

## Experiences from the Use of Skolelinux: Use of OpenSource Software at Four Norwegian Schools

### **Introduction**

*This case study is based on the report by Statskonsult 2003:24 “Experiences from the Use of Skolelinux-Use of Open-Source Software at Four Norwegian Schools”. This case study has been revised and edited with updated information compiled for the Open Source Observatory by Kirsten Haaland and Rishab Ghosh at MERIT.*

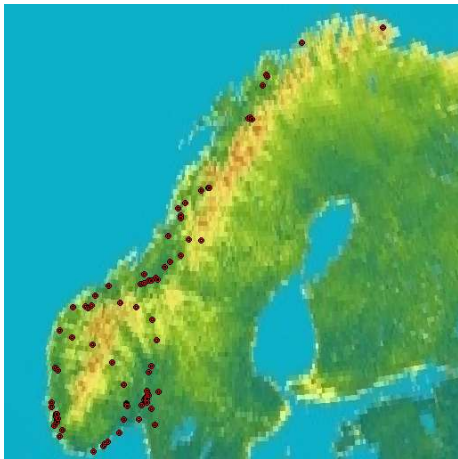
### **Skolelinux**

The goal of the Skolelinux project is to develop a Linux distribution for Norwegian schools. The Skolelinux distribution should be simple to install and maintain and it must be based on both standard Norwegian and New Norwegian and, as much as possible, on the Sami language.

From the start, the project had three primary objectives:

1. Translate all programs included in a Linux distribution into both standard Norwegian and New Norwegian, and some of the more widely used programs into the Sami language.
2. Develop a concept for simple installation and maintenance of the software in the schools.
3. Achieve a realistic introduction and spread of the software in the schools.

One of the basic concerns for the project has been that ICT in the schools should be based on pedagogical principles and not be guided by whatever software is most widely used. The project started in the summer of 2001 and has had contributions from several hundred volunteers.



Distribution of schools. Source:  
[http://www.skolelinux.org/no/user\\_experience/test\\_schools/test\\_schools\\_map](http://www.skolelinux.org/no/user_experience/test_schools/test_schools_map)

As of today there are 104 schools registered online on Skolelinux.no, distributed over the country as shown on the map. This is up from 20 schools at the time when the original report was written. Knut Yrvin, project leader of Skolelinux, says there are indications that 104 schools is an underestimation of the actual number, where the real number is somewhere around 200. This is due to that many schools are testing it out before making an official commitment before they go through the bureaucracy associated with a transition. Further, Telecomputing and InOut who are suppliers selling Skolelinux report that none of their customers have switched away from

Skolelinux after buying it. Further, Skolelinux is starting to be used in various European countries, in Hawaii, and in Eritrea through a FAIR, and one in Uganda.

### **ICT in Education**

There are not enough PCs in the schools. There is a need for good arrangements for the acquisition of ICT equipment and software. There is a need for greater Internet capacity. Operation and maintenance is a challenge. The acquisition of ICT equipment is the responsibility of the individual school/municipality.

In the action plan ICT in Norwegian Education- Plan for 2000-2003, the following items are seen as national challenges concerning infrastructure and cooperation:

- Satisfactory availability of equipment for both students and teachers and fulfilment of the requirements of users with special needs
- Good access to the Internet
- Good arrangements for operation, maintenance and technical support in educational institutions
- Better reciprocal utilization of competence and resources between business and education sectors

Additionally, there are a number of conditions tied the working environment such as the generation of heat and noise by PCs. The noise and heat generated by the use of PCs in the school can have a negative effect on the working environment. Because of this, solutions that are used in the schools should generate as little heat and noise as possible. Students and teachers do not have their own work places. In urban areas there are many students in each class. Students and teachers move from classroom to classroom. ICT equipment is primarily placed in common rooms such as the library or computer room where many PCs are placed in the same room.

In short, increasing the number of computers in the schools is a goal in Norway. Few of the schools' resources are focused on operation and administration of ICT systems. The ICT administrators focus on helping others in the school with the use of software. Consideration must be taken to the special working environment in the school when acquiring ICT equipment.

