

Microsoft[®]
The UK Schools Blog



Saving Money with ICT

The Microsoft UK Schools blog e-book

During 2010 Ray Fleming of Microsoft wrote over 50 articles on the Microsoft UK Schools blog (<http://blogs.msdn.com/ukschools>) on Saving Money with ICT.

This e-book provides a convenient way to read the whole story, and is written explicitly for UK School Leaders, Network Managers and School Business Manager.

As with the original blog posts, the material is the opinion of the author, and may not reflect the views and opinions of Microsoft.

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Introduction

Where else to introduce a book about cost saving than in a school that's at the sharp end of the battle to make the most of its resources? A school like Bristnall Hall for example, -- a 950 pupil 11- 18 Technology College in Sandwell Local Authority, one of the most deprived areas of the UK.

ICT is a priority in the school, praised by Ofsted, and there's no doubt that Network Manager Phillip Wakeman plays a key part in that.

Phillip is knowledgeable and enthusiastic, but a lot of his skill has to be deployed in the cause of making much of little and so he's very focussed on cost saving.

"In fact," he says. "It's one of our constant preoccupations."

As with many schools, both cash and time are in short supply at Bristnall Hall. During the first half of 2010 the four-person IT support department was reduced to three because one who left wasn't replaced. The annual budget was reduced too, with further cuts to come. And just to add insult to injury, says Phillip, Bristnall Hall is one of the Sandwell schools that's missed out on an already- planned BSF rebuild. As a consequence, he says.

"With very little capital and little in the way of budget we'll have to compete with schools on each side of us that have had new buildings."

This book is for schools like Bristnall Hall – which, to me, means all schools, because there surely isn't a single one -secondary, primary, special, independent - that isn't trying to build better teaching and learning on a restricted and often visibly shrinking budget.

Over the last year, I've been researching, writing and speaking about the use of ICT to support money saving in schools – not just in the ICT budget, but across the school. During that time I've written and told many stories about what schools can do, and are doing, to save money.

And so, for all of you, we've put together this ebook, based upon the 50+ blog posts written for the Microsoft UK Schools blog (<http://blogs.msdn.com/ukschools>), as a collection of practical ideas that might just make life and learning a little easier for your staff and students.

The Green Agenda

This is a paper about cost-saving. That, frankly, is at the top of the agenda in most schools at the moment. Fortunately, though, the way it works in ICT is that the more money you save, the more you're likely to be helping the environment, and that's something to which schools, and young people, are deeply committed. So if your school has a staff/student team working on environmental issues, you'd do well to pass this document along to them. They could, perhaps, annotate each of the sections with their own notes on the environmental impact of what we're proposing. If they do that, we'd be interested to read their conclusions and comments.

Tackling the Mindset

There's a default mindset among many school leaders and governors that says computers cost money they can't afford. It probably started in 1980 when the government gave each school half the cost of its first computer, and the PTA had to have a jumble sale to cover the rest. For a long time after that, heads despaired at what seemed like the unheralded arrival of a hitherto unknown budget heading having neither an obvious upper limit nor any clear benefits.

"But we bought four computers three years ago! How long do they last for Pete's sake? And what do we do with them when the computer fad's over?"

Nobody's asking that sort of question now I hope. ICT is firmly embedded as a continuing and essential budget item. I'm pretty sure, though, that in many senior leadership teams and governing bodies, that residual mindset is still there, and it leads them to agree each new purchase with all the enthusiasm of a belted Earl underwriting his son's gambling debts.

The challenge for a school's network managers and ICT leaders is to change that. Take these two statements.

"Information Technology costs us money, and we're living in hard times,"

That's the one school network managers often hear when they negotiate their annual budget, or request clearance to buy more ICT.

The second one,

"We're living in hard times and information technology can save us money,"

isn't heard nearly so often. But it's a valid response to the first, and it's actually the message of this book. It's clear and simple, and - dare I say it - if you were fully to take it on board you could probably stop reading now and go out ready to take on all opposition to your plans. Before you do, though, I have to say that you'll miss out on a lot of the supporting evidence you'll undoubtedly need when the questions start coming - evidence that we give you here, drawn from real experience in real schools.

What we need, it seems to me, is a new sort of mindset that not only acknowledges the benefits of ICT - we probably do have that now - but appreciates that wise ICT investment can far more than pay for itself.

Making the case for ICT and Saving Money

It's because I have fervent and evidence-based belief in the message that wise ICT investment pays for itself that for some time now I've carried around a virtual banner with the words "Cost Saving Ideas for Schools". I've dedicated a lot of time and space to it, on the web, in print, and as a speaker, because I genuinely believe that properly used, ICT can save every school significant money. Why do I believe it so strongly? Because people I trust, working at the sharp end of education, in our schools and colleges are proving it to be true.

But how do we get the message across? To a large extent, it seems to me, it's got to be a sales pitch by the IT and network team to the school's senior leadership, a pitch that says, in effect,

"Look, we're not just a money pit. Give us a chance and we'll show you how we can actually make some savings – not for us, but for the whole school."

That's why, in the Summer of 2010, I decided to prime the pump a bit by writing a "Letter to the Head". It was written as if it might come from a concerned network manager in a school. I tried it on some heads and network managers before I published it, and when it did appear on my blog, it provoked some debate. Most thought it was a good idea. Some had doubts, not so much about its content but about the way it might work in particular schools and circumstances. I understand all that completely. What's important, I think, is that the debate is there, and that it should continue. If you're worried that your head teacher is seeing your budget as a cost, rather than as an investment, or you want to raise the debate about the contribution you can make to saving your school money, then it's time to tell your leadership team that you're here to help.

The key point of the letter is that cost saving with ICT isn't just cost saving for ICT. It's cost saving for the whole school.

So here's the letter:

The “Dear Head” letter - From a school’s Network Manager

“Dear Head Teacher,

The big thing at the moment is cost saving. You and the governors are looking closely at every budget heading. That being so I want to draw attention to how much we in your IT team can help.

Usually, I know it’s easy for people to think of IT in terms of spending rather than saving – more machines, more software. I’d like you to know, though, that we really can save money – for the whole school, not just for us in IT.

So, for example, we’ve been looking at virtualising our servers. Whether you know what that means technically doesn’t really matter. The important thing is that when we do it, we’ll need fewer humming boxes in the server room – a lot fewer in fact. That means we’ll spend less money on replacing them, and on the contract for supporting them and we’ll use less electricity on running them and keeping them cool. I’ve talked to another school about this and they’ve worked out server virtualisation will save between £15,000 and £23,000 a year. You know you could spend that money very productively on staff – or it might even save someone’s job. Now I don’t know whether we’ll save as much as that, but I know we’ll at least get somewhere towards it. I’ll be happy to give you the figures if you’d like me to spend some time working them out.

Then there’s paper. Have you any idea how much money this school spends on paper each year? And I don’t just mean buying the stuff, I mean total spend on copying and printing. I know in other schools figures like £40,000 and £50,000 - and over a million sheets of paper - are being quoted. We’ve done our bit, working to get as much as we can up there on the network – student work, assignments, information for parents, reports. We could do a lot more of that, but I have to say that getting the full benefit depends on all of us changing our habits. We all, staff, students, have to start thinking of sharing documents on the network instead of printing them out. Evidence in other schools is that it’s difficult to persuade people to do that, and frankly it needs a strong lead from the top – rules, if you like, about what’s to be printed and what’s not, and close control of printers and copiers. The reward could run to a five figure impact on the school budget.

In schools we’ve come to think that because staffing is far the biggest budget item, that’s where you make savings, and anything else is just tinkering.

Well, we’re here to say that some of the cost savings we in IT can achieve – and there are others besides the ones I’ve described here - are a good bit more than tinkering. So, please can we have some time to examine these issues with you to see how they might work in our school for our students?

Yours sincerely,

Your school ICT team”

How much can we save?

Naturally, you want to know some figures. And the good news is that we have them, right here. Since late 2009 I've been working with a group of schools to look at exactly how ICT can help save them money.

From the work with them so far, putting together the various strategies, tips, innovations and management techniques, it's clear to me that you and the network team could, over three years, **save the average secondary school a staggering £350,000 and a primary school just under £90,000. And all without jeopardising learning.**

The savings come from the existing ICT and other budgets, and, importantly, savings of that magnitude have an impact on the whole-school budget

So you see, I have one really simple goal, which is to help the ICT team in school to explain to the leadership team how they can help out the rest of the school.

Clearly, this isn't a matter of tinkering round the edges of the budget, saving small amounts here and there. We've found – and will describe – single initiatives that bring in five figure savings -- £20,000 from the school electricity bill, £40,000 off the reprographics and printing costs. Again – and the shameless repetition is intended to show you just how important I think this point is –

Saving with ICT is cost saving for the whole school.

In Appendix A at the end of the book, we tabulate and add up the individual examples, showing how we reach the £350,000. For full details, you can also refer directly to the blog (<http://bit.ly/ms350>) which also contains links to school case studies for many examples.

Are your printers printing money?

