

eee-pc @ school

The Netbook in
Classroom Instruc-
tion at the Praxis-
volksschule der
Kirchlichen Pädago-
gischen Hochschule
Wien/Krems,
Campus
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Ilse Bailicz
Martin Newald
Wolfgang Seper
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with the cooperation of Johann Eder and Anton Reiter

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Preface

When the Taiwanese computer manufacturer ASUS established a new product category at the end of 2007 with the first Eee PC™ generation, reactions on the market and among the public were initially subdued. No one truly wanted to believe that all the hard-won technological progress in the field of computer engineering was not always matched by the needs of consumers. But sometimes less really is more!

In the 1970s, when microprocessor technology was still in its infancy and the world only knew large computing systems and centralised data processing, the industry was focused on maximising pure computing performance. And with good reason. In the end, Ken Olsen's assumption that "[t]here is no reason for any individual to have a computer in his home" was finally disproved in the 1980s. Numerous innovations in the computer industry very quickly led to the unprecedented growth of the personal computer and to the digitalisation of an entire society. The current level of technology and its penetration into numerous aspects of private and professional life is the result of the drive for innovation in the industry.

The companies in the industry were consistently dedicated to achieving a technological advantage over their competitors. This drove developments that continuously expanded the range of applications. However, in the heady euphoria of progress, some useful applications were often left unconsidered. The products were not always made with people in mind, and the users were not always prepared to handle such a tidal wave of possibilities. There can be no doubt that information technology has vastly improved many work processes and has become a fundamental component of the modern business world. But not everywhere does increased performance equate to an improvement.

It is for precisely such areas that the Eee PC was conceived. The Eee PC is directed toward young students and beginners as well as more advanced users. It is equally suited for home, school, study and work. In terms of performance and features, however, the Eee PC takes a step back. For example, it does not make use of the most powerful processors, and maximum memory capacity is also

not a priority. Since the USB stick has now established itself as a widespread storage medium, a CD/DVD drive was also intentionally left out. Other attributes were emphasised instead, such as "simplicity" and "mobility". The heart of the system is a fast and energy-efficient Intel® Atom™ processor combined with a high battery capacity and special power conservation functions developed by ASUS to allow users to remain independent of the power network for very long periods. The average weight of an Eee PC of roughly one kilogramme also promotes the concept of mobility. With integrated WLAN or even a UMTS module, the Internet is also constantly available.

Lowering the performance bar offers yet another advantage: cost-efficiency. Users save money on a system with reduced capabilities. On the other hand, they are also able to make full use of what is made available to them.

Many applications that arise in the home, at work and particularly in an educational environment profit well from the concept behind this class of device. This was also recognised by the director of the Praxisvolksschule, RgR Prof. Johann Eder, and his project team. Since this school located in the heart of Vienna already had some experience with computer-aided learning, there was no shortage of enthusiasm for the evaluation project.

The question of whether the Eee PC would actually prove to be an appropriate mini-computer for students also piqued our curiosity here at ASUS. This led to the birth of the `eee-pc@school` project.

It became clear over the course of the first few months that a great many more people were also interested in this topic. The project is still being widely discussed in the German and Austrian media. Many schools have become aware of it and are now pursuing similar approaches for utilising the Eee PC as a supplemental learning aid in the classroom. We hope to continue to inspire enthusiasm in schools and among teachers and parents as well as to allay any reservations or concerns. As we observed very clearly in this project, the students themselves were fired up from day one.

Of course, the ideas of computer-aided learning, networked schools and the early promotion of media literacy

are far from new. Myriad approaches are being undertaken by numerous institutions to promote effective integration of computer hardware into educational instruction.

After concerning myself closely with the topic over the past months, however, I am left with the impression that schools often run up against significant obstacles in such efforts. The procurement costs often represent a high initial hurdle.

Psychological and pedagogical reservations and fears also still exist in connection with increased use of modern IT in schools.

I hope that the eee-pc@school project and the team at the Praxisvolksschule in Vienna can clear up some of the prejudices and misunderstandings. Perhaps this project will serve as an inspiration for other schools in how the accomplishments of the IT industry can be put to good use in daily educational instruction.

We at ASUS are very pleased at this opportunity to support Prof. Johann Eder and his team in the evaluation project, and we wish them great success as the two-year project continues.

Dipl. Kfm. Torsten Schröder, Marketing Manager ASUS Computer GmbH

Foreword

With the appearance of mini-notebooks, which began their worldwide triumphal procession in 2008 with the Eee PC from ASUS, instructors well-versed in IT and media-based education at the Praxisvolksschule der Kirchlichen Pädagogischen Hochschule Wien/Krems, Campus Wien-Strebersdorf proposed another innovative project to investigate the possibilities of these devices.

Over the last decade, the school has also undertaken many internationally well-received evaluations of the application of modern information technology in educational instruction, such as the use of Pocket PCs or interactive whiteboards.

The Eee PC 900 series from ASUS was given primary consideration for possible use in the school project. Along with the three E's advertised by the manufacturer ("easy to learn, work and play", "excellent Internet experience" and "entertainment on-the-go"), the low weight of these computers made them appear well suited. Netbooks of this category are much more functional than a Personal Digital Assistant (PDA) or a Pocket PC, for example, while offering a format smaller than DIN A4, a weight as low as a sub-notebook at about one kilogramme and a considerably lower purchase price (about 400 euros per computer) – all with the trade-off of reduced technical features and performance.

After ASUS equipped ten schools in Lower Saxony, Germany, with Eee PCs, the decision was made to apply to ASUS Germany for sponsoring of a project by the Praxisvolksschule der KPH Wien-Krems, Campus Wien-Strebersdorf. To the great pleasure of everyone involved at the school, Marketing Manager Torsten Schröder responded positively to the request and offered to provide 30 ASUS Eee PC 901 netbooks for the project at no cost. The cooperation between ASUS Germany and the PVS officially began on 17 September 2008 with the formal handover of the computers.

The students of Class 3a are working with the Eee PC 901s under the supervision of project manager Prof. Ilse Bailicz, who also successfully completed the Pocket PC project. The goal of the project is to test the usability of such devices in everyday instruction and to explore didactic approaches for effective future use of netbooks at pri-

mary school level. The plans include classroom instruction using the computers across multiple subjects, and the 901s will also be available for the children to take home for homework and individual activities, just as was possible with the Pocket PCs during that project. In numerous press releases, ASUS has stated that one of the key goals of the project, in addition to generally encouraging the students to enjoy learning, is to increase their media literacy. This approach is intended to clear away any fears or reservations associated with the technology and to support the identification of possible uses of the new netbook PC segment in education.

A number of factors predict a high level of success for the project. The size and weight of the Eee PC 901 is a particular advantage for children. The netbook is hardly any larger than a textbook and fits in any schoolbag, and at just over one kilogramme in weight, it should not burden the students as much as a laptop or notebook computer.

In consideration of its technical features, the Eee PC was a perfect fit for our project: The long battery life ensures uninterrupted work without annoying cables, the non-reflective display is easy on the eyes, and the robust construction means they can even survive being dropped. With the three USB slots, it is possible to connect various peripheral devices and to save data to USB sticks. The integrated camera allows children to create photographs quickly and easily. Overall, the hardware is entirely sufficient for all applications in primary education.

The project has been planned for two years but is already demonstrating success. The children and their parents are enthusiastic, the educational community is extremely interested in the project progress and the programme jury of the "World Conference on Computers in Education 2009" held at the end of July in Porto Allegre, Brazil, accepted the talk submitted by Dipl. Päd. Wolfgang Seper into its main programme and proceedings. The excellent empirical and scientific evaluation performed by Prof. Dr. Leopold Sperker and the reception of the PR measures surrounding the project make it particularly clear how important the progress to date has been for the school, ASUS Germany and the Federal Ministry for Education,

Arts and Culture (BMUKK), which is supporting the project. Technical support and advice is also available from one of the IT pioneers at the school, Dipl. Päd. Martin Newald, who was one of the first advocates for the project and has pursued it with devotion and great energy.

The Eee PC from ASUS is expected to prove an innovative tool within the school of the future not only because it is a sufficiently powerful and flexible device to meet the needs of students and teachers but also due to the fact that it can be flipped shut at any time and set aside or stowed in a desk or school bag when it is no longer needed. This allows the computer to be used as a natural and goal-oriented educational tool.

This systematically assembled report in six chapters offers interested readers a detailed description of the device used, the Eee PC 901, by Dipl. Päd. Newald, an account of the practical experiences using the 901 for instructional purposes by Prof. Bailicz, a summary of a number of public relations measures by Dipl. Päd. Seper as well as concrete results of the scientific evaluation performed by Prof. Dr. Sperker, which have been consistently positive.

As representatives of two institutions, specifically the KPH Wien/Krems, Campus Wien-Strebersdorf, and the Federal Ministry for Education, Arts and Culture, we would like to extend our special thanks to the sponsor

company ASUS Germany, represented by Marketing Manager Dipl. Kfm. Torsten Schröder, without whose generous support this highly innovative project would not have been possible.

We would also like to thank everyone on the project team who served as authors and made contributions to this report as well as our editor Mag. Rosemarie Stöckl-Pexa, who added a few finer touches, where necessary. Grafik Design Wurnitsch was responsible for attractively laying out the report in book form in accordance with the design guidelines of previous project reports, and the excellent photographs used in the brochure were very professionally provided by Foto-Studio Nikolaus.

A printable PDF document is available for download from the BMUKK website under the category "Publications": <http://pubshop.bmukk.gv.at>

We would like to wish the entire project team a second successful year on the project. Anyone interested in following the further progress is encouraged to read the regular blog that the project team will be maintaining on the ASUS platform <http://eeepcatschool.blogspot.com/>.