### **Experiences from the Schools**

The following are summaries of the interviews that were conducted. There were interviews with ICT administrators and teachers from 4 schools. The statements and evaluations are the interview subjects' own and have not been evaluated. The schools were chosen so they could provide as much knowledge and experience as possible in the use of Skolelinux. The schools were not chosen for being representative. The experiences from the schools are first individually presented before they are compared for possible similarities in the different cases.

#### ***School A***

##### **About the School**

The school has about 500 students in grades 8-10, and 50 teacher positions. There are 3 administrative employees. The average age of the teachers is above 45 years. There are 2 who share the responsibility as ICT administrator, one mainly responsible for operation and the other for training. They also teach at the school. The ICT administrators have good general knowledge of ICT and also good knowledge of Linux. The school has used Skolelinux since Spring 2002.

## **ICT at the School**

Prior to the installation of Skolelinux, the school had a few old PCs which were a mix of Windows 95 and Windows 98. They were experienced as being very unstable. The students often downloaded new software and changed the setup of the PCs. The number of PCs per student/teacher was low. In total there were no more than 10 PCs in the whole school. At the start, Skolelinux was installed on 6 of the teacher machines. Today there are about 25 teacher machines and 50 student machines that have Skolelinux installed. The Skolelinux machines are set up as thin clients. Students and teachers use Skolelinux. The administration uses Windows and is connected to its own network. The students and teachers are each connected to their own servers with the two networks separated by two firewalls. It is clearly evident which network one is coupled to when one logs on. The set up of Skolelinux as thin clients makes the machines simple to administer, having a common setup. This also means that the students have access to their own home directory no matter which student machine he or she uses to log on. The school has a 2 Mb line out to the Internet. Some of the teaching is based on the use of the Internet.

The teachers use educational portals which are places where the teachers can place information for entire groups/classes. Some of these websites also hold educational software. Some of these require a lot of bandwidth so there cannot be many who use these external programs at the same time. The school uses the following software: OpenOffice, Gimp, Opera, K-mail and various educational software for mathematics, chemistry and astronomy.

## **Experiences Using Skolelinux**

Prior to the implementation of Skolelinux, the school expected a stable system that was simple to operate and did not cost much money. All of the expectations were realised. The school has received the advantages they hoped to get: the stability, use of old equipment, economic gains. The number of machines has increased greatly. There has been some resistance from individual teachers, but these have died down as the number of PCs available has increased and they become familiar with the new system. The ICT administrators experience a stable system demanding little daily supervision. How much of this is due to Linux and how much is due to the transition to thin clients is uncertain. Students and teachers are primarily satisfied with Skolelinux. Those who are most satisfied are those who have not had much prior experience. One problem is retraining of those with prior skills to become familiar with the new platform. The school has not accepted the offer of training from the Skolelinux Project.

## **Evaluations about Choosing Skolelinux**

It was a mix of economic, competence and technical grounds that lay behind the decision to use Skolelinux. Some of the operating personnel were also involved and were familiar with Skolelinux. The school chose Skolelinux so they could use old machines. They also consider it is easier to operate a Linux network than a Windows network. With Skolelinux, it is no longer necessary to have a Unix/Linux background. Skolelinux as Linux distribution was chosen because it was designed to work right out of the box. Other distributions have to be adapted to the school's everyday routine. Skolelinux is built upon Debian which is considered to be the one distribution that is simplest to administer and gives the best control. In Spring 2002, the operating personnel were granted a sum of money for the acquisition of new IT equipment. During a holiday period the systems administrators got the go ahead to install Linux, and Skolelinux was

installed on 6 machines. There was no official decision at the school that Linux should be used. It was purely a financial/administrative choice.

Conversion between simple text documents and spreadsheet is unproblematic. The teachers can exchange documents with their home machines where they use Word and/or OpenOffice. All documents in OpenOffice are saved as Word documents at school. Some documents exhibit changes in layout when they are converted to HTML and are published to the net. WYSIWYG functionality in Linux is not always entirely correct.

### **Other**

In the future, a lot will be based on the use of centrally located educational portals or learning portals. Some examples of this are [utdanning.no](http://utdanning.no) and [skolenett.no](http://skolenett.no). Recently the school has gone over to using only Classfronter. This learning platform functions better with Skolelinux and OpenOffice. The decision to use Classfronter was taken centrally by the School District. The school has stopped using Opera as its standard Internet browser, and now uses Mozilla instead, because it is based on open and free software. The training of teachers is based on Windows. LærerIKT is a centrally-offered training program that is based on distance learning via Internet, drilling teachers in the use of Windows. This is wasted on a school that uses Linux and makes it more difficult to use Linux-based PCs in the schools.

