. School coordinates  
(link to geographically keyed information in GIS system)
2. District
3. Municipality
4. Place  
(city, town or village)
5. Address
6. Name of school
7. School registration number
8. Telephone
9. Fax
10. Type of school  
(primary or secondary, central or satellite, regular or special, music school, ballet school, adult education, etc.)

11. Year founded
12. Status  
(working or not working)

#### *Student enrollment:*

13. Total enrollment
14. First grade enrollment
15. Second grade enrollment
16. Third grade enrollment
17. Fourth grade enrollment
18. Fifth grade enrollment
19. Sixth grade enrollment
20. Seventh grade enrollment
21. Eighth grade enrollment

#### *Information regarding teachers and other school employees:*

22. Teachers - fully engaged
23. Teachers - partially engaged
24. Expert staff - fully engaged
25. Expert staff - partially engaged
26. School administration
27. Additional expert staff
28. Technical and maintenance staff
29. Total number of employees
30. People engaged part time

#### *Classes:*

31. Total number of classes
32. Number of shifts
33. Classes in first shift
34. Classes in second shift
35. Classes in third shift
36. Number of multi grade classes

*Information on school space:*

37. School has its own building
38. Number of buildings
39. Number of satellite schools
40. Total area
41. Total area of teaching facilities
42. School library
43. Number of books
44. Number of school gyms
45. Total area of school gyms
46. Number of school auditoriums
47. Total area of auditoriums
48. Shop
49. Other schools using this space
50. Details of use by other schools
51. Renting of school space

*Connection to utilities:*

52. Drinking water
53. Type of heating
54. Type of toilets and sewage
55. Quality of electrical supply
56. Auxiliary power generator

*ICT infrastructure:*

57. Computer labs
58. PC's - Pentium 2 and newer
59. PC's - Pentium 1 and older
60. Older microcomputers
61. Type of telephone link
62. Internet connection
63. School web site

*Basic geographical data*

This geographical data is visible on-line on the project web site through the GIS interface. What follows is a partial list of available classes of geographical data.

*Borders*

(Federal, republic, province, district, municipality)

*Places*

(cities, towns and villages with population greater than 100)

*Shapes of cities and larger towns*

*Rivers, streams and lakes*

*Roads*

(five levels of classification)

*Railroads*

Additional information such as the locations of airports, power plants, dams, etc.

*Distances between points*

*Auxiliary school parameters*

This data is also from the 2001/2002 school year. It may be found only in the off-line version of the project database. Some of the data was left out of the on-line database because it is of interest only to a limited number of people. For example, the numbers of students in each class in each school for a given year is not of wide interest yet it substantially in-

creases the size of the database and speed of access. Another part of this data is not easily used because it full of erroneous inputs usually resulting from the ambiguities in the phrasing of specific questions in the utilized questionnaires. For example, many school administrators filling out the forms did not know the specific difference between 'classroom', 'specialized classroom', 'lab' and 'shop'. The same problem was with the filling out of items related to 'part time students', or 'self-financed students'.

At the same time, many of those filling out the questionnaires were lax in consistently filling in the unending details that were asked of them. This is particularly true of the way their entries on size distributions of classroom, labs, shops, etc.

Still, with all its problems, if used carefully, this data can be of use. For this reason we have left it in our offline database.

Here is a partial list of these parameters:

- Distribution of classrooms by area, their total area and number;
- Distribution of specialized class-

rooms by area, their total area and number;

- Distribution of labs by area, their total area and number;
- Distribution of shops by area, their total area and number;
- Number of regular students;
- Number of part time students;
- Number of self-financed students.

#### *Additional data for municipalities*

We have also used additional economic and demographic data. This data was of use, but it had many problems associated with it. The main problem with the demographics data is that it is one decade out of date, and no extrapolations are possible through a decade of conflicts that caused huge fluctuations in the population coming from civil wars, refugees, internally displaced people, out migrations, etc.

The official results of the 2001 census are still not available. This is quite unfortunate as it would have made possible the tracking of a whole number of very important educational parameters, particularly of disaggregated data such as the envelopment of various minorities in the primary education system, their drop out rates, educational

outcomes, etc. There seem to be problems with the census. We might have expected such problems due to the unclear status of part of the country (Kosovo), huge numbers of refugees many of whom are not registered, large numbers of internally displaced persons whom the censuses did not treat according to a unique methodology, etc.

It is quite possible that the best snapshot of the country's demographics may be had by looking at the data gathered in this project - the network of primary schools is a huge system and evenly distributed throughout the country, i.e. for many things it is an ideal representative sample. For example, it is quite easy to see innate demographic trends as well as geographical distributions of refugees by looking at such things as the time variations in school enrollment.

The problem with the economic data is that it is also out of date. The newest data was for 2000. One must remember that the democratic change in Serbia happened at the end of 2000, and ushered crucial change in the functioning of the economy. Also, 1999 was the year of NATO bombing of Serbia and economic data for 1999 and 2000

are quite unrepresentative of either Serbia's past or of its present state. This is particularly true if one looks at data at the municipality level, as we needed to. Viewed this way the numbers for 1999 and 2000 are totally unrelated, for all practical purposes they are random.

An even bigger problem is that the available economic data almost totally disregards the private sector, i.e. the assessments of the level of development of municipalities coming from this data is quite skewed. According to these numbers the highest per capita GDP is in the center of Belgrade (the result of the fact that most of the country's administration live here, and they are a part of the public sector), while the truly developed municipalities (those having strong private sectors) are often shown as underdeveloped.

For all of these reasons we used this additional data quite warily, and only after checking its consistency. This is the reason why we elected to keep this data only in the off-line version of the project database.

We end this appendix by giving a partial list of these additional demographic and economic parameters:

- Results of the 1971, 1981 and 1991 census, including the demographics (by municipalities) of the school age population, of minorities, the gender distribution, etc.
- Numbers of medical doctors and dentists in 1991;
- Number of employed in 1999 and 2000;
- Number of unemployed in 1999 and 2000;
- Per capita GDP in 1999 and 2000;
- Per capita budgetary expenditures in 1999 and 2000;
- Per student education expenditure in 1999 and 2000.



## **F2. Proposal for the future organizing of annual network monitoring and optimization**

There are almost 4,500 primary and secondary schools in Serbia. The current project has given the basis through which this extensive network of schools can make the first crucial steps in increasing the economic and pedagogic efficiency of its functioning. The project has gathered detailed information about the functioning of all the schools in the network, has developed an extensive education database, has mapped all school, has developed a new and extensive network optimization methodology, has isolated the burning problems challenging that network and has focused the network optimization methodology on the solving of those burning problems.

Much has been done, but even more remains to be done. Serbia's education system is now, for the first time in its long history, in the situation of basing the future reform of its network of schools on hard facts, not conjectures.

It is quite obvious that the efficient functioning of a large, branched out and diverse system like the network

of schools makes it necessary to have in place a system for its continuous monitoring and evaluation. This system could then be used by the education authorities to bring about continuous and inexpensive fine tuning of the network. The natural time scale for this monitoring is once per year - a time scale set up by the functioning of the schools.

The education database that has been developed here is modular, i.e. it can be easily expanded on. The expansion can be a horizontal broadening (increase of data about the network at a given time), but, even more importantly, it can be vertical (increase of number of time slices for which we have data). The system is there - what is important is to set up a body whose task would be to regularly acquire the necessary data, check its consistency, analyze it and input it into the database for each new school year.