Now let's turn to some actual examples. And remember that's exactly what these are -- real or realistically projected savings in real schools using generally accessible technologies and management techniques, some almost absurdly simple, some more technically sophisticated. To take a simple one first, underlining just how generally available some of the measures are, what could be a more obvious cost-saving target than cutting the amount of printing that goes on in your school?

"Blimey!"

That was Assistant Head Mike Herrity's Twitter comment when he discovered that his school – Twynham High in Christchurch, Dorset – was using over a million sheets of paper a year – around a thousand sheets per pupil. Other schools have backed this figure up, with typically between 1 and 1.5 million sheets of paper per secondary school.

Depending on which side of the Atlantic you prefer, that's either 2 Nelson's Column of paper, or 3 Statues of Liberty

And, of course, the cost of the actual paper is fraction of the whole bill for printing and copying.

You can easily find out how much printing and copier paper your school uses – it's just a matter of looking at the invoices for paper delivery in the office. If it turns out to be 1,000 sheets per student per year, you'll be in good company. Then you could make a bit more effort to add in the printing costs. And do a quick survey to see how many printers, and how many types, you have in school. Do that and you too, I can almost guarantee, will utter either the word "Blimey!" or something else in similar vein. I'm sure, in fact that the average secondary school is spending more on reprographics than they do on their whole ICT budget. And I'm equally certain it opens up obvious ways to save money in the school budget.

They've made a start on that at Twynham – moving as much paperwork as possible to the school's SharePoint Learning Gateway, building up the number of parents willing to take school reports online. Then they've tackled the printing process itself – putting in departmental quotas and building 'stop and think' warnings into the machines for large print runs. Add it all up and it's quite realistic, says Mike Herrity, to aim for a saving of at least £50,000 a year on paper and printing alone.

Unsurprisingly, other schools have cottoned on to the fairly obvious principle of posting documents on SharePoint instead of printing them out. In the Midlands, at Bristnall Hall Technology College in Sandwell, ICT and Network Manager Phillip Wakeman finds it relatively easy to forecast a saving of £25,000 from doing this, and he has his eye particularly on the printing demands made by ICT exam students.

"Students doing ICT coursework habitually print off the whole lot – and it could be 200 pages for each student – a few times each year. With 200 students in each year group, the amount of printing is enormous."

He hopes to work towards coursework being posted on SharePoint - to be created and edited there, commented on by teachers and revised there, and not printed out until the end of the process.

I've also heard of a school which simply set "Print to PDF" as the default setting in Office – so that students were able to keep permanent copies of their work at any point, but always electronically rather than on paper.

Yet another school that's making a determined run for "paperless" status is West Hatch High School in Essex. There, Alan Richards, Information Systems Manager, and his team have put the latest Microsoft products to work in a way that saves costs and improves efficiency right now, and opens up even more possibilities for the future.

The key is to transform paper forms into truly interactive documents on the school's SharePoint Learning Gateway. The starting point was to tackle the extensive paperwork supporting the school's Academic Review Days.

There are two Academic Review Days each year, for which staff collaboratively prepare two documents for each student– a Progress Review, and a Target Setting Document. Both are two pages long which makes four pages, twice a year, for each of 1,300 students. So moving the whole process online (using the Serco MIS for the Progress Review and SharePoint for Target Setting) saves printing 10,400 sheets of paper each year.

How it works is that the Target Setting document for each student is agreed by teachers, parents and students individually at the academic review day meetings. Previously a paper exercise, it's now done on an interactive form on SharePoint, created by InfoPath in Office2010. Each student, with their parents and a teacher, works on a laptop to come up with a set of targets. When they're all agreed, the teacher presses "submit" and the final version goes off by email to the parents and to the student.

Inspired by this success, West Hatch staff have looked around to see what other commonly used forms can be moved to SharePoint. One obvious candidate was what Alan calls "The training form" – a request by staff to go on a course.

Says Alan,

"You had to fill in the form, then somebody would read it and manually gave it the OK, then someone else manually filed it. Now it's been redesigned and put online."

The plan is to do the same for all commonly used forms. And as Alan points out, the whole "paperless school" initiative isn't just about the cost of paper and printing. It makes for a more efficiently-run and cost-effective school. There's improved collaboration both within the school and between home and school, together with better administration and easier access to useful data. As Alan explains,

"Once the documents and forms are on SharePoint, it's easy to extract data from them. For example, under a manual system, if the head wanted to know how many people had been on training courses, somebody had pull out the forms and go through them. Now the data's kept centrally, and it can be analysed quickly and easily."

It all adds up, according to Alan to real enthusiasm at West Hatch for moving away from paper.

"We've got no end of ideas – but we wouldn't have attempted it without our implementation of SharePoint 2010 and Office 2010. They're the key factor. InfoPath 2010 makes it possible to create interactive and rich forms without the need for any coding knowledge."

Importantly, he goes on, the project is an excellent demonstration to the whole school community of what the ICT infrastructure is capable of.

"Our governors have spent a lot of money on our ICT. And this is one way of showing clearly how ICT impacts on the way the school works. What we're doing is working a lot smarter."

Island Ingenuity

Reinforcing the paper-saving message, and the increased efficiency that goes with it, at the same time underlining the way it can work in schools of all types and sizes, here's a really encouraging story from the Hebrides.

Islay High School, serving the islands of Islay ("Queen of the Hebrides"), and Jura, is one of those schools you long to visit, and Islay's eight whisky distilleries are only part of the reason

I've talked to Ian Stuart, ICT Coordinator there a couple of times, because I was interested in his drive to save paper and printing costs by persuading staff to move their paperwork to the school network.

And I have to say that the savings in this one area alone have been pretty dramatic.

Up to 2006, this school of 222 students aged 11 to 18 was spending £20,000 a year on paper and printing. Rigorous application of a "No printed handouts or memos" rule reduced this by an astonishing 80 percent in 2007, although later relaxation after cries of pain has evened this out to about 65 percent. In cash terms it's added up over four years to £40,000.

As at West Hatch, though, this is emphatically not a story of cost saving at the expense of teaching and learning. Quite the contrary. In fact the reduction in printing costs has gone along with a radical plan to transform teaching and learning at the school by giving every student a netbook, and every teacher a Tablet PC. It was the need to finance this equipment which brought about the focus on printing costs.

It all started, says Ian in 2006, when Ian had discussions over two days with representatives of Microsoft.

"We talked about everything, including our values, one of which is the confidence to try new things. It was suggested we should be looking at UMPCs and I began to develop a vision around note-taking."

It was then that OneNote was mentioned, and Ian took time to renew his knowledge of it.

"I realised that there were so many ways it could be used in learning and teaching."

In fact, what Ian's done, with his colleagues, is develop an entirely new classroom approach using students' netbooks, teachers' tablet PCs and digital projectors. The lesson builds on

the 'board' (in fact, says Stuart it's a complete white wall) while the teacher walks the room with the Tablet and students contribute from their netbooks. It's true collaborative learning, made possible with One Note LiveShare.

So you see not only have the budget savings come as the result of improving students' learning experience, but the cost benefits have themselves significantly contributed to the funding of the necessary hardware, and in 2010 Islay High acquired its second generation of netbooks.

The Kneejerk Syndrome.

Alan Richards, at West Hatch School, was the one who, when we talked about reducing printing costs, used the term "Kneejerk printing".

Many of you will be well ahead of us, already nodding because you know exactly what he means. It's the habit of just printing everything, often for no reason at all. Mike Herrity at Twynham, for example, finds that some departments are so certain of the importance of their paper handouts that they continue to use them, even if their printing allocation has been deliberately reduced, funding them from other parts of their departmental budget.

Phillip Wakeman, at Bristnall Hall, identifies the same problem when students continually print out their coursework drafts.

It all shows that old habits die hard, and reduce some of the benefit to be had from a learning platform. As Alan Richards says.

"It's not so much the technology that counts as changing the culture. The teacher should be saying, 'I'll put this on the learning gateway, and you can go there and get it'."

Key points on printing costs.

- Educate staff and students into sharing documents on your Learning Gateway.
- Enrol parents into voluntarily receiving reports and other communications online.
- Apply steady management pressure to discourage unnecessary printing.
- Control printing budget allocations to departments.
- Use a few high-volume, low-cost printers rather than many local expensive printers.
- Use printer features that demand confirmation or checks before long print runs.
- Point out the 'audit trail' and security advantages of keeping documents online.
- Keep everyone informed of the actual and projected savings, which in most, if not all cases, will be significant for the whole school's budget. Most important of all are the benefits for communication and collaboration. It's not called "SharePoint" for nothing.

I chose to start with paper and printing because it's an obvious target, easy for all members of the school community to understand. It's also potentially easy to tackle, provided there's a real collaborative willingness to make it happen.

Now, though, let's turn to another, potential "big hitter" in the battle for the budget – one that in some cases, is producing the most dramatic results of all. Yes, it's technical, but the principle is not difficult for non-technical staff members to understand. As for the actual technical processes, they're likely to be both familiar and comprehensible to the network team, though they may need help with putting the plan into action. What we're talking about here is virtualising your servers.