RegR Prof. Johann Eder

MinR Mag. Dr. Anton Reiter

I Introduction

The Praxisvolksschule (PVS) der Kirchlichen Pädagogischen Hochschule (KPH) Wien/Krems, Campus Wien-Strebersdorf, is known throughout Austria and increasingly even beyond its borders as a pioneering school in the use of information and communication technology (ICT) in primary education. Many times already, the school has proven adept at selecting devices suitable for primary school students. Initial evaluations during the course of the ongoing project show that expectations are being met. The Eee PC netbooks from ASUS have passed their first practical test in a 3rd grade class.

The “eee-pc@school” project originated out of cooperation between the director of PVS, RegR Prof. Johann Eder, his team of dedicated instructors, the Federal Ministry for Education, Arts and Culture (BMUKK) and an innovative company from the ICT industry.

Class instructor Prof. Ilse Bailicz, Dipl. Päd., who also led a participating class through the previous ppc@school project, prepares the teaching units with the Eee PC and puts them into practice. Dipl. Päd. Martin Newald and Dipl. Päd. Wolfgang Seper, who are responsible for the area of ICT at the PVS, lead the voluntary classes “Promoting Interest and Talent” (computer-aided learning), which are attended by all students of the project, and also provide technical support. Prof. Mag. Dr. Leopold Sperker is responsible for the accompanying evaluation. The BMUKK has undertaken financing of the project and is represented by MinR Mag. Dr. Anton Reiter. The Eee PC 901 series netbooks have been provided for the project by ASUS at no charge.

This report describes the initial project phase from the handover of the Eee PCs on 17 September 2008 up to the middle of the second semester, from which point the students were also permitted to use the computers at home. The contents of this report include technical information about netbooks, their practical applications in school instruction, steps that have already been taken and the further planning supported by the accompanying evaluation as well as documentation of public relations work and media reports.

In Chapter 1, Dipl. Päd. Newald explains the meaning of the relatively new term netbook. He covers how the first

Eee PC from ASUS, originally intended for families and children, took the international computer market by storm as well as which models ASUS has developed since that time.

A categorisation of mobile devices places the netbook somewhere between a personal digital assistant (PDA) or smartphone and a notebook computer. The possibilities of the handy, robust devices are indicated as are their limits, such as being unsuitable for large volumes of data.

Chapter 2, also authored by Dipl. Päd. Newald, revolves around the Eee PC 901 used in this project. A detailed description of the hardware is followed by the reasons why this model was particularly well suited for use in primary education – for instance due to the small keyboard, low weight and long battery life. A complete list is also provided of the included software, which offers a fully featured office environment. In conclusion, this chapter explains how a simple and safe Internet connection is made available to the children via WLAN with a PC acting as the gateway into the network.

Chapter 3 is dedicated to use of the netbook for instructional purposes. Prof. Bailicz shares her practical experiences as class teacher – from the children’s initial attempts with the drawing and word processing programs to learning how to touch-type and use the Internet. She addresses how the children handle the Eee PC with both curiosity and creativity as well as a sense of responsibility for the expensive device.

Multiple lesson examples on various topics created by the class teacher, some of which also make use of the Internet, are offered as illustrations of how netbooks can be effectively used in an educational setting.

The students of project class 3a are also given the opportunity to speak out in Chapter 3. For one thing, everyone agrees that learning with the netbooks is fun. The children also share what they particularly like about working with the Eee PCs and whether they already see themselves as little “netbook pros”. Many stress how proud they are of the computers.

In Chapter 4, Prof. Sperker presents the concept for the evaluation that is taking place alongside the project. This includes quantitative and qualitative surveys, observation of lessons recorded on video and performance comparisons in two subjects.

The initial results are already available. The parents of the students take a positive attitude toward the use of computers for work and play as well as in primary education. The children are unanimous in their verdict of the Eee PCs; they are satisfied with the computer-aided instruction and proud to be in an Eee PC class.

In Chapter 5, Dipl. Päd. Seper summarises the public relations measures undertaken by the KPH and by ASUS as well as reports presented in the media. It can be seen that even the kick-off event with the formal handover of the netbooks by ASUS to the KPH has already piqued the interest of media representatives. Another high point was the presentation of the Eee PC project at a press event by ASUS in Hamburg. In July 2009, eee-pc@school will be presented to an international audience of experts at the World Conference on Computers in Education (WCCE) 2009 in Brazil.

In Chapter 6, Dipl. Päd. Newald offers a look at where the development of the portable computer – and netbooks in particular – is heading, despite the fact that rapid progress in the area of information and communication technology can make reliable predictions nearly impossible. One example is E-Ink, or electronic paper, which may solve a problem that has burdened generations of schoolchildren by allowing them to carry just a single, energy-efficient “electronic book” in their bags in place of several heavy textbooks.

It is not yet possible to predict whether E-Ink or other innovative technologies will become part of everyday school life. And yet, after Pocket PCs, interactive whiteboards and now netbooks, it is exciting to anticipate which futuristic solutions in the area of information and communication technology will be discovered by the Praxisvolksschule der Kirchlichen Pädagogischen Hochschule Wien/Krems for providing a high quality primary school education.

Mag.a Rosemarie Stöckl-Pexa

1 Netbooks – Handy Devices with Special Applications

1.1 The History of the Eee PC

1.1.1 The First Eee PC

Over the course of 2007, rumours abounded that ASUS was planning to introduce a sub-notebook (i.e. a particularly small notebook) at a previously unheard of low price.

When the ASUS Eee PC 701 (the designations vary somewhat) first saw the light of the computer world in Asia and America toward the end of the year, it generated an

unbelievable level of hype. With production unable to meet the extreme demand, ASUS repeatedly delayed the introduction to Europe in favour of supplying existing markets overseas.

At the start of 2008, it was finally possible for the first Austrian customers to obtain the handy devices, although initially only in small numbers. The competition, which initially forecasted at best a niche market for the device as a children's toy, was "bowled over" by its success and forced to take immediate action in order to avoid leaving this market entirely in the hands of ASUS.



RegR Prof. Johann Eder, Dipl. Kfm. Torsten Schröder, Marketing Manager ASUS Computer GmbH, Prof. Ilse Bailicz

As the first products from other manufacturers finally found their way onto store shelves, ASUS was already in the third generation of mini-notebooks, or as they are typically called today: netbooks.

1.1.2 Successor Models

As mentioned above, ASUS is continually bringing new variants of its popular network onto the market at a rapid pace. The “original netbook”, the Eee PC 701 (or 4G), was followed by a device with a display of larger size (8.9" = 22.6 cm) and higher resolution (1024 x 600 pixels). This Eee PC 900 was shipped with a relatively power-hungry Celeron processor due to insufficient availability of the Atom processor.

Since the arrival of the Eee PC 900A and 901, all models have featured Intel Atom CPUs, which are also used almost exclusively by the other manufacturers. One exception here is the Eee PC 904HD, which has a hard drive, but also sports a Celeron processor. In further, finely graduated development steps, ASUS is treating its popular mini-computer to larger displays, hard drives and/or UMTS modules. To ensure a presence in the business world as well, primarily “beefed up” devices with relatively expensive SSD drives are designed to appeal to business customers. This marketing-optimised range of models has so far brought us 17 technically different variants in Austria alone.

At the moment, the Eee PC 1000HE is the newest representative of the Eee netbook family. In addition to its 10.2" display and 160 GB hard drive, this model features the latest Intel Atom processor (N280), which not only makes an important contribution to the nine-hour battery life but also supplies sufficient processing power to display high definition (HD) video formats of up to 720p (= 720 full lines per frame). Despite these features, the current sale price is well below 400 euros. The Eee PC 1008HA has been announced for the higher-priced business segment and will have a particularly slim profile (about 2.5 cm thick), a UMTS module and high-end sound.

1.2 What Are Netbooks?

1.2.1 Characteristic Features of Netbooks

Netbooks are characterised roughly as follows, with only marginal technical differences between the various brands:

Weight: Between 700 and 1500 g

Size of the shell: Up to A4

Display size (diagonal), exclusively widescreen:

Between 7" (17.8 cm) and about 10" (25.5 cm)

Processor: Until availability of the first low-cost, low-power CPUs from Intel (“ATOM”), primarily inexpensive processors, such as Celeron or VIA

RAM: Between 512 MB and 2 GB (in some cases expandable)

Drive(s): SSD (4 to 32 GB) or HDD (generally 160 GB)

Note: In contrast to a hard disk drive (HDD), a solid state drive (SSD) has no rotating magnetic disk, using instead the same technology as digital camera memory cards.

Optical drives (CD, DVD): None, since they are too large for the shell

Memory cards: Multifunction card reader (at least SD)

Ports and connections:

- ▶ Multiple (generally 3) USB ports
- ▶ Audio jacks (microphone and headphones)
- ▶ VGA connection
- ▶ LAN and WLAN, sometimes also Bluetooth
- ▶ Speaker and microphone
- ▶ Integrated (Web) camera

Battery

Operating system: Either Windows XP or various Linux options

Price (subject to heavy day-to-day fluctuations): Starting at roughly 160 euros (generally less expensive than notebooks; however, some do cost over 600 euros, making them almost twice as expensive as low-end notebooks)

1.2.2 Notebook, Netbook, PDA (Smartphone) – An Attempt at Categorisation

Since the appearance of the first portable computers in the 1980s (at the time, they had built-in CRT monitors measuring roughly 12 cm diagonally and integrated 5.25" diskette drives, all in cases weighing up to 10 kg), the consumer market has produced nearly every conceivable

Technical feature	PDA/Smartphone	Netbook	Notebook
Display size (diagonal) in inches	2.4 to 4.2	7 to 10.2	11 to 20.1
Resolution in pixels	320x240 to 640x480	800x480 to 1600x768	1024x768 to 1920x1200
CPU	Various ultra-low-voltage (ULV) processors	Primarily Intel Atom, rarely Celeron, VIA, AMD Geode	Intel, AMD, from single to quad-core
Processor speed in MHz	200 to 624	500 to 1660	1600 to 2800
RAM in MB	16 to 512	512 to 2048	512 to 4096
Permanent memory in GB	0.1 to 0.5 eePROM	4 to 32 SSD and/or 80 to 160 HDD	80 to 2 x 500
Additional drives or removable media	SD	SD	DVD, SD
Network connection, communication	Bluetooth, WLAN, UMTS, IR	Bluetooth, WLAN, UMTS, LAN	Bluetooth, WLAN, UMTS, LAN, IR
Dimensions	Approx. A7	Approx. A5 to A4	Approx. A4 to A3
Weight in g	Approx. 100 to 150	700 to 1500	2000 to 5000

size of computer. The spectrum ranges from wristwatches capable of playing videos and MP3 files with a 4 cm colour display all the way to personal digital assistants (PDAs) and netbooks to notebooks with a diagonal screen size of over 20" (= 51 cm).