The aim of this appendix is to give a proposal, based on the experience gathered during the implementation of this project on how that yearly monitoring should be set up.

The current situation is that only a very small number of schools in Serbia are on the Internet, in fact a siz-

able number of schools (particularly in some regions) do not even have a phone connection. This fact implies that for the next few years it will not be possible to collect information about schools in an on-line way.

In addition, our experience with the field work phase of our project is such that, even if this on-line work could be organized the education authorities should not do so in the next 5 years. The schools, particularly the smallest schools, have been out of contact with the central system for a long time, they need to be visited in person. This allows the simplest two-way exchange of information, makes possible the accumulation of data that is not easily quantifiable and builds confidence in the system as a whole.

How should these visits to the schools be organized? We feel that in the ensuing decentralization of education in Serbia the chief thing that should remain the job of the center is gathering, collating and disseminating of information about the education system. Serbia is not too large a country, making it possible to set up a small, efficient central data gathering unit. One of the most important consequence of such a monitoring is the simplicity of main-

taining a unique set of standards for data input and checking.

This kind of monitoring unit can either be part of the Ministry of Education, or better yet it can be constituted as an independent institution answering to the Ministry. This second choice would, most probably make the monitoring body function more efficiently by making it less susceptible to bureaucracy.

The estimates we make here are based on just such a network monitoring unit. The proposed unit would consist of 20 people organized into 10 two man teams. At a given time 2 members would be in the central offices/communication center, while 9 two man teams would be in the field. With proper transportation each of these teams can cover an average of 2 schools each working day. In this way the monitoring group would cover the whole network of schools once a year.

The whole process would be much cheaper if the mobile teams had at their disposal room and board facilities located in the 12 regional offices of the Ministry of Education.

The equipment for the mobile teams would be easily acquired. Each team

would have at its disposal one all terrain vehicle (making possible year round access to even the most remote schools), one laptop PC (all data would be directly input in electronic form - making it easy to check for consistency by comparing to the previous year's data), one digital camera (multimedia database of schools, teachers and students) and one GPS apparatus (for the precise localization of all schools).

The equipping of just such a monitoring team would not be very expensive and could easily come through a moderate sized foreign donation to Serbia's education system.


Each member of the team would need to be able to drive the all terrain vehicles and would need to go through a brief ICT enabling course.

The cost of maintaining such a monitoring team would also not be high. Our estimate is that the yearly cost would be below 200,000 Euro. The majority of this money would go towards the salaries of the 20 people. This estimate assumes that room and board for the mobile team members would be organized by the Ministry of Education. If not, the yearly cost would be more nearly 300,000 Euro.

We believe that this is an extremely small price to pay for having ongoing and consistent information regarding the functioning of a complex country-wide system such as the network of schools, a system serving 1,150,000 primary and secondary school students, a system employing 75,000 teachers working in almost 4,500 schools.

The information gathered by the monitoring group would bring about a much more efficient network of schools - the yearly savings would be far greater than the above mentioned price tag. In fact, the Ministry of Education could itself easily pay for all of these activities by reducing the number of people employed by it in some of its least efficient sectors - like its statistics sector. The network of schools would not be functioning at today's low level of efficiency if these sectors had done any kind of job in the last five decades.

The following appendix gives our proposal for a questionnaire that would be used by the mobile teams. We have designed the questionnaire as if it were in paper form. It would be even better, and easier to use if it was in the form of an electronic form - the form that we propose the mobile teams should in fact use.



What would be ideal is if all schools would get a paper copy of the basic questionnaire at the beginning of each school year. Their principles would then have plenty of time to gather all the needed information.

The mobile teams would then, according to some optimal schedule, come to each school and spend a relatively short amount of time filling out the electronic versions of the forms. Each mobile team would have a copy of the whole educational database for all the previous years - this would make it possible to immediately check the consistency of much of the data.

**F3. Proposed questionnaire for annual monitoring of the network**

**QUESTIONNAIRE FOR SCHOOL YEAR 2003/2004**

Data to be filled out by school principle or designated employee. **The school principle is the only person responsible for the data.**

**BASIC DATA**

This is the data for the specific school, be it a central or a satellite school (for example, in the case of a satellite school, under "municipality" fill out the appropriate information for that school not for the central school it is linked to).

01. NAME OF SCHOOL \_\_\_\_\_
02. SCHOOL REGISTRATION NUMBER
03. ADDRESS OF SCHOOL \_\_\_\_\_  
\_\_\_\_\_
04. NAME OF SETTLEMENT (city, town or village)  
\_\_\_\_\_
05. MUNICIPALITY (list of municipalities given)  
\_\_\_\_\_
06. DISTRICT (list of districts given)  
\_\_\_\_\_
07. SCHOOL DISTRICT (list of school districts given)  
\_\_\_\_\_
08. DOES SCHOOL HAVE ONE OR MORE TELEPHONES?  
(choose only one)
  - a. yes
  - b. no

09. CONTACT TELEPHONE

(this field is to be filled only if 08a has been chosen)

(format: area code – number)

10. DOES SCHOOL HAVE ONE OR MORE FAXES?

(choose only one)

- a. yes
- b. no

11. CONTACT FAX

(this field is to be filled out only if 10a has been chosen)

(format: area code – number)

12. DOES SCHOOL HAVE A WEB PRESENTATION?

(choose only one)

- a. yes
- b. no

13. HOME PAGE OF SCHOOL \_\_\_\_\_

(this field is to be filled out only if 12a has been chosen)

**ADDITIONAL DATA**

14. OWNERSHIP OF SCHOOL (choose only one)

- a. public
- b. private

15. YEAR SCHOOL WAS FOUNDED

16. TYPE OF ADMINISTRATION (choose only one)

- a. central
- b. satellite

17. TYPE OF SCHOOL (choose only one)

- a. eight year primary
- b. four year primary
- c. high school

- d. secondary vocational
- e. primary and secondary
- f. adult education
- g. special education

18. SCHOOL REGISTRATION NUMBER OF THE CENTRAL SCHOOL THAT THIS SCHOOL BELONGS TO

(to be filled out only for schools that have filled out 16b)

19. NUMBER OF SHIFTS SCHOOL WORKS IN (choose only one)

- a. one
- b. two
- c. three

20. PRINCIPLE LANGUAGE OF INSTRUCTION \_\_\_\_\_

(see instructions for complete list of possible answers)

21. SHORT TEXT DESCRIBING THE SCHOOL AND ITS ACTIVITIES

(up to 100 words)

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### **SCHOOL ADMINISTRATION**

22. NAME OF SCHOOL PRINCIPLE (first, last)

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23. PHOTOGRAPH OF SCHOOL PRINCIPLE

(attach bellow)



#### 24. CURRICULUM VITAE OF PRINCIPLE

- a. date of birth (day/month/year)  
□□ □□ □□□□
- b. place of birth \_\_\_\_\_
- c. date became principle (day/month/year)  
□□ □□ □□□□
- d. date tenure ends (day/month/year)  
□□ □□ □□□□
- e. primary education completed
- i. name of primary school  
\_\_\_\_\_
  - ii. address of elementary school  
\_\_\_\_\_
  - iii. year graduated □□□□
  - iv. average mark □.□  
(from 1 to 5 to one decimal place)
- f. secondary education completed
- i. name of secondary school  
\_\_\_\_\_
  - ii. address of secondary school  
\_\_\_\_\_
  - iii. year graduated □□□□
  - iv. average mark □.□  
(from 1 to 5 to one decimal place)

g. tertiary education completed

i. university faculty or higher school

\_\_\_\_\_

ii. address of school

\_\_\_\_\_

iii. year graduated

iv. average mark .