Virtualisation.

Virtualisation is a way of drastically reducing the number of servers that are needed to run a school network. Reduce the number of servers and you cut all manner of associated costs.

Are you old enough to remember the first time that you realised that you needed a room in your school to put the server in? Rather than just leaving it in the corner of a classroom or the technician's office? Those days are long gone now. Every secondary school has now got a Server Room. Some are converted broom cupboards, others are purpose-built, purpose-cooled spaces. And a survey on the ICT forum EduGeek.net showed that an 'average' secondary school has over a dozen servers. Each one costs money to buy, to run, to maintain, and to replace.

Virtualisation will make it possible to replace them with perhaps just three or four. How? By replacing many of the physical servers with virtual servers – that's to say they exist as software rather than as big metal boxes. The virtual servers are collected together into clusters, and each cluster lives in a powerful physical server.

And why are so many organisations – not just schools – going down that road? For two main reasons. Firstly, a virtualised server system, provided it's properly done, is more efficient and reliable, and secondly it costs less. In fact it can be spectacularly cheaper both to install and to run. West Hatch School in Essex, for example, used virtualisation to move from 20 physical servers to just five virtual ones. As a result of replacing fewer servers each year at £3,000 each, they will save £7,000 a year for replacements in the virtualised environment. With fewer servers running there are also significant energy savings – West Hatch estimates they'll reduce by a third the £12,000 it currently costs to run the servers.

It's a story that's being repeated around the country. At Bristnall Hall Technology College in Sandwell, Phillip Wakeman has used the free download version of Hyper-V Server 2008 R2 to reduce 20 physical servers to two. And Lodge Park Technology College in Northamptonshire, reducing from 20 servers to six, will save £6,000 to £10,000 a year on hardware and a huge chunk from the energy bill.

Stephen Peverett, the Network Manager at Lodge Park, explained clearly, in a Microsoft Case Study, how that's achieved.

"I used to work on a four-year lifecycle for servers alone. With 20 servers, we were replacing six servers a year at approximately £2,000 per server. If I can reduce those 20 servers with six machines running virtual servers I'm cutting my costs by more than half."

In fact the savings are probably greater than Stephen quotes. It will have saved them around £20,000 a year on electricity – because it's reduced the need for air-conditioning, and moved to six physical servers from 20. The virtualisation also adds a new capability to update and repair servers with no downtime. This issue has become more and more critical in schools, when students and staff are accessing learning platforms and other systems 24-hours a day. There's not even a mid-summer break when systems can be shutdown for maintenance.

Another virtualisation example from Wiltshire

At Wootton Bassett school in Wiltshire, Head of ICT Steve Gillott recalls that at the end of 2008 the school's systems were looked after by 13 servers.

"We were running out of places to stuff more machines," says Steve. "And after we'd seen a demonstration of virtual machines, Clarity IT solutions (www.clarityit.co.uk) designed a solution which took 13 servers and consolidated them down to three."

Steve reckons this is saving £23,000 annually, and a similar sum, though spread over three years, is the lowest estimate of the savings from virtualisation at Neville Lovett Community School in Fareham, Hants.

But why has all this suddenly come into view? The answer lies in the arrival of Microsoft's Windows Server 2008 R2 Hyper-V. Without going into the technicalities, let's just say that although virtualisation's been around for some time, it's Hyper-V that makes it cheap and relatively easy for schools to do. It's a facility that's being rapidly exploited by network managers who are at this moment finding their way with it, blogging, tweeting and meeting to share their experiences.

What's very striking is that they're every bit as interested in the improved service they get from the new system as they are in the cost savings. Alan Richards, Information Systems Manager at West Hatch School, says.

"It's obviously nice to save that money but the main reason for the change is to ensure reliability and sustainability for the school."

The key to the system's improved reliability lies in the way it deals with failure. Any physical server, in the best of systems, can and will fail occasionally. Usually it takes with it the applications it provides. In a virtualised system, however, if a physical server fails it automatically and seamlessly moves all its services to another server. Nobody out there in the school even knows it's happened. In the trade it's called 'failover', and in a school that's been beset by network frustrations it's the killer application that restores faith in the use of ICT.

The evidence that virtualisation saves money is overwhelming. So why isn't everybody jumping in and doing it? Is there a 'but' in this story anywhere?

Not really, except insofar as there's a real need to approach virtualisation very carefully, unhurriedly, and in full knowledge of what you're doing. Alan Richards spent a year on the planning of his project, including running a long term test with one server, and also monitoring and measuring existing network use over a considerable period of time. The basic need is to get the number of physical servers right, together with the way the virtual servers are allocated between them. The twin aims are expandability, to accommodate rapidly growing ICT use, and redundancy, so that there's room on any server to accommodate failovers when another server goes down. The upside of this is that it provides the opportunity to rethink the whole system, maybe, as at West Hatch, replacing one SharePoint server with two virtual versions so as to accommodate expected future expansion.

Alan's work on Virtualisation at West Hatch is impressive in its attention to detail and clarity of thought. The result is going to be what he's aimed at all the way through – a first class, reliable ICT infrastructure ready for 21st Century learning. And a side effect is that Alan's become an expert and a source of advice and generous help to others.

Making virtualisation happen in your school.

For some readers, it's enough to know what virtualisation is, that it works in practice, is efficient, and saves money. Others will want more detail, and so in the Appendix, there are three Microsoft Case Study of virtualisation as it was carried out in 2009. These are of West Hatch High School in Essex, Neville Lovett School in Fareham, Hampshire and Lodge Park Technology College in Northamptonshire.

Taken together, these case studies make a powerful combined case for the benefits of virtualisation. So what can you do to reap the same advantages?

Server virtualisation is still a relatively young and rapidly developing technology. Windows Server 2008 R2 and Hyper-V makes it easier and brings it within the reach of school network managers. But the word is "easier", and that doesn't necessarily mean it's something you can do overnight with a sheet of instructions in one hand.

Now let me make it absolutely clear - I am not a virtualisation expert. But I have heard enough network managers in schools, colleges and universities talking about their virtualisation projects to know that it's very important to their ICT infrastructure - whether that's reducing cost, cutting carbon emissions, managing their workload, or improving their network reliability and service levels.

But I've also talked with other IT managers who've convinced me that it's specialist knowledge that isn't widely shared. After all, if you're not quite sure what the difference is between server virtualisation and desktop virtualisation, or whether 'virtualisation' and 'moving to the cloud' are the same thing, then it can be awkward to ask. *(A bit like ten years ago when I sat in a meeting with a school, and was too embarrassed to ask what 'assessment for learning' meant. It helped later when I discovered that nobody else in the meeting knew, but they all thought everybody else did.)*

One obvious piece of advice is to do business with a supplier who knows what they're about, which means a Microsoft Partner. You can find one with Microsoft Pinpoint(pinpoint.microsoft.com), which allows you to find partners with specific competencies.

Another way of finding help is to use EduGeek.net and to build up contacts on social network sites such as Facebook and Twitter. This, in turn, can lead you to some useful blogs, because some of the best network managers are also good bloggers. Alan Richards, who's the IT Manager at West Hatch School, has written about various aspects of virtualisation on his [Education Technology Now blog \(http://edutechnow.com/\)](http://edutechnow.com/). At every step of his virtualisation journey he wrote about what he was doing, and the decisions he was taking, and it provides a detailed case study on how to virtualise school servers.

The series of blog posts he's written take a step-by-step journey through each of the technical phases of the virtualisation process. And he continues to add specific posts about

particular parts of the network infrastructure. Frankly, it's a technological tour de force, pure gold dust for anyone less experienced (which is probably almost everybody else.)

Then, of course, if you're up to sitting down to a substantial read, you could try to find the perfect reference guide, written in plain English. And for virtualisation I have found it!

It's called "Understanding Microsoft Virtualization Solutions" (<http://bit.ly/a1OGR8>) and it does what it says on the tin. Which means it's absolutely massive at 450 pages. And it has only one subject - virtualisation, virtualisation, virtualisation. But the chapter titles tell you that it's just what you may need:

- Chapter 1 - Why Virtualisation?
- Chapter 2 - Server Virtualisation
- Chapter 3 - Local Desktop Virtualisation
- Chapter 4 - Remote Desktop Virtualisation
- Chapter 5 - Virtualisation Management
- Chapter 6 - Cloud Computing

And it's got a brilliant index too, so that next time somebody says "failover clustering", you can look it up slyly on your laptop, and join the conversation.

So if you want to learn more about the latest Microsoft virtualisation technologies, so that you can differentiate your Hyper-V from your Remote Desktop Services, then this is the job. And it also covers Microsoft Virtual Desktop Infrastructure, Microsoft Application Virtualization 4.5, Microsoft Enterprise Desktop Virtualization, Windows Virtual PC and Windows XP Mode, System Center Virtual Machine Manager 2008, and Microsoft's private and public cloud computing platforms including Windows Azure. (No wonder it needs 450 pages.)

