

CONDITION OF IT EDUCATIONAL INFRASTRUCTURE IN SELECTED SCHOOLS OF THE PROVINCE OF LUBLIN

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Key words: education computer science, school computer rooms, educational infrastructure of computer science.

A b s t r a c t

The present article shows the results of a study of selected factors affecting the computer skills of pupils in the province of Lublin. The article presents the results of a survey carried out in secondary schools in the area. The survey covered pupils' access to computers and the internet and the quality of the computers in school computer rooms. The article also highlights problems and expectations of the pupils connected with computer education in society.

OBRAZ STANU BAZY DYDAKTYCZNEJ EDUKACJI INFORMATYCZNEJ W WYBRANYCH PLACÓWKACH SZKOLNYCH WOJ. LUBELSKIEGO

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Słowa kluczowe: badania ankietowe, baza dydaktyczna, edukacja informatyczna.

S t r e s z c z e n i e

Przedstawiono wyniki badań przeprowadzonych w wybranych szkołach gimnazjalnych województwa lubelskiego, których celem było poznanie uwarunkowań edukacji informatycznej realizowanej w tych placówkach. Uzyskane rezultaty pozwalają na przedstawienie i weryfikację rzeczywistego obrazu dostępności młodzieży do sprzętu komputerowego oraz stanu bazy dydaktycznej edukacji informatycznej w badanych szkołach.

The article shows both the results of a questionnaire survey concerning pupils' access to computers and the condition of the IT educational infrastructure in the examined schools. The survey was carried out among students in the northern areas of the province of Lublin. It should be noted that this part of the province is a typical agricultural area and is rated as financially disadvantaged. The aim of the study was to check the accessibility of young people to computers – the basic requirement for IT education. The study involved 6 urban and 6 rural junior high schools situated in the urban and rural areas of Biała Podlaska. 233 students were surveyed anonymously (52% urban and 48% rural respondents).

To study general IT education, researchers should consider the factors which significantly influence the education of young people. The study began with an assessment of how computer rooms are equipped. The results indicated that all schools had computer rooms and the situation in rural junior high schools was better than in rural primary schools. There were no computer rooms in only

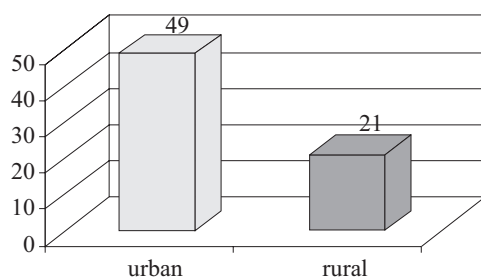


Fig. 1. Number of users per computer at school

12% of the rural primary schools. This seems to indicate that financial resources from both the local and federal governments have been successful in equipping computer rooms. Due to this, young people leaving junior high schools have had contact with computers and at least a basic level of computer skills. The high amount of modern equipment in the schools is a result of their rather recent installation. While designing and equipping a locations for their computers, many schools provided separate computer rooms. Rural schools also had fewer users per computer than in urban schools (Fig. 1).

The difference is quite large, which is important for the quality of education and for computer literacy. The trend is similar for rural primary schools as well. This could be due to the fact that there are fewer children in both rural junior high and primary schools. Rural junior high schools, like urban schools, have only one computer room each. Undoubtedly, primary schools are better off because some of them have two computer rooms. The low number of computer rooms in junior high schools hinders the possibility of organizing additional IT classes. Computer rooms in urban schools have an average of 12 computers per computer room. The situation in rural schools is similar, with an average of 11 computers per computer room. The research shows that many junior high school schools were equipped with computer rooms within the last two years (Fig. 2). The larger number of new computer rooms in rural junior high school schools

shows that, unfortunately, not all young people from these schools had equal access to computer equipment in comparison with their urban peers.