(from 5 to 10 to one decimal place)

v. title of diploma thesis

\_\_\_\_\_

vi. name of thesis mentor

\_\_\_\_\_

vii. score on thesis defense .

(from 5 to 10 to one decimal place)

g. higher academic degree (circle highest only)

i. none

ii. masters

iii. doctorate

h. university that granted the degree

\_\_\_\_\_

i. field in which degree was granted \_\_\_\_\_

j. in-service training courses completed

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

25. E-MAIL OF PRINCIPLE \_\_\_\_\_

(leave empty only if there is no e-mail)

26. CONTACT TELEPHONE OF PRINCIPLE

(to be filled out only if 08a has been chosen)

(format: area code - number)

27. HOME ADDRESS OF PRINCIPLE

\_\_\_\_\_

28. HOME TELEPHONE OF PRINCIPLE

(leave empty only if there is no number)

(format: area code - number)

(privacy issue: not to be displayed publicly)

29. NAME OF SCHOOL SECRETARY

(first, last) \_\_\_\_\_ , \_\_\_\_\_

30. E-MAIL OF SECRETARY \_\_\_\_\_

(leave empty only if there is no e-mail)

31. CONTACT TELEPHONE OF SECRETARY

(to be filled out only if 08a has been chosen)

(format: area code - number)

32. HOME ADDRESS OF SECRETARY

\_\_\_\_\_

33. HOME TELEPHONE OF SECRETARY

(leave empty only if there is no number)

(format: area code - number)

(privacy issue: not to be displayed publicly)

34. DESIGNATE EMPLOYEE RESPONSIBLE FOR SATELLITE SCHOOL (to be filled out only if 16b has been selected)

\_\_\_\_\_ , \_\_\_\_\_

35. CONTACT TELEPHONE OF DESIGNATED EMPLOYEE )

(to be filled out only if 08a has been selected)

(format: area code - number)

36. HOME ADDRESS OF DESIGNATED EMPLOYEE

\_\_\_\_\_

37. HOME TELEPHONE OF DESIGNATED EMPLOYEE

(leave empty only if there is no number)

(format: area code - number)

**(privacy issue: not to be displayed publicly)**

38. NUMBER OF ATTACHED SATELLITE SCHOOLS

(to be filled out only if 16a has been selected)

(note: this includes all satellite schools that are currently not working, but that have not been officially closed.)

39. LIST OF ALL ATTACHED SATELLITE SCHOOLS

(to be filled out only if 16a has been selected)

**Note, a separate sheet must be filled out for each satellite school** containing the following information:

a. NAME OF SATELLITE SCHOOL

\_\_\_\_\_

b. ADDRESS OF SATELLITE SCHOOL

\_\_\_\_\_

c. MUNICIPALITY WHERE SATELLITE SCHOOL IS  
LOCATED \_\_\_\_\_

d. TELEPHONE OF SATELLITE SCHOOL

(leave empty only if there is no number)

(format: area code - number)

e. IS SCHOOL ACTIVE IN CURRENT SCHOOL YEAR OR  
NOT (circle only one)

i. active

ii. inactive

f. NAME OF DESIGNATED EMPLOYEE RESPONSIBLE FOR  
SATELLITE SCHOOL

\_\_\_\_\_ / \_\_\_\_\_

g. HOME TELEPHONE OF DESIGNATED EMPLOYEE

(leave empty only if there is no number)

(format: area code - number)

**(privacy issue: not to be displayed publicly)**

## FACILITIES

40. BUILDING TITULAR (circle only one)
- a. school has title to all its space
  - b. school has title to some of the space it uses
  - c. school does not have title to space it uses
41. SHARING OF SPACE WITH OTHER SCHOOLS (circle one)
- a. school does not share space with other school or preschool institution
  - b. school shares part of the space with other school or preschool institution
  - c. school shares all the space with other school or preschool institution
42. RENTING OF SPACE TO OTHER INSTITUTIONS  
(not school or preschool institution) (circle only one)  
(to be filled out only if 40a or 40b have been chosen)
- a. space rented
  - b. space not rented
43. RENTING SPECIFICS  
(to be filled out only if 42a has been chosen)  
Note, a separate sheet must be filled out for each rental contract containing the following information:
- a. OFFICIAL NAME OF INSTITUTION RENTING SPACE FROM SCHOOL  
\_\_\_\_\_
  - b. CONTACT PERSON OF THAT INSTITUTION  
(first name, last name) \_\_\_\_\_ , \_\_\_\_\_
  - c. OFFICIAL ADDRESS OF THAT INSTITUTION  
\_\_\_\_\_

d. CONTACT TELEPHONE OF THAT INSTITUTION OR HOME TELEPHONE OF CONTACT PERSON

(format: area code – number)

□□□ □□□□□□□

e. TYPE OF ACTIVITY BEING CONDUCTED

\_\_\_\_\_

f. START OF RENTAL CONTRACT (day/month/year)

□□ □□ □□□□

g. EXPIRATION OF CONTRACT (day/month/year)

□□ □□ □□□□

h. TOTAL MONTHLY CHARGES □□□□□□ (dinars)

i. PERSON WHO SIGNED CONTRACT ON BEHALF OF SCHOOL (first, last) \_\_\_\_\_ , \_\_\_\_\_

j. PERSON WHO SIGNED CONTRACT ON BEHALF OF RENTIER (first, last) \_\_\_\_\_ , \_\_\_\_\_

k. DESCRIPTION OF SPACE BEING RENTED

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

l. AREA OF SPACE BEING RENTED □□□□

(square meters)

m. TIME OF DAY WHEN SAID SPACE IS BEING RENTED OUT \_\_\_\_\_

44. AREA OF SCHOOL (format: number, in square meters)

a. TEACHING AREA □□□□□

(all classrooms, specialized classrooms, shops and labs)

b. LIBRARY AREA □□□□□

(library, reading rooms, media rooms)

c. GYMNASIUMS □□□□□

- d. AUDITORIUMS
- e. ADDITIONAL SPACE FOR TEACHERS AND ADMINISTRATION
- f. AUXILIARY AND MAINTENANCE SPACE
- g. TOTAL OF ALL INDOOR SPACE
- h. AREA OF SCHOOL YARDS AND STADIUMS

45. INTERNAL ASSESSMENT OF THE QUALITY OF SCHOOL SPACE

(each item is given a mark from 1 lowest to 5 highest, detailed instructions are given on how to make this assessment)

- a. TEACHING AREA   
(all classrooms, specialized classrooms, shops and labs)
- b. LIBRARY AREA   
(library, reading rooms, media rooms)
- c. GYMNASIUMS
- d. AUDITORIUMS
- e. ADDITIONAL SPACE FOR TEACHERS AND ADMINISTRATION
- f. AUXILIARY AND MAINTENANCE SPACE
- g. TOTAL OF ALL INDOOR SPACE
- h. AREA OF SCHOOL YARDS AND STADIUMS

46. COMMENTS ON STATE OF SCHOOL SPACE

(300 words or less)

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47. INTERNAL ASSESSMENT OF SCHOOL FURNITURE

(item is given a mark from 1 lowest to 5 highest, detailed instructions are given on how to make this assessment)