The right device can now be found to suit any taste or application. This also makes it clear that one size does not fit all. For example, anyone interested primarily in digital video editing will not do well with computers below the performance notebook class. Since these extremely different computers cannot be compared directly, it is only possible to list the specific features and the resulting suitability for specific uses.

As such, the list below is intended to compare the respective technical features and indicate appropriate types of use. The information does not cover all variations available on the market and only reflects typical technical performance data from the time at which it was created (April 2009).

Typical PDAs are gradually being displaced by smartphones, which integrate an increasing number of functions that were previously found in separate devices. For example, many of these telephones not only support all possible communication modes (HSDPA, HSUPA, WLAN, Bluetooth, IR, FM), they also have high-resolution cam-

eras, GPS, television and radio receivers and micro-beamers; however, they are situated in a price class equivalent to standard notebooks.

But what are the classic applications for these three classes of device? What are their strengths and weaknesses? The smallest devices, PDAs, are currently primarily suitable for performing tasks that arise regularly throughout the day, such as schedule and address management, as well as for communication, particularly while on the go.

Notebooks are portable but are generally set up temporarily in a stationary location in order to work with them. They are useful for processing large quantities of data (composing lengthy documents and spreadsheets, etc.). They are not ideal for quick reading of emails or searching for an address due to their bulkiness and slow initial access time (booting).

In many respects, netbooks represent the link between the two above categories. They are small enough to be taken (almost) anywhere and are even suitable for larger tasks, thanks to their notebook-like features. Perhaps the most important advantages of these computers lies in their original purpose: a simple, robust device designed for children and families, but still a serious computer for work and play.

1.3 Possibilities and Limitations of Netbooks

In principle, any programs that run on “normal” computers can also run on netbooks. It is clear, however, that not every application can be used effectively on these small computers.

Netbooks are generally not suited for applications that require specific hardware (such as the largest possible screen for computer-aided design, or CAD), high computing power (e.g. fast processing of large data volumes for video editing) or storage of large data volumes (e.g. storage of video and audio files). The greatest strength of this computer category is clearly its portability. The weight, robust design and, of course, the battery life point to the main applications for these devices.

For children, it means having their own computer which they can easily take with them to school and which gives

them access to a large number of programs independently of their parents’ computer. Adult users find it practical to be able to use familiar software to enter or obtain information while on the go.

Modern netbook variants (such as the ASUS Eee PC 1000HE) can operate for nine hours on a single charge. This means that it should be possible to go for an entire school or work day without plugging in. Although ASUS is considering implementing a touchscreen in some models, the benefits of this hardware expansion are somewhat doubtful.

The typical netbook shape is not recommended for prolonged use of a stylus. The T91 model, on which the display can be rotated and folded down (the monitor can lay face up on a desk), is better suited for this type of control. As can be seen in the current state of smartphone technology, handwriting recognition is only useful for short entries, and keyboards are increasingly being integrated into such devices as well.

2 The Eee PC 901



The white version of the model ASUS Eee PC 901 was made available to us for our project. Since most netbooks have a smooth surface, white or another light colour is recommended since otherwise fingerprints spoil the appearance of the device. Thankfully, manufacturers have reached the point at which they primarily install non-glare displays that are easier to read under a wide range of lighting conditions and, importantly, produce less eye-fatigue.

2.1 Hardware

The core of the 901 is a 1.6 GHz Intel Atom N270 that has access to 1 GB of RAM and a total of 12 GB of permanent memory (4 GB Flash + 8 GB SSD). The 8.9" (22.6 cm) display has a native resolution of 1024 x 600 pixels. Two standard graphics modes can also be activated with a separate key (1024 x 768 with scrolling or 1024 x 768 compressed) for increased compatibility with projectors. In addition to three USB ports, the 901 also has a microphone line out, LAN port and VGA connection. The very sensitive (= large range) WLAN (802.11 abg) and Bluetooth components make the small computers easy to network without cables. The integrated card reader is

excellently suited for expanding the permanent memory (the SD card slides all the way into the slot). Rounding out the features is an integrated camera (1.3 megapixels) that can record video and stills and is also suited for streaming video (e.g. video telephony).

Three aspects of the 901 are particularly worth noting: On the one hand, the device is exceptionally well-suited for audio conferencing – the microphones (two of them!) and speaker are so well adapted to each other that feedback almost never occurs. It is possible to communicate clearly and be understood even at a distance of several metres. In the classroom, unfortunately, use of this great feature is somewhat restricted, such as when contacting a partner class over the Internet using a single device. For individual “calls”, the headsets (included with the netbooks we received) should be used to avoid disturbing the other children.

On the other hand, the large trackpad has multitouch functionality, meaning that it can detect multiple simultaneous finger contacts. After a brief learning phase, this technology allows for simplification of frequently used operations (window scrolling, rotating images, ...). Finally, the high-capacity battery combined with the in-

telligent power-saving technology ensures sufficient operating time for a school morning, and charging can take place once per day (at home, for instance). The advantage of eliminating power cables (tripping risk) from the classroom cannot be overstated.

Thanks to the original positioning of the later netbooks as computers for children and families, they were kept particularly simple and robust. Falls from table height generally do not result in any damage. The typical shell size does result in a small key size and shorter distances between keys, but this fact also makes it possible for children to learn touch-typing at an early age.

2.2 Software

Our project netbooks run Windows XP, which offers the advantage of an enormous range of available software and hardware and requires less adaptation of the system (in comparison to Linux, at least for now). On the negative side, it is necessary to employ up-to-date protection systems that severely reduce the performance of the small computers.



ASUS offers the Windows version of the 901 with a number of preinstalled programs: StarOffice is a fully featured office environment (word processing, spreadsheet, drawing and presentation programs, database) that is compatible with the product of the market leader Microsoft.

In addition, the typical software available in XP (email program, browser, games, etc.) is expanded with a DVD program, Skype (Internet video telephony and chat) and various tools that allow control and use of the integrated hardware (e.g. a camera program for taking stills and videos). The software package is rounded out by the availability of online storage (20 GB) that can be used at no charge for a certain period of time. Eventually, usage fees apply.

Here is a complete list of preinstalled software (some applications are already included along with the operating system):

- ▶ MS Works (spreadsheet, database, calendar, dictionary, PowerPoint viewer, Works Portfolio)
- ▶ Star Office (Base, Draw, Writer, Calc, Impress)
- ▶ Wordpad (Windows XP text editor)
- ▶ MS Paint (simple drawing program included as a Windows XP accessory)
- ▶ Skype (Internet telephony)
- ▶ Windows Media Player
- ▶ Outlook Express
- ▶ Windows Live Mail (can be set as standard news client)
- ▶ Windows Messenger
- ▶ Live photo gallery
- ▶ Movie Maker (for cutting and editing simple videos).

Of course, the software can be further adapted to meet specific requirements, but the selection provided by ASUS already covers the majority of typically desired applications.

2.3 Internet

During the initial phase of the project, during which the children were only allowed onto the Internet while at school, the following method was used:

All netbooks connect via WLAN to a standard PC, which functions as the gateway to the network and therefore to the Internet. This makes it possible to use virus scan-

ners and firewalls installed on this computer, which does result in a (negligible) reduction in the data transfer rate but does not impair the computing capacity of the individual netbooks. In addition, this allows for careful monitoring of the surfing behaviour of the children (content filtering) and simplified installation of new software, since it is possible to reference files to be installed through minor manipulation of the browser start page.

Our project is pursuing the goal of empowering the children to work as autonomously as possible with the computers, from operation of the hardware (inserting the battery, cleaning the computer and display, recharging the battery...) to basic configuration of the operating system (modifying the interface, setting the date and time...).

We also install small tools and programs for this purpose.



Project class 3a

3 Use of the Eee PC in Lessons

The “eee-pc@school” project intends to show that it is possible to teach primary school children the proper way to work with a netbook and that it can be used as a learning tool in a wide range of subjects. Work with the small computers began with the students unpacking the devices themselves and starting them up. The most important rules for handling and using the Eee PC were also agreed upon.

Over time, it was possible to answer the following questions on use of the Eee PC in classroom instruction:

- ▶ What skills must the children acquire in order to use the netbook correctly?
- ▶ How can the netbook be used effectively in lessons?
- ▶ In which subjects is it particularly useful?
- ▶ Is it possible to teach the children how to touch-type so that they can quickly and reliably enter text on the PC?
- ▶ Do children of this age learn how to handle the netbook and keep it safe from damage?
- ▶ Does working with the Eee PC improve the students’ interest in learning?

3.1 Learning the Skills for Using the Eee PC

The project team decided in advance that the children would not be allowed to take the netbooks home right away. First they had to master important skills and learn how to use the small computers correctly. As a result, learning with the netbook was initially limited to the classroom.

To teach the children the skills for correct handling of the Eee PC, it was agreed with the parents that all students of class 3a should attend the voluntary class “Promoting Interest and Aptitude” once per week. This class is offered throughout the entire school year and is led by Dipl. Päd. Martin Newald and Dipl. Päd. Wolfgang Seper (both teachers at the Praxisvolksschule who are responsible for the subject of “Computers”). This agreement made it possible to ensure that all students had the

same level of knowledge with regard to the small computers, allowing them to acquire the basic knowledge required to use the netbooks for learning.

