Introducing Open Source Software into Slovenian Primary and Secondary Schools

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Keywords: country-specific developments, elementary education, secondary education, software

Received: September 23, 2005

This paper deals with the use of Open Source Software (OSS) in learning environments. Advantages and obstacles of OSS are discussed. Problems and opportunities of introducing OSS into an educational process especially in primary and secondary schools are presented. The survey research, which was carried out in order to study the use of OSS in the educational system of Slovenia is described. The most important characteristics of OSS like reliability, functionality, interoperability, licensing philosophy, values of OS movements and price are examined. The results are presented and compared with those of a similar research in USA. Some interesting similarities and differences are discovered.

Povzetek: Prikazani so rezultati raziskave o uporabi odprte kode v slovenskih osnovnih in srednjih šolah.

1 Introduction

The use of Information and Communication Technology (ICT) is becoming very important in learning environments. And it is very expensive. This causes the global digital divide – the wide disparity between the world's information-rich and information-deprived, which affects educational opportunity [16], [25]. This is among others the reason why the question - which type of software to use – is becoming more and more important.

ICT consists of hardware (HW) and software (SW). Since every SW does not run on every HW, the selection of both is interconnected. But the users are in the first place interested in the functionality of ICT, which depends on SW. Therefore the decision about SW should be made first. There are several different types of SW. In learning environments the most important selection is between proprietary SW (PSW) and OSS. To understand the difference between PSW and OSS we need to explain a few terms first.

We can find a relevant open source (OS) definition on the website of the OS Initiative [20]. As the definition is quite long, we will emphasize only the most important part – distribution terms in the continuation. So the distribution terms of OSS must comply with the following criteria:

- The redistribution must be free.
- The program must include source code, and must allow distribution in source code as well as compiled form.
- The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original SW.
- Integrity of the author's source code must be ensured.
- The license should not be discriminating against any person or group of persons.
- The license must not restrict anyone from making use of the program in a specific field of endeavor.
- The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.
- License must not be specific to a product.
- License must not restrict other SW.
- License must be technology-neutral.

On the other hand PSW is any closed-source material, which fundamentally means that the user does not control what it does or cannot study or edit the code [27]. Its use, redistribution or modification is prohibited, or requires you to ask for permission, or is restricted so much that you effectively cannot do it freely [11]. It usually means that some individual or company holds the exclusive copyrights on a piece of SW, at the same time denying other people the access to the SW's source and the right to copy, modify and study the SW.

We must also mention the term, which is very close to the term OSS – Free SW (FSW). But we must be very careful with the term 'free software', because it has an

ambiguity problem. An unintended meaning, 'SW you can get for zero price' fits the term just as well as the intended meaning, 'SW which gives the user certain freedoms.' But for most purposes, FSW and OSS can be considered to be the same [24]. To avoid confusion we will only mention OSS in the continuation.

With the rising popularity of OSS there has been increasing interest in both its various benefits and disadvantages [21]. The crucial economic freedom that OSS provides is that of the rejection of licensing costs [5]. Another benefit is the stability and reliability – it may not have as many errors or crashes as PSW. Since anyone can see the source code, bugs can be repaired quickly. With the source code being available for all to see, greater security is also provided, because holes that would allow worms or viruses to do damage are found and fixed at an amazing rate [13].

An important advantage of OSS is a possibility of making practically unlimited modification and customization. It is true, that some users in education try to customize PSW, for example Microsoft Office [10], but these are only customizations 'on the surface' and with other limitations regarding redistribution of their 'added value'.

Proponents of OSS usually emphasize economic and technological reasons [3], [13]: lower Total Cost of Ownership (TCO), better stability and reliability, better security that usually accompanies OSS. But some of them even take the slogan of the French Revolution, 'Liberté, Egalité, Fraternité' and show how each of these ideals is an important part of the OSS movement [12]:

- Liberty
  The user is free to: use SW, understand exactly what the program does, modify SW to his/her needs, distribute the modified version etc..
- Equality
  It is important in this context that even students (in our article the term 'students' means students in primary and secondary schools) that do not have enough money to buy PSW, can use the same SW at home and at school. So effective home-school link strategies can be adopted through the exploration of the permeability of home/school boundaries [15].
- Fraternity
  Here the term fraternity stands in the context of cooperation and mutual help between SW developers and users, between users themselves, between school and families [6].