**CONNECTION TO UTILITIES**

48. ELECTRICITY (circle only one)

- a. none
- b. inadequate
- c. adequate
- d. quality electrical connection

49. HEATING (circle only one)

- a. by classroom (wood and coal)
- b. by classroom (fuel)
- c. by classroom (electrical)
- d. central (wood and coal)
- e. central (fuel)
- f. central (gas)
- g. connection to city heating system

50. DRINKING WATER (circle only one)

- a. none
- b. from well
- c. from local water main
- d. from city water main

51. QUALITY OF DRINKING WATER IN WELLS

(to be filled out only if 50b was chosen)

- a. how often is quality checked

(format: months; leave empty if answer is 'never')

b. date of last check (day/month/year)

c. name of responsible person who analyzed water

(first, last) \_\_\_\_\_ , \_\_\_\_\_

d. contact address of institution that did analysis

\_\_\_\_\_

e. telephone number of that institution

(format: area code - number)

52. WASTE (circle only one)

- a. no septic tank
- b. school septic tank
- c. connection to city waste utility

53. TOILETS (circle only one)

- a. outhouse toilets
- b. indoor toilets (below standards)
- c. indoor toilets (up to standards)

54. NUMBER OF PHONE LINES (format: number)

55. QUALITY OF PHONE CONNECTION (circle only one)

- a. pulse only
- b. tone only
- c. mixed

### **SCHOOL EQUIPMENT**

56. NUMBER OF BOOKS IN SCHOOL LIBRARY

(format: number)

57. INTERNAL ASSESSMENT OF STATE OF BOOKS

(each item is given a mark from 1 lowest to 5 highest,  
detailed instructions are given on how to make this  
assessment)

- a. assessment of the number of books
- b. assessment of the state of books
- c. assessment of the types of books
- d. assessment of the book catalogues
- e. assessment of additional material   
(maps, records, multimedia)

58. COMPUTER EQUIPMENT USED BY STUDENTS

(format: number, fill out each field, if necessary with "0")

- a. number pre PC computers
- b. number of first generation PCs   
(386 or older)
- c. number of second generation PCs   
(486 to Pentium I)
- d. number of third generation PCs   
(Pentium II to Pentium IV)
- e. number of laser printers
- f. number of other printers   
(dot matrix or ink jet)
- g. number of video beams

59. COMPUTER EQUIPMENT USED BY SCHOOL ADMINISTRATION

(format: number, fill out each field, if necessary with "0")

- a. number pre PC computers
- b. number of first generation PCs   
(386 or older)
- c. number of second generation PCs   
(486 to Pentium I)
- d. number of third generation PCs   
(Pentium II to Pentium IV)
- e. number of laser printers
- f. number of other printers   
(dot matrix or ink jet)

60. LOCAL AREA NETWORK (circle one)

- a. none
- b. slower than 10 Mbps
- c. 10 Mbps
- d. 100 Mbps or higher

61. TYPE OF ACCESS TO INTERNET (circle one)

- a. none
- b. part time connection via modem (14400 bps or less)
- c. part time connection via modem (14400 – 33600 bps)
- d. part time connection via modem (33600 – 56600 bps)
- e. part time via ISDN
- f. full time connection (slower than 1 Mbps)
- g. fast full time connection (1 Mbps or faster)

62. NUMBER OF SCHOOL PCs THAT CAN ACCESS THE INTERNET

63. EMAIL (circle one)

- a. none
- b. administration has email
- c. all students and teachers have email

64. WEB SITE TYPE (circle one)

- a. none
- b. basic website
- c. website with student and teacher presentations

65. DO STUDENTS ADMINISTER SCHOOL WEB SITE?

- a. yes or partially
- b. no

66. INTERNAL ASSESSMENT OF THE QUALITY OF ICT EQUIPMENT

(each item is given a mark from 1 lowest to 5 highest, detailed instructions are given on how to make this assessment)

- a. COMPUTERS
- b. LOCAL AREA NETWORK
- c. ACCESS TO INTERNET
- d. WEB SITE
- e. GENERAL SOFTWARE
- f. EDUCATIONAL SOFTWARE

### **SAFETY AND HYGIENE**

#### **67. INTERNAL ASSESSMENT OF SCHOOL SAFETY**

(each item is given a mark from 1 lowest to 5 highest, detailed instructions are given on how to make this assessment)

- a. DRUGS
- b. ALCOHOL
- c. SMOKING
- d. FIGHTS
- e. BASIC SAFETY

(electricity outlets, traffic safety near school, etc.)

#### **68. INTERNAL ASSESSMENT OF TRENDS IN SCHOOL SAFETY OVER LAST 10 YEARS**

(each item is given a mark from 1 lowest to 5 highest, detailed instructions are given on how to make this assessment)

- a. DRUGS
- b. ALCOHOL
- c. SMOKING
- d. FIGHTS
- e. BASIC SAFETY

(electricity outlets, traffic safety near school, etc.)

69. INTERNAL ASSESSMENT OF SCHOOL HYGIENE

(each item is given a mark from 1 lowest to 5 highest, detailed instructions are given on how to make this assessment)

- a. ADEQUACY OF THE NUMBER TOILETS
- b. ADEQUACY OF THE TYPE OF TOILETS
- c. STATE OF TOILETS
- d. OVERALL CLEANLINESS OF SCHOOL
- e. CAFETERIA OR FACILITIES USED FOR LUNCH
- f. BASIC STUDENT HYGIENE
- g. COMPARISON OF HYGIENE LEVEL AT SCHOOL AND IN LOCAL COMMUNITY

70. INTERNAL ASSESSMENT OF TRENDS IN SCHOOL HYGIENE OVER LAST 10 YEARS

(each item is given a mark from 1 lowest to 5 highest, detailed instructions are given on how to make this assessment)

- a. NUMBER TOILETS
- b. TYPE OF TOILETS
- c. STATE OF TOILETS
- d. OVERALL CLEANLINESS OF SCHOOL
- e. CAFETERIA OR FACILITIES USED FOR LUNCH
- f. BASIC STUDENT HYGIENE
- g. COMPARISON OF HYGIENE LEVEL AT SCHOOL AND IN LOCAL COMMUNITY

**STUDENT ENROLLMENT**

71. NUMBER OF STUDENTS (fill each field, if need with "0")

The attached instructions give information on how to fill this item.