The age of the computer room also influences the quality of the computer equipment. Unfortunately, it is difficult for schools to keep up with the rapid pace of technological improvement and maintain the most modern

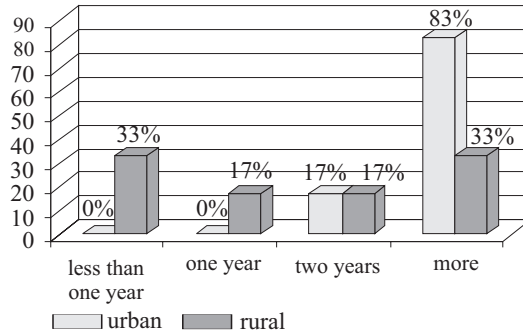


Fig. 2. Age of computer rooms

equipment. The survey therefore also sought to accurately assess the quality of computers in the schools. It is obvious that the class of computers is determined by several factors. In the present study, the frequency of the processor and the amount of RAM memory were selected as the assessment factors. 500 MHz and 64 MB were recognized to be threshold levels enabling the proper functioning of (computer) hardware. The results showed that urban schools with older computer rooms just barely met the minimum requirements. The situation is much better in rural schools with newer computer rooms. They all possessed computers with processors over 500 MHz (including 2 schools with over 1000 MHz) and over 128 MB RAM memory (only 2 urban schools possessed computers with processors between 500 MHz and 1000 MHz and 128 MB RAM). Analysis of data from the questionnaires concerning hardware quality is alarming because the current average hardware speed standards range between 1,5 GHz and 2 GHz and only one of the schools in the study had a computer meeting this standard. It is doubtful whether schoolchildren learning basic computer skills

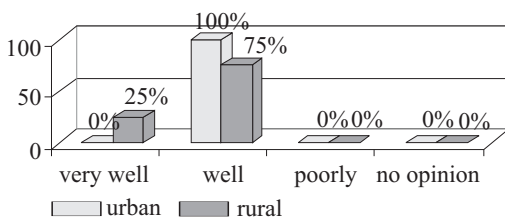


Fig. 3. IT teachers' opinion of equipment in computer rooms

really need such modern hardware. However, the results obtained in this study suggest that if similar research is carried out again in a few years, the same hardware will be found in computer rooms and will be unable to run new operating systems and new software.

In consequence, young people will learn “unnecessary” things, i.e. the operation of obsolete programs and systems. Thus, attention should be paid to the need to upgrade the computers and the gradual obsolescence of existing computers. Unfortunately, investment in IT education is still insufficient and, in the near future, there is no chance of

replacing old hardware. Teacher-respondents' opinions do not seem to support this view, however, because research results show that, according to the respondents, computer rooms are well-equipped (Fig. 3).

However, the discrepancy between quality of hardware accessible at school and hardware that pupils have at home can be extremely problematic for schools and IT teachers. If the trend of investing in new computer rooms in rural schools continues, in the future the level of equipment in these rooms will

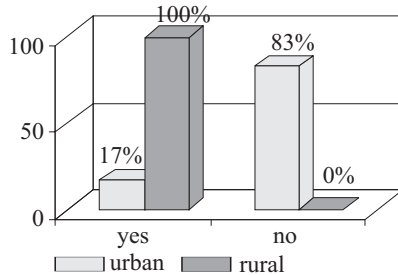


Fig. 4. The number of junior high school schools using governmental and non-governmental IT education programmes

decrease even more to the disadvantage of urban schools. What is interesting is a comparable situation which has been observed in rural primary schools, where hardware quality is better than in urban schools. It is worth carefully searching to find sources of financing hardware for school computer rooms. Two questions seem especially crucial: 1) Who benefits from numerous new computer rooms, particularly in rural areas, and, 2) Are the hardware purchases really government-financed? The answers to these two

questions provide a very interesting measure of how seriously the government takes IT education. After carrying out questionnaire surveys among school heads and conducting oral interviews, it was determined that only 22% of the purchased hardware came from the financial resources of the local or federal governments. Many computers come from sponsors, as well as from companies donating older, outdated computers to schools. The Agriculture Restructuring and Modernization Agency has also helped in equipping schools with computers (Fig. 4).

