

branched out networks in their own right. Map 14 shows the locations of high schools, while Map 15 gives the locations of the country's vocational education schools.

### *Gender balance*

We end our very brief excursion away from the network of primary schools. In returning we wish to focus on an important parameter related to educational equity. In the country as a whole girls are only slightly under represented. In the 2001/2002 school year girls made up 48.66% of the total primary school population.

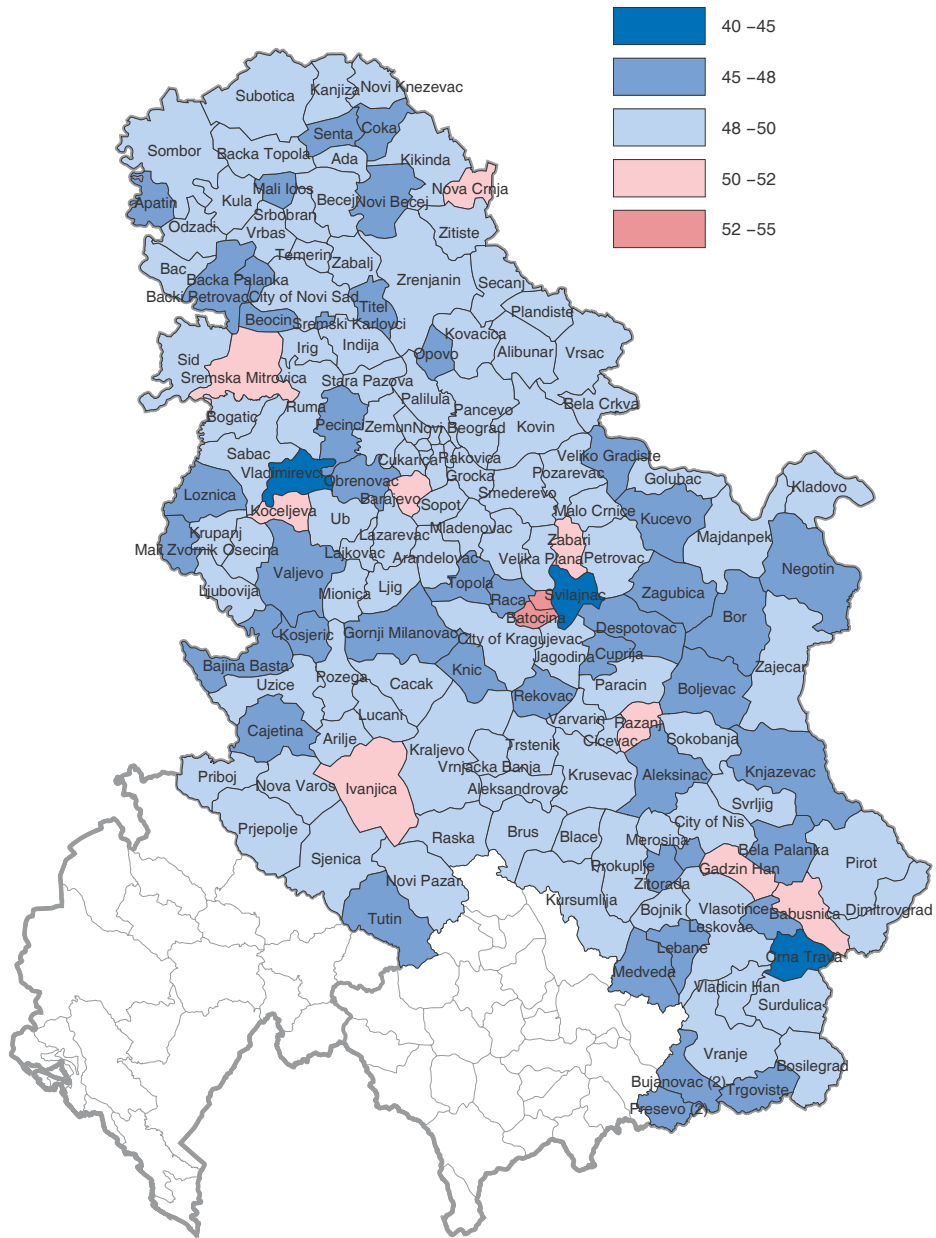
Map 16 gives the percent of girls in Serbia's primary schools as an average by municipality. From the map we see that the country's primary education system is to a good approximation gender neutral, and that this property is to a high degree valid throughout the country. Gender neutrality may probably be thought of as the second most important achievement of the post World War II period (1945-1990), i.e. the period of communist rule in Serbia (the first and related achievement being the high rate of envelopment of the population in eight year primary education).