- a. number of strudents in preschool
- b. number of strudents in grade 1
- c. number of strudents in grade 2
- d. number of strudents in grade 3
- e. number of strudents in grade 4
- f. number of strudents in grade 5
- g. number of strudents in grade 6
- h. number of strudents in grade 7
- i. number of strudents in grade 8
- j. number of strudents in grade 9
- k. number of strudents in grade 10
- l. number of strudents in grade 11
- m. number of strudents in grade 12

72. NUMBER OF CLASSES

(format: number)

- a. in preschool
- b. in grade 1
- c. in grade 2
- d. in grade 3
- e. in grade 4
- f. in grade 5
- g. in grade 6
- h. in grade 7
- i. in grade 8
- j. in grade 9
- k. in grade 10
- l. in grade 11
- m. in grade 12
- n. number of mulit-grade classes

## SCHOOL EMPLOYEES

(each person belongs to one and only one category, e.g. if current principle used to be a teacher he or she now belongs only to the school administration category)

73. NUMBER OF TEACHERS (format: number)

a. full time employed

b. part time employed

74. NUMBER OF EXPERTS (format: number)

(school psychologist, pedagogue, librarian)

a. full time

b. part time

75. NUMBER EMPLOYED AS MAINTENANCE STAFF

76. NUMBER EMPLOYED IN SCHOOL ADMINISTRATION

## SCHOOL COMMENTS

77. THE BASIC PROBLEMS FACED BY THE SCHOOL AND  
POSSIBLE WAYS OF SOLVING THESE PROBLEMS

(200 words or less)

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78. NUMBER OF SEPARATE PAGES ATTACHED TO THIS BASIC  
FORM (answers to items 39 and 43)

**Note: staple all additional pages mentioned in item 78 to this basic document and form a single document. The document is considered void if the number of attached pages does not agree with the number in item 78.**

**STATEMENT OF SCHOOL PRINCIPLE OR OF DESIGNATED RESPONSIBLE EMPLOYEE (In case of satellite school):**

I confirm that the above data is true as of the date given bellow. I understand that and all inaccurate or incomplete information is my sole responsibility. I understand that not filling out, completing and returning this form constitutes a serious breach of job obligation.

\_\_\_\_\_  
NAME (first, last)

\_\_\_\_\_  
SIGNATURE

DATE (day/month/year)

This general form is accompanied by detailed instructions on how to fill out each item. In addition, the filling out is made easier by the addition of template of a filled out form has also been sent out with this form. Additional information about the filling out and sending of this form can be found at:

TELEPHONE

(service available from every working day from 9:00 to 17:00)

WEB SITE

The principle property of this kind of questionnaire is that it would enable the gathering of the same data as was amassed by our project for the 2001/2002 school year. The better design of the questionnaire, however, would immensely simplify the checking of data consistency and the ultimate input of the data into an integrated education database. The current form for the proposed questionnaire is a result of several important lessons learned from the old questionnaires designed by the Ministry of Education:

- The new questionnaire is of a true multiple choice variety. Items in previously questionnaires could often be answered by circling more than one response. This kind of structure is often connected with questions that have not been fully thought out. It also makes automatic data checking more difficult.
- The old questionnaires, even when they gave a disjoint set of possible responses always tacked on at the end a further option that could be chosen, an option designated as "other". Not surprisingly, most people filling out the questionnaires chose this option. The new form does not have this option and makes automatic processing possible.

The introducing of "other" as a response simply means that the authors of previous questionnaires did not think through what all the possible relevant answers would be, i.e. they displayed their lack of knowledge of the system being analyzed.

- The old forms gave no templates and few guides that would help in filling out the many questions. In addition, the guides, when they existed, were often ambiguous. The result was predictable - a huge proportion of the answers were to questions that were not being asked. Some of these answers could in fact be salvaged, through a slow and painstaking process. Many of the answers were totally useless.
- The old questionnaires asked many unnecessary details, yet sought no information about items that are crucial to the functioning of the school (safety issues, hygiene, assessment of chief problems, etc.).
- The old questionnaires did not explicitly designate the individual responsibility for completing and sending out of forms or for the data being complete and true. As a result almost 30% of schools did not respond to the Ministry's questionnaires.

#### **F4. Present and future follow-up projects and initiatives**

During the work on network optimization the project's teams also contributed to several other projects that were initiated independently, but that to a large degree depended on information gathered in our education database. We give here only a brief list of the projects that have already been completed:

- Database of UNICEF's educational programs in Serbia. The network optimization computing team has completed the implementing of the first phase of this project. We are currently discussing with UNICEF work on the project's second phase which would introduce another level to the database and would tie it to our web based GIS engine. The ultimate aim is that this database contain all educational project's in Serbia, not just UNICEF's and that it be extended to include a web based monitoring and evaluation component. Ultimately, the idea is to tie this database to the network of schools database.
- Gender balance in Serbia's primary schools. This is a small, though much needed, stand alone project of UNICEF. One of its chief starting points was the data collected in our project database regarding gender balance.
- Donation of school furniture for the Sandžak region. This joint UNICEF/Luxembourg project was implemented directly after the completion of the field work phase of the network optimization project, in particular after our visit to the schools in Sjenica and Novi Pazar. The project database was used to make an assessment of furniture needed. As a result, an average of 50% of the school furniture in the region is now new. The donation particularly targeted the smallest schools. These schools had all of their old furniture exchanged for new.
- Donation of books to small schools by the government of Norway. The project database was used to determine which schools would get the donations of the translations into Serbian of children's books written by several well known Norwegian authors.
- The building of a school in Novi Pazar. We were contacted by the representatives of this joint Luxembourg/Belgium initiative during our stay in Novi Pazar.

The information offered to them helped determine the details for the implementation of their project. As we have seen in this document Novi Pazar is in the worst situation in the country with respect to large central schools working in three shifts. For this reason the building of even one additional school should measurably help the city to better organize the delivery of primary education.

- Distribution of PC equipment. The project database was used on behalf of the Ministry of Education to help them determine how to distribute donations of PC equipment to secondary schools based on the current level of ICT equipment in these schools.
- Local project initiatives gathered during field work phase. The project team collected these local initiatives and in some cases helped in formulating these initiatives into well thought out project proposals. Several dozen such local initiatives were gathered and all were presented to UNICEF for their support. We hope that a way will be found to realize these worthy initiatives.

In addition to these projects there is a host of direct future follow-up ac-

tivities that we are aiming for:

- Printing of a brochure of project findings and its distribution to all teachers in Serbia.
- Help to the Ministry of Education with the implementing of procedures for the optimization of Serbia's secondary school network.
- Participating in the in-depth municipality level optimization of schools related to the decentralization of education process. Our partners here would be the Ministry of Education and the local government.
- Training of staff employed in several sectors of Serbia's government for the use of GIS in the monitoring and optimizing of complex systems such as the country's network of schools.
- Training teachers for work in small schools. This is a direct consequence of two of Education Forum's biggest projects - the network optimization project and the Active teaching/learning project.
- Connection of this project with the national project for poverty reduction (by utilizing and strengthening the capacities of schools to serve as centers of their local communities).

These current and future follow-ups are direct consequences of the completed network optimization project. Each is important in its own right, each represents steps that need to be taken within the overall education reform process. There are, however, two broader sets of paths that we see as the most important extensions of network optimization, and that will certainly take up more of the time of the experts gathered within the Education Forum in the years to come. We will give here only a brief introduction to them.

*General directions - regional projects and rural development*

The principle character of the Education Forum's approach to network optimization was the attempt to reach out across sector boundaries. This is a direct result of the fact that the functioning of the network of schools affects and is affected by, in varying degree, not only the sector of education but that of agriculture, culture, tourism, economy and finances, and many others.

Having completed the network optimization project there are two general directions in which to go. One direction open to us is to build on acquired expertise, extend the project

to other countries and thereby offer the possibility of treating a wider region within a unique methodological and technological framework. The other is to target specific parts of Serbia's network (determined either geographically or functionally) and try to upgrade them. The principle identified impediment to the efficient functioning of the network of schools in Serbia is the organizing and functioning of extremely small schools in what are usually underdeveloped and remote rural areas. The isolating of this major problem, and the classifying of small schools according to available strategies for their more efficient functioning, has rather naturally opened up a new task for us – the linking of education with rural development.

Of the two directions before us one expands the picture to encompass the wider region, while the other zooms in on a specific important problem, that of finding new ways for the organizing of education in rural areas. The two roads are not as divergent as they seem at first hand, and the aim of the Education Forum is to make important contributions in both of these directions.