Since the main sources of financing do not come from the government, but through other funding sources (Fig. 5), junior high school principals have been

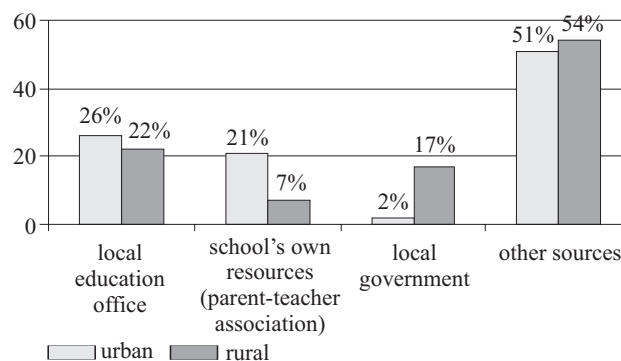


Fig. 5. Financial resources for financing purchases of computer hardware in junior high school schools

forced to look for additional resources. It could be suggested that there would be a lot more computers and computer rooms in schools if the schools started to universally participate in governmental and non-governmental IT education programmes. It is difficult to objectively access why so few urban schools use these programmes. Perhaps it is merely reluctance or neglect on the part of principals, or perhaps the reason lies in the setup of the programmes themselves by limiting participation to a very small number of schools. Apart from the hardware in computer rooms, another issue that should be noted is software, which is bought mainly on the initiative of government, principals and teachers. This situation is completely different from that in primary schools, where the educational institution's share in software purchases is 20%. This situation seems to follow rational financial management by allowing purchasing to be conducted according to the individual need of schools.

Another crucial issue is access to computers after IT lessons in computer rooms. An analysis was made of access to computers during breaks, spare time spent in school libraries, after-school clubs and during other lessons. An analysis of the data below shows the real access of pupils to computers and, broadly speaking, to IT education. The study results clearly show that pupils' access to computers outside computer rooms is very limited (Fig. 6). The situation is similar in urban junior high school schools. The results suggest that, at present, computer access outside computer rooms is wishful thinking on the part of pupils, both in junior high and primary schools.

An important educational factor is the number of pupils present in a computer room during a lesson. To enable a teacher to provide individual attention to pupils, the class should not exceed 16 pupils. According to the data collected, the number of pupils in urban junior high school schools is comparable to the number of pupils in rural schools (16 and 15, respectively). In both cases, the numbers are acceptable although they are at the upper limit. It is more difficult to work with sixteen pupils than with eleven, but it does not have significantly negative effects on the educational process. Only 25% of pupils in urban junior high school schools work at their own workstation. The number reaches 50% in rural junior high school schools, which is far better than in primary schools where pupils work in two-person groups as a rule. Independent work means better contact with hardware for pupils and more effective lessons for teachers (Fig. 7).

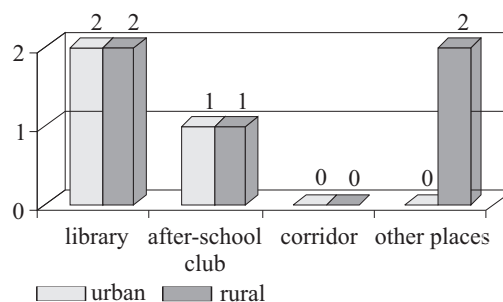


Fig. 6. The number of computers accessible to pupils outside junior high school computer rooms

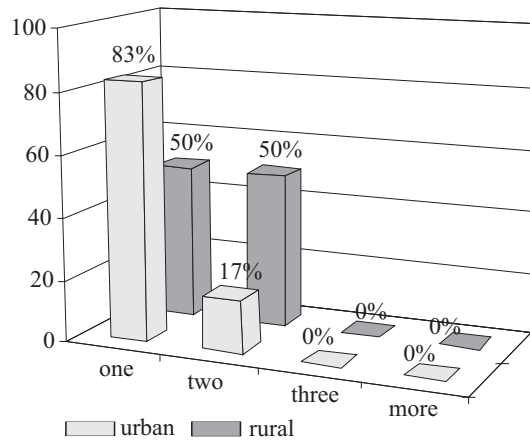


Fig. 7. The number of pupils per computer

A particularly difficult situation is access to, and use of, computers during other lessons. In the six urban junior high school schools, only two of them allowed pupils to use 5 computers in other classrooms. The situation in rural schools was similar, although half of them had hardware in other classrooms. The number was not significant because rural schools made only 4 computers available. No schools possessed a multimedia projector, which means that using computers for teaching other subjects will remain unrealistic for the time being. It should be mentioned that the resources of computer rooms have not been made available anywhere to conduct lessons other than IT, wasting the great potential of computers in teaching such subjects as mathematics, physics, chemistry, etc. Additional IT lessons were reported to have been attended by 100% of pupils. It seems unlikely that only rural junior high schools have such high attendance rates in their computer rooms. Urban junior high schools have only slightly lower figures in this respect, with 89% of pupils reporting attending additional IT lessons. The data is encouraging, although it should be treated with some caution because it concerns only declarations that are difficult to be