In the beginning, the children received extensive explanations of the device and learned the various icons on the task bar as well as important terms so that instructions could be correctly understood and followed.

The director of the Praxisvolksschule, RegR Prof. Johann Eder, suggested covering the white surface of the 10.1-inch netbook with a film bearing a portrait-sized caricature of the respective student. These caricatures were intended as a type of “incentive” to increase personal identification with the device so that children would exercise caution when handling the computers.



The renowned Carinthian caricaturist Christian Berger was commissioned by the BMUKK to create 28 caricatures, 27 for the students and one for the class teacher, Prof. Ilse Bailicz. The digitised images were transferred to adhesive film by Andreas Rührer (Werbewerkstatt GmbH). These were then applied to the outside of the netbooks. The costs were covered by the BMUKK (Presidential Directorate/IT).

The first program introduced was "Paint". The children tried it out with great enthusiasm and explored their artistic sides by playing with the various icons. An important factor in this learning process was the "freedom" to try out many things for themselves, and the kids happily took advantage of this opportunity. There was never any lack of creativity in these exercises.

The next program that the children learned was "Star Office Writer", which is particularly important for word processing. In this context, they learned the function of the cursor as well as the functions of the various buttons. They wrote their first words on the netbook and discovered how to write words that start with capital letters. The students initially worked only with the touchpad, which wasn't entirely easy for all of them. After a while, each child received a mouse and learned how to operate it as well. Many children prefer to work with the mouse, only a few prefer the touchpad. The students acquired many skills very quickly and demonstrated a great deal of enthusiasm from the very start whenever using the netbook. After only a short time, it was no problem at all for the children to follow the instructions provided and correctly use the icons on the toolbars.

Naturally, questions and problems arose regularly from individual children who did not immediately understand how to do something. The students helped each other in such situations and attempted in this way to answer questions themselves. The children could often be heard saying, "Just a second, I'll show you how to do that."

The children were particularly excited by the integrated camera. They learned how to take snapshots and used these to create personal profiles that they composed alongside the photos, for example. Eventually, the photos they took could also be seen as the desktop wallpaper on the netbooks. The children photographed themselves, sometimes with a friend, and frequently changed their wallpapers with these images.

The children never lacked motivation or eagerness in completing the various lessons, which had a very positive effect on the work performed with the Eee PC.

With the help of the project team, the students had acquired the most important skills for working with the netbooks by the end of the first semester. This satisfied the established conditions for allowing them to take the Eee PCs home with them on a daily basis.

From this point onwards, the children also received homework assignments making use of the netbook. These primarily involved content that was taught at school in the morning and was to be practised by the students in the afternoon. The main subjects were German, reading, writing and mathematics.



The great sense of responsibility shown towards the small computers by the children is also worth mentioning. They are fully aware that these are expensive devices that can easily be damaged if not handled properly. For this reason, the children always handle the netbooks very carefully, taking care that they never become dirty and always storing them properly in netbook covers.

They also make certain that there is enough space in their school bags to take the Eee PC home with them. In addition, the students are responsible for regular charging of the computers, which must also take place at home. All netbooks are almost always charged and ready for use in the classroom at any time. A certain pride at being in a netbook class supports this behaviour and contributes to the smooth experiences working with the small computers.

3.2 Learning to Touch-Type

Is it possible to teach children how to touch-type so that they can quickly and reliably enter text on the PC? The class teacher Prof. Ilse Bailicz was particularly interested in answering this question. One argument given in the past against teaching children touch-typing has been that their hands are much too small for a standard computer keyboard. They have problems reaching some of the keys without having to spread their fingers very wide. Due to the size of the Eee PC and its small keyboard, this argument no longer applies. In an age in which everyday life and work cannot not be imagined without computers, it can only be advantageous to learn how to touch-type in order to write quickly and reliably on the PC.

The class teacher used the book "Schnell und sicher Maschinenschreiben am PC" (Fast and Accurate Typewriting) by Margot Kempkes as the basis for teaching touch-typing.

The first piece of information given to the children by the teacher was the correct posture needed to avoid tiring the arms and hands and avoid back pain. Another important instruction was to perform loosening exercises with the fingers after a while to prevent cramping. Before every new typing lesson, these "rules" were reviewed and put into practice. The children remembered the various finger loosening exercises very well and frequently did them independently. Since the children were observed to be a little tired after an exercise phase, the writing phases did not last too long.

The children first learned the basic position of the eight fingers. All other letter keys were addressed from this position. The small points on the F and J keys were very helpful in letting the students quickly determine where to place their index fingers and thereafter the other six fingers as well. Another important instruction was to quietly speak the name of each letter when typing it. This way, they were able to easily memorise the positions of the letters and did not have to constantly look at the keys while typing.

Being able to type without looking is essential for quick and consistent typing on the PC. The goal set by the teacher is therefore to teach the children how to touch-type so that they no longer have to look at the keys. However, this required additional time and increased practice. This goal should be achieved within the two years allotted for the project.

The children then learned step-by-step which fingers should press the individual keys, all based on the typing course. Before a new letter was added, the previously learned letters were repeated. The teacher named letters and the children pressed them as they were said. Then they typed whole words with the keys they had learned. The children were instructed that a steady rhythm is very useful when typing and that the hands must be held correctly.

After several lessons of the typing course, the children learned the function of the shift key to allow them to type capital letters. From this point onwards, it was possible to pay attention to correct capitalisation, which is very important for children of this age level who are learning to differentiate between the different word types.

The students have since learned how to type all the letter keys. Regular practice remains important so that the children can get faster and more accurate while touch-typing and type the words correctly. These typing exercises were either done during instruction time or they were assigned to the children as homework to ensure regular practice. The students approached the lessons seriously and with patience, which was very helpful for quickly learning how to touch-type.

The children particularly enjoyed the game "Break Out", which they downloaded from the Internet and in which they can earn points by quickly and correctly typing the specified letters.

All the children completed the typing course very well,

although some differences in accuracy and typing speed were observed. Over the course of the project, however, the children will have sufficient time to improve in both aspects and catch up with the others.

3.3 Using the Eee PC in the Various Subjects

3.3.1 Subject *German, Reading, Writing*

It quickly became apparent that the netbook could be used very well in the subject of German, reading and writing. Many exercises were possible in the sub-areas of this subject in which the children worked on specific content and were able to practise touch-typing at the same time.

In the area of spelling, for example, the children used formatting to emphasise special characteristics of words (double letters, elongations, accentuations ...) using colours to make them easier to memorise. In the texts provided, they searched for words that are particularly difficult to spell, selected them and formatted them in colour with the "Font colour" icon.

The fact that incorrectly written words are underlined with a red wavy line by the spellchecker is also helpful for learning spelling. The children immediately checked the spelling of the word and corrected errors. However, they also learned that they cannot rely entirely on the spellchecker since the computer does not "recognise" all words.

Particular attention to correct spelling when using the netbooks was observed. The teacher employed many such exercises in order to achieve the learning objectives in the subject of German.

Despite use of the netbook, however, paper notebooks, textbooks and the board were also used. The wide range of learning aids helped the children remain focused and allowed variety to be planned into the lessons.

3.3.1.1 Lesson Example

Reading

The teacher also designed various exercises for the area of reading. Sometimes these were about understanding the meaning of a text and answering questions that were prepared on the netbook. At other times, reading exercises were performed in combination with other subject areas.

Lesson topic:

Words for colours are adjectives – gaining insight into language based on the book "Elmer and the Rainbow" by David McKee

Lesson goals:

The students should:

- ▶ *Read and understand the story "Elmer and the Rainbow";*
- ▶ *Learn that words for colours are adjectives;*
- ▶ *Independently insert words for colours into a provided text and spell the words correctly.*

Lesson plan:

- ▶ *First, the students solved riddles with solutions that were words for colours.*
- ▶ *Then they listened to or read the story "Elmer and the Rainbow".*
- ▶ *The important characteristics of the adjective were reiterated.*
- ▶ *The words for colours were shown on an overhead film in mirror writing. The children typed the words correctly on the netbooks and formatted them with the corresponding colours. For example, the colour descriptor "blue" was formatted in blue.*
- ▶ *The teacher had prepared a file "The land of Colours" in order to practise and reinforce the correct spelling of colour names.*
- ▶ *The students independently read through the text on the netbook and inserted colour names of their own choice. In this way, they created various stories about the "Land of Colours".*
- ▶ *Finally, every child read this story to the person next to him or her and together they checked the spelling of the colour names.*



ASUS Eee PC 901 Technical Data

Processor: Intel Atom N270 1.60 GHz

Display: 8.9" WSVGA non-glare TFT (1024 x 600)

RAM: 1024 MB

Mass storage: 12 GB (4 GB Flash + 8 GB SSD)

No optical drive

Graphics processor: Intel GMA 950 (IGP) shared memory

Interfaces:

3x USB 2.0

10/100 MBit LAN

WLAN 802.11 abgn

Bluetooth

Plus:

SD card/MMC slot (SDHC compatible)

Webcam (1.3 megapixels)

Battery: Li-Ion battery (6 cells)

Weight: 1.10 kg

Operating system: Windows XP Home

Eee PC



3.3.1.2 Lesson Example

Spelling

In the sub-area of spelling, the children regularly used the netbook for exercises in which they practised the correct spelling of words. The students displayed particular motivation and great concentration, which greatly helped the practising and learning of difficult words.