One important idea in education is also to teach computing concepts [13]. We can use OSS to achieve this goal. Many times too much effort goes into teaching procedural knowledge of specific applications. For example, OSS OpenOffice.org - offers word processing very similar to that of PSW products. They are so similar that learning most features in one will transfer to the other. Word processing as a concept is a valuable tool for students, teaching specific programs is not. By teaching from multiple angles, teachers are providing a greater breadth of information.

All the benefits of OSS have been confirmed also by the latest 'Open Source Software in Schools' study [2], published in May 2005 by the British Educational Communications and Technology Agency (Becta). Their findings namely show that OSS can provide a suitable technical infrastructure and a basic set of applications for classroom use and that it can offer a cost-effective alternative to PSW.

On the education field we can also find some specific obstacles. The first problem can be that even if the main policy framing ICT in education has the provision of HW and infrastructure as its main target – little advice on how they might be used is offered [9]. Namely, one of the most important background variables that affect ICT contrubution to powerful learning environments is teachers' skill in using ICT [23]. This can be especially problematic regarding the introduction of OSS into schools.

In Finland they have also realised, that teachers need to use a lot of time in developing new IT courses and updating the old courses. To address these problems, they have started an Open Source Courseware (OSCu) project, with a fundamental goal to increase cooperation between universities in course development [1].

The foremost concerns that schools express when contemplating migration to OSS are installation and support [7]. Any SW solution requires some service and support and for both OSS and PSW experts depend on email lists and community Web sites as well as contracted support. Some OS companies offer good support contracts, but a school may not be able to afford them. So they mostly depend on OS community volunteers and help may not be as certain or as timely as they wish [17]. A commonly cited problem is also finding time to absorb the new technology to maximize its pedagogic potential [26].

In recent years there have been many political initiatives trying to foster OS movement and to spread the use of OSS in public administration and at schools and universities [22]. In Slovenia in the past, some teachers wanted to introduce OSS into their educational processes on their own. There was no support from educational institutions. Therefore in 2003 the Slovenian Ministry of Education came to realize that educational institutions should be offered - besides PSW (mainly Microsoft SW) - also alternative SW. It has started the Open Source Project - 'OS project' [19] with the intention to make the introduction of OSS into education environments faster and more efficient. The Ministry has invited teachers to get involved into the project. In fact an 'expert group' of enthusiastic teachers was formed. But they soon realized that introducing a new type of SW into educational field is not an easy job.

The main problem in using OSS is the lack of experience. Opportunities for appropriate training are limited, with many educators being self-taught IT users [8]. Sometimes, teachers have ICT-competence training with a measure of success, but it is tempered by a considerable degree of negative reaction to form and content of the training [14]. That is why we have made it our primary assignment to direct teachers and other

educational workers into recognizing and using OSS and didactic applications and materials, based on them.

The OS project is intended to integrate informational environments based on open standards and OSS into educational establishments. This will increase the selection of didactic tools and applications, which can be used by teachers and/or students in the process of teaching and learning. OS project directly supports the use and further development of OSS in educational processes.

The more detailed goals of the OS project are:

- To acquire quality and free (or moderately priced) didactic SW for the purpose of education in educational establishments. All subjects of teaching will be covered by a number of didactically suitable applications and tools. Students and teachers can use the SW freely for educational purposes at school and at home.
- To offer to educational establishments OSS based on open standards, which does not depend on one manufacturer solely.
- To inspire the use of OSS and its further development.
- To stimulate the use and development of didactic applications, which are portable and operating system-independent.
- To educate teachers, so they will be willing to use didactic programs and tools irrelevant of the system environments.
- To teach students how to use applications and programming tools irrelevant of their system environments.