[Understanding Microsoft Virtualization Solutions: From the Desktop to the Datacenter, 2nd Edition](#)

Save the school even more electricity on your desktop computers

One of the savings from virtualising servers comes from reduced energy use. So while we're about it, let's look beyond the server room at the computers round the school. With the rapid growth in the number of computers (an average secondary school has more than 300 according to recent research) has come a corresponding rise in the cost of the electricity they use.

However, that's often invisible to the ICT team in the school, because the energy bills come from some other budget in the school, not from the ICT budget (I can imagine a few of you saying "*Phew!*" at this point)

But suppose you could reduce your ICT energy use by an amount that would show up on the school electricity bill? Not only would you be visibly playing your part in general cost-cutting, but you'd be equally obviously demonstrating that wise investment in ICT can pay off across the school budget. The first step is to make sure your workstations are using the latest version of Windows. If you upgrade to Windows 7 from Windows XP, you will find that you can typically save between £23 and £46 per computer per year. So an 'average' secondary school is going to save up to £10,000 a year, and a primary school up to £3,000.

- The reason is that within Windows 7 the standard configuration of Windows is set to use the power saving features more often, and especially during periods of low or non-activity. For example, Windows 7 makes more use of:
- Switching off the display after inactivity, reducing the monitor power usage
- Using Sleep mode, to put the PC into an extremely low-power mode, but with rapid restart
- Using Hibernate mode, to put the PC into a zero-power mode, with rapid restart

And within Windows 7 it is easier to manage this across your whole set of PCs at once – as a network manager, you can make a Group Policy change on power settings (eg changing how many minutes of inactivity to allow before switching off the display) to every machine in the school with one setting change. In Windows XP you may have to visit every single machine to make a change.

Next comes power management – making sure computers go into sleep mode when they're not in use. That's not always straightforward, because schools don't always use all of their computers in a way that makes it easy to regulate their "waking hours". In fact, when I've talked to network managers about this they've often raised objections along the lines of -- "Well, we tried it, and the head made us abandon it", and "I know it will save money, but the teachers found ways to get around it".

My answer to this is to gather the evidence to show school leadership that it's financially worth putting a firm policy in place. So here's my:

Five Steps to Save Your School £10,000

- Go down to your local DIY shop and buy a power monitor plug. They cost a tenner, and they'll let you monitor all kinds of devices.
- Plug it into one of your classroom computers for a week, so that it can tell you how much it costs per week/day/hour.
- Walk around the school at 5 o'clock and count the number of unused computers that are switched on.
- Work out what it's costing your school per year for unused computers left switched on
- Go and see the head teacher with your back-of-the-envelope stats

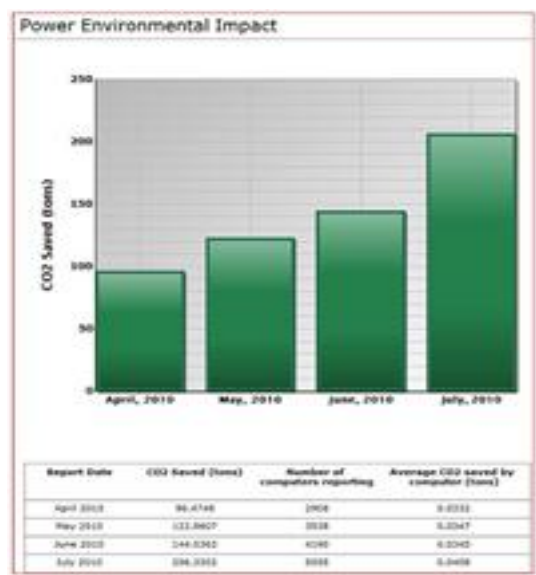
For further evidence on this, you may be interested to read [how we've rolled out power saving settings within Microsoft](#) (and if you think your teachers are hard to please with technology, imagine what it's like providing IT services for 100,000+ IT geeks).

Our IT team at Microsoft have recently implemented a worldwide power management strategy across 165,000 desktop and laptop computers used within our business right around the world, to contribute to our goal of reducing our carbon emissions by 30% over five years.

The benefits that they've calculated are:

- 27% drop in power used by managed desktop computers
- 12.33 kilowatt hours saving per desktop per month
- £8 to £9 saving per desktop computer per year (*this is lower than the PC Pro figures quoted earlier, because we were already using Windows Vista, with its power saving settings*)

In [the case study](#), the framework of power settings is discussed, along with the practical implications and the lessons learnt. For example, the first method used was a simple policy for setting up a new user/computer, but they found that 80% of users simply permanently overrode the setting within 30 days. The second method was to have an extended 60-minute time-to-sleep setting, which would be refreshed regularly, so that even if the user changed it temporarily (eg to stay on for a presentation) it would reset again later.



The team relied very heavily on System Center Configuration Manager, which meant that they could apply policies and measure the impact of them over time. The chart on Power Environmental Impact is one of the examples from the pilot. Having data displayed in this way allows you to demonstrate the savings impact to your senior management team, and calculate reduction in your carbon footprint or energy bills.

In your school, you may not need to use System Center - you can make a start for free simply by changing some of the default power settings when you deploy new computers . But if you've got hundreds of computers, it might be worth starting to calculate just how much money you might save with a much more comprehensive power management strategy.

Buy computers that use less electricity.

We've looked at finding ways of reducing the energy consumption of your computers. But you could also very usefully take energy consumption into account when you buy new equipment. According to BESA research, primary schools have an average of 50 computers per school, and secondary schools have an average of 328 – a huge increase over a decade ago, and also one of the reasons why schools are now typically spending more on energy than on ICT. As well as the big savings that can be made on servers, and through more effective power management settings on your computers, it is worth considering energy usage when you replace your computers.

In the past, schools have considered thin clients, but have recognised that there are limitations with their use – for example, with complex multimedia applications, or for advanced graphic design work. But there are now things that you can do that very effectively reduce your school's electricity bill and give you a fully functioning computer.

The cost savings possible mean that this is something you should consider as you replace or buy new computers – it wouldn't make financial sense to throw out existing computers that don't need replacing yet.

Switch to laptops

Although laptops have other benefits of mobility and the chance to use them at home, one of the things that's been rarely discussed is the fact that they use less power. A power supply for a laptop is typically rated at 50-70 watts (Although it's important to say "YMMV" here – *Your Mileage May Vary!*), which is significantly lower than a typical desktop PC.

So as you bring more laptops into your school, and replace old desktops, you are reducing your electricity bill. Savings will vary depending on your current computers, and the easiest way to work it out could be to plug in a power monitor as we described earlier.

Switch to lower power computers

A number of manufacturers have introduced lower-power desktop computers, which are based on conventional desktop computer design. The example I've used in presentations is the [RM ecoquiet range](#). These are full PCs that use less energy than a traditional lightbulb. The picture on the right is a bit small to see, but it shows a computer and a lamp plugged into power monitors, and the complete PC including the monitor is using less than 50w. You can read an independent [review of the ecoquiet range on Merlin John's blog](#).



Building on Success – extending the life of your computers

Virtualisation, paper saving, reducing the electricity bill – they add up to big numbers when it comes to cost saving. But once you're in the right frame of mind, the ideas keep flowing. So we're not done yet. Consider, for example, what else you could do with the money if you didn't have to buy so much hardware.

As more and more schools catch up with Windows 7, they discover that one of its bonus features is to be very tolerant of what it runs on. And if, like me, you remember the days when a new version of Windows meant you needed to upgrade your own computer too, that translates, in effect, into a cash bonus for the ICT budget.

In June 2009 PC World ran an article with the headline "[Windows 7 Hits a New Low](#)", which made exactly the same point (my heart sank when I saw the headline, until I read the article and realised it was actually being positive about Windows 7).

So the message was clear – Windows 7 was going to allow you to sweep up lots of older equipment and get it all onto the same version of Windows. Of course, there is a minimum specification for [Windows 7 system requirements](#), which is 1 GHz processor, 1 GB of RAM and at least 16 GB of hard disk, and I can't recommend you straying below that. But it certainly seems to be the case that with Windows 7 you are likely to be able to use quite a lot of your older equipment in school -- a big win for a network manager, and a genuine good news message for the school budget holders.

When we interviewed Windows 7 Adopters in Autumn 2009, a number of network managers made this very point. Jim Christie, of Long Eaton School in Nottinghamshire used the phrase "hardware agnostic" to describe Windows 7, going on to point out that this is a key issue for schools where budgets are tightening.

"They're having to proactively manage the resources they already have. Usually, with a new operating system, and a new feature such as encryption, it would be necessary to replace hardware. The benefit of Windows 7 is that's no longer the case."

Stephen Peverett, IT Systems Manager at Lodge Park Technology College, in that same series of interviews, made the same point.

"We've had it running on netbooks and it works perfectly well. That means we don't have to spend money on upgrading hardware. For schools that's really important."

Change the way your staff communicate and teach

We've seen that the best software innovations deliver a double bonus – they promote efficiency and save money at the same time. SharePoint, intelligently used, is like that, and so is the process of virtualisation. Now we'll see that there are schools who've used a combination of Office Communications Server, and Office Live Meeting to save money and add new facilities.