### ***School B***

#### **About the School**

The school has 270 students in grades 1 – 7. There are a little more than 20 teachers. In addition there are a number of assistants. The school is one of Education Minister Clement's bonus schools. The ICT administrator has 2 teaching hours a week available for use as ICT administrator.

#### **ICT at the School**

There is a mix of Windows versions and Linux in the school. In total, there are about 30 Linux PCs, which are connected in a network to a server. The Linux machines are set up as thin clients. There are a number of Windows machines in the media centers. These are not connected to the network but some of them are connected to the Internet. The Windows computers in classrooms are also not connected to the network. There is a network printer in each of the media centres, which only does printouts from the Linux machines. The teachers and the students have separate networks. The teacher machines use Windows. There is one PC in each teacher office. Each office is shared by 2-5 teachers. The students use primarily word processing, spreadsheet and Internet browser to surf on the Internet. There is some educational software on the PCs in the classrooms. After the acquisition of so many new PCs the school also got broadband. They advertised for EEA bids and a local supplier won. The school has developed its own training plan with accompanying exercise booklets for the students' use of ICT. They refer to this training as their own version of the Computer Driving License. This training plan was developed based on the use of Windows, and has been revised to include both systems.

#### **Background for Choosing Skolelinux**

In spring 2002, the Skolelinux Project contacted the school to hear if they could install Skolelinux. The school was promised PCs almost free of cost and the help to install the equipment. The Skolelinux Project contacted the headmaster who, in turn, contacted the ICT

administrator. Together, they discussed the proposal with the ICT administrator for the municipality. The proposal was also put before the employees at the school. They only a short time to evaluate the proposal before they accepted the proposal. This was the first school getting Skolelinux installed by people from the Skolelinux Project. A course was held after the end of the school year for ICT administrators in the municipality. In the course of July-November 2002, a network was set up and PCs were installed in the school. This was done by volunteers from the Skolelinux Project and some parents.

### **Installation of Skolelinux**

It was more difficult than expected by the Skolelinux Project to get the PCs for the school. It took a lot of work and the school accepted all of the machines that were offered to them. Many of them later proved to be too bad to be used for Linux installation. Afterwards they realised that they should have made more clear demands regarding the machines. Parents and enthusiasts from the Skolelinux Project did the cabling for part of the school. During the summer of 2003 the 5th-7th grade classrooms were cabled by a professional firm. It became apparent that the markings on the cables were not done according to specifications. Now there are network plugs in all classrooms, group-rooms and in the student kitchens for the 5th-7th grades. There are network jacks in the media centers and in the teachers' workroom. The installation was done by the municipality, who also paid for the necessary hardware for the server and cabling. The school's decision to use Skolelinux was supported by the municipality. Without such support, the school would not have chosen to accept the offer from the Skolelinux Project.

### **Evaluation and Experiences in the Use of Skolelinux (and ICT)**

There is not enough Norwegian educational software for Linux. Some software the municipality did buy only works with Windows. The students primarily use word processor and Internet browser, and these work excellent with Linux. It is impossible to save on diskettes on a Linux network. Thus, the students cannot switch documents between Windows and Linux. Skolelinux has told them that there is no need for this; they can save on the network and send documents to each other by e-mail. Today, the students do not have their own user accounts on the student network. There are 6 user names/passwords that are used to log on to the network. The respondents thought that the students were not ready to have their own username/password. They would forget them and the ICT administrator would have to spend time helping them log on. Many students also forget to log off so the next user would get access to that user's area. The respondents were not certain how they wanted, in the future, to organize storage, user accounts, and if the students should have their own user name and password or if each grade would have a common user account. (N.B. The Skolelinux scheme works best when all of the students have their own user names/user accounts on the network.). The respondents have not used Skolelinux's e-mail list to get help. Previously, the ICT administrator has written e-mails directly to some of the enthusiasts she knows to get help. The people in Skolelinux and the teachers do not use the same technical jargon. They have too high expectations concerning the teachers' knowledge. The municipality has now got a contract with a firm for service for the Linux machines (Linux Labs). The firm has managed to arrange several things when they were visiting the school to get to know them. The students must use both Windows and Linux. The school uses Word and not OpenOffice on the Windows PCs. The students do not complain about Linux, they work by trial and error and think everything is OK. The obstacle for Linux is it lacks educational software. There are some purchased educational software for Windows. There is none for Linux.