The problems related to rural education faced by Serbia are shared by

all the countries of the region. At the same time, the solution of certain of these problems is either impossible or difficult without approaching them from a wider, regional perspective. Our focus on education has brought us to a unique picture of the future of Southeast Europe as a truly integrated "region of regions".

During the concluding phase of the network optimization project we had very useful talks with representatives of FAO as well as of the Faculty of Agriculture of the University of Belgrade. In these talks we found that we have come to identical conclusions having started from different points. The FAO representatives were shaping their mission in Serbia and came to the conclusion that this is an agriculturally developed country and that their primary contribution to it should be in rural development. They then correctly identified education as the principle pivot that is to be used to bring about that rural development.

The Education Forum came to the same conclusions having started from education, rather than agriculture. Our point of view was chiefly shaped by UNESCO and UNICEF documents whose aim was to determine

ways and available means for the bettering of educational quality, relevance, availability, equity and efficiency. Already by the end of the "Comprehensive Analysis of Primary Education in FRY" we had come to a general feeling that in Serbia these goals may be achieved by anchoring the education enhancing process to that of the development of Serbia's rural communities.

The merging of these two paths toward the same goal was not an accident as it only slightly predated the recently completed World Summit on Sustainable Development. The summit was held in September 2002 in Johannesburg and saw the launching of a new FAO/UNESCO Flagship Program on "Education for Rural People". In his address FAO's Director General laid emphasis on the following key features of the new program:

- The education of rural people needs to be placed at the core of National Plans for Education for All. This must be accompanied by the strengthening of institutional capacity to do this.
- It is necessary to expand access to quality education in rural communities. Among the most important tools for doing this he specifically mentioned:

information and communication technology, distance education, life long education and flexible school calendars.

- Ways must be sought to improve relevance of what is being taught to rural needs and interests. This is primarily to be done through: support of participatory curriculum development, teacher training, and the fostering of skills for life in a rural environment.

The focal point for the activities encompassed by this Flagship Program is to be the building of partnerships that are to include governments, international organizations, UN agencies, civil society, local initiatives and the private sector.

More than ever before education is seen as the pivotal prerequisite for poverty reduction and sustainable development. We believe that the network optimization project offers a strong starting point for Serbia to take an active role in this new program.

We believe that the partnership between the three institutions that made the network optimization project possible (Education Forum, Serbia's Ministry of Education and UNICEF) is a concrete example of

the kind of partnerships needed between civil society, governments and international agencies - the kind of partnership and cooperation that will be needed in the future if we are to be truly successful.



## **F5. Project material available in electronic form**

One of the central aims of the project was to make the data on the state of the network of schools available to all educational stakeholders. The best way to do this, we believe, was to make the project's results available in electronic form. For this reason the project was build around a web-centered database.

The project database was planned as the first important module of a future integrated education information system. Therefore, the central requirement was to make that database easily portable to that future system, i.e. that it not be based on non-standard software, or on software solutions that are not easily scalable. A further important goal was to make that web document into a tool that would help education authorities in Serbia to monitor the future state of the network of schools on a regular basis, as well as to use the obtained data as a basis for the continued optimizing of the network's functioning.

The project's database runs on a Linux platform and is written in MySQL. The web-database interface is through PHP. Ease of use as a

planning tool is achieved through a web-GIS interface. As a result, it is possible not only to search the database through standard queries, but also to display the results of those queries geographically. The project's home page is located at:

<http://www.obrazovanje.eu.org/>

Associated web sites that have additional information related to the current project, and that are also a part of the Education Forum's web space are:

<http://www.eforum.eu.org/>

<http://www.braindrain.eu.org/>

<http://www.aktivnoucenje.eu.org/>

<http://www.klinici.eu.org/>

The complete version of the current document, in English and Serbian languages respectively, can be found in Adobe PDF format at:

<http://www.obrazovanje.eu.org/network.pdf>, and at:

<http://www.obrazovanje.eu.org/mreza.pdf>

The school network optimization project also has a DVD presentation of the results of the project, as well as a database of 1,500 photographs of Serbian schools. More information about this and other related documents may be found on the project web site.



## **F6. Media visibility of the project**

The current document is the work of a large number of individuals, experts in a variety of relevant fields (see Appendix F7). As such, it necessarily bears the touch of their expertise but also of their individualities. When all of these individual threads of activity started coming together, however, it soon became apparent that the final product would carry a strong link to the basic visions and attitudes of the institution behind it - of the Education Forum.

One of the places where this is most apparent is in the project's insistence on strong informational ties to educational stakeholders and the public in general. This was done through the Education Forum's regular news conferences, through media activity of individual members, associates and the members of Education Forum's regional offices, through official statements given to the media on current phases of the realization of the project, and through the organizing of a host of public debates.

As a result, the project started with the belief that one of the key points in the reform and optimization of the education system in Serbia, and

the functioning of the network of its schools in particular, is to inform, motivate and involve all the different stakeholders: students, teachers, parents, school administrators, various representatives of the local government and of local businesses, etc. One of the principle ways to do this was through meetings with interested parties that were held during the project's field work phase. The other was to nurture a continued and rich interaction with the media covering education issues, both at the level of the country and at the local level. The chief aspect of that interaction was to give journalists direct contact with the project and to give them timely access to all the data gathered by the project.

The Education Forum's regular monthly news conferences have been one way of keeping the public appraise of the project's aims and the dynamics of its implementation. Several of these news conferences have solely been devoted to the current project. This has resulted in a large number of interviews in the media (TV, radio, newspapers) which were focused on the project.

One of the most interesting meetings was the one in which the project teams met with representatives

of the Education Forum's 12 regional offices as a preliminary to the organizing of future field work. The members of the media that were present did not just cover the meeting, but played a much more interactive role. The ideas brought up at this meeting strongly influenced the field work phase of the project.

Here is only a partial list of news articles about the project that appeared in Serbian media during the project's first eight months:

Danas, 4 October 2002  
Glas Javnosti, 4 October 2002  
RTS II, November 2002  
TV Politika, 16 November 2002  
TV B92, 16 November 2002  
Danas, 3 June 2002  
Danas, 14 June 2002  
Glas Javnosti, 26 July 2002  
Radio Beograd II, 29 July 2002  
Politika, 29 July 2002  
Politika, 30 July 2002  
Politika, 31 July 2002

In addition to informing the public about the project it was important to inform the key institutions involved in its realization – the Ministry of Education and UNICEF, as well as the representatives of other international institutions and of individual countries serving as donors to Serbia's education system. We have had

the following visits related to the current project:

*Ministry of Education:*

Prof. dr Gašo Knežević, Minister  
Ž. Popov, Vice Minister  
V. Majić, (former) Vice Minister  
Prof. dr T. Kovač-Cerović,  
Deputy Minister  
Prof. dr R. Šećibović,  
Deputy Minister  
Prof. dr S. Turajlić,  
Deputy Minister

*UNICEF, Belgrade Office:*

J. M. Delmotte, Head of Office  
dr M. Black, Project Coordinator  
S. Marojević, Education Officer  
V. Vukojević,  
Monitoring and Evaluation