Office Communications Server (OCS) gives you internet phone calls within and outside of school, a conference calling system, secure instant messaging within your school and/or local authority and remote desktop sharing.

Office Live Meeting adds the ability to deliver training or lesson materials through any software, including PowerPoint, to groups – such as students -- anywhere there's an Internet connection.

(Since originally written, we've renamed OCS as 'Microsoft Lync', and added some of the features of Live Meeting to it)

Put them together and can manage your school communications more effectively. You can also switch around your teaching resources. For example, you can deliver a lesson to students across a number of schools at the same time -- increasingly useful as inter-school collaboration becomes more common. You can also use it to start a class covered by a supervisor or non-specialist teacher.

Instant messages within the secure context of your own school only, means you can allow teacher-to-teacher messaging, or student support outside of lesson hours, without having to have your staff and students using public systems like Windows Live Messenger. (And because you control the system, you can keep a record of all conversations).

Steven Gillott, at [Wootton Bassett School](#) in Wiltshire, used OCS and Live Meeting to improve staff-to-staff communication, allowing staff to choose the right medium – phone, mobile, instant message, email or video conferencing – at the right time. And it also allows staff to quickly escalate a conversation, by bringing in others, or changing from an IM Chat to a full video conference. The school also uses it to help deliver more flexible accelerated learning for their students and it opens up the possibilities of virtual museum visits.

"Office Live Meeting makes it possible to deliver lessons remotely to classes being supervised by non-specialist cover staff or supervisors according to school policy. This can help to reduce the cost of supply teachers in some instances and can save between £160 and £180 per day where cover supervisors can be used, supported by remote qualified teachers."

Be creative with the latest software

It would be interesting to try to calculate the amount of money that's made from selling software products to people whose existing systems will already do what they're looking for. OK, sometimes the new product is easier to use, or more entertaining, or has some extra features, but when money's tight it makes a lot of sense to be sure you're squeezing value from what's sitting in your servers. So, every time we release a new version of our software, and you upgrade to it, it is well worth doing a review of what extra features it includes that may be able to save you money. Typically I find more and more facilities in Office that mean I need less third party software.

Another area where you may well be spending money on a feature that your existing software already has is that of

Remote Access to your school network

Windows – Windows 7 and Windows Server 2008 R2 -- allow you to improve secure remote access to your network from outside of the school. Although remote access used to be something that was only used by big businesses, it has become increasingly common for schools to need secure access to the school network for staff working from home, or when they are at meetings at the local authority. In fact [Becta's advice](#) for schools in [Keeping data secure, safe and legal](#) now stipulates that staff should not have copies of sensitive pupil data on their own laptops when off-site, but always connect securely to the school network to get access (eg for SIMS access).

Traditionally, this has been done by use a Virtual Private Network (VPN), which means a combination of special hardware on your network, and special software installed on your computers. But if you're updating to Windows 7 and Windows Server 2008 R2 you can do away with all of this additional software and hardware, and use the in-built capabilities of Windows, called DirectAccess, to create a secure and seamless connection. The potential money saving here is not just in hardware and software costs, but also in the support costs that VPNs require, and the additional management time needed to maintain another system in your school.

You can find out more about [DirectAccess on this blog post](#)

Removing the need for other software licences – and saving up to £25,000

Dean Close School, in Cheltenham, were one of the early adopters of Windows 7 and Windows Server 2008 R2, and since they have been using it, they've found a number of ways it can save them money – including using DirectAccess. They also have their eye on their Citrix software, which is used for staff and students to get remote access to their software. By using DirectAccess, the school will rely less on the Citrix software it currently uses to manage information and access. Niall Monkton, the school's IT Manager expects to save £15,000-£25,000 a year by switching to using Direct Access instead of Citrix.

You can read more about what [Dean Close School have done in their case study](#), which was done with their Microsoft partner, [Bechtle](#).

Lower cost classroom voting systems

Here's another example where you might well stop and think before spending your money, Voting systems,

Hand held devices that engage students in their lessons are increasingly popular. They add interactivity and feedback to lessons – at the same time as matching the need for more formative and summative assessments. But what happens when you want voting keypads for your students, but can't afford the cost? Do you shop around to find cheaper keypads, or do you wait until you've saved enough money? Or do you look for alternative ways of achieving the same outcome? With the ICT budget under pressure, what are the options for achieving similar outcomes at lower cost? Here's what I've come up with.

First, there's the **non-ICT answer**, with quiz whiteboards and marker pens for every student, so that you can ask questions and every student holds up their answer. This costs about [£40 for a class](#). It's an idea that has been around for a while, and and aroused interest when it was used in a 2010 BBC2 programme, "[The Classroom Experiment](#)".

Then there's **A lower-cost ICT answer**. Using [Mouse Mischief](#) (a free software add-in for PowerPoint) to add interactive quizzes into lessons, using everyday mice instead of dedicated voting pads. This costs about [£50 for hubs](#), if you've already got the mice around. This works by using multiple mice with one teacher laptop – either using up those spare mice you've got laying around the ICT room, or buying some cheap ones, with some cheap USB hubs. This low-cost approach would mean having temporary cables around the desks.

Also with Mouse Mischief, there's a medium-cost solution with wireless mice. This costs [about £700 for a full classroom set](#) - as you'll need to buy 30 wireless mice, at around £23 each. A little more expensive, but it means no trailing wires, and more portability.

Finally, if you do decide only voting pads will do, they'll cost up to £2,000 – but please do the research that will provide your best value.

There's a good summary of the options, and case studies, on the [Hertfordshire website](#)

Make use of your students' own devices.

The basic principle of this cost saving idea is to think about how you can take advantage of the fact that most of your pupils already have a device – home computer, laptop, mobile phone, all of which are constantly becoming more powerful. Up to now, it's been common for schools to be very wary of allowing students' own devices through the door. Mobile phones, particularly, have had a bad press. All that's understandable, and often well founded in experience. At the same time, other schools are gradually coming to the view that a student's own device is potentially a useful addition to the school's array of ICT resources, and it's not difficult to see the financial advantages.

What are the potential savings?

The British Educational Supplies Association (BESA) estimates that all schools, primary and secondary, spend up to 48% of their budget on laptop and desktop computers. For a primary school that's about £6,000 a year, and for a secondary it's £37,000. You're not going to save all of that, but it might seem a reasonable target to achieve a 50% saving by allowing students to use their own laptops in school.

What are the implications?

Of course, there are quite a few implications for making a change like this. For example, ensuring your network and data is still safe and secure, and that students have the right software on their laptops. However, as you plan your strategy for the future, it is possible to make changes that allow students to connect their own laptops.

Network security: Now that many schools have Learning Platforms that students can connect to when they are out of school, is there a way to allow that within school in the same way? And what extra protection can you add to your network to make sure that you aren't compromising your security (eg ensuring that all laptops connected to your network have up-to-date virus protection and the latest operating system updates)

Software: Is there a standard set of software that you need your students to have, and are there cost effective ways for you to buy on their behalf? Is there advice you can offer students about the choices they make?

Unsuitable activities: What are the kinds of things you need to ensure that students don't do with their laptops – in school, and at home – and are there safeguards you can introduce to help parents and add further protection in school?

Obviously this cost-saving idea isn't for everybody, and many schools won't have the necessary technical capabilities, or student profile to be able to make this switch. But I think it is something that should feature in your questions about your school's ICT strategy for the future. Although there's a cost and time implication for doing this, there's a significant saving possible which more than offsets it.

Want more information on how universities are doing this, from a technical point of view? There's a [case study on La Trobe University's use of Network Access Protection](#), which includes [a video overview](#) too.

Take a (free) step into the Cloud.

Did you know that instead of running your own email servers, or paying somebody to run an email service, you could simply just switch to our free cloud-based Live@edu service? The London Grid for Learning (LGfL) switched and saved £10 per user per year – which could save more than £11 million for London in total.

LGfL's use of hosted email draws attention because it's a large project, covering a lot of schools and saving a lot of money. Live@edu, though, is available to individual schools as well as to local authorities and regional broadband consortia. And as it saves money and offers a better service, what's not to like about it?

Here's the bullet point version of what Live@Edu will do for you. It will

- Provide a co-branded hosted Exchange solution at no cost with Outlook Live (10GB mailbox per user)
- Equip your students for the real world with Microsoft tools
- Help to keep your students' data private and promote online safety
- Excite students with 25GB of free file and document online storage on Windows Live SkyDrive
- Simplify online collaboration and document sharing with Office Live Workspace
- Give your school a reliable and easy-to-manage Microsoft solution with enhanced security
- Be supported on all popular browsers on Windows or Mac, including Firefox and Safari
- Now I reckon at this point you'll have some questions. I knew that, and I've prepared some answers already --
- No, there is no advertising on the email
- Yes, really, it's free
- No, your data doesn't take a transatlantic trip.. We keep it in our EU-based data centre in Dublin.
- Yes, your students can each have a 10 GB mailbox, not 10 GB divided amongst them all
- No, we don't scan the email for targeting adverts (see above!)
- Yes, you can set it up so that email is filtered for banned words (or even set it up with a third-party system to do email filtering etc - as LGfL have done)
- No, we don't charge anything. It's free.