The fact that Serbian primary education has remained gender neutral through the decade of permanent crisis is an important testament to the resiliency of the primary education system.

### *School equipment*

Let us finally focus on a set of indicators having to do with school equipment (libraries, computers, internet connections). These parameters are more closely related to the level of overall economic development of the country over a period of several decades.

The parameter that is, perhaps, the least related to the current economic level is the number of books in school libraries. The economic situation during the nineties was such that very few new books found their way into school libraries, therefore, what we now see are the same books that were there in the eighties. All told, Serbia's primary and secondary schools have around 15 million books, or around 13 books per student. However, the situation is much worse than it seems at first hand. Most of these books are rather old and worn. A large percentage of school books are out of date textbooks, or the romanticized biogra-



Map 16:  
 Percent of girls in Serbia's primary schools averaged by municipality  
 (2001/2002 school year).

phies of heroes of the communist period. Perhaps the most useful are the works of literature which were at one time or another obligatory reading in schools. Currently, school libraries are most lacking in new textbooks, work guides and related material, as well as foreign language books. In addition, practically all schools are without periodicals of any kind. Even the books that do exist are often not located in adequate school libraries. Far from having space for access to book catalogues, or the Internet, or just for reading the books, most schools lack even the space in which

to stockpile the books themselves. There are exceptions, however, and some may be found in quite out of the way places.

However inadequately supplied the school libraries may be, in many rural areas they represent the only nearby library. Viewed in this way, school libraries are an important community resource that is, for the most part, not available to the community. This is an added illustration of how the schools have been divorced from their local communities. Looked at from another point, this

Photograph:

Bottom left:

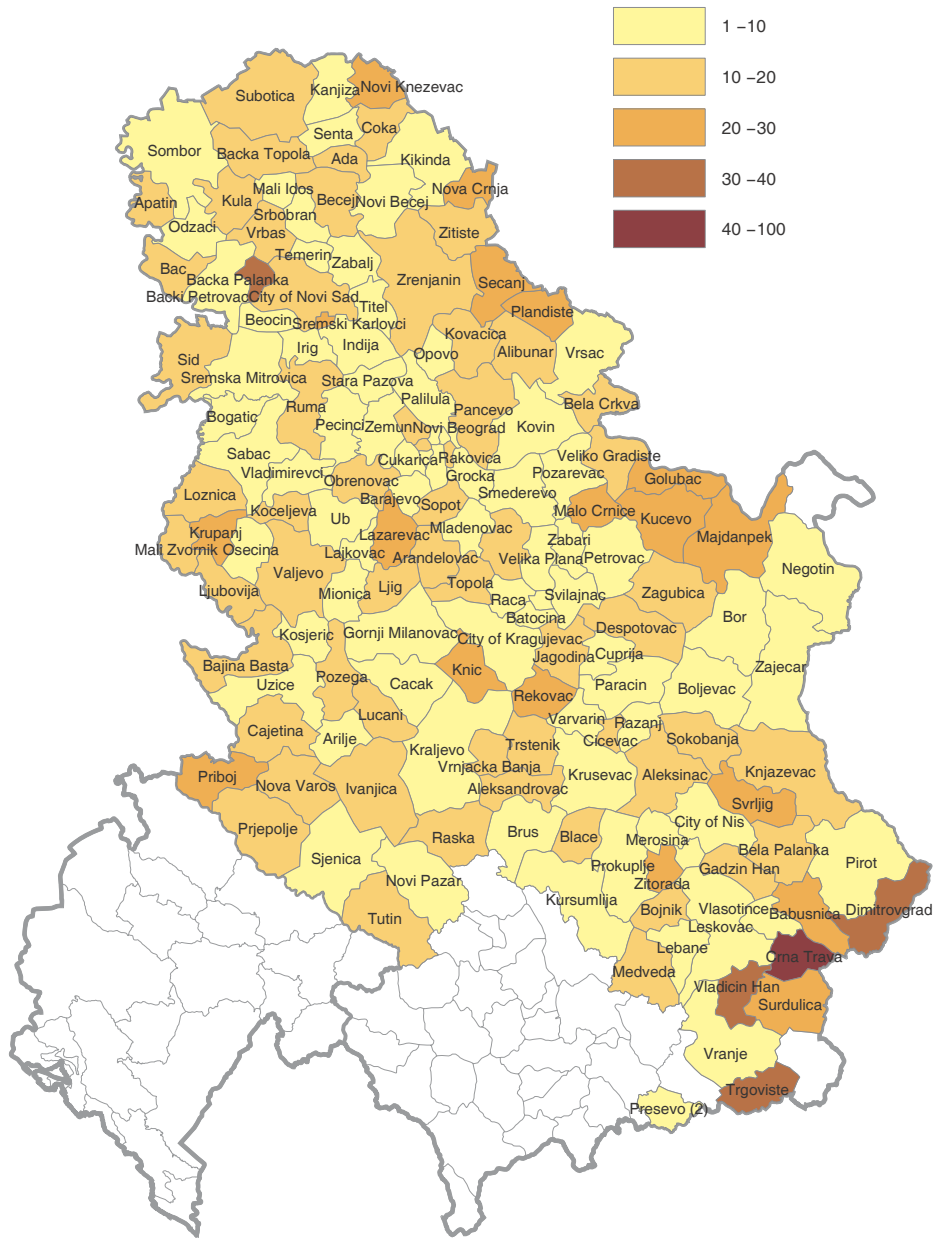
The satellite school in the small village of Trijebine in the municipality of Sjenica has 39 students and 200 books. The books are located in two small cupboards, all are old and in poor condition.