*Other institutions:*

S. Uvalić-Trumbić, UNESCO, Paris  
J. Stevens, World Bank  
T. Bassler, Open Society Education Programs for South East Europe  
I. Halbritter, Dadalus, Sarajevo  
T. Počuča, European Agency for Reconstruction  
T. Levitas, Development Alternatives, Inc.  
M. Mertough, Development Alternatives, Inc.  
A. Pichvai, CILC, Brussels  
A. Mulhall, ITAD, UK  
A. Zamberlin, FAO

## **F7. Members of the project's expert teams and their affiliations**

### **a) Authors**

*dr Aleksandar Bogojević,  
Education Forum, Executive Director;  
Institute of Physics*

(Author of sections A, B and F, co-author of section E and of the project's DVD presentation)

*Prof. dr Ivan Ivić,  
Education Forum, President;  
Institute of Psychology*

(Author of sections C and D and co-author of section E)

*Raša Karapandža,  
Faculty of Mathematics*

(Author of the project's web based educational information system, co-author of the project's DVD presentation)

### **b) Core team**

The project's core team consisted of seven experts who in various ways significantly contributed to the project throughout its duration. In addition to the above mentioned authors the project's core team consisted of:

*dr Aleksandar Belić,  
Institute of Physics;  
Ministry of Science, Deputy Minister*

(Computer modeling and GIS)

*dr Ana Pešikan, Institute of Psychology;  
Education Forum*

(Coordinator of experts taking part in the project. Final revision of this document)

*Prof. dr Ratko Jankov, Faculty of  
Chemistry; Education Forum*

(Coordination of external consultants. Coordination of activities with Education Forum's regional offices)

Photograph:

Offices of Urban-In, in Novi Pazar. Twelve independent NGO's such as this one form the regional offices of the Education Forum located throughout Serbia.

The regional offices helped organize the project's field work activities and helped get follow-up information about the schools visited. In addition, they were of assistance to the schools visited in formulating their initiatives into project proposals.





Photographs:

Top:

Karl Jan Solstad is a senior researcher at Nordland Institute in Norway. dr Solstad visited Serbia at the invitation of the Education Forum in late June 2002. His field of expertise is focused on issues of educational quality and equity in small rural schools. He has written several books on the topic and has had extensive experience with small schools in Norway, Scotland and England, as well as in Africa.

During his stay dr Solstad participated in several meetings with the project's team of experts and presented important information on various issues related to organization of teaching in small schools, training of teachers for these roles, educational outcomes of children from small schools, etc. dr Solstad gave several noted interviews to Serbian media. The journalists were most interested in details about Norway's education system, particularly its curriculum, as well as on dr Soldstad role in the network optimization project.

Right:

Meeting of the project's teams in June 2002. Left to right: Prof dr Milena Dragičević - Šešić, dr Ana Pešikan, Prof. dr Ivan Ivić, dr Aleksandar Belić.



*Antun Balaž, Institute of Physics*

(Development of project database. Coordination of data input and consistency.)

### **c) List of experts that participated in project discussions**

*dr Mirosinka Dinkić,*

G17 Institute, Head of Social Policy; Education Forum

*Vigor Majić,* Petnica Science Center; former Vice Minister of Education

*Prof. dr Refik Šećibović,*

Ministry of Education, Deputy Minister; Faculty of Economics,

*Prof. dr Milena Dragičević-Šešić,*

University of Arts, Rector; Education Forum

*Iskra Maksimović,* Catholic Relief

Services; Education Forum

*Prof. dr Gordana Zindović-Vukadinović*, Faculty of Geography; Education Forum, Head of the National Forum for Education for All

*Prof. dr Ljubiša Rajić*, Faculty of Philology; Education Forum

*Prof. dr Snežana Medić*, Faculty of Philosophy; Education Forum

*Prof. dr Sulejman Hrnjica*, Faculty of Philosophy

*Prof. dr Verka Jovanović*, Faculty of Geo-economics, Dean

*Ilija Jurić*, Ministry of Education

*Ivana Zlatanović*, Ministry of Education, Head of Statistics

*dr Dijana Plut*, Instit. of Psychology

#### **d) Consultants**

*Radiša Đorđević*, school supervisor, Alka - Education Forum Regional Office in Požarevac

*Ana Novković*, Focid - Education Forum Regional Office in Kovin

*Aida Ćorović*, Urban In - Education Forum Regional Office in Novi Pazar



Photograph:

dr Steve A. Quarrie, Consultant to the Faculty of Agriculture at a meeting held in September 2002 at the Education Forum with the network optimization expert team, representatives of FAO and of the Faculty of Agriculture. The meeting's participants stressed various possible additional roles that rural schools could play in order to serve as centers of future rural development. The meeting focused on pilot projects for rural development in three different regions identified by the network optimization project.

*Prof. dr Goran Đorđević*, Faculty of Natural Sciences, Niš

*Prof. dr Jasna Soldić-Aleksić*, Ministry of Education; Faculty of Economy

*Dragiša Bjeloglav*, Strategic Marketing and Media Research Institute, Research Director

*Dušan Vitorović,*  
Geomatics, Director

*Aleksandar Štrumberger,*  
Geomatics

*Milan Todorović,*  
Mikrokom, Director

*Prof. dr Zora Dajić,*  
Faculty of Agriculture

*Aleksandra Zamberlin,*  
FAO, National Policy Assistant

*Jovanka Sečanski,*  
Šlos - Golubinci

### **e) External consultants**

*dr Karl Jan Solstad,*  
Nordland Institute, Norway

*Svetlana Marojević,*  
UNICEF, Belgrade Office

*dr Steve A. Quarrie,*  
Faculty of Agriculture, Consultant

*Prof. dr Sofija Pekić,*  
Faculty of Agriculture, Dean

*Prof. dr Vesna Poleksić,*  
Faculty of Agriculture, Vice Dean



Photographs:

Top:

Jean Michell Delmotte, Head of the Belgrade office of UNICEF during a visit to the Education Forum in February 2002.

Left:

dr Mary Black (left) and Svetana Marojević (right) from UNICEF during a visit to the Education Forum in April 2002.



Photographs:

Presentation of the final results of the network optimization project to the Ministry of Education and to UNICEF. Education Forum, November 25, 2002.

Top:

Prof. dr Gordana Zindović - Vukadinović, Head of the National Forum for Education for All, member of the Education Forum (left), Prof. dr Refik Šećibović, Ministry of Education, Deputy Minister (right).



Right:

Prof. dr Gašo Knežević, Minister of Education (left) and Želimir Popov, Vice Minister of Education (right).



Bottom:

dr Aleksandar Bogojević, Head of Project (left), Jean Michell Delmotte, Head of the Belgrade Office of UNICEF (center), Prof. dr Ivan Ivić, President of the Education Forum.

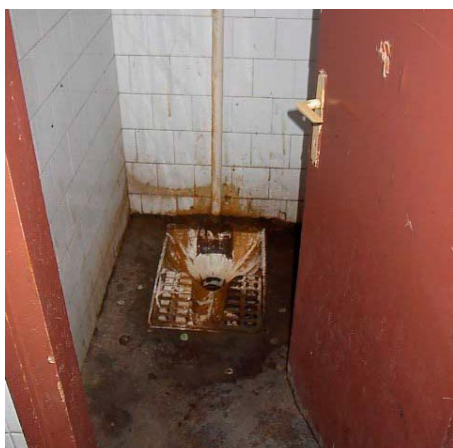




## F8. Gallery of school toilets

The first step in solving a problem is in seeing it clearly, particularly its less palatable parts. If we are, therefore, indeed wanting to implement reform and not just talk about it then our heads must not remain buried in the sand. These pictures were not chosen exclusively for their shock value. They are not extreme examples but typical ones.