And now you can sign up your school individually, and not have to go through your local authority. So if you're spending money on email for your students (or not using email as much as you want with students because of the cost implications) then here's what you do:

First, sign up for a trial on our website. We'll then set up the system for you, with an Exchange server in Dublin doing all the work. You can then access your email from the web (using the 2010 version of Outlook Web Access), or from your existing email client (such as Outlook) or from other devices (like your mobile phone) You can keep your own email address and domain (like head@excellentschool.countyshire.sch.uk)

And finally, and very satisfyingly, if you like it, you just keep using it. Free. It really is that simple.

Only a couple of things to add – if you're in London, talk to LGfL to find out when your school is scheduled to be switched on. Elsewhere. I'd recommend finding out if your local authority or RBC plans to roll this out.

So how much could you save with Live@edu?

The DCSF (as was), looking at the LGfL project, estimated a minimum of £10 per user per year-meaning £11m across London. But it might be different (or more) in your school, so here's the costs you might save.

- Server licences (That's normally Exchange and Windows Server as a minimum!)
- CALs (if you don't know the acronym, CAL=Client Access Licence, then I recommend staying blissfully unaware, and leaving it to your network manager!)
- Server hardware
- Power for the server (24 x 365 could easily be £300+)
- Cooling for the server
- Support contract for the server
- Filtering and spam-handling software
- Technician time to keep it running and management time too
- Backup devices
- Backup media

Instead, we take away all of that stuff (including server maintenance, backup and disaster recovery). If we use DCSF's £10 per user per year, then that could mean a typical secondary school saving nearly £10,000 a year. And savings of £2,500+ for a primary school. And if you study the list of savings carefully you'll see that most will continue over time, with the potential for growing rather than fading away. A recent Microsoft paper on Cloud Computing quotes Microsoft Director of Education Steve Beswick saying,

“Cloud gives you an opportunity to reduce your spend on existing systems, and invest more in innovation, rather than being dragged back all the time into maintenance mode for old systems that require management.”

That's the key point. Live@edu isn't just an email system. It's a first step into the world of cloud computing and to new levels of efficiency and value for money.

Another significant potential money saver – Software Licensing.

Here's where an e-book has a real advantage, because we're waiting for a brand new licensing structure -- coming in March 2011, details to be announced at the UK BETT 2011 show in January. At the moment the main thing we know is that it'll be an even better deal for most schools than what's on offer already.

Some of my basic arguments about licensing will clearly continue to be valid, though. I've spoken and written about the importance of choosing the most economical and efficient software licensing deal for your school – taking into account what's included in the way of upgrades and so on. We've urged the benefits for most schools of using an annual subscription rather than buying licences outright, not least because it enables a school always to have the latest software in place for students. Buying a licence outright may look cheaper, in the short term, but when new software appears you'll have to choose between buying again or keeping the older version going, to the disadvantage of your students and staff.

Cost is only part of the story though. When Nyall Monkton arrived in 2008 to be ICT Manager at Dean Close School in Cheltenham, moving to Schools Agreement certainly meant he could afford very quickly to bring his computer suites up to scratch. For him, though, the main advantage of Schools Agreement is that the regular and consistent annual payment is just easier to handle and more businesslike.

"It fits the way I manage my budget," he says. Significantly, Nyall came to Dean Close from a business environment, and he just wanted the efficient, neat and manageable arrangement that he'd been used to.

Under the coming new arrangements all those arguments will, if anything, be strengthened, but I have to hold back from figures or precise advice until the detail is announced. But don't just sit waiting for January or March. There's stuff you need to take notice of right now. So here's today's advice,

Over the next few months, we are going to introduce some big changes to school licensing. It will make licensing simpler, and it will make it significantly cheaper for most schools in the UK. The big announcement of all of the detail will happen in January at [BETT 2011](#) in London, but we're publishing some of the information a little earlier, so that you can think about it in your planning for next year's budget.

All of the following information is a high-level overview, but at the end there are some very specific actions for some schools now.

What changes are we making?

From the 1st March 2011, we are introducing a new licensing scheme for schools, called Enrolment for Education Solutions. Or EES for short. This is a (better!) alternative to the School Agreement subscription scheme.

- EES works on a single annual subscription payment, based on your Full-Time Equivalent (FTE) staff count, and what products you select. You can optionally license computers dedicated exclusively to one student, or computers owned by students. *Today's School Agreement works by counting all of your computers.*
- You have a choice of software that you can license across all of the computers, including Microsoft Office*, the Windows Upgrade, and the Client Access Licence (CAL) suites.
- You can then license additional software on some, or all, of these computers - eg Visio or Project

Why is it good for schools?

Firstly, costs will come down for most schools who use School Agreement, because you'll be counting staff, not computers. And in England, there's about two-thirds less staff than there are computers.

Secondly, if you normally buy your software on a perpetual licence(eg Select), then switching to this will reduce your annual bill substantially, as well as making sure you're always licensed for the latest version, whenever you choose to use it. This means the decision of when you move to the latest version of Windows or Office can be dictated by your teaching and learning needs, not by cost. Of course, because it's a subscription, you have to pay the subscription fee every year, but when you see the costs nearer the time, you'll understand why it's wise to seriously consider a subscription.

** The version of Microsoft Office 2010 that's included is Professional Plus , which includes Word, Excel, PowerPoint, OneNote, Publisher, Access and Lync ([Full details here](#))*

What do you do now?

Firstly, let me remind you that this is advance warning of a change coming on the 1st March 2011. So you can't get this new agreement now. **But here's some advice on what you can do now:**

If you are going to renew a School Agreement between now and the 1st March, ask your Microsoft Partner whether you'd be best to get a short-term extension for your School Agreement. This would give you 3 months of cover, to take you through until you can switch to EES. Your Microsoft Partner will be able to advise you if this is likely to save you money.

If you're planning to buy any Microsoft software in the next year, then consider coming along to our BETT stand in January, and having a chat with us about your best option. *If your Head Teacher is reluctant to sign off a day out of school, then point out how much you might save with the new way of counting (staff, not computers).*

If you're not buying your software under a School Agreement subscription already, then take a look at this, and have a chat with other schools locally that are. Although the new EES scheme isn't the same, you'll get a good idea of the benefits of subscriptions over other methods, and that will help you to make the right informed choice for next year.

You can see an updated comparison of the main schemes for [Microsoft licensing for schools here](#)

We have published more advance detail on the [Microsoft EES scheme here](#)

Conclusion - It's all about management and leadership.

It's clear, to judge by the five figure sums which are scattered through this story, that, yes, there are big financial savings and associated environmental gains to be made both *with* ICT and *within* ICT. In most of the schools we've looked at, more than one strategy's been deployed, because once you start thinking about how to make savings, other ideas start to come.

But if all the benefits are really going arrive as black ink in the school budget, four important lessons have to be borne in mind, emerging from this developing story:

Keep up to date

It's essential that key people in the school keep in touch with the trends. Two of the ICT leaders quoted here mention, for example, that up to recently, virtualisation was something of an unknown quantity. Now, there's more experience, and updated technology, and school after school sees it as a realistic way forward. That's just one example of important it is, in this fast-moving area, not to make assumptions based on what you learned a few years ago. Join the networks, visit schools, keep up with CPD. And, of course, there's the Microsoft Innovative Teachers programme.

Change management needs good leadership

Alan Richards says, "...it's not so much the technology that counts as changing the culture." He might well have said, "It's not about technology, it's about leadership." If all the benefits - - we don't just mean the financial ones - of a SharePoint learning platform are going to be reaped, for example, then it has to be driven by informed and passionate leadership starting at the top and working its way through.

Know your costs and savings

Know the numbers. So many of the measures we've described here are obvious money savers. Often, though, the actual figures aren't pinned down. What happens is that some changes are made - upgraded software, more use of SharePoint. It's clear that there are some cost savings, but nobody's quite sure exactly what they are, so you go round saying, "We've made considerable savings.."

Well, and I emphasise this, it's important that you do know the figures. The fine grain has to be visible. It's needed for accountability, and to empower school leaders and governors as they try to extract best value for teaching and learning from a limited school budget.

Help your School Business Manager to help you

There's a clear role in all this, it seems to me, for the school business manager. If I might say so, school business managers are sometimes too detached from the ICT process, content to leave it to the IT team. In my view they should be working together - technical expertise and business know-how operating in tandem in the common cause of better teaching and learning in their school.

Appendix A – The Cost Savings Calculations

At the time of writing the original blog posts, which make up this e-book, on the Microsoft UK Schools blog, I calculated the approximate total impact of the Money Saving tips – with a goal to see how much money a school could potentially save over three years if it hadn't yet implemented any of the ideas.

Below is the table of calculations, showing a potential saving of over £350,000 for a secondary school – over £100,000 a year. The good news for a school IT Manager is that this is more than a typical school ICT budget. Which means that your ICT system could be a net contributor to the school cost saving budget.

