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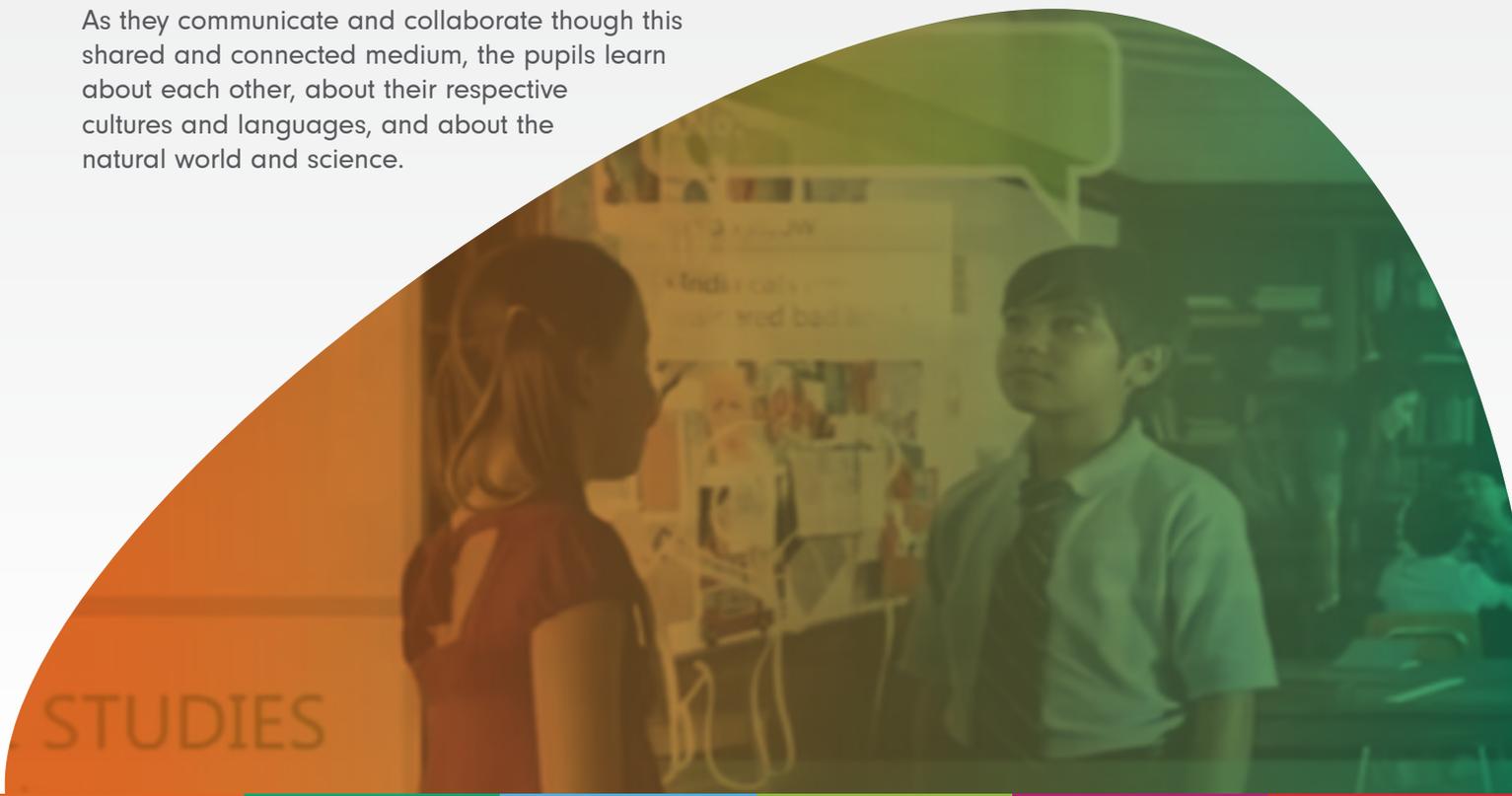# classroom
of the
future

A new way of learning

There's a very good and professionally-produced YouTube video – made by Microsoft – about how technology will be used in the future that starts with an English-speaking schoolgirl writing on a video wall that is linked to another video wall in a classroom in India. What one child draws or writes on the wall the other can also see; the wall also translates what they say into the other student's language.

The first pupil draws a dog and says: 'I have a cat. Do you have any pets?' The girl on the other side of the wall replies 'no', but instead draws a ball on the wall and sends it bouncing away – which the virtual dog obligingly chases. A text box then pops up on first pupil's screen that says, 'Did you know cats are considered back luck in India?'