Besides the Slovenian Ministry of Education, this project has also been founded and supported by the educational establishments, The National Education Institute of The Republic of Slovenia, Universities of Ljubljana, Maribor and Koper, Government Center for Informatics, Ministry of Information Society, LUGOS – Linux User Group of Slovenia and individual expert associates.

One way to achieve all these goals is also introducing some kind of 'Reference schools'. A reference school acts as a model and a guide to others and is a center for exchanging knowledge in using OSS in education establishments for their region. Reference schools are intended for educating IT teachers, school ICT administrators, subject teachers and students. Their goal is to encourage everyone to use didactic OSS and material for the purpose of education. Teachers and students will learn how to use it for teaching and learning and how to develop and upgrade didactic SW based on OS.

Subject teachers present the contents, i.e. the demand, for a specific didactic application, whereas IT teachers and administrators, together with students, develop and test this application or work with outside developers in developing and testing it. A reference school will present a motivational environment for everyone involved.

We have also started a research about using OSS in education, because in Slovenia no research was done in the past that would answer the questions like: who, why, how…uses OSS in education. Actually, we knew that some 'enthusiastic' teachers use OSS in the classrooms (and otherwise) on their own, but nobody systematically followed their attempts and analyzed the situation. We also wanted to get information about their experience with introducing OSS, their general opinion of OSS and about solutions they recommend.

We must also emphasize that we do not want to prejudice in advance that OSS is a better solution to education than PSW. Moreover, the coexistence of PSW and OSS is a possible interpretative key for the success of OS movement [4] and we must consider all types of SW equally.

In the remainder of the paper survey methodology is first described then the results of the survey are presented and compared with the results of a similar research in USA. At the end the main findings are summarized and a possible further research is suggested.

2 Survey methodology

Our research is based on a similar research by Northwest Regional Educational Laboratory (NREL), which has been running in USA since 2002. The purpose of this survey was to study the use of OSS in K12 education system [18]. The questionnaire was posted on the Northwest Educational Technology Consortium (NETC) website in November 2002 and data were collected in February 2003. The survey was open to all. Survey analysis only included the fully completed questionnaires and the answers of those survey participants, who were currently working in a K12 school. The participants were able to choose whether they wished to remain anonymous, but many had decided to give their personal information anyway.

The questionnaire was intended for anyone using OSS in K12 schools. To draw the participants from the target audience, they posted the survey link on mailing lists and different websites. Most participants lived and worked in USA (nearly half of them from Oregon and Washington).

Our (Slovenian) survey was entitled 'Using FSW/OSS in the Process of Education and for Administrative Purposes'. We have decided to use the same methodology as in NETC survey, since ours was also open to all users (no password/username required) and the personal information was also optional. The survey included a similar range of target population in primary and secondary schools in Slovenia.

The research tries to answer the following questions about educators:

- Who they are?
- What they use?
- Do they use OSS on their desktops?
- How difficult was it to implement OSS in schools?
- Which solutions do they recommend?
- Their general opinion of OSS.

The questionnaire was available on the website of the OS project. We also posted the survey link on mailing lists of all 'target' schools in Slovenia. As Slovenia nearly has

no other type of school than state/public school (on the primary and secondary level), these schools can be considered as public (non-private) schools. The e-mail invitation to participate in our research was sent to the principals of:

- 151 secondary schools
- 463 primary schools
- 41 primary schools for children with special needs
- 81 music schools

The principals were asked to inform their employees about the research and to ask them to participate. The invitation was sent on 22 January 2004. We ended collecting the data (from the web questionnaire) on 9 March 2004.

The answers in the questionnaire were mainly predefined and were open only if it was not possible to predict the answers of the participants in advance. But basically we have taken the original research and modified it slightly to learn as much as possible about the use of OSS in primary and secondary schools in Slovenia.

The research yielded 433 entries with 280 valid entries (67%). An entry was not considered to be valid, if the questionnaire was not completely filled-in or if the answers were obviously wrong. Some participants only looked at the questions or just filled in a few of them.