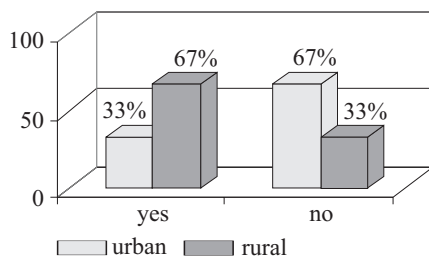


Fig. 8. The number of schools subscribing to IT magazines

verified. Besides additional IT lessons, there are other forms of IT education such as self-education through reading books and magazines on IT. As books on IT are quite expensive and do not always contain the latest knowledge in this field, magazines seem to be a suitable alternative to books. The responsibility for making this form of education available to pupils should lie with schools.

The study results showed significant diversity in the number of magazines subscribed to by schools. In urban schools, only about 33% subscribe to at least one IT magazine. More than 50% of rural junior high schools are interested in this form of educating young people, but it is still insufficient and suggests that schools underestimate the educational value of written IT magazines for youngsters in different age groups. To analyse their pupils' access to IT education, teachers were asked whether the time allotted to IT education by the government allowed them to teach the basics of the computer science. The results indicate that a considerable number of junior high and primary school teachers believe that there are a sufficient number of lessons. Access to IT education also means using the internet. All schools confirmed internet access and most had ISDN links and some had SDI links (Fig. 9).

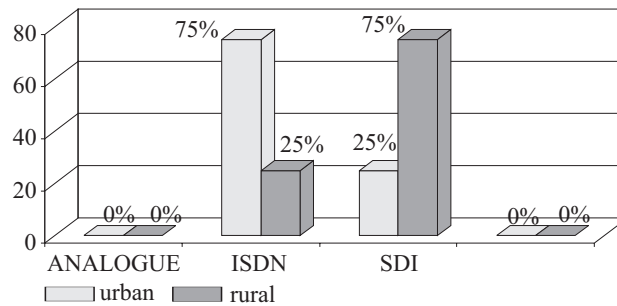


Fig. 9. Types of school internet connections

Although this graph confirms widespread access to the internet and data transmitting capacity, deeper analysis reveals an enormous equipment shortage of computer rooms and lack of other places where pupils and teachers could use the internet, which is an invaluable source of knowledge (Fig. 10). Unfortunately, only a small number of school have access to the internet outside

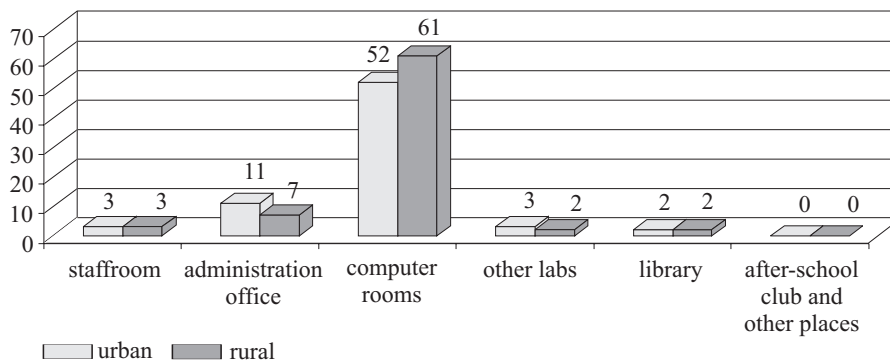


Fig. 10. The number of computers with internet access in the junior high schools surveyed

the computer room. It should be mentioned that if a school has only one computer room which can be used during IT lessons, then young people practically cannot use the internet after lessons. The same problem concerns teachers, who do not have such access even in their common room. Although six of the schools surveyed had access to the internet outside computer rooms, this was only half of the schools questioned and reflects the importance of delivering IT education throughout the entire school environment.