	Secondary School Saving	Primary School Saving
Switch to Virtualisation	£53,000	£12,000
Switch on Power Management	£30,000	£9,000
Switch to lower energy devices	£15,000	£4,000
Switch your communications	£30,000	£10,000
Switch to remote access	£15,000	£3,000
Stop buying every computer yourself	£60,000	£15,000
Stop photocopying/printing	£100,000	£20,000
Stop buying so much software	£1,000	-
Stop your email servers	£30,000	£7,500
Save money on upgrades	£12,800	£3,200
Save your old computers	£10,000	£3,000
Save your software budget	£1,000	£300
GRAND TOTAL	£357,800	£88,000

For Secondary schools I assumed 1,000 pupils, 400 computers and 13 servers (the 'average' secondary school would have 860 pupils and 300 computers). For Primary schools I assumed 100 computers and 4 servers (the 'average' primary school would have 240 pupils and 50 computers).

Appendix B– Virtualisation Case Studies

West Hatch High School IT Infrastructure Supports Teaching and Learning and Saves School £12,000 a Year

Like most schools today, West Hatch High School is heavily committed to the use of information and communications technology (ICT) for teaching and learning, parental engagement, and administration. The school has five IT suites for general use, two suites for media and music, and three in the business and enterprise department. Sets of portable computers are also available in subject departments for teachers use in class. To take even greater advantage of ICT and establish West Hatch as a hub of anytime, anywhere learning, administrators implemented Microsoft Office SharePoint Server 2010 while virtualising the school's servers, cutting more than £12,000 a year on hardware and running costs. Future expansion is now affordable because the system can be scaled easily, in line with the school's future needs.

Situation

West Hatch High School is a specialist business, enterprise, and humanities college in Essex, United Kingdom (U.K.), with 1,300 students. In March 2009, Office for Standards in Education, Children's Services and Skills (Ofsted) judged West Hatch to be "Good," with several "Outstanding" aspects. The school holds Investors in People status and National Healthy Schools and Sports Mark awards.

For teachers and students to take full advantage of the technology available at West Hatch, it had to work on demand whenever needed. West Hatch Deputy Headteacher Penny Johnson, the school's Information and Communications Technology (ICT) Strategic Lead, says: "I teach in 13 different classrooms. I want to be able to go into any room in any building in the school knowing that I can use ICT to teach the lesson I've planned." Until 2008, West Hatch students and staff had no guarantee of their network's reliability, which meant it was underused. West Hatch Information Systems Manager, Alan Richards, says: "Teachers will try things two or three times, but after that, if a lesson's wrecked, they won't risk it again."

It was clear to the school's senior staff that if the full benefits of technology were to be realised, a considerable programme of work—and investment—would be needed. This included replacing most of the school's network with virtual servers installed on significantly fewer physical machines. Before that, though, the condition of the network itself had to be addressed.

Solution

Richards arrived at West Hatch in May 2008, as part of the school's strategy to address its ICT challenges. His first concern was the school's network. Like many schools, West Hatch built its network by responding to a succession of short-term demands. "The infrastructure had built up over a number of years and was difficult to manage," says Richards.

The school's governing body decided that infrastructure problems could only be solved by a complete refurbishment. The governors agreed on a six-year, £1.5 million plan to transform

the school's ICT. The first step was to rebuild the whole school network, complete with new fibre-optic and network cabling and a managed mobile solution.

A school network will usually have one server for each of a number of functions, such as the management information system, virtual learning environment (VLE), printers, and the library. When a system is virtualised, physical hardware is replaced with virtual servers that are housed in clusters on a smaller number of machines. To reap the full benefits of virtualisation, Richards researched the project thoroughly—even visiting other schools to see how they were using virtualisation in practice.

Richards and his team ran a pilot programme using Windows Server 2008 R2 with Hyper-V technology for an entire year with two virtual servers on one physical server. They looked at ease of use, energy savings, and reliability, measuring use across the network—at West Hatch, administrators used Microsoft Network Monitor and performance logs and alerts on all the servers.

Following the pilot, West Hatch moved to a virtualised server environment, replacing 24 physical servers with nine. Of these, five run the virtualised environment. The remaining four work as standalone single-function servers. The firewall and the domain controller stand apart from the network on their own servers.

Benefits

By virtualising the school's IT infrastructure, West Hatch provides a stable environment for teachers and administrators to the 21st century tools that encourage anytime, anywhere learning. Improved collaboration and communication creates an atmosphere of greater parental engagement, efficient administration, and interaction between students and their peers and teachers. The school saves more than £12,000 a year with virtualisation, including savings on energy and maintenance.

High Availability Offers Better Support for Teaching and Learning

A key goal for administrators at West Hatch is to improve the school's "Good" Ofsted rating to "Outstanding." To do this, a responsive and reliable ICT network is vital. Virtualisation provides the system with the ability to deal seamlessly with the failure of a server, an event that can even occur in the best-maintained networks. It does this by automatically moving all its services to another while the rest of the school doesn't even know it's happened. "Our staff have confidence in the use of ICT now. They know they can go into a classroom, turn on the computer, and have the applications they need for their lesson up and running in seconds," says Richards.

Johnson adds: "We're a good school. We're proud of our achievements, but we're also focused on continuous improvement, and the virtualisation project is an important part of that. Students expect to use ICT in their learning anytime and anywhere—in school and at home—but teachers can only meet those needs if the systems in place are reliable and responsive. With our new server environment, we'll have a secure infrastructure on which we can build our vision of 21st-century learning."

Stable Environment Provides Anytime, Anywhere Learning

With students logging onto the school's VLE from home, it needs to be available at all hours. Previously, if Office SharePoint Server failed outside of school hours, students were not able to log on to the system. Now two virtual servers accommodate rapidly rising demand for the VLE. If one fails, the other takes over providing continuous service.

School closures due to snow storms in early 2010 further illustrated how online learning and Microsoft Office Live Meeting can help keep teachers and students in touch. Richards says: "We realise the importance of learning outside the classroom, so we're looking at the overall picture. Our IT infrastructure is designed to cover student and community needs by providing an alternative during unforeseen circumstances, such as inclement weather, as well as enriching education with anywhere, anytime learning."

Virtualisation Saves more than £12,000 a Year

By reducing yearly hardware spend, West Hatch immediately saves £7,000 a year. Even though a server that is powerful enough to run a virtual system will be more expensive than previous hardware, fewer machines are needed, both for initial purchase and for replacement. In addition to hardware, the school saves a further £5,000 a year on electricity and maintenance, saving money and reducing the school's carbon footprint. "The total projected annual savings of £12,000 which is a conservative estimate, is significant in a tightly controlled school budget. It amounts to half the salary of a newly qualified teacher," says Richards.

Streamlined Environment Leaves Room for Growth

The ICT infrastructure takes up less space, providing plenty of room for the school to scale its environment in line with future needs and technology releases.

"Whenever administrators or teaching staff need a new system, it's easy to set up a virtual machine. IT staff can load the software, run it, test it, and move it into the production environment in a matter of weeks, providing the opportunity to respond quickly to initiatives," says Richards.

Specialist School Saves £23,000 with Innovative Virtualised Environment

Neville Lovett Community School relies on information and communications technology (ICT) to support its specialist curriculum and enhance student learning. In 2009, the school network was migrated to Windows Server 2008 R2 to take advantage of Hyper-V virtualisation technology. The solution will save the school a minimum of £23,000 over three years by reducing the number of servers purchased, and lowering licensing and power costs.

Business Needs

Neville Lovett is a specialist maths and computing school located in Fareham in the United Kingdom (U.K.). The multiple award-winning school is committed to using ICT to advance independent learning and support students to reach their full potential. Richard Markey, IT Manager for Neville Lovett, is passionate about providing a seamless ICT environment to the school's 780 students. Since he accepted the role in 2007, he's worked tirelessly to modernise the school's network—backed by the full support of Head Teacher Julie Taylor. He says: "Like most schools, we found the cost of replacing, managing, powering, and cooling our servers put a significant strain on our budget. We wanted to expand our ICT services and capabilities, but at the same time we needed to reduce running costs."

In 2007, Markey began replacing a disparate server system with a streamlined virtualised network based on VMware. Although he was convinced of the savings and performance benefits of virtualisation, Markey was concerned about the licensing and operating costs associated with the VMware solution. "We spent £2,500 on new processors to support a specific fault tolerance feature, plus an additional £4,000 on two VMware licences," he says. "I could see that we'd spend a lot of money every time we needed to add functionality. I wanted Neville Lovett to get the best value for money and decided it wouldn't hurt to look at the developments and competition in the virtualisation market."

Solution

In mid-2008, Markey approached Microsoft Gold Certified Partner Medhurst Communications for virtualisation advice and support. Charlie Baynes, Managing Director of Medhurst Communications, says: "We encouraged Markey to research and experiment with a virtualised environment based on Windows Server 2008 R2 and Hyper-V technology. Once he looked at the solution in our Innovation Centre, he immediately realised he could make significant savings on licensing alone." Markey agrees: "Neville Lovett is already on a Microsoft School Agreement. I discovered that our terms for Windows Server 2008 R2 Datacenter mean we can run up to 16 Hyper-V hosts and unlimited virtual machines without incurring extra licensing costs."