The implementation of Skolelinux happened quickly. There was not much time to make preparations. A lot was promised but not everything was delivered. Not all of the machines worked. It took a lot longer time to get Linux installed on the machines and do the cabling for the network. There are now less problems with the machines than previously, and the school has got a more stable operating environment. The school has also gotten more PCs by using Linux. Previously they could have annually afforded 1-2 new PCs without Skolelinux. The respondents would probably make the same choice again if they got to choose again.

### ***School C***

#### **About the School**

The school has a little more than 200 students in grades 8-10. There is a 25% position devoted to ICT administration in the school.

#### **ICT in the School**

Today the school has a student network consisting of 25 PCs in a network and 6 stand-alone PCs. The PCs in the network are set up with Skolelinux, as thin clients. These PCs were set up in spring 2003. The teachers have not got their own network. The administration has their own PCs which are connected to the municipality's systems. The software that is used is primarily ordinary standard software and not specially developed educational software. The clients do not have diskette stations and the students have no possibility to install their own software. Some of the cabling in the building had been done incorrectly, so that had to be fixed. The work continued from summer 2002 – spring 2003. Now all the rooms in the school are cabled by a professional installation firm. They also have a broadband connection.

#### **Background for Choosing Skolelinux**

When the ICT administrator came to the school, there were few PCs present. The school could not afford to acquire more PCs or software. The school received an extra grant from the municipality that made it possible to invest in more equipment. The municipality has passed a resolution that Linux would be used in the schools on a trial basis. When new PCs and software were to be acquired, Linux became the choice. The ICT administrator took the initiative in considering Linux. The ICT administrator put forward a suggestion about this to the headmaster and the other employees. They accepted the suggestion when they saw that the investment made it possible to buy up to 30 new ICT working stations for the students.

#### **Evaluation Concerning the Use of Skolelinux**

The ICT administrator does not regret choosing Skolelinux. He recognises that he has got more PCs with this solutions. He considered it relatively simple to install Skolelinux in the school. In this work, he has had the help of people from other schools, Skolelinux's e-mail lists and from external suppliers. Installation of the broadband connection to the Skolelinux network cause no problems. Some of the students have reacted to the fact that they cannot install any software they want and that they cannot use programs such as Chat. There have been no comments that the available software is difficult to use. As of today, the students at the school do not share documents with others. If they need to save a document on a diskette, they must go to the ICT administrator to get it done. The ICT administrator has uncovered some errors in Skolelinux. He has got help from the project to correct or work around the errors. He has also experienced that Skolelinux has got better over time, even if it still has some errors left to be corrected. It is easy for the ICT administrator to install new programs in Skolelinux. He has done this, among other

things, with the Internet browser Mozilla. The ICT administrator is mostly satisfied with Skolelinux. He misses a few things such as printout management, integration with Windows and a better backup system. Most of this is under development in Skolelinux.

### **Other**

The municipality has made a contract with a commercial party for remote operation and support for the schools using Skolelinux. This has freed up resources for the ICT administrator. He recognises this as a great advantage and security. The ICT administrator has a good dialogue with the person in the municipality who is responsible for ICT in the schools. He has got support from central municipal authorities for choosing Skolelinux. The ICT administrator would still choose Skolelinux if he got the possibility to make that choice again.

### ***School D***

#### **About the School**

The school is an upper secondary school with over 600 students and about 60 teachers. There are 2 students per PC at the school, while each teacher has their own PC. The school was named Bonus School in 2002 for its results in the use of ICT in education and for development of a good school environment. The school has pilot classes with laptops for all students. The school has ICT as one of its areas of concentration.

#### **ICT in the School**

This school year, the school has begun using two new ICT systems. One is Skolelinux and the other is the learning platform Classfronter. The school has also set up a new, large ICT room with 90 thin clients that use Skolelinux as an operating system. The machines being used have been received or acquired cheaply. Consequently they are heterogenous and have various processor and memory capacity.