Bottom right:

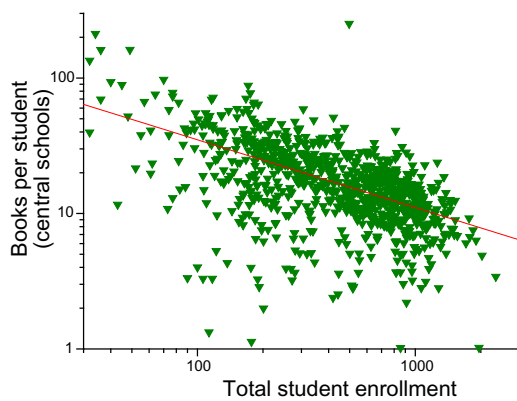
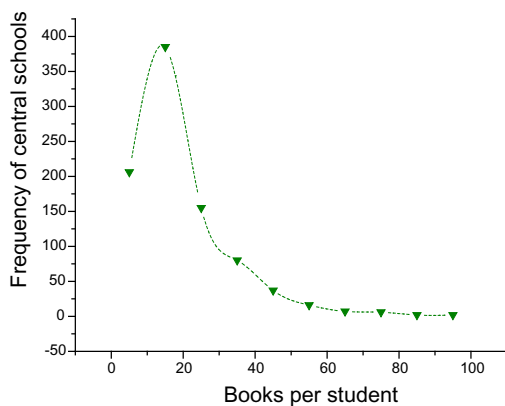
The small central school "Žarko Zrenjanin" in the village of Skorenovac in the Kovin municipality has 228 students and 2,680 books. The primary teaching language in the school is Hungarian. The school has a very nice, easily accessible library.

Both of these schools are located in the category of municipalities with the lowest number of books per student (see Map 17), which is surprising since Kovin is economically much more developed than Sjenica. However, the school in Skorenovac is in a much better situation than the one in Trijebine. Their books are newer, the selection is much better and there is much more space for the books.





Map 17:  
 Number of books in the school library per student averaged over a given municipality (2001/2002 school year).



Figures 25 and 26:

The top left figure shows 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 8,245.

The figure on the left looks at how the number of books per student in these 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.

can be seen as an ideal opportunity to both upgrade the state of school libraries as well as to do an important service to the local communities these schools belong to.

The total number of books is not what is most important. One must also look at how these books are distributed throughout the network. Map 17 gives the municipal averages of the number of books in school libraries per student.