After two weeks of using Hyper-V technology, Markey became convinced that it was not only more cost-effective for the school than VMware, but it also provided him with tools for managing the Neville Lovett network more efficiently. "With Microsoft System Center Operations Manager 2007—part of the System Center suite—my team can manage all servers from a single monitor, which means we can prevent many of the problems that

cause user downtime. For example, we can back up and restore a student's work in around 15 minutes," he says. In addition, Microsoft System Center Configuration Manager 2007 provides employees with the tools to deploy updates remotely, and configure machines to comply with the school's policies, improving network security and increasing performance and availability.

Markey is now in the final stages of migrating the school's network onto a Windows Server virtualised environment and is delighted with the easy-to-deploy solution. He says: "If I'd opted for this solution earlier I could have saved money by downloading the Hyper-V hypervisor from the Microsoft Web site for no extra cost. When we installed VMware we had to pay an upfront fee for the software."

Benefits

Low running costs, fewer server purchases, fast backup and recovery, and simplified maintenance and administration all combine to provide Neville Lovett with an excellent return on investment. "With Hyper-V technology and Windows Server 2008 R2, we have a solution that saves us time and money, and supports my team to develop innovative student services," says Markey.

- Low running costs. Markey expects Neville Lovett to save around £1,000 a year on power and cooling.
- Significant server savings. Markey estimates the school will save £23,000 over three years by not having to replace an average of three servers a year.
- Quick data recovery. Students often accidentally lose or delete their work. Markey's team members can recover data quickly with minimal disruption to student learning or taking time out from their valuable IT projects.
- Reduced maintenance. Markey's team spends a lot less time identifying and fixing routine problems, and performing backup tasks.
- Enhanced student services. One project being planned is a self-service portal that students can use to restore their work themselves. Based on System Center Operations Manager, it will remove the need for students to leave class and make a trip to the IT department's office.
- Time for innovation. Another project the school is planning involves a cloud-based storage solution, which is part of Microsoft [Live@edu](#) . With this, students can make and edit films using third-party software accessed on the Internet. Final versions can be saved on the school network, which helps reduce the school's storage expenditure.
- Simplified administration. Employees can deploy security updates and enforce new user policies without having to put aside significant time and resources to do so. This supports a safe, consistent, and secure school network.

Technology College Deploys Cutting-Edge IT and Immediately Saves up to £10,000

Established in 1964, Lodge Park Technology College in Northamptonshire was one of the first schools in the United Kingdom (U.K.) to be designated as a technology college in the 1990s. In keeping with this forward-thinking approach to education, it provides the latest innovations in teaching and learning. In keeping with that philosophy, Lodge Park and Trust Partner Dell deployed Windows Server 2008 R2 with Microsoft operating system Windows 7, to modernise the school's infrastructure and reduce energy consumption, while reaping the benefits of a more flexible environment. Lodge Park will save £6,000 to £10,000 a year with virtualised systems that reduce the need to replace older hardware. Students like the interactive interface of Windows 7, while everyone on campus can access the school's online learning environment 24 hours a day, 365 days a year—without interruption.

Business Needs

Lodge Park Technology College, in the U.K., offers high-quality education to students aged from 11 to 19 years, and wide-ranging adult learning courses for school leavers and the general public. Working in partnership with students, parents, industry, and the community, the school adopts a well-rounded approach to learning that addresses the needs of the 21st century.

As a designated technology college, the school places a strong emphasis on using cutting-edge tools for teaching and learning. Students are highly IT literate, so it's important to provide them with a challenging, progressive environment that reflects the unique status of the school and equips them with the skills they'll need in further education or in the workplace.

Students and staff were logging on to the school's virtual learning environment at all times of the day and night, so Stephen Peverett, Network Manager at Lodge Park Technology College, wanted to modernise the school's infrastructure to increase availability of IT and improve the learning experience. He also wanted to ensure that any new infrastructure would accommodate the additional services the school was planning to introduce. Peverett says: "We used to be able to make whatever changes were needed to the infrastructure—repairs or maintenance—after school hours. Now, the services are in demand 24 hours a day, seven days a week, so we need to provide service at all times, without disruption."

Solution

Peverett consulted with the school's Trust Partner Dell. Terry Storey, Senior Global Architect with the Dell Global Infrastructure Consulting Team, recommended the Windows Server 2008 R2 and Windows 7 Early Adopter Programme. Storey and his team worked with Peverett to put together a business case to present to the head teacher. After seeing the potential savings, further improved with the free consulting and support from Microsoft and Dell, the school decided to test the applications. Storey says: "After initial testing, it was clear that Windows Server 2008 R2 and Windows 7 were the ideal choice. Deploying under the Early Adopter Programme was even better because Microsoft supported consultancy from Dell with no additional cost to the customer."

After helping to plan the best way to implement Windows Server 2008 R2, it took just two days for Dell to roll it out at Lodge Park. Dell created a virtual server and then began the physical-to-virtual migrations, demonstrating the process to Peverett and making sure the live migrations worked. "Dell consultants spent time talking to us, getting to know our environment and hardware, and what we wanted to achieve. When it came to the actual deployment, everything went smoothly," says Peverett.

The next step was to deploy Windows 7. The school has a number of information and communications technology (ICT) suites with everything from thin clients to high-performance desktops. The first step was to deploy Windows 7 in two of these suites, which were ready two weeks before the end-of-term break. "It created considerable excitement," says Peverett. "Students were eager to look at the technology and use it before the following term." Peverett looks forward to taking advantage of key features in Windows 7, such as BitLocker and AppLocker, to bring more functionality to students.

As a Microsoft UK Services Ready accredited partner, Dell was able to follow Microsoft Services best practice materials. Following this framework, Dell has access to technology implementation processes that are fully optimised and easily repeated on any scale beyond Lodge Park and with much lower risk.

Benefits

Deploying Windows Server 2008 R2 with Windows 7 is key to modernising the school's infrastructure to provide a more flexible environment that addresses the changing needs of students and teachers. The additional benefit of cutting costs helps Lodge Park meet the challenge of providing more services with ever-decreasing budgets.

School Saves Between £6,000 and £10,000 a Year

With Windows Server 2008 R2, Peverett was able to migrate physical servers to virtual systems, reducing the need to continually replace older hardware. Not having to replace servers this year immediately saved the school between £6,000 and £10,000. Peverett says: "I used to work on a four-year lifecycle for servers alone. With 20 servers, we were replacing six servers a year at approximately £2,000 per server. If I can reduce those 20 servers with six machines running virtual servers I'm cutting my costs by more than half."

In addition to cutting costs on hardware, implementing Windows Server 2008 R2 has reduced the burden on the school's cooling system and reduced energy consumption.

The ability to run Windows 7 on older computers will further increase savings. "We don't have to upgrade our hardware to run Windows 7," says Peverett. "And it works well with both existing and new hardware."

User-Friendly Interface Embraced by Students and Staff

Students like the interactive interface of Windows 7. With a taskbar that displays more information in less space, the system is intuitive and easy to use. The graphics are much more appealing to students and staff, encouraging creativity and engagement. "The ICT suites equipped with Windows 7 are extremely popular with students. Windows 7 will be a catalyst for collaboration and help our students work faster," says Peverett.

Virtualisation Meets Increased Demand for Availability

As students and staff discover the convenience of anytime learning, they log on to the school's virtual learning environment at all hours, day and night. Peverett was keen to be one of the first schools to use Windows Server 2008 R2 and Windows 7. The combined solution promised a more flexible environment that would easily scale to meet the changing needs of the school and would ensure that systems were consistently available when staff and students needed them. Peverett says: "Increasing the availability of IT to fit the hours students are logging on can only improve the learning experience and encourage student engagement. The flexible working options it provides will increase staff satisfaction."

A key component of the implementation was the updated version of virtualisation software Hyper-V, which is part of Windows Server 2008 R2. With the Live Migration feature, Peverett can update and repair servers with no impact on users. "Now that we can maintain and repair servers without interrupting service, we will be operating continuously. This is a big improvement over losing a week's worth of school days per year, when the system used to crash," says Peverett.

Enhanced Security Protects Students and Important Data

Safety and security is important in an educational setting. In addition to protecting students online, administrative data and student records need to be stored and accessed securely. Windows Server 2008 R2 integrates well with the security systems already set up on campus, increasing safety and security even more—a high priority for Peverett and his staff.

Ease of Deployment Removes Barriers to Adoption

The scalability and flexibility of Windows Server 2008 R2 and Windows 7—combined with Dell’s hands-on approach—contributed to a smooth deployment. In addition, the system integrates well with existing custom-built applications developed for educational purposes.

Future deployment of Windows 7 will be even more streamlined across the campus. “Windows 7 works the same on all hardware,” says Peverett. “Now we only need one image for any machine, plus with Windows Deployment Services built in to Windows Server 2008 R2, we can deploy applications from our desktops, instead of running around the school visiting different classrooms.”