The school has several computer rooms and a mix of PCs that use Windows 98, Windows 2000 or Linux. The school also has one class for each grade level that is equipped with laptops. The class that started in Autumn 2003 has laptops equipped with Linux. A wireless network allows constant connection to the Internet. Most of the servers use Linux as an operating system, but there are some using Windows. All teachers have laptops, and these machines have Windows operating systems.

ICT is used in almost every subject. Even those taking the foundation course in Sport and Physical Education use ICT in sport subjects. The use of ICT and learning platforms (Classfronter) has become a part of the daily routine at the school. The exercises are published on Classfronter where the students also has an overview of schedules and activities. Classfronter is also used as a communication channel between teacher and student, accessible both from the school and from home. All of the students have their own user name and password for Skolelinux. In addition, they have their own password to get into Classfronter. For the most part, the students remember their passwords for Skolelinux, but they have often forgotten their password for Classfronter. The office and the teachers are responsible for Classfronter, while ICT operation is responsible for Skolelinux. The administration has its own Windows network that is separate from the educational network. Much of this software is run centrally in the municipality.

#### **Experiences from the Use of Skolelinux and Classfronter**

The school has had startup problems with the implementation of Skolelinux. In the beginning, the machines often froze and were slow. The teachers felt that they had gotten too less training in the use of the system. This also applies to the students. The students said that the system was slow to respond and had previously often frozen. They had no problems using the software, irrespective of whether they had used Linux before. Concerning interoperability with other systems, it has been suggested that all of the students should get a copy of OpenOffice to install at home. The students do not have OpenOffice at home, so when they save documents on Classfronter in OpenOffice format, they cannot open them at home. Giving them a OpenOffice copy or getting them to save the documents in "RTF" or "doc" format would solve this. What is more difficult to solve is that some of the economy textbooks have exercises in Excel and these cannot be opened in OpenOffice Calc. It is also difficult for the students to make the transition from using Microsoft PowerPoint to OpenOffice Impress. It was an evaluation that OpenOffice Writer is greatly similar to Microsoft Word, but that there were larger discrepancies between Impress and PowerPoint.

The teachers were just as much occupied with the implementation of Classfronter as they were with Skolelinux. The teachers used Windows so they primarily had to orient themselves to Classfronter. One of the teachers, together with office personnel, have responsibility for administration of Classfronter. The greatest challenge the school faced in implementation of Skolelinux has been getting Skolelinux and the Internet browsers used to satisfactorily work together with the learning platform Classfronter. Now the school has chosen Mozilla which it considers to be the best for Skolelinux. As of today, this works fine with Classfronter. In addition there have been problems with the sharing of resources on the network, and that the upper limit for the number of concurrent processes on the system was too low at the start of school year. Much of this has been fixed.

### **Evaluations on the Choice of Skolelinux**

The school's main reason for choosing Skolelinux was economical, plus the fact that the ICT administrator promoted the solution. In order to run thin clients with Windows, the school would have needed several new servers. By using Skolelinux, they only needed one new server. The school expects to save money on licensing and the they can use the existing equipment longer. Without the ICT administrator's initiative and knowledge of the system, it would probably not have been considered as an alternative. The headmaster made the formal decision for Skolelinux, and the teachers did not actively participate in the decision-making process. The teachers still use Windows, and for them the migration to a new learning platform is more important than the migration to Skolelinux.

### ***Why the Schools Implemented Skolelinux***

The schools' primary reason for implementing Skolelinux was financial. There were less expenditures in licensing and there were possibilities to use older and cheaper PCs to increase the number of PCs. The schools also wanted a more stable system and a system that could give them better control over the students' use. The survey shows that several ICT administrators had knowledge of Linux before the choice of Skolelinux was made, and their acquaintanceship with Skolelinux influenced the choice. These ICT administrators are also part of the Skolelinux Project and, as such, have the possibility of influencing the further development of Skolelinux. This has also been an argument for implementing Skolelinux. At one of the schools, Skolelinux took the initiative to get the school to implement Skolelinux in order to get a reference installation. At all



schools there were active and competent ICT administrators who were positive to the implementation. There were few or no pedagogic reasons to indicate that the school should not choose Skolelinux. Some of the educational software that they have for Windows is not useable, but there is a lot available for Linux, too. As time goes by, a lot of the ICT training/teaching will be based on centrally available Internet services. This reduces the need for a specific operating system at the school. The primary and lower secondary schools' use of ICT today is not so advanced that it cannot be taken care of by Linux software.