Lesson topic:

*Identifying the same spelling in different words:
Words with "chs"*

Lesson goals:

The students should:

- ▶ *Rearrange scrambled words into real words and type them into the netbook.*
- ▶ *In words with "chs", format the difficult spelling in colour.*
- ▶ *Write meaningful sentences with the words.*
- ▶ *Split up words with "chs" and write them correctly.*

Lesson plan:

- ▶ *Scrambled magnetic letters were placed on the board. The children assembled these into words and typed the words in the netbook.*
- ▶ *In each word, the students formatted the letter sequence "chs" in red.*
- ▶ *The children formulated meaningful sentences with the individual words and typed these in the netbook.*
- ▶ *The students split up the words by syllables and clapped at the breaks to note where they were.*
- ▶ *The children then wrote the words separated by syllables: Example "wachsen: wach-sen"*
- ▶ *Then the children orally added words with "chs" into sentences given in the German textbook.*
- ▶ *Finally, they wrote the sentences into their exercise books as an exercise*

3.3.1.3 Lesson Example

Grammar

In the sub-area of grammar, exercises were often focused on differentiation between the individual word types. The children also used the netbook to practise identifying sentence clauses and rearranging sentences. They skilfully moved clauses around using the copy and paste functions to complete the rearranging exercise.



Lesson topic:

Identifying clauses as elements that can be rearranged

Lesson goals:

The students should:

- ▶ *Arrange multiple clauses into meaningful sentences.*
- ▶ *Format the individual clauses with different colours.*
- ▶ *Rearrange the sentences using the copy and paste functions.*

Lesson plan:

- ▶ *The children reviewed the term “clause” and considered what they had already learned about it.*
- ▶ *Multiple words were written on the board, which the children typed into the netbooks.*
- ▶ *They used the copy and paste functions to arrange the words into a meaningful sentence.*
- ▶ *The students identified the individual clauses and formatted them with different colours.*
- ▶ *Then the children copied the individual clauses to create all possible rearrangements.*
- ▶ *Finally, they correctly capitalised the first word in the sentence and placed the correct punctuation after the last word.*

3.3.2 Subject Mathematics

Although the Eee PC was not used for the subject of mathematics as frequently as it was for German, reading and writing, there were still regular exercises that made use of the netbook.

Lesson topic:

- ▶ *Multiplication by 4*
- ▶ *Division by 4, with and without remainder*

Lesson goals:

The students should:

- ▶ *Practise and reinforce multiplication by 4 and division by 4.*
- ▶ *Be able to solve division by 4 with remainder.*

Lesson plan:

- ▶ *First the students reviewed the multiples of 4 and wrote them in the notebook in increasing and decreasing order.*
- ▶ *Then the teacher recited mathematical stories. The children wrote down the appropriate multiplication equations and solved them. In place of the multiplication symbol, the students used an “x” since they had not yet learned the function “Insert – Symbol”.*



- ▶ The process was repeated with division by 4. For each mathematical story told by the teacher, the children wrote the corresponding division equation in the netbook and solved it.
- ▶ After the introduction and explanation of division with a remainder, the children solved these problems on the netbook after the teacher gave them numbers to use.
- ▶ A prepared file for practising and reinforcing division with remainder ended the unit.

3.3.3 Subject General Studies

In the subject of general studies, the netbooks were regularly used to work through specific informational texts, either as a warm-up for a topic or as a summary of newly acquired knowledge.

Lesson topic:

Sound – what is it?

Lesson goals:

The students should:

- ▶ Discover through experimentation that sounds/tones result from vibrations.
- ▶ Discover through experimentation how the volume of sounds/tones can be changed and how they can be shortened.
- ▶ Reinforce the information learned by working through an information text.

Lesson plan:

- ▶ The children listened to various sounds and attempted to guess what they were.
- ▶ This was followed by a discussion of what sound is, how sounds and tones are created and how it is possible to change their volume and prolong them.
- ▶ In group work, the students performed experiments with instructional cards and various materials. In this way, they were to find answers to the questions posed.
- ▶ In a discussion circle, the children reported on what they had learned about sound.
- ▶ The teacher had prepared an information text as a summary. The children opened the file on the netbook. Together they read through the text. Then they formatted important passages in colour in order to emphasise these parts.

- ▶ They read through the coloured text passages multiple times and tried to memorise them.
- ▶ Then the students answered questions about the topic that were written at the end of the informational text.
- ▶ To finish with, they checked the various answers together.

3.3.4 Use of the Internet in the Classroom

The Internet inspires a certain fascination among the children of the project class, and they always found it exciting and interesting to go onto the Internet with the netbooks. Some of the opinions given by the children about learning with the computers also indicated that the children find the Internet to be particularly good fun.

Once it was made possible to use all Eee PCs on the Internet at the same time thanks to a network gateway connection, this was also used in classroom instruction. First the project team explained to the children some important rules for using the Internet correctly. These explanations were particularly important to ensure effective use of the Internet. The children also learned how to access the Internet with the netbook, how to correctly enter addresses for Web pages and what a search engine is. After this introduction, the students explored the Internet with their Eee PCs.

3.3.4.1 Lesson Example

General Studies with Use of the Internet

Lesson topic:

Learning about our Floridsdorf school district

Lesson goals:

The students should:

- ▶ Learn the individual district sections of Floridsdorf.
- ▶ Obtain information about the district from the Internet.

Lesson plan:

- ▶ The teacher introduced the topic to the children with explanations.
- ▶ Then the students learned the individual district sections of Floridsdorf.
- ▶ Together they discussed where more information about the 21st district could be found. Some children named the Internet as a possible source.

- ▶ The teacher explained the “Google” search engine to the children and how to use it.
- ▶ Then the children went onto the Internet with their netbooks and entered the address *www.google.at*.
- ▶ Having entered the search term “Floridsdorf - Wikipedia”, they found more information about the 21st district, which they read and discussed together.
- ▶ The lesson was concluded by working together to summarise the most important information that the children had learned.

3.3.4.2 Lesson Example

Mathematics with Use of the Internet

Lesson topic:

Written subtraction exercises

Lesson goals:

The students should:

- ▶ Review and reinforce all aspects of written subtraction.
- ▶ Practise written subtraction with various learning materials.

Lesson plan:

- ▶ The children reviewed everything that they had learned about subtraction.
- ▶ Then the teacher explained the various learning tools for independent work.
- ▶ One option was available to the students with their netbook. They started Internet Explorer and entered the address *www.rudiswelt.net*.
- ▶ In the program “Lernen mit Rudi”, they selected the subject mathematics and the 3rd grade. Then they started the exercise “Written subtraction” and solved the subtraction problems presented.
- ▶ In a concluding discussion, the children reported on learning with the various options, and frequently stated that arithmetic with the netbook was particularly good fun. It is also worth noting that this option for arithmetic practice was used by all children.



What the Children of the Project Class Think About Learning with the Eee PC



Julia A.

I really enjoy learning with the netbook, but most of all working on the Internet. I can already do a lot, but I will definitely learn much more. I am also very proud that I have a netbook.



Sebastian B.

I really like learning with the netbook. Most of all, I enjoy writing with the Eee PC. I am also very proud that I have a netbook. I am not a real netbook pro, but I will definitely become one.



Isabella B.

I really like learning with the Eee PC. The Internet is a lot of fun. I am very proud that I have a netbook and am already very good at using it.



Maximilian M.

I like learning with the netbook. I particularly like working on the Internet. I am already a little netbook pro, but I will definitely become a bigger one.



Michelle F.

I really like learning with the netbook and am also proud to have one. I think that I am already a netbook pro.



Maximilian K.

It is great to have a netbook because it is fun to learn with it. I have also done homework with the netbook. For example, I had to rearrange sentence clauses, solve arithmetic problems or simply do writing exercises.



Natascha H.

I really like learning with the netbook. I like best of all when we are allowed to try things out ourselves. I think that I am already almost a netbook pro.



Philip T.

I really like learning with the netbook, and I enjoy doing many things with it. I think it is great that I have this little computer, and I can already use it very well.



Julia K.

I really, really, really like learning with the netbook, and everything is a lot of fun. I am very proud to be in an Eee PC class because we were even written about in the paper and we were also on the radio. I am a little netbook pro already, but I will definitely also get better.



Nikola P.

Learning with the Eee PC is a lot of fun. We use the netbook to do many things. That is why I am very good with it.



Celina L.

I really like to learn with the netbook, and I enjoy the Internet most of all. I am very proud that I have an Eee PC, and I can already use it very well.



Elias R.

I like learning with the netbook because it is something unusual for a third grade class and because you can do a lot of things with the small computer.



Antonia N.

I like learning with the netbook, and I enjoy doing many things with it. I am proud that I have an Eee PC and believe that I can already use it very well.



Klemens S.

I really like learning with the Eee PC, and I think that it is the best device in the world. I am already in a computer course, which is why I am already very good at using it.

**Alisa O.**

I enjoy everything with the netbook, and I really enjoy learning with it. I think it is great that I have an Eee PC.

**Jakob S.**

I am glad that I have an Eee PC. Most of all, I enjoy drawing. The netbook helps me learn very well and I enjoy it.

**Alina R.**

I like learning with the netbook. My favourite thing is that we learn so much with it. I also really like the Internet. It is great that the keyboard is so small and perfect for the hands of children.

**Andreas S.**

I really, really, really like learning with the netbook and think it is great that you can learn so much with it. There are exciting and funny things on the Internet that I like. I am very happy that I have a netbook and am already very good at using it.

**Natascha R.**

I really, really, really like to work with the netbook, and it is very fun when we go to Internet pages for kids. I am very proud that our class received the netbooks. We have already learned so much with them, but I would like to learn much more.

**Timo S.**

I really like working with the netbook, and I really enjoy it when we go on the Internet. I am very proud to have an Eee PC and would like to learn much more with it.

**Anna S.**

I really like learning with the netbook. I enjoy making photos with it and going on the Internet. I am very proud to have an Eee PC and can already use it very well.

**Theodor S.**

I really like learning with the netbook. Most of all, I enjoy the Internet. I am already an Eee PC pro, and I am proud that I have such a computer.

**Cosma S.**

I really like learning with the netbook. The Internet and the games are a lot of fun. My family and I are very proud that I have an Eee PC. Since I already have a computer at home, I am very good at using the netbook.