3 Results

The results were categorized into 6 sections:

- Research participants
- Use of OSS on desktops
- What influences are important in selecting SW
- The difficulty of transition
- General opinion of OSS
- Use of Information Technology (IT) in education – this section was not a part of the original NETC survey and it is not directly connected with OS. Nevertheless we added this section in order to get information about the general use of IT in education.

3.1 Research participants

There are four questions in this part of the questionnaire. We wanted to find out what position the participants have and if they are teachers, where (primary/secondary level) they work, if they are IT teachers and if they select SW for students. We also wanted to know, if they work mainly in small, medium or large schools.

Table 1 shows the structure of the participants according to their positions in educational establishments.

Teacher	21%
Principal or other executive	21%
Administrator (works in school administration)	13%
Full-time IT maintenance person	45%
Part-time IT maintenance person	0%

Table 1: The structure of the positions of the participants in educational establishments.

As we can see, nearly half of the participants are full-time IT maintainers. About one fifth of them are teachers and another fifth of them principals.

If the option ‘teacher’ (Table 1) was selected, the participants had to select one of four further options regarding the subject they teach (Table 2).

IT subjects at primary school	28%
IT subjects at secondary school	12%
Other, non-IT subjects at primary school	52%
Other, non-IT subjects at secondary school	8%

Table 2: The structure of teachers-participants.

When we look at the structure of teachers-participants we notice that more than a half of them teach non-computer subjects at primary level, while every third teaches computer subjects at primary level. Only every one in five teacher participants were secondary-school teachers (of both, computer and non-computer subjects).

The question, do you select the SW to be installed on other computer-desktops (i.e. students’ computers) has been answered as follows: 58% of the participants are responsible for selecting SW to be used on students’ desktops, while 42% have no influence in this aspect.

In Table 3 the answers to the question, how many students go to your school, are categorized.

Less than 100	6%
100-499	58%
500-999	30%
1000-1999	5%
More than 2000	1%

Table 3: Number of students at the school of the participants.

3.2 Use of OSS on desktops

In this part we tried to answer the question, what kind (if any) of OSS the participants/their students use on their desktops. It consists of eight questions. We focused on the operating system and most popular applications – internet browser and office suite, but we also asked about other OSS–use. The questions refer separately to the use of participants themselves and to the use of their students.

	Yes	No	I don't know
Do you use OS operating system on your computer?	12%	81%	7%
Do you use OS operating system on your student's computer?	5%	88%	7%
Do you use OS browser on your computer?	24%	70%	6%
Do you use OS browser on your student's computers?	12%	82%	6%
Do you use OS office suite on your computer?	28%	66%	6%
Do you use OS office suite on your student's computers?	14%	80%	6%

Table 4: Types of OSS that the participants/their students use on their desktops.

In general OSS is very poorly represented (Table 4). The participants do use OS office suite on their own computers, yet only 28% of them. They also use OS browsers and operating systems but in very low percentages and mostly on their home computers rather than on their students' computers.

Other OSS that you use on your computer or on your students' computers? Only 8% of all participants entered something in this area. It turned out that the participants still have problems with the term OS, because many of them entered different kinds of Microsoft SW, which does not belong in this category. Those answers will therefore not be analyzed further. We can determine, however, that it will take much time and effort to educate teachers and other education-related professionals of different kinds of SW equipment.

3.3 Factors influencing the selection of SW

In this section the participants had to choose the importance of predefined factors influencing their decisions about using OSS. We can see the results for three types of SW: OS operating system (Table 5), office suite (Table 6) and browser (Table 7).

	Very important	Important	Not so important	Unimportant	I don't know
Customization	56%	16%	8%	4%	16%
Desirable features	61%	26%	4%	0%	9%
Interoperability	65%	22%	4%	0%	9%
Price	82%	9%	0%	0%	9%
Reliability	82%	9%	0%	0%	9%
Reputation	9%	17%	57%	13%	4%
Teachers/ students can use SW at home	40%	30%	17%	9%	4%

Table 5: Factors influencing the selection of OS operating system.

The most important criteria in deciding, which operating system to use, turned out to be price and reliability, followed by interoperability and desired functionality. Its openness (students/teachers can use SW at home) and reputation do not seem to be so important.