It varies whether the school has gotten support from the municipality. The schools getting no support from their own municipality have had ICT administrators with high competence in Linux. These have made the choice despite the municipality's objections. None of the schools have been asked by their municipality to implement Skolelinux. The goal of the schools was to get more machines within the limits of their budget. By choosing Skolelinux and the thin client solution, they got more and cheaper machines and were spared having to devote more resources to operating the system. Simpler system operation was also an argument for choosing Skolelinux. Just getting a system that the school could administer by itself was an argument for Skolelinux.

### ***Experiences in Using Skolelinux***

The evaluations from the schools tell that they are satisfied with Skolelinux. They have got access to more machines, something that according to the SITES report, was the most important thing for the schools, and they have gotten a more stable operating environment. It is unclear if this is due to the transition to Skolelinux, to thin clients, or to a combination of the two things. Skolelinux and the accompanying software are simple to use. Those most satisfied are those who have not had a lot of previous experience. One small problem is retraining those who knew a lot from before. This also tallies well with a report about the user friendliness of Linux by Relavantine AG in Germany [9] which concludes that Linux as a desktop system is about as user friendly as Windows XP.

Word processing, spreadsheet and Internet browser are the programs that are used most often in the school. There are few problems using these programs both for the teachers who use Linux and for the students. It varied from school to school whether they had pure Linux environments or whether they had a heterogeneous environment. Some of the teachers viewed it as an advantage, for the teachers and students to have the same system, while it did not make any difference for others. Student complaints about the system primarily concerned the fact that they were not allowed to install their own programs or change the system themselves. There was also some dissatisfaction among some students about limitations on which programs were available and that some of the machines did not have speakers, CD-ROM or diskette stations. There were few or no complaints concerning availability of educational programs. In some cases there were also complaints that the system was slow and that Skolelinux could not be integrated with existing external software and learning platforms.

Those students we spoke with said that they thought Skolelinux was OK. They missed some programs, but they thought it was simple to relate to both the OpenOffice suite and Mozilla. The younger the students were, the easier it was for them to adapt to Linux. The youngest students did not need any retraining. Several of the schools used many different systems. This meant that the teachers used one platform while the students used another one. So, the teachers did not get as well acquainted with the systems. Several said that it would be expedient for the teachers and

students to have the same programs. OpenOffice and Mozilla are available both for Windows and Linux. The schools with a heterogeneous environment considered using OpenOffice and Mozilla on both platforms to make the transition between the two systems easier. There is a lack of some educational software in Skolelinux. This is especially true in mathematics and economics where exercises have been developed based on Microsoft's Excel. These exercises are not available for Linux. There are different experiences concerning compatibility of Skolelinux and the learning platform Classfronter. Those who have used the combination the longest time are satisfied, while those who have just started have experienced difficulties. The Skolelinux scheme works best when all of the students have their own user name and password on the network and when student work is saved on the network or on a learning platform.

The school's administrative systems are physically separate from the teaching part of the schools' network. This means that there is no existing administrative system to be integrated with Skolelinux. This has made the implementation of Skolelinux easier. According to the survey from AAD/NHD, the lack of availability of administrative software for Skolelinux is one of the obstacles to the use of Linux in Norwegian municipalities. All of the ICT administrators in the schools that were surveyed are resource persons who have contributed a lot to make Skolelinux work well in the schools. It is much to their credit that the school has successfully implemented Skolelinux. The systems for administering users, permissions, etc. was especially developed for Skolelinux and adapted to the needs of the schools. This helps simplify the operation of Skolelinux. Skolelinux is focused on creating a total environment for the schools. They have adapted a general system to a specific environment. They are the only ones who make a total environment for the schools. There is no "SchoolWindows". The version of Windows that is used by the schools is the same one used by everyone else with all of its strengths and weaknesses. The transition to thin clients has made system administration simpler, while the control of the use of programs and resources has got better. The systems at the schools have become more stable after the transition to Skolelinux and the problem with viruses has been significantly reduced. All in all, the transition to Skolelinux has led to a more stable operating environment where the ICT administrator can focus more on user support than on troubleshooting acute problems. The transition to thin clients has also meant that the users get their own set up no matter which machine they log onto. This is important in schools where the students do not have access to their own machine. As one of the ICT administrators said, "The advantage of Skolelinux is that it works right out of the box." All of the ICT administrators would have made the same choice again if they had the same opportunity.