One of the places where Serbia's schools fall way below European

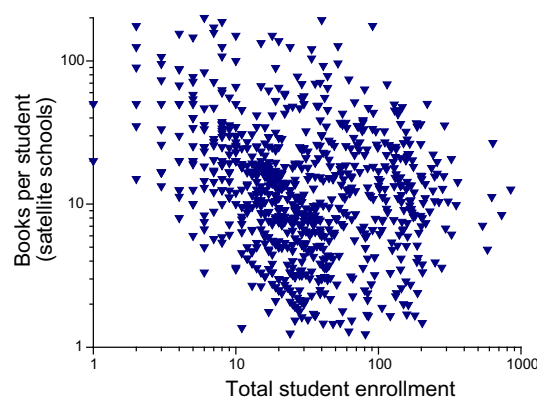
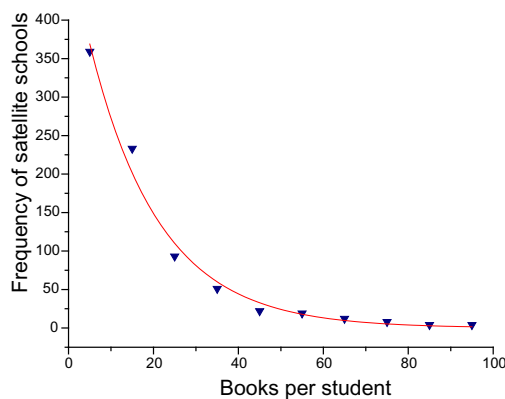
standards is in equipment for ICT. The decade of crisis that the country went through overlaps with a period of dramatic technological growth, particularly in computer and communication technology. In Europe and the world, these technologies have quickly found their way into schools, where they are currently fueling a new revolution in the way that knowledge is presented, searched for, correlated and used. The new information technologies will ultimately help change not only the way teaching/learning is done and the way data is stored and

Figures 27 and 28:

The top right figure shows 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.

The above histogram is a nice statistical law, but what determines the number of books in a given satellite school? The first thing one thinks of doing is to look at how the number of books per student depends on total enrollment, e.g. are small or large satellite schools favored with respect to this parameter.

The result is shown figure on the right. 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.

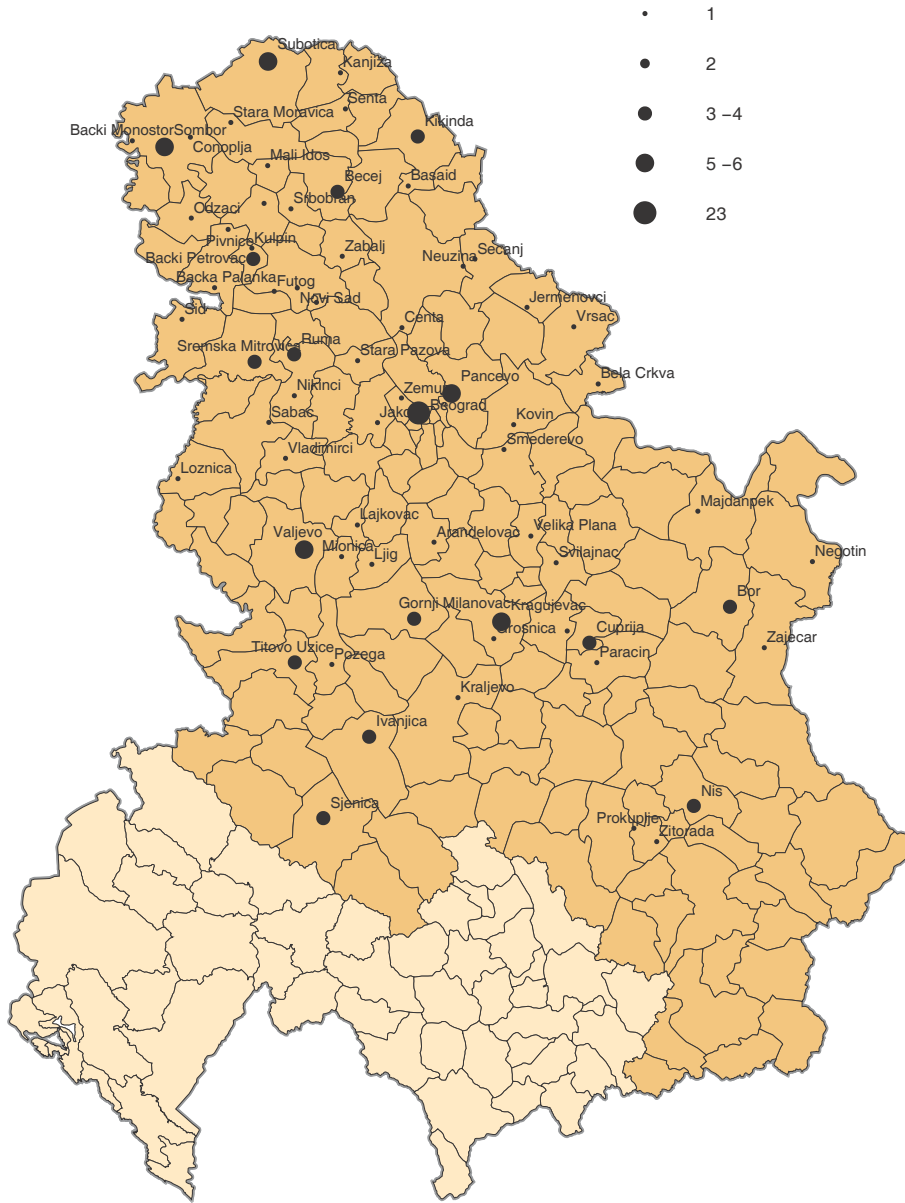


shared, but it will also change the way schools are organized.