**Stefan T.**

I really like learning with the Eee PC, and it is a lot of fun. I am proud that I have a netbook, and I think the computer is very cool.

**Stella R.**

I like the Eee PC, and learning with it is really, really, really fun. I enjoy working at school and our teacher always has many exercises prepared for us to do on the netbook. It is great that I have such a little computer.

**Matthias P.**

I really, really like learning with the Eee PC. It is simply something very new, and I like it. I feel very honoured that we are a netbook class. I am already very good at using the netbook, but there are certainly still many great things to learn.

**Maresa W.**

I really like learning with the netbook. The Internet is what I enjoy the most. I am very proud of my Eee PC, and I think that many other children are jealous of us because they do not have these computers. I am already very good at using the netbook, but I think that I will learn much more.

4 Project Evaluation

The number of research projects on the use of computers in primary school education is relatively modest. The topic often does not seem "career-advancing" and is somewhat too lightweight to have a scientific reputation. This contrasts with social developments as well as the didactic and individual significance of the topic so that it is possible to speak of a deficit with regard to our scientific understanding of computer use at primary school level (see Mitzlaff, p. 102 ff).

One exception here is the Praxisvolksschule der KPH Wien/Krems, which has begun a successor project to the published "ppc@school" project that was completed in 2006. This time, all the students of a 3rd grade class were given netbooks from ASUS, which were made available for the project at no cost. This means that each child has his or her own netbook for use in the classroom and during free time.

The project is subject to an internal formative evaluation (in other words, accompanying the project), with a focus on the corresponding didactic aspects, the learning process and, to a certain extent, the learning outcomes and ICT skills.

The key points of the concept are:

- ▶ *The netbook as a tool to aid instruction in connection with self-regulated, largely independent work, problem-solving behaviour with phases of introductory fundamental instruction and accompanying support by the teachers.*
- ▶ *The netbook as a demonstration tool in connection with a whiteboard for interactive instructional use, as a tool for work by the students, as a reference work and open information source, as a universal communication and collaboration tool, as a learning world.*
- ▶ *Support for classroom instruction through fundamentally interactive information and communication technology (ICT).*
- ▶ *Writing instruction, touch-typing course.*
- ▶ *Use of information processing tools for text, pictures, sound and graphics to relate learning at school to the everyday life of the students.*

- ▶ *Use of the netbook to improve teaching and learning in the sense of modern instruction (individualisation, differentiation, challenging and encouraging, demonstration, skill development, sustained learning, self-regulated learning...).*

4.1 ICT Skills in the Primary School

The use of computers and ICT concepts in curricula positively influences the learning culture and expands the options for structuring the instruction. The integration of ICT harbours the potential of initiating, supporting and promoting development processes in the direction of a new learning culture at primary school level.

As part of its general educational goals, the Austrian primary school curriculum calls for the "development and teaching of fundamental knowledge, skills, capabilities, insights and attitudes that serve for the learning of fundamental cultural technologies (**including the use of modern communication and information technologies as appropriate for children**) ...".

4.1.1 New Media in the Primary School

Within the framework of the research accompanying the Eee PC project, only a portion of the complex changes brought on by integration of the netbooks into everyday school life can be intensively observed and documented.

If one attempts, despite sometimes contradictory empirical results, to collate an overview of the studies performed to date, it is possible to formulate the following thesis, which should be observed more closely during the evaluation project as far as circumstances permit:

- ▶ *New media can be used to promote independent and self-regulated learning by students. The relationship between teaching and learning changes permanently in favour of learning and activities on the part of the students. From a didactic perspective, a shift from instruction (by the teacher) to construction (by the students) can be expected in general.*

- ▶ *The availability of new media facilitates communication and cooperation between the students.*
- ▶ *Working with computer-based media makes it possible to promote the acquisition of cross-disciplinary skills, such as effective use of the computer, communication skills and presentation skills.*
- ▶ *The use of digital media can fundamentally improve learning performance and reduce learning times under specific conditions.*

4.1.2 Pedagogical Applications of the Eee PC in Lessons

Possible pedagogical applications of the Eee PC in the primary school are listed below:

- ▶ *The netbook as tool (e.g. for text processing, text layout)*
- ▶ *Research in dictionaries (student dictionaries in the Internet)*
- ▶ *The netbook for stimulating creativity (e.g. for design purposes, image productions)*
- ▶ *The netbook as communicator (e.g. for sending emails)*
- ▶ *The netbook as a subject of study with corresponding learning programs (e.g. for teaching media skills)*

4.2 Key Questions for Guiding the Evaluation

The following key questions were posed to guide the evaluation of the Eee PC lesson:

- ▶ *How does use of the Eee PC contribute to the realisation of modern and student-centric instruction methods?*
- ▶ *How does the Eee PC influence learning methods and other learning process variables?*
- ▶ *How does the Eee PC influence learning by the students during and outside of the lesson?*
- ▶ *What changes arise from a didactic perspective through the use of Eee PCs in lessons?*
- ▶ *Does the use of Eee PCs contribute to the acquisition of media skills?*
- ▶ *How is the Eee PC used for homework and during free time?*
- ▶ *What basic computer skills are important for using the netbook meaningfully and effectively in lessons?*
- ▶ *Does the Eee PC give rise to informal learning processes?*

4.3 Research Design

It is not possible for this project to make use of existing scientifically founded knowledge regarding the use of Eee PCs at primary school level because of the scarcity of research and publications on this topic. The instrument of a summative evaluation was selected for this project in order to arrive at scientific conclusions regarding the use of the Eee PC and its pedagogical effects on instruction in the primary school.

- ▶ *Various research designs are used, such as a panel study, which is a special form of longitudinal study in which data is collected repeatedly with the same sample set and the same collection instrument. Students evaluate the instruction with the Eee PC on multiple occasions with the help of surveys. This yields an efficacy study over a prolonged time period that can also investigate the familiarisation effect.*
- ▶ *Video documentation supplements the research design to more closely illuminate special instruction sequences that make use of the Eee PC in special learning arrangements.*
- ▶ *Structured interviews with some students regarding the project and satisfaction with the Eee PCs further supplement the study.*
- ▶ *Tests of basic computer skills and the mastery of touch-typing on the keyboard are the basis for corresponding statements on how well primary school students are able to use the smaller keyboards of the Eee PCs and what skills they develop in doing so.*

4.4 Initial Results

Starting in autumn 2008, Eee PCs were regularly used for instruction in class 3a in accordance with the level of competence in basic PC skills on the part of the students. Since February 2009, the children have also been able to take the Eee PC home with them and use it privately.

4.4.1 Quantitative Parent Survey

The first wider parent survey took place in March 2009 and was focused primarily on the availability and use of computers in their households. In addition, the parents were given a chance to document their expectations for the project.

It should be noted that the parents of the children in class 3a did not know that this project would be implemented in G2 at the time they registered for 1st grade. This means that no selection took place based on any parental interest in registering the children for an education with a focus on computers. When interpreting some of the results of this parent survey, the high ac-

ceptance of the goals of this project stands out in particular. It currently appears to be a given that computers with an Internet connection are used as tools in professional as well as private life. The computer is accepted at a level of 100% in the working world and at a very high level in the private sphere.

The following table shows an overview of the partial studies:

Sequence of the individual studies

Partial studies	Survey time	Design	Investigative method	Sampling
Study 1				
1.1 Quantitative parent survey	March 2009	Survey	Questionnaire	26
1.2 Quantitative survey of the children	March 2009	Survey	Questionnaire	27
Study 2				
2.1 Quantitative survey of the children	Juni 2009	Survey	Questionnaire	27
2.2 Qualitative survey of the children	October 2009	Survey	Guideline-based interview	27
2.3 Quantitative survey of the children	December 2009 März 2010	Survey	Questionnaire	27
Study 3				
3.1 Lesson observations	March 2009 November 2009 January 2010	Theoretically processed video observation	Video recording of interactions	3
Study 4				
4.1 Computer skills	April 2009	Skills test	Computer test	27
Study 5				
5.1 Subject-specific performance in German	Autumn 2009	Writing paragraphs (quality, text length)	Control group design	27
5.2 Subject-specific performance in touch-typing	June 2009	Skills test	Typing test	27
5.3 Subject-specific performance in the subjects German and mathematics	March 2010	Schoolwork	Comparison with international performance results	27

Two-thirds of those surveyed are female (Tab. 1), whereby no serious interpretation of this fact is possible. However, one could provocatively ask: Is school, education and everything associated with it, including filling out of the questionnaire, still largely a matter for women?

In the question regarding increased creativity (Tab. 5) in the use of computer games, it is noteworthy that almost 80% of those surveyed identify a positive relationship here. This question tended to be answered negatively in previous studies, which could mean that the generation of parents to these children grew up with the first computer games and were able to acquire their own experiences with them.

76% of those surveyed (Tab. 4) see a risk of social isolation due to the frequent use of computer games, which is remarkable insofar as so many sociological studies in this direction have to date failed to show any significant relationship between social isolation and frequent use of computer games.

The question of whether PCs should be part of the basic equipment of a primary school (Tab.7) elicited a high level of agreement, specifically 84%. To date, controversy still prevails among experts in the discussion of whether the early use of computers in primary schools is productive, whereby strong and coherent arguments against the early use of PCs are presented, such as: The devices are too heavy and too prone to failure. The children no longer learn how to write by hand. Important learning time is wasted. The keyboard is not the right size for children. These arguments no longer apply to the newest generation of netbooks since these are more suitable for children particularly with regard to size and weight. The technical maturity of these small computers is now very good; no significant technical problems have arisen so far.

One strong argument against the use of computers is the cost, although the devices are continually becoming less expensive thanks to rapid technological developments and high production volumes. In this project, the sponsorship provided by ASUS made it possible to furnish all the children with their own computers. However, the evaluation should include the extent to which the typical purchase price correlates with the results. In spring of 2010, the parents will be asked if they would be prepared to purchase the computers for their children themselves.