### ***Interoperability with Other IT Systems***

The schools reported minor problems concerning the conversion of documents written in Linux programs to other systems. It was necessary to save documents written in OpenOffice Writer or other programs as RTF files. The schools had some problems importing documents written in Word. This was especially true when lists and bullets were used. Some macros and templates in Word were not interpreted correctly by OpenOffice Writer. This is supported by a report developed by Statskonsult about the interoperability of "StarOffice" and Word. Documents written in OpenOffice can be saved in Word format. This makes it simple to retrieve a document using Word later. Some of the formatting may change when documents written in OpenOffice Writer are saved in doc format. OpenOffice had also got some limitations concerning the choice of fonts and styles. Converting documents from OpenOffice Writer to Word works fine, but some changes can take place when documents are converted from Word to OpenOffice Writer. The text

does not disappear when converted between the two systems, but the layout may be changed. Concerning the use of the Internet browser, Mozilla worked well together with most of the web-based services. As of today, Mozilla is the best choice for an Internet browser for Skolelinux. Both OpenOffice and Mozilla are available in versions for both Linux and Windows. This makes it possible to transfer documents between the two operating systems in a simple and problem-free manner. The introduction of OpenOffice on a Windows platform can also make the transition to a Linux platform easier because the user is familiar with parts of the system.

### **Some user comments**

Having been in touch with various schools, a comment that is very often made is concerning the graphical user interface (GUI) Skolelinux provides. Eivind Ødegård from Båtsfjord school reports that especially schools with older students (grade 8-10) are dissatisfied with the GUI. Odin Hetland Nøsen at Harestad School even tells that the GUI was one the main reasons for ultimately deciding to use K12LTSP, an alternative Linux distribution for schools. He claims user friendliness and modern feel to the GUI is very important for teachers and students, and Skolelinux has some way to go to fully achieve this. According to Nøsen, a modern GUI also makes the transition from Windows to Linux smoother. Overall, however, schools choosing to install Skolelinux still seem satisfied with the costs associated with it, the functionality, the success with thin clients, administration and ease of updating, confirming the initial findings of the report. Talking with a young student, Nora Haaland (12) working with OpenOffice at school she comments “in the beginning the buttons are a bit different, but you quickly get used to it and it is unproblematic to work with”. This confirms the general feeling that teachers and students having much experience find it harder to make the transition than younger students. Further, upon questioning Nora Haaland about Linux she did not know what Linux was, but did recognise the picture of the penguin. Overall, functionality appears to be what young students judge the software by, being totally unaware of the open source/proprietary software debate.

### **Evaluations and Conclusions**

Skolelinux is a good product for the schools, satisfying all of the main needs. It is inexpensive, stable and can be used together with various learning platforms and learning portals. Using thin clients, Skolelinux in a school environment is less expensive to acquire and operate than different Windows versions. The schools having picked Skolelinux are satisfied with the choice, and would do it again.

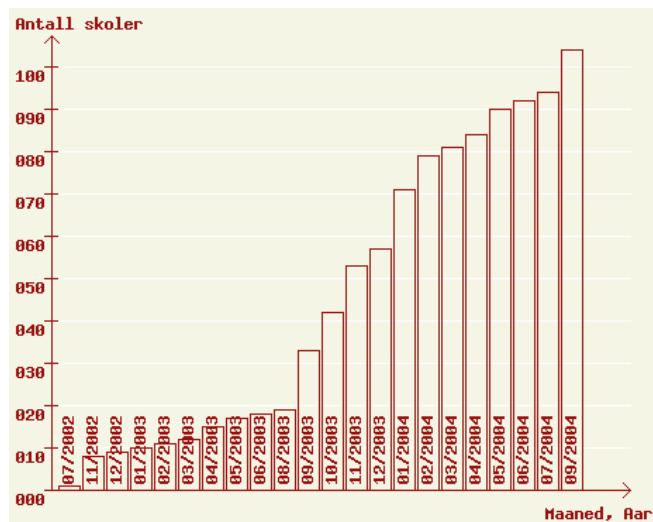
The concept that Skolelinux is built on, with thin clients and central administration of a server in the school, simplifies the operation and should be implemented to a greater degree in the schools. Schools with few PCs per student have the most to win by implementing Skolelinux since they have low transitional costs. Skolelinux has taken the action plan "ICT in Education" seriously and made a product that is adapted to the school's situation and resources.