Accessing and using computers is critical for proper education in a computer society. The aim of the questionnaire survey among junior high school pupils was to assess the situation and level of educational development outside school lessons. The survey asked how many pupils had computers at home. It also studied how long they had had them and whether there were significant differences between urban and rural pupils (Fig. 11).

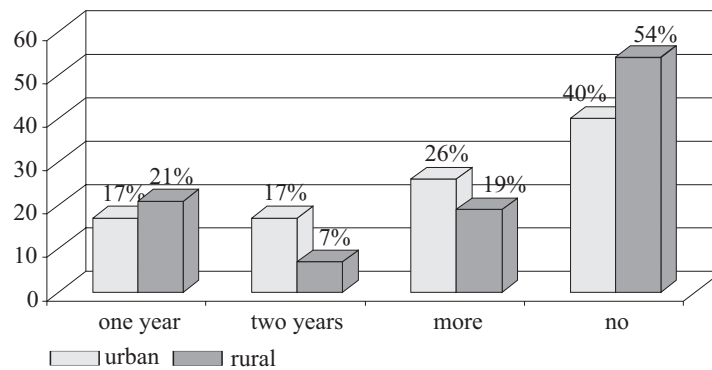


Fig. 11. Length of computer ownership among surveyed pupils

The results indicate that the difference in owning computers is slightly in favour of urban pupils. However, it is troubling that half of those surveyed, on average, did not have computers at home. It is a serious obstacle to developing

computer skills. Computer literacy broadens skills in using other technologies, transmitting data and methods of communicating with other people. The lack of computer hardware among of rural children is compensated for, to some extent, by the opportunity of using a computer at a friend or colleague's home (Fig. 12). However, it is not known how often or how long they use it, for what purpose (games, learning, communication) or how significantly it influences computer literacy. The presence of hardware at home does not

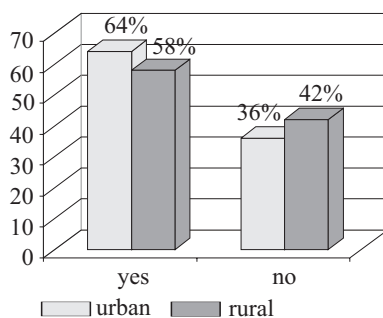


Fig. 12. The possibility of using a friend or colleague's computer

guarantee that a child uses it. For instance, a computer can be a parent’s tool which children use sporadically, although the research indicates that this is not the case. Most computers sets were used by young people (Fig. 13). It shows that parents decided to invest in their children’s education by buying them computers, among other things. Using computers and learning should take place under parental guidance (Fig. 14). As can be seen, however, 50% urban parents and 75% of rural parents never use a computer with their children.

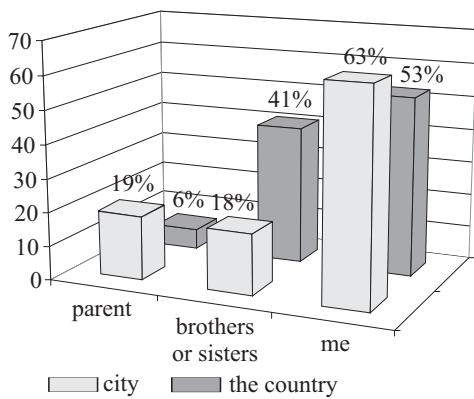


Fig. 13. Responses to the question, “Who uses the computer the most time at home?”

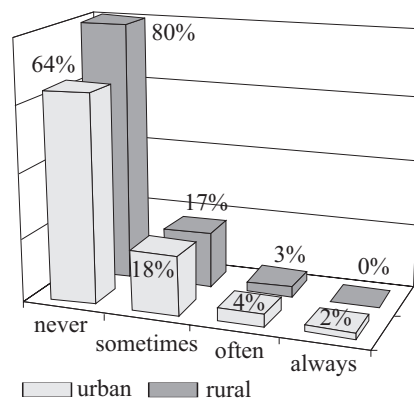


Fig. 14. Pupils’ responses to the question “How often do parents spend time at the computer with their children?”

Not using a computer with their children can have a negative effect on using computers and decrease the level of education. It should be added that no more than 20% of pupils received some teaching on computers from their parents. How much time young people spend at the computer is important because overuse can have various undesirable effects. Children can become addicted to computers and neglect other aspects of their lives. The survey did not find the respondents to be spending excessive amounts of time at the computer (Fig. 16). However, pupils who spent more than two hours per day at the computer should be closely supervised by their parents.