Tables and diagrams

Table 1: Survey – Gender

		Frequency	Percent
Valid	Male	9	34,6
	Female	17	65,4
	Total	26	100,0

Diagram 1: Survey of parental education and gender

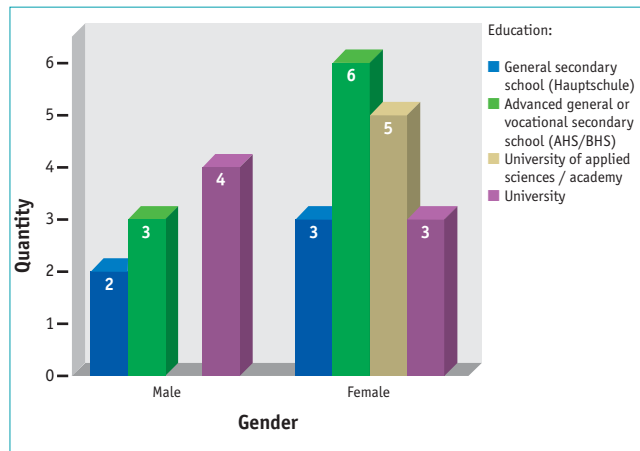


Diagram 2: Parent survey – Providing children with their own PC

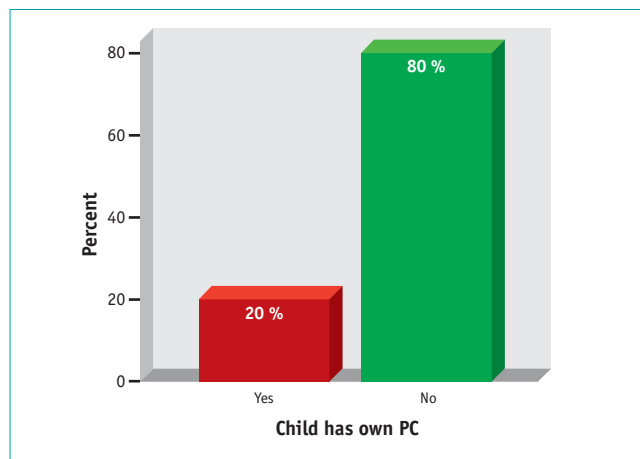


Table 2: Parent survey – PC use in professional life

PCs are an essential part of business life		Frequency	Percent
Valid	Strongly agree	26	100,0

Table 3: Parent survey – PC in daily use

PCs are an essential part of everyday private life			
		Frequency	Percent
Valid	Strongly agree	19	73,1
	Somewhat agree	4	15,4
	Somewhat disagree	2	7,7
	Disagree	1	3,8

Table 4: Parent survey – Risk of isolation

Risk of isolation due to the PC			
		Frequency	Percent
Valid	Strongly agree	8	30,8
	Somewhat agree	12	46,2
	Somewhat disagree	3	11,5
	Disagree	3	11,5
	Total	26	100,0

Table 5: Parent survey – PC games and creativity

PC games promote creativity, fantasy and intelligence			
		Frequency	Percent
Valid	Strongly agree	5	19,2
	Somewhat agree	15	57,7
	Somewhat disagree	5	19,2
	Disagree	1	3,8
	Total	26	100,0

Table 6: Parent survey – PC as basic equipment in primary school

Computers are part of the basic equipment of a primary school nowadays			
		Frequency	Percent
Valid	Strongly agree	9	34,6
	Somewhat agree	13	50
	Somewhat disagree	2	7,7
	Disagree	2	7,7
	Total	26	100,0

4.4.2 Student Survey with Questionnaire (March 2009)

As was regularly observed during visits to the project class, the children approach the matter with enthusiasm! They sit serious and focused in front of their Eee PCs and complete the tasks presented with a high level of motivation. They open files, complete their assignments using the corresponding programs, save their work, surf the Internet, etc., all as a matter of course.

These observations are completely confirmed by the children themselves according to the results of the children survey in the following tables. They are very proud to be able to use these devices in the classroom as well as privately, with the fact that computers were provided exclusively to this class naturally also playing a role.

Table 7: Children survey – Approval of the use of Eee PCs in lessons

	Frequency	Percent
Completely true	27	100,0

Table 8: Children survey – Satisfaction with the Eee PC during learning

	Frequency	Percent
Completely true	27	100,0

Table 9: Children survey – Keyboard use

		Frequency	Percent
Valid	Completely true	15	55,5
	Partially true	9	33,3
	Only OK	3	11,2
	Total	27	100,0

Table 10: Children survey – Proud to be in an Eee PC class

	Frequency	Percent
Completely true	27	100,0

4.5 Outlook

The use of netbooks in the 3rd grade was primarily intended for learning the basic skills required to work with the PC. A touch-typing course was also started, in which the students made great progress. Programs such as Word were also used on a basic level in order to include corresponding subject-specific content in the typing

course. The second year of the project will increasingly focus on instruction with the help of the computer using modern learning methods, achieving a basic level of media competence, more in-depth use of the included programs and use of the Internet. Furthermore, it will also be investigated whether the motivation and learning outcomes of the students have improved due to the regular use of Eee PCs in lessons.



5 Public Relations Work and Media Reports

The Eee PC project is making headlines! Media both inside and outside of Austria have already reported on the use of netbooks at the Praxisvolksschule (PVS) der Kirchlichen Pädagogischen Hochschule (KPH) Wien/Krems, Campus Wien-Strebersdorf:

5.1 Project Start

The project first garnered public interest at the **formal handover of the Eee PCs** on 17 September 2008. The kick-off event took place in the ballroom of the KPH in the presence of numerous guests and journalists, including Judge MMag. DDr. Ulrike Greiner and other representatives of the KPH, MinR Mag. Dr. Anton Reiter from the Federal Ministry for Education, Art and Culture (BMUKK) and Dipl. Päd. Ing. Christian Schütz, MSc, from the Vienna School Council. Dipl. Kfm. Torsten Schröder, the ASUS marketing manager responsible for the Eee PC project, handed the netbooks over to the director of the PVS, RegR Prof. Johann Eder. The students of project class 3a were able to try out the devices immediately fol-

lowing the festivities.

The event was announced in a **notice issued by the Austria Presse Agentur** on 16 September 2008: "Primary School Students as IT Pros"

(http://www.kphvie.at/uploads/media/APAAussendung_Volkssch%C3%BCler_als_IT-Profis.pdf).

The **PR-Agentur Flutlicht** reported in detail about the formal handover in its press release of 17 September 2008 on behalf of the KPH: "Eee PC@School in Vienna: The Compact Eee PCs Become Mobile Classmates"

(<http://www.prcenter.de/Eee-PC-School-in-Wien-Die-kompakten-Eee-PCs-werden-zu-mobilen-Klassenkameraden.28800.html>).

Die Presse published an article on the kick-off event in both the print edition (18 Sept. 2008) and online (17 Sept. 2008): "Digital Primary School: One PC per Child"

(<http://diepresse.com/home/panorama/oesterreich/415165/index.do?from=suche.intern.portal>).



The November/December 2008 issue of the **Wiener Lehrerzeitung - Organ der christlichen Lehrerschaft Wiens** contained an article written by Dipl. Päd. Wolfgang Seper about the Eee PC project: "eee-pc@school" (<http://www.clw.at/zeitung/2008/novdez08/WLZ1108-Internet.pdf>).

A number of articles were published on the **Internet** about the start of the project:

Futurezone, the ICT online magazine of **ORF**, also mentioned the Eee PC project in its article of 16 September 2008 on the right age to start working with computers: "The Right Age to Start with the PC" (<http://futurezone.orf.at/stories/307763/>).

Austria's school portal for religion, rel.schule.at, reported on the kick-off event in detail: "KPH Strebersdorf Testing Computer Use" (<http://www.rel.schule.at/index.php?modul=news&news=7015>).

The Eee PC project team wrote a report on the project that was published on 7 October 2008 on the teacher

platform **TeachersNews Österreich** "'eee-pc@school': Evaluation Project – Working with 'Netbooks'" (<http://www.teachersnews.at/artikel/schulformen/volkschule/008388.php>).

Der Bericht des Projektteams wurde auch auf der Homepage des **is informatik servers** veröffentlicht: "'eee-pc@school': Evaluationsprojekt – Arbeiten mit 'Netbooks'" (<http://www.informatikserver.at/index.php/component/content/article/15/14891>).

5.2 Project Presentation in Germany

ASUS also presented the Eee PC project within the framework of a presentation of the Eee PC product family at a **press event** in Hamburg on 16 October 2008. Dipl. Päd. Wolfgang Seper was invited to the event as one of the teachers at the KPH involved in the project, and one student of class 3a was also invited.

A number of reports on the press event can be found on the **Internet**, such as on the following pages:



Computer Bild, 16 October 2008: "Press Conference in Hamburg: New Technology from Asus. Presentation: First Impressions of the Eee PC S101 and Eee Top"
<http://www.computerbild.de/fotos/Praesentation-Erste-Eindruecke-Eee-PC-S101-und-Eee-Top-3409301.html> – Fotos vom Schüler der PVS mit Eee PC)

Eee PC News, 16 October 2008: "Eee PC S101 Launch Event in Hamburg - Live Updates" (mention of the Eee PC project;
<http://www.eeepcnews.de/2008/10/16/eee-pc-s101-launch-event-in-hamburg/>);
 positive postings on the presentation of the student on the Eee PC
<http://www.eeepcnews.de/2008/10/16/video-asus-eee-top-hands-on/#more-2359>)

HT4U.NET, 17 October 2008: "Live Report from Hamburg - ASUS Eee Family"
http://ht4u.net/reviews/2008/asus_eee_familie/index6.php)

MTN MiniTechNet, 17 October 2008: "Asus Eee PC S101 Launch & Presentation of the Eee Family in Hamburg" – "Eee PC @ School in Vienna: Mobile Classmates"
http://www.minitech.net.de/pressconf_asus_s101_hamburg_3.html)

PCMasters, 17 October 2008: "Asus Announces Three New Eee PCs" (<http://www.pcmasters.de/hardware/review/asus-kuen-digt-drei-neue-eee-pcs-an.html>)

NETBOOK MAGAZIN, 19.10.2008: „Video: Eee Top Touch-Screen“
<http://www.netbook-magazin.com/720/video-eee-top-touch-screen/>)



5.3 News in 2009

In November 2008, Ö1 editor Michael Fiedler made a live recording in the project class and interviewed the project team. The piece was broadcast on Ö1 on 7 January 2009.