	Very important	Important	Not so important	Unimportant	I don't know
Customization	62%	21%	13%	0%	4%
Desirable features	58%	33%	0	0	9%
Interoperability	79%	13%	0%	0%	8%
Price	79%	13%	0%	0%	8%
Reliability	67%	25%	0%	0%	8%
Reputation	8%	21%	46%	21%	4%
Teachers/ students can use SW at home	55%	21%	8%	8%	8%

Table 6: Factors influencing the selection of OS Office suite.

In the aspect of office suite, the importance of price and that of interoperability were balanced. As seen before, reputation is not very important.

	Very impor-tant	Impor-tant	Not so impor-tant	Unim-portant	I don't know
Customi-zation	42%	29%	21%	4%	4%
Desirable features	46%	46%	4%	0%	4%
Interope-rability	54%	21%	13%	8%	4%
Price	58%	13%	21%	4%	4%
Reliability	62%	17%	17%	0%	4%
Reputa-tion	9%	13%	52%	26%	0%
Teachers/ students can use SW at home	37%	21%	17%	21%	4%

Table 7: Factors influencing the selection of OS Internet browser.

Here, the situation is very similar to that in operating system and office suite categories. The results show that the participants do not find price so important as we have seen before. One can expect that the reason for this is the fact that Microsoft Internet Explorer is also free of charge. Reputation, again, does not seem to play a major role in the decision.

3.4 The difficulty of transition

It was interesting for us to see the results of this section, because OSS is usually considered to be harder to implement than similar solutions. Table 8 shows how hard it was (for the participants) to implement the OSS solution (technically) when compared to similar solutions (PSW).

Harder	Similar	Easier	I don't know
9%	47%	3%	41%

Table 8: The difficulty of implementation of OSS solution, compared to similar solutions.

The participants mostly believe that OSS is technically just as simple (or difficult) to implement as similar commercial solutions.

And how satisfied are the participants with the OSS solution when compared to similar ones (PSW)? The results are shown in Table 9.

Very satisfied	Similar	Not satisfied	I don't know
9%	47%	3%	41%

Table 9: How satisfied are the participants with OSS solution, compared to similar solutions?

Similar to the previous question, most participants are just as (dis) satisfied with this solution as they are with other commercial ones.

We could also expect that the participants got some reluctance from superiors and/or users while implementing OSS solution. Table 10 shows their opinion about the level of this reluctance.

Much	Some	Very little	I don't know
18%	18%	26%	38%

Table 10: Reluctance while implementing OSS solution.

Almost one in five participants encountered much reluctance (mostly from superiors and/or end users) when trying to implement a new solution and just as many of them encountered some reluctance,.

Would you like to recommend any specific OSS? (open-type question)

The participants mostly (40%) recommend OS office suite OpenOffice.org, which is followed by Linux operating system (20%) and other applications.

3.5 Factors influencing the selection of SW

What is your general opinion about OSS? Here, the participants had to select the level of agreement or disagreement with some predefined statements:

- Some OSS is ready to be used in education.
- I personally wish to use OSS wherever possible.
- I am not interested in the competition between different licensing philosophies and such, I only want to satisfy my needs.
- OS values and philosophy influence my decision in the selection of SW.

The following levels of agreement/disagreement were available: I strongly agree, I agree, Neutral/I don't know, I disagree, I strongly disagree. Nearly a half (48%) of the participants agree or strongly agree with the statement that some of OSS is mature enough to be used in education. Over a half (52%) of the participants are eager or very eager to use OSS wherever possible. The answers to the third statement show that the participants are not interested in the competition between different values and license philosophies and are only interested in what will help them achieve their goal (79%). However, one in every three participants is influenced by the values and the philosophy of OS movement when selecting SW, while others are neutral.

3.6 Factors influencing the selection of SW

As previously mentioned, we added this part of the questionnaire to find out a general use of IT. Table 11 shows, how and where IT is used in primary and secondary schools.