Close supervision will prevent many of the above-mentioned problems. Few parents are aware of the problems caused by computer overuse (Fig. 17). Less than 20%

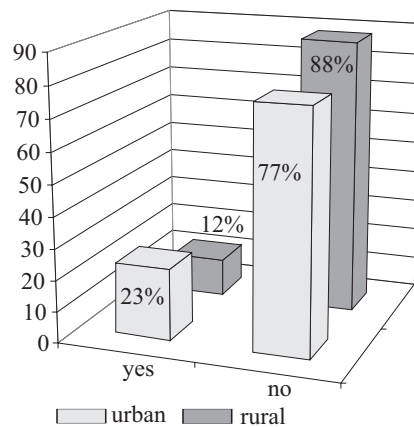


Fig. 15. The number of pupils who received computer training from their parents

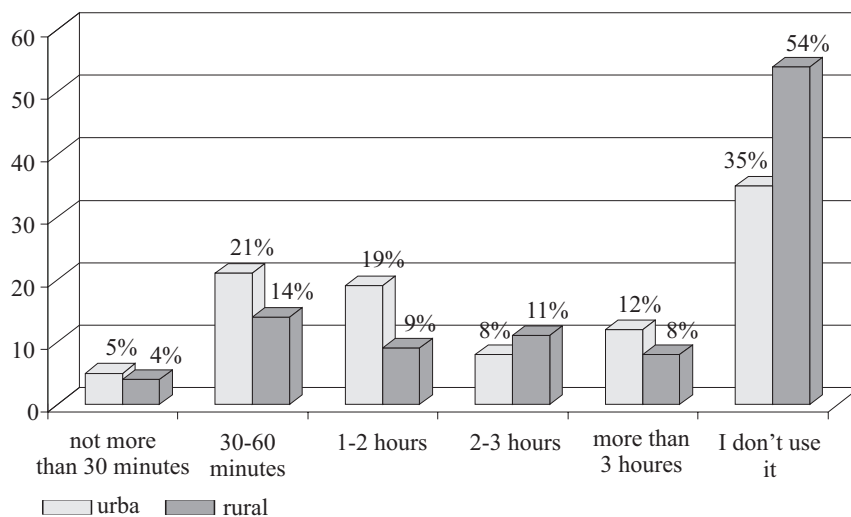


Fig. 16. The amount of time respondents spend at the computer per day

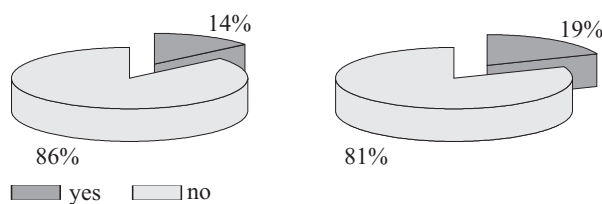


Fig. 17. The number of parents monitoring how much time their children spend at the computer

of parents monitor this period of time. Owning a computer does not always involve advanced IT learning. Most often, this "wonder of technology" is an excellent way of spending free time pleasantly and learning is the lowest priority. Research also shows that only 14% of pupils use the computer primarily for learning (Fig. 18). The remainder play games, listen to music, watch films, etc. These are not activities that contribute significantly to better computer literacy. For some pupils, however, the computer is a helpful tool in learning.

If pupils use the computer to learn, they use it to learn several subjects (Fig. 19). Most often, the subjects are: information technology, foreign languages and geography, with pupils most often using a range of educational computer programmes and multimedia encyclopaedias (Fig. 20). Unfortunately, it can also signify a lack of other forms of computer education, lack of knowledge of the internet and poor knowledge of foreign languages.