On 19 February 2009, **Mag. Dr. Susanne Brandsteidl, Executive President of the Vienna School Council**, visited the Praxisvolksschule to learn about the Eee PC project.



Der Standard reported on the Eee PC project on 17 March 2009 with a focus on "Mobile Learning": "It Makes It Much Easier to Delete Things"
<http://derstandard.at/?url=/?id=1237227542709>).



On 30 April 2009, **Ing. Heinz Lehner, District Director of Floridsdorf**, visited the Praxisvolksschule to learn about the Eee PC project.

ASUS created **Eee PC @ School** (<http://eeepcatschool.blogspot.com/>) as a platform for the presentation of school projects with Eee PCs. Contributions by the Praxisvolksschule appear here in the form of a blog.

5.4 Upcoming Press

The **Kinderkurier**, the "Paper for Young People" of the newspaper **Kurier**, is expected to report on the Eee PC project in June 2009.

In July 2009, Dipl. Päd. Wolfgang Seper will participate in the **World Conference on Computers in Education (WCCE) 2009** in Bento Goncalves, Brazil, with the support of the BMUKK, where he will report on the Eee PC project.



*After publication of the printed version, this project report will be made available for download on the **website of the BMUKK** as a PDF document under the heading "Publications" (<http://pubshop.bmukk.gv.at/>).*

All listed Web addresses were last verified on 13 May 2009.



6 Development Trends for Mobile Devices

It is impossible to make precise predictions about where the development of netbooks in particular or portable computers in general is headed. These days, even the most futuristic predictions are often surpassed by reality within months. Nevertheless, I would like to hazard a guess based on the technologies currently in development and the requirements being discussed in Internet forums, among other places.

6.1 Trend 1 - Increased Autonomy (Battery Life)

Probably the most important factor for any device is the length of time it can operate without being plugged in. It is not enough to expand the battery capacity by multiplying the number of cells because that also adds weight.

For this reason, in addition to optimising the battery technology, manufacturers are working on various power saving mechanisms (e.g. automatic shutdown of components not currently in use) and on reducing the power consumption of the largest power consumers: the display (lighting) and the CPU.

Two types of extremely energy-efficient display technologies currently exist, although each still has a problem or two:

In contrast to current displays, OLED displays (Organic Light Emitting Diode) require no separate power-guzzling backlighting since they produce their own light. In addition, this property allows the creation of exceptionally thin displays that can even be rolled up, folded or applied to uneven surfaces. This technology is currently struggling with the display of colours and product lifetime.

E-Ink, or electronic ink, functions according to a very different principle. Black and white particles contained in pixel-sized capsules can be precisely arranged by applying a voltage. This makes it possible to set specific pixels to be black or white at any time. The most important advantage here is that power is only required for changing the image. In other words, even when electrical en-

ergy is no longer present, the last image created is still visible. The image quality is quite similar to that of a book in terms of contrast and sharpness.

In addition, this technology produces no flickering at all. At the moment, however, there are still some problems that make E-Ink unsuitable for use in displays for PDAs, netbooks and notebooks: The maximum refresh rate is roughly two images per second, and the switch is accompanied by a brief inversion of the image, meaning that moving images cannot currently be displayed at all. Moreover, the commercially available technology is only capable of displaying a few shades of grey and no colours.

E-Ink could revolutionise the everyday school experience since this technology offers advantages in terms of portability (a single “electronic book” weighing approximately 200 g would be enough to store the contents of several libraries), up-to-date information (stored data can be updated at any configured interval) and the ability to link information together (hyperlinks).

At the moment, E-Ink still carries a high price tag, but this is offset by the elimination of printed textbooks and the ability to use electronic devices for several years.

6.2 Trend 2 - Increased Display Size

The largest dilemma, particularly for the smallest mobile computer models, is definitely the size of the display, which is limited by the physical design of the product.

It is clear that limits exist on how large the displays can become. At the moment, I see three possibilities for bypassing these limits:

- ▶ *Foldable and rollable displays could expand the display surface to a limited extent without the need for additional equipment.*
- ▶ *Display glasses wirelessly connected to the computer could allow displays of nearly unlimited size, however at the expense of not being able to perceive one's immediate physical environment.*

- ▶ *Projection chips are already used in some mobile telephones and pocket projectors. However, their use is limited in that a projection surface is required, making them nearly impossible to use while on the go.*

6.3 Trend 3 - Modularisation

Through the standardisation of individual hardware modules, it will become possible to assemble devices according to one's own specific needs, requirements and wishes. What is typical today with standard computers will then also be possible with PDAs, netbooks and hybrid devices.

6.4 Trend 4 - Simplified Control

Approaches for intuitive control of computer functions, such as are gaining in importance for mobile devices in particular, can already be found in a few products today as part of test projects.

These include control with position and acceleration sensors as well as methods for using integrated cameras for detecting gestures or situations in the immediate environment. In addition to the interpretation of facial expressions (already found, for example, in current digital camera models to automatically trigger capturing of an image upon detection of smiling faces), special hand motions can also be used to initiate specific actions (e.g.

zooming, sliding and rotating of photos, volume control, accepting or rejecting calls, etc.).

If these technologies are combined with extremely thin OLED layers applied to films, one could imagine interactive displays applied to school desks that allow multimedia learning in a way that is much better adapted to the habits of people. In addition, increasingly advanced sensors make it easy to integrate everyday objects, which can make it easier for children to identify interrelationships.

For example: When multiple building blocks are placed on the display, the system could detect their shape, position and number in order to integrate them into mathematical problems that could be solved by manipulating the blocks (sliding, rotating or removing).

The most interesting aspect of this idea is that the technology already exists to implement it! Only a few things are missing to bring such systems into the classroom: committed inventors and money.

No matter which of these developments finally find their way into our everyday use of mobile computers, the appearance of netbooks has permanently changed the market with a price that offers an affordable option to people who previously had almost no opportunity to participate in the networked world of technology with devices of their own. These small computers have the potential to level the playing field in a two-class information society.

7 Summary

“eee-pc@school” is a project for testing and evaluating the **use of netbooks in primary school classrooms**. It has been made possible through cooperation between the Praxisvolksschule (PVS) der Kirchlichen Pädagogischen Hochschule Wien/Krems, Campus Wien-Strebersdorf, the Federal Ministry for Education, Arts and Culture (project financing), represented by MinR Mag. Dr. Anton Reiter, and the company ASUS (provision of the Eee PC 901 computers).

The **project team** at the PVS consists of school director RegR Prof. Johann Eder, who is responsible for organisation and company contacts, class teacher Prof. Ilse Bailicz, Dipl. Päd., who prepares the lessons with the netbooks, Dipl. Päd. Martin Newald and Dipl. Päd. Wolfgang Seper, who are responsible for technical support, and Prof. Mag. Dr. Leopold Sperker, who is performing the scientific evaluation.

The **project duration** is two school years, whereby this report documents the results of the first phase up to the middle of the second semester.

The **instruction concept** prepared and implemented by Prof. Ilse Bailicz has proven itself. After an introduction to the use of the Eee PCs, the students learned how to use a drawing program and a word processing program.

A central component of the project is the teaching of touch-typing, which has previously not been taught at primary school level. This is made possible by the small keyboards of the Eee PC 901, which are appropriate for children’s hands.

The netbooks have so far been used in the subjects of German, mathematics and general studies, in some cases also with use of the Internet. Social learning is also promoted through use of the Eee PCs. When they encounter problems, the children help each other out. They are aware of the responsibility that the netbooks represent and handle the devices with appropriate care.

The **hardware and software** used has proven suitable for primary school use.

The Eee PCs are small and light enough for them to be carried in a school bag. Thanks to the long battery life, the devices only need to be charged once per day. The battery operation also makes power cables in the classroom unnecessary. The robust construction of the computers even forgives being dropped.

The students are particularly enthusiastic about the integrated cameras, which they use frequently. The majority of the children prefer the mouse over the touchpad.

The Internet is accessed via WLAN with a PC acting as the gateway to the network and therefore to the Internet as well, which makes it possible to use virus scanners and a firewall installed on the gateway computer and also allows monitoring of the pages accessed by the children.

The large selection of typical, preinstalled programs means that teachers do not need to learn new software.

It should be noted in particular that no technical problems have arisen so far.

The results of the qualitative survey of the parents and children performed in March 2009 as part of the **accompanying evaluation** are now available.

The parents unanimously believe that computers are essential to professional life and the majority consider PCs essential to private life as well. A majority of the parents agree that PCs should be part of the basic equipment of a primary school.

All students approve of the use of the Eee PCs in classroom instruction, are satisfied with the devices as learning tools and are proud to be in an Eee PC class.

As part of the **public relations work**, the Eee PC project was presented to interested media representatives at the kick-off event at which the PCs were handed over to the PVS as well as at a press event held by ASUS in Hamburg. Multiple print and online media outlets have already reported on the project.

8 *Brief Biographies*



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In the project “eee-pc@school”, the Praxis-volksschule der Kirchlichen Pädagogischen Hochschule Wien/Krems, Campus Wien-Strebersdorf, is testing and evaluating the use of netbooks, specifically Eee PC 901s from ASUS, in primary school instruction.

For the first time, primary school students are learning to touch-type, which is made possible by the small keyboards of the devices. This report contains experiences from lessons given using the Eee PC, technical information and the initial results of the accompanying evaluation.