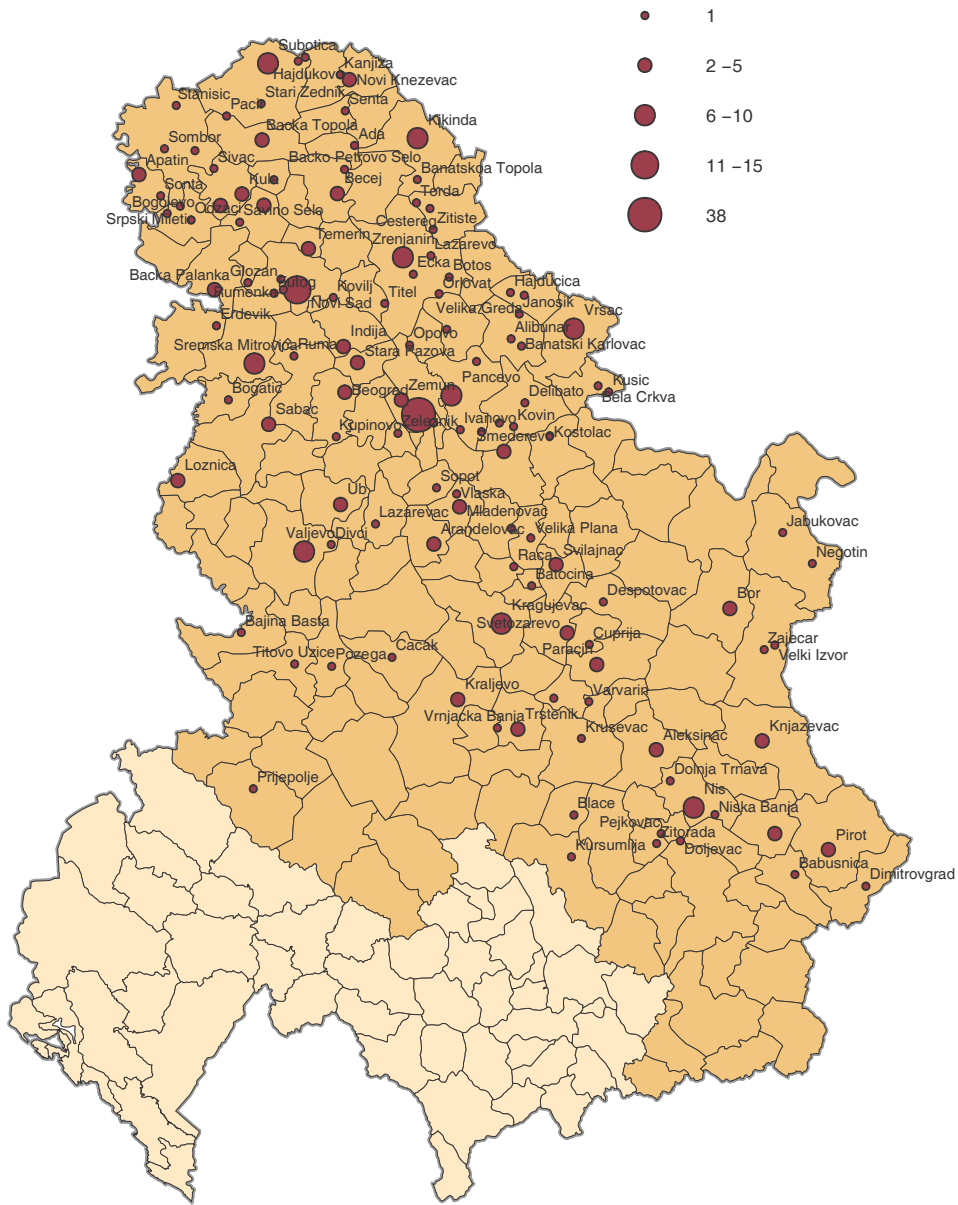
Throughout the world schools, education experts and education administrators are trying their best to keep up with the fast pace of the Internet revolution.