Unfortunately, the number of respondents using educational computer programmes was very low. From among those surveyed, slightly over 25%

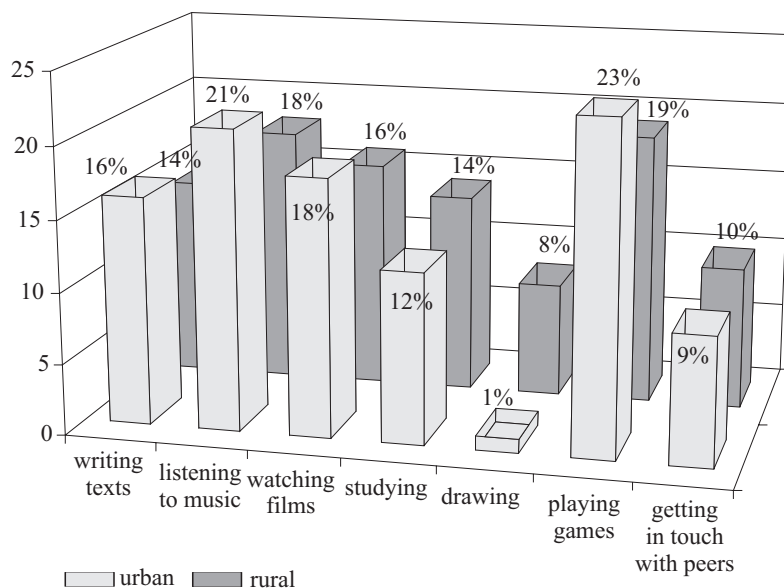


Fig. 18. Responses on the most frequent uses of the computer

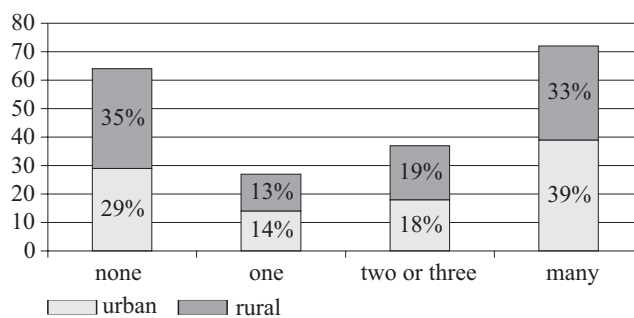


Fig. 19. Responses on how many subjects use a computer

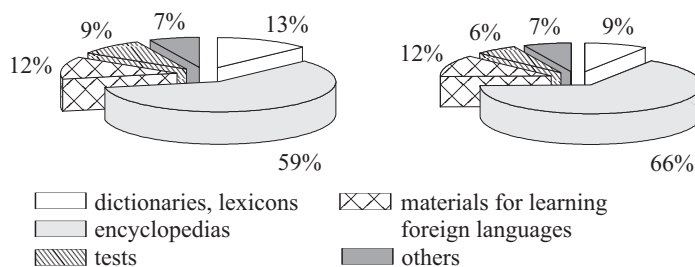


Fig. 20. Educational computer programmes most frequently used by pupils

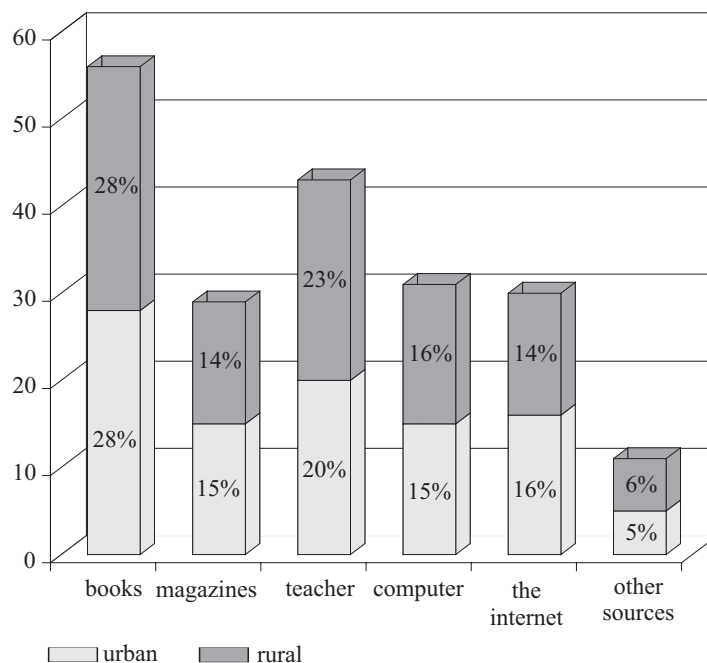


Fig. 21. Teaching aids used to broaden knowledge according to respondents

declared frequent use of these programmes. This could be connected with a lack of money for teaching aids.