The Skolelinux scheme works best when all of the students have their own user name/user account on the network. The availability of programs for both Linux and Windows makes the transition easier. Conversion of text from Microsoft Word to OpenOffice Writer mostly works well.

Skolelinux lacks some educational software. Some learning platforms work poorly together with other Internet browsers than Internet Explorer. This is a problem that Skolelinux and the schools should address.

The centrally organised training of teachers is based on Windows. This makes it difficult for the schools to choose anything other than Windows-based solutions. The training of teachers should be more flexible and not based solely on the use of products from one single supplier.

According to Statkonsult's evaluation, Skolelinux is well suited for use in the school. This also seems supported by the fact that the number of schools are continually increasing, and is up from 20 at the time when the report was first written to 104 today (but possibly being as high as 200). It is also spreading internationally, to various European countries, Hawaii, Eritrea and Uganda.



Registered Skolelinux schools. Source: [http://www.skolelinux.org/no/user\\_experience/test\\_schools/test\\_schools\\_history](http://www.skolelinux.org/no/user_experience/test_schools/test_schools_history)

### Further Information:

- **Skolelinux:** <http://www.skolelinux.no>
- **Original 2003 report:** Statskonsult 2003:24 “Experiences from the Use of Skolelinux-Use of Open-Source Software at Four Norwegian Schools”.
  - The Norwegian version: <http://www.statskonsult.no/publik/rapporter/2003/2003-24.htm>
  - The translated version:  
*as pdf:* [http://developer.skolelinux.no/rapporter/statskonsult\\_2003\\_24\\_eng.pdf](http://developer.skolelinux.no/rapporter/statskonsult_2003_24_eng.pdf)  
*as sxw:* [http://developer.skolelinux.no/rapporter/statskonsult\\_2003\\_24\\_eng.sxw](http://developer.skolelinux.no/rapporter/statskonsult_2003_24_eng.sxw)

### Other related projects and sources of information:

- Det Danske Teknologirådet: “[Open source software i den digitale forvaltning](#)”, October 2002.

- Swedish Agency for Public Management: “[Free and Open Source Software – a Feasibility Study](#)”, February 2003.
- Statskonsult: Rapport 2001:7 “[The Usability of Linux and Other Open-Source Software in the Norwegian Public Sector](#)”, March 2001.
- Andreas Quale: “[Second International Technology in Education Study, modul 1, nasjonal rapport, Norge](#)” – Institutt for Lærerutdanning og Skoleutvikling, Universitetet i Oslo, September 2000.
- Norwegian Ministry of Education: “[ICT in Norwegian Education- Plan for 2000 – 2003](#)”.
- Relevantive AG: “[Linux Usability Report](#)”, August 2003.

Interesting interviews with Knut Yrvin, Project Leader of Skolelinux:

- <http://lwn.net/Articles/46850/> (English)
- <http://www.itavisen.no/art/1304590.html> (Norwegian)

Skolelinux Interview by Waldo Bastian: interviews with Bart Cornelis (Belgian), Kurt Gramlich (German), Conrad Newton (American) and Knut Yrvin (Norwegian) to learn more about Skolelinux and the role that KDE plays in it.

<http://edu.kde.org/interviews/skolelinux.php>

For financial calculations:

Teleplan – (On commission from AAD og NHD): "Åpen programvare i Norge - Status, effekter hindringer og drivere", October 2003.

Tests of interoperability:

Swedish Agency for Public Management: "[Interoperability Test and XML Evaluation of StarOffice 6.0 and Office Word 2003 Beta 2](#)".

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