	Often	Rarely	Never
For preparing lessons and materials	70%	16%	14%
For lessons/work in IT classroom	55%	19%	26%
For presentations	48%	29%	23%
At laboratory work	16%	28%	56%
For administrative tasks	76%	15%	9%
For e-mail communication and similar tasks	81%	10%	9%
For browsing on the Internet	81%	10%	9%

Table 11: The use of IT in primary and secondary schools.

IT is mostly used for e-mail communication and for browsing the Internet. This is followed by administrative tasks and after that comes the use of IT for preparing lessons and materials. Computers have generally proved to be hardly ever used in laboratory work. Besides these predefined options, the participants also entered other activities where IT is to be used: in libraries, for writing music, for home schooling etc.

The last but one of the most important questions was, how important are different obstacles in using IT in education (Table 12)?

	Very imp.	Partly imp.	Not imp.
Poor education teachers get in using IT	61%	37%	2%
Nonexistent equipment in schools	48%	47%	5%
Inefficiency of using IT in schools	27%	61%	12%
Lack of materials, documentation and other support	39%	55%	6%
Unsuitable system of educating teachers for using ICT	42%	53%	5%

Table 12**:** The importance of different obstacles in using IT in education.

The most important obstacle in using IT in education has proved to be the poor education teachers get in using IT. Besides that, the participants listed old or nonexistent equipment in schools. The participants also had a chance to enter their own thoughts on the subject, but no such answers were given.

What is your suggestion for improving the use of IT in education? As this was an open-type question, it resulted in many different answers. These answers could be grouped into different categories, the most obvious one being educating teachers in using IT, which (again) seems to be the basic problem for teachers.

4 Comparison with a similar research on NREL

In this section we compare the results of our survey and those of a similar NREL survey by individual questions.

Who are the participants? NREL: Most participants (44%) are working for school districts (not individual schools) and are not teachers. Most of them are responsible for administration, selecting also the SW to be used on other people's computers. Minority of participants were teachers (13%). Our survey: Nearly half of the survey participants are full-time IT administration/maintainers, some 20% are teachers (one fifth working in high school, others primary school) and about the same amount of them are working in management. A fair half (58%) is in a position to select SW to be used on other computers (i.e. for students). Due to the differences between systems of education in USA and Slovenia, this part of survey was hard to compare. Despite the differences, however, we can notice certain similarities: in both surveys, most participants came from the area of IT administration and only a small percentage were teachers. Similarly, a large portion of participants in both surveys select SW on other people’s computers.

What are they using and are they using OSS? Except in the use of OSS office suites, which is almost identical (in percentages) in both surveys, the use of OSS is clearly more widespread in the NREL survey (on participants' computers as well as on student’s computers). For example, in NREL survey 42% of respondents use OSS operating system (e.g. Linux) on their computers, which is 30% more than in our survey.

When we are talking about OSS operating systems, the most important quality in NREL survey is reliability, followed by desired features and price. After that comes interoperability. These four criteria were also the most important ones in our survey.

Similarly as in the case of operating systems, in NREL and in our survey the office suite and web browser fulfills the following most important criteria: price, reliability, interoperability and desired features.

An interesting situation evolves around the reputation criterion, which proved to be of higher priority to the participants of NREL survey than to those included in our survey. On the other hand, the participants of our survey believe that being able to legally use the SW at home is very important, while to the American participants this is not so.

In the NREL survey, the participants believe that implementing most OSS solutions is easier or at least just as demanding as similar commercial solutions. On their homepage there is additional material – comments by the participants, interviews etc. The answers and comments they have entered show that the transition and implementation can be somewhat difficult in the beginning, however the solutions later prove to be more reliable and satisfactory in the long run. Most participants did not experience a considerable reluctance by their administration, as is frequently the case in other technological reorganization. Some mention slight

reluctance, which is cleared when they get to know the new solution.

The obvious difference between the answers to the question, how demanding it was to implement OS solution, when compared to similar PSW solutions, is due to a much larger number of undecided answers (don't know) in our survey. This option was far more frequent than in the NREL survey, which is the reason, why we cannot directly compare these results. We can, however, determine that option 'harder' was in both surveys surpassed by the number of participants selecting 'easier' and 'about the same'.