Many things are already becoming a reality, such as education at a distance. Other things are still only fuzzy outlines in the heads of visionaries. One thing, however, is certain: early exposure by children to computers and the Internet not only offers them a better starting position

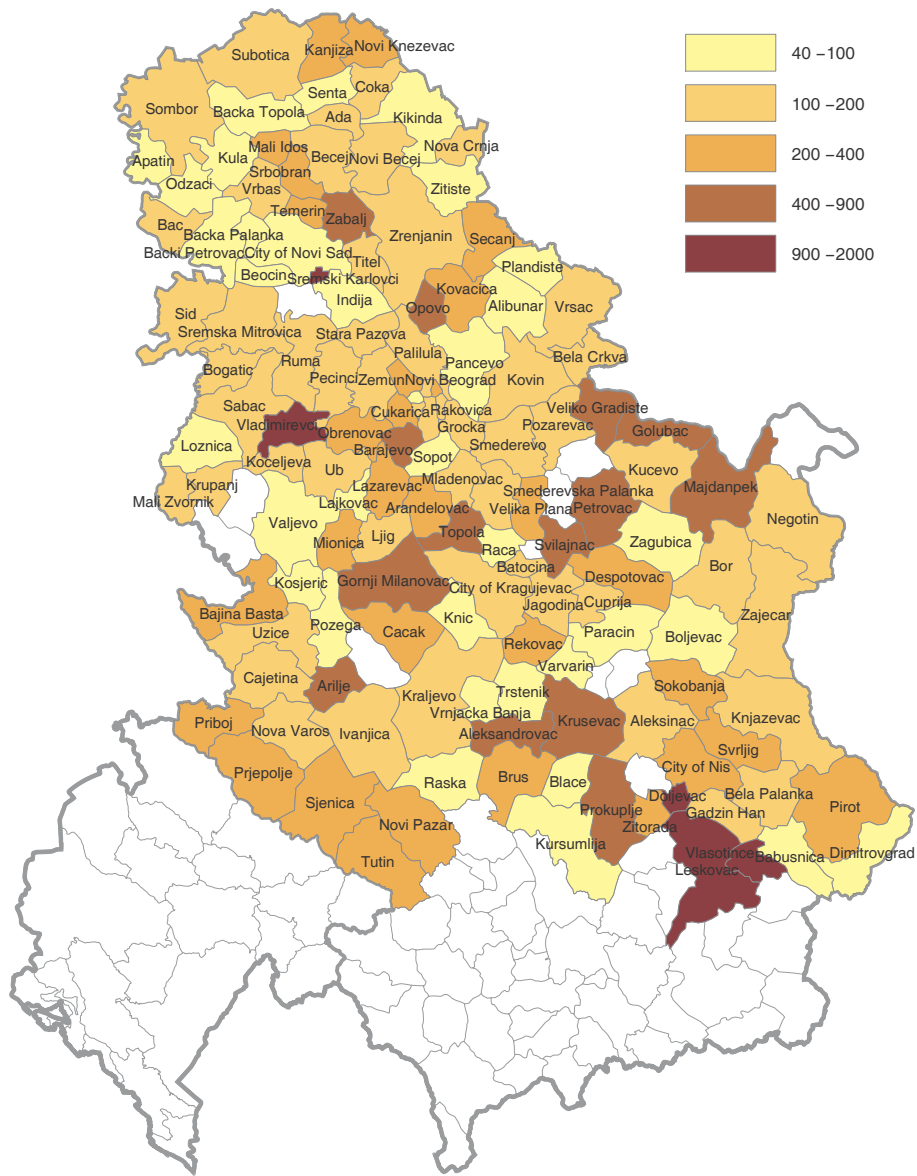
in the future job market, but also makes learning more fun than it has ever been. For this reason schools the world over keep spending more and more money on computers and related equipment and software, as well as on wide band connections to the Internet. Serbia needs to do a lot of catching up. Catching up to Europe won't be easy, but the country has several important things going for it. First of all, ICT infrastructure is cheap when compared with any other infrastructure. Second, the country has a very large number of quality experts in the field. Al-



Map 18:  
Distribution of schools with a permanent connection to the Internet  
(2001/2002 school year).



Map 19:  
Distribution of schools with a temporary (modem) connection to the Internet (2001/2002 school year).



Map 20:  
Municipality average of the number of students per PC. This map shows the distribution of older generation PC's, e.g. Pentium I and older (2001/2002 school year).