In education, the role of the computer in acquiring knowledge should be prominent, however, the results show that the computer is not the main source of knowledge. Books and teachers are still predominant, and the position of the computer is comparable to that of magazines. In addition to the computer programmes mentioned above, the internet could become an enormous source of knowledge for young people. It is unfortunate that so few people with computers at home reported using this medium – 29% of urban pupils and 25% of rural pupils. The pupils who use the internet do it quite seldom and not for long (Fig. 22).

Those using the internet usually have access to the internet at home or school. It seems that a significant number of third-form pupils (38% in urban, 30% in rural schools) do not use computers or have not come into contact with this source of information.

As not all the pupils have computers at home and can afford quite expensive telecommunications services to connect to the internet, schools should do everything they can to make the internet accessible to as many pupils as possible. The pupils who use it most often search for information (24%) or use chat programmes (22%). On the basis of this, it can be concluded that the internet is insufficiently used to acquire knowledge. As was mentioned before,

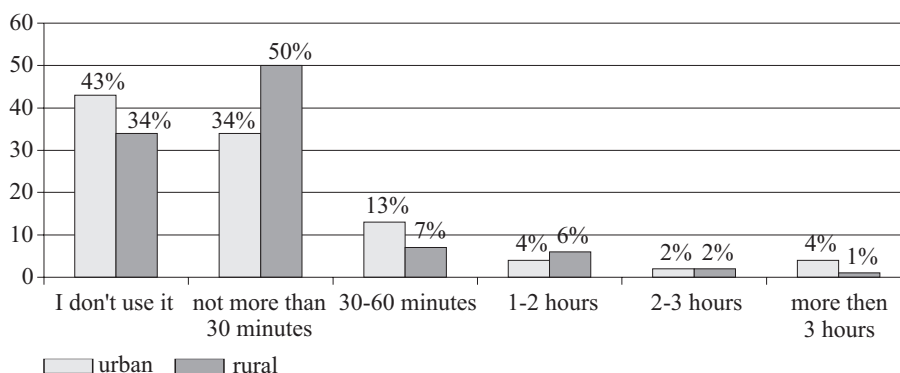


Fig. 22. The amount of time pupils allow for the internet daily

a significant link in IT education is access to computer magazines. Only half of the surveyed pupils read them, due to a lack of money on such teaching aids or a limited magazine circulation. In such a case, schools should provide pupils, especially from rural schools, with a subscription to at least one magazine. As is seen from the research, schools currently provide such access only to a limited degree (13% of respondents in urban and 12% in rural schools have permanent access to a computer magazine at school).

A complete picture of access to IT education also involves gathering the respondents' opinions of after-school IT activities to more accurately reflect their engagement in the IT learning process. Among the pupils surveyed, a clear majority expressed an interest in IT classes (74% of urban teens, 84% of rural teens). It is clear that young people are interested in learning about information technology, as is shown by their clear desire to have more IT lessons. However, it is unclear as to why so few pupils actually attend additional IT classes – 9% in urban, 17% in rural schools. This may be due to a limited number of classes offered or other priorities placed on the students regarding clubs, sports, homework, etc.

CONCLUSIONS

An analysis of the data from the questionnaire survey presents a clear picture of the IT educational infrastructure in the surveyed schools in the province and highlights some factors influencing the effectiveness of IT school education. The collected data shows that few urban schools use aid programs offered by the government, while rural schools make full use of them. There could be several reasons for this situation, however, in many cases it largely

depends on the personal initiative of school principals or on particular grant criteria. It appears that the existing government programmes are insufficient to meet the demand and the programs that are offered are too narrow in scope, most likely due to a lack of financial resources. After analysing the research results and direct interviews, it is clear that the IT educational opportunities of rural pupils do not differ significantly from their urban peers. The hardware in rural schools is new and modern, in contrast with urban schools where the hardware barely meets the minimum requirements. The average number of pupils per lesson in rural schools is also lower than in urban schools. Thus, it is further evidence that rural educational opportunities for access to education in general, and IT education in particular, are at least equal. The research results presented in this article and their analysis still require more detailed investigation and will be the subject of future studies.