We shouldn't be apprehensive of displaying these pictures publicly as we've not been apprehensive in having our children see this each an every school day.





Not all schools are like this. Working under the same economic difficulties, some perfectly ordinary schools have offered their children quite a different learning environment - for school toilets are a part of the learning environment just as much as classrooms and science labs.



## **G. FIGURE AND MAP CAPTIONS**

Figure 1:

Number of primary schools from 1960 to 2000.

Figure 2:

Number of secondary schools from 1960 to 2000.

Figure 3:

Number of students enrolled in primary schools from 1960 to 2000.

Figure 4:

Number of students enrolled in secondary schools from 1960 to 2000.

Figure 5:

Number of teachers working in primary schools from 1960 to 2000.

Figure 6:

Number of teachers working in secondary schools from 1960 to 2000.

Figure 7:

Student/teacher ratio for primary schools from 1960 to 2000.

Figure 8:

Distribution of central schools according to their student enrollment (2001/2002 school year).

Figure 9:

Distribution of satellite schools according to their student enrollment (2001/2002 school year).

Figure 10:

Distribution of existing central schools according to the year they were founded.

Figure 11:

Distribution of existing secondary schools according to the year they were founded.

Figure 12:

Number of students that finished primary school and obtained a degree in a given year from 1970 to 2000. Data for Central Serbia and Vojvodina is shown in blue, data for Kosovo is shown in red.

Figure 13:

Number of students that finished secondary school and obtained a degree in a given year from 1970 to 2000. Data for Central Serbia and Vojvodina is shown in blue, data for Kosovo is shown in red.

Figure 14:

Percent of enrolled students that obtained a primary school degree in a given generation from 1970 to 2000.

Figure 15:  
Percent of enrolled students that obtained a secondary school degree in a given generation from 1970 to 2000.

Figure 16:  
Percent of primary school graduates that went on to obtain a secondary school diploma (four years later) from 1970 to 2000.

Figure 17:  
Distribution of classrooms according to the number of students in them for central schools (2001/2002 school year).

Figure 18:  
Distribution of classrooms according to the number of students in them for satellite schools (2001/2002 school year).

Figure 19:  
Distribution of classrooms according to the number of students in them for secondary schools (2001/2002 school year).

Figure 20:  
Central schools: electrical power, drinking water, toilets and sewage.

Figure 21:  
Satellite schools: electrical power,

drinking water, toilets and sewage.

Figure 22:  
Special schools: electrical power, drinking water, toilets and sewage.

Figure 23:  
Art schools: electrical power, drinking water, toilets and sewage.

Figure 24:  
Secondary schools: electrical power, drinking water, toilets and sewage.

Figure 25:  
The histogram of the number of books per student in central school libraries. The distribution is peaked at 17 books per student, while the average number of books per student is 20.4. The average number of books in these libraries is 8245.

Figure 26:  
The number of books per student in central schools depends on the total student enrollment. The dependency is quite noisy, however, one does see that in general smaller central schools are favoured with respect to this parameter. The red line on this log-log plot shows the effective dependence to be a power law: the number of books per student is inversely proportional to the square

root of the total number of students. Though simple, this strange result is certainly not the consequence of any educational standard.

Figure 27:

The histogram of the number of books per student in school libraries for satellite schools. The distribution fits an exponential decay law, e.g. there are very few satellite schools with a relatively large number of books. On the average satellite school libraries have 909 books. The average number of books per student is 24.9, a bit more than in central schools).

Figure 28:

The relation between the number of books per student and the total student enrollment in satellite schools (2001/2002 school year). There is in fact no correlation between the two parameters. This just shows that there do not exist any school standards related to the number of books.

Figure 29:

Relation between the total number of school employees and the corresponding student enrollment for central schools (2001/2002 school year).

Figure 30:

Relation between the total number of school employees and the corresponding student enrollment for satellite schools (2001/2002 school year).

Figure 31:

Relation between school area and student enrollment for central schools (2001/2002 school year).

Figure 32:

Relation between school area and student enrollment for satellite schools (2001/2002 school year).

Figure 33:

Simplified monthly per student cost estimate for central and satellite schools.

Map 1:

Schools with electrical power problems. Black triangles denote schools without electricity, green triangles represent schools with an inadequate power hookup (2001/2002 school year).

Map 2:

Schools without drinking water. Larger circles denote higher concentrations of such schools (2001/2002 school year).

Map 3:

Distribution of schools with only out-house toilets, not possessing septic tanks. Larger circles denote higher concentrations of such schools (2001/2002 school year).

Map 4:

Percent of schools in a given municipality that have a telephone connection (2001/2002 school year).

Map 5:

Distribution of schools currently not working (2001/2002 school year). Larger circles denote higher concentrations of such schools.

Map 6:

Distribution of schools with total enrollment less than or equal 10 students. Larger circles denote higher concentrations of such schools (2001/2002 school year).

Map 7:

Distribution of satellite schools. Larger circles denote higher concentrations of such schools (2001/2002 school year).

Map 8:

Central schools working in only one shift. The only place that has more than one such school is Belgrade (2001/2002 school year).

Map 9:

Central schools working in three shifts. The largest concentrations of such schools are in Novi Pazar and Novi Sad (2001/2002 school year).

Map 10:

Municipalities with greatest number of multi-grade classrooms (2001/2002 school year).

Map 11:

Municipality level data documenting the relative decrease of the number of primary school students in an eight year period (2001/2002 school year).

Map 12:

Distribution of special schools (for special needs children). Larger circles denote higher concentrations of such schools (2001/2002 school year).

Map 13:

Distribution of art schools (primary music or ballet schools). Larger circles denote higher concentrations of such schools (2001/2002 school year).

Map 14:

Distribution of high schools. Larger circles denote higher concentrations of such schools (2001/2002).

Map 15:

Distribution of vocational education schools. Larger circles denote higher concentrations of such schools (2001/2002 school year).

Map 16:

Percent of girls in Serbia's primary schools averaged by municipality. In the 2001/2002 school year girls represented 48.66% of all enrolled primary school students.

Map 17:

Number of books in the school library per student averaged over a given municipality (2001/2002 school year).

Map 18:

Distribution of schools with a permanent connection to the Internet (2001/2002 school year).

Map 19:

Distribution of schools with a part time (modem) connection to the Internet (2001/2002 school year).

Map 20:

Municipality average of the number students per PC. This map shows the distribution of older generation PC's, e.g. Pentium 1 and older (2001/2002 school year).

Map 21:

Municipality average of the number students per PC. This map shows the distribution of newer generation PC's, e.g. Pentium 2 and newer (2001/2002 school year).

Map 22:

Municipality average of the number of primary school students per school employee (2001/2002 school year).

Map 23:

Age of central schools averaged by municipality (2001/2002 school year).

Map 24:


Schools and roads in the Soko Banja municipality. All the satellite schools in the municipality are attached to a single central school (2001/2002 school year).

Map 25:

Schools and roads in the Žabari municipality. The municipality has two central schools. Circles denote catchment areas for these two central schools (2001/2002 school year).

Map 26:

Schools and roads in the Crna Trava municipality. Crna Trava has the



smallest population of any municipality in Serbia. The single central school has a third of the student enrollment of the average small central school (2001/2002 school year).

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