The answers to the question, how satisfied you are with the OS solution compared to similar PSW solutions, shows that in both surveys there is only a trivial number of users who are not satisfied with the solution.

We can notice a higher percentage of participants in Slovenia complaining about the reluctance from their management and users than in USA.

In the NREL survey regarding the open-type question, which OSS you would recommend to other users, most participants recommend Red Hat Linux distribution, including the American K12 version (K12LTSP), which is based on it. Most popular backend solutions prove to be Apache web server and SquidGuard, while OpenOffice.org office suite, The Gimp and web browser Mozilla are most recommended in the frontend section. Similarly to NREL survey, our survey also mentions Red Hat Linux and OpenOffice.org as the most recommended OSS solutions.

By expressing general opinion of OS (Some OSS is ready to be used in education) only a minimal number of participants selected the negative options (disagree and strongly disagree) – 1-2 %. The Slovenian participants were more inclined towards neutral options than the American, whereas there was an almost three-times higher number of positive ('strongly agree') answers in America than in Slovenia.

Answers show that the participants of the NREL survey were more inclined to use OSS anywhere possible than the Slovenian participants.

The Slovenian participants are far less interested in the competition between different licensing policies and more in finding and using the best solution to suit their needs.

34% of the Slovenians and 54% of the Americans agree or strongly agree with the statement: The values and the philosophies of OS movement influence my decision on using a certain SW. On the other hand, 8% of the Slovenian and 13% of the American participants disagree or strongly disagree with it. From these results we can conclude that NREL survey participants are more easily influenced by the philosophy and values of OS movements.

5 Summary and some concluding remarks

Finally, we will summarize the most important findings of our research:

- In general, OSS in education is very poorly represented.
- The participants still have problems with the 'OS' term, so it will take much time and effort to educate teachers and other education-related professionals of different kinds of SW.
- The fact that students and teachers can use SW at home and reputation of SW are not as important to the participants as one might expect.
- The participants mostly believe that OSS is technically just as simple to implement as similar commercial solutions.
- The participants mostly recommend OS office suite OpenOffice.org and Linux operating system Red Hat.
- About a half of the participants agree or strongly agree with the statement that some of OSS is mature enough to be used in education and are eager or very eager to use OSS wherever possible.
- The most important obstacle in using IT in education has proved to be poor education teachers get in using IT. Besides that, the participants listed old or nonexistent equipment in schools.
- The most important suggestion for improving the use of IT in education that the participants gave was to educate teachers in using IT, which seems to be the basic problem for teachers.

The most interesting findings in comparison between the results obtained in Slovenia and USA are:

- Except in the use of OSS office suites, which is almost identical in both surveys, the use of OSS on participant's computers as well as on student's computers is clearly more widespread by the NREL survey.
- The most important qualities of OSS in both surveys are reliability, desired functionalities, price and interoperability.
- The reputation criterion proved to be of higher priority to the participants of NREL survey than those of our survey, but the ability to legally use SW at home is more important for the Slovenian participants.
- We can notice a higher percentage of participants in Slovenia complaining about the reluctance of their management and users than in USA.
- The Slovenian participants are far less interested in the competition between different licensing policies and more in finding the best solution to suit their needs. NREL survey participants are more influenced by the philosophy and values of OS movements.

Finally, we would like to mention that the OS philosophy is not only about SW. An interesting movement that is also going on in the world is an initiative to make open to the public all kinds of learning resources as e-resources. Wikipedia might be the most famous example of this movement. It is a Web-based free content encyclopedia that is openly edited and freely readable. A small step towards these temptations is also a decision of the Slovenian Ministry of Education to

analyze possibilities to publish some student-books and workbooks in an e-form on Internet, so that students and parents could more or less freely use them. So these may be the most important directions for future research of this field.

Acknowledgement

This research was supported by Ministry of Higher Education, Science and Technology of the Republic of Slovenia under the grant No. P2-0037.

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