The bouncing ball and the chasing dog stops short of another pupil on the Indian side of the wall who is writing the word 'water' in Hindi. The word is translated immediately on the screen with both language forms shown. The video wall then displays a graphic showing a natural water cycle, with water falling as rain and, in combination with the sun, stimulating the growth of plants.

As they communicate and collaborate though this shared and connected medium, the pupils learn about each other, about their respective cultures and languages, and about the natural world and science.

STUDIES

In another video illustration, Technology in Education: A Future Classroom by Nemroff Pictures, students are shown filing into class and setting down what would seem to be an all-glass tablet on the desk. The surface of each desk is also made of glass, and it comes alive when the tablet is set down, recognising and welcoming the pupil and activating 'School Mode'. Then, with a swipe of the pupil's finger, a virtual laptop is projected up from the desk, with the keyboard mapped onto the surface and a holographic screen is projected upwards into the pupil's vision.

At the front of the class, the teacher has even more power at his disposal; he pulls up a 3D hologram of the moon and sends its spinning around on its axis. Information about the mass and structure of the moon are displayed holographically too, as he speaks to the class.

In another room, another student sets down their own smartphone on the surface of a desk, and is once again, instantly recognised. The device switches into 'Work Mode' and then asks the student what subject they'd like to work on by displaying a menu of options. The student selects 'Chemistry' and in a moment, their next interactive lesson starts to play in the glass desktop in front of them. A virtual keyboard is also provided for them to take notes.

On the touch-sensitive desk surface, they can write formulas and take tests and receive right/wrong responses, further instructions and suggestions, and congratulations when they have completed a lesson. They can also call up and manipulate images or project them as 3D holographs – DNA double helix or an acetic acid molecule for example, moving them around in any plane and discussing them with other students or their teacher.

Students can then switch the whole desktop to a 'Lab Mode' and use it to perform practical experiments, heating up solutions and following instructions displayed between whatever apparatus they have on the surface of the desk. The whole experience is, from start to finish, smooth and streamlined. It's much more interactive and collaborative, and gives the student and the teacher, new ways of learning and teaching.

In another video by glass developer Corning, a whole group of students make use of multi-touch, community activity table, with all of them interacting with the content, moving and exploring items and images together.

In all of these videos, there is not a text book anywhere in sight.

Few if any classrooms have this kind of technology or anything quite like Microsoft's interactive collaboration wall just yet. But they are not all that far away, and many are already using collaboration technologies, such as Skype to connect to other schools in other communities or countries.

The classroom of the future will be much more connected and open – and it is certainly possible and practical to create much smarter, more interactive, engaging, intuitive and collaborative classrooms with the technology that is available to schools today.

You can see the videos at the following links:

Microsoft's vision of future productivity
https://www.youtube.com/watch?v=bwj2s_5e12U&list=PLCBF56A5EAFFBE4E4&index=4&t=0s

Nemroff Pictures' video on A Future Classroom
https://www.youtube.com/watch?v=uZ73ZsBkcus&list=PLCBF56A5EAFFBE4E4&index=6

Corning's A Day Made of Glass 2
https://www.youtube.com/watch?v=X-GXO_urMow

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An immersive learning experience

What does the classroom of the future look like? That, of course, will depend on your own future vision for teaching and learning and every classroom will be different. It will be based on your specific needs. But one thing is certain – it won't look anything like the traditional stereotype, in which rows of identical desks are all set out to face the blackboard and the teacher's desk at the front.

In the future, the classroom will immerse both pupils and teachers in technology that enables them to learn more intuitively, to collaborate and communicate together – as a whole class, in smaller workgroups, and with other students and tutors who are in a different school, or perhaps even, on the other side of the world.

There will be a large, interactive, multi-touch display at the front of the class, which will be used when the whole class is working together. Desks will almost certainly be arranged in small groups around the edges of the room and there may be another, smaller shared display at each table.

Students will have access to some kind of PC device – or a Windows or Chrome notebook or tablet that is either a shared resource within that classroom or school, or assigned to them for the school year, which they carry from lesson to lesson. Or they will simply bring and use their own device – that's already happening in many institutions.

It's also likely that around the room – perhaps at each group table or in shared area at the opposite end of the room to the large interactive display – there will be other useful and intriguing pieces of tech – visualisers, 3D printers, virtual and augmented reality headsets and 360-degree cameras that enable students to create and become immersed in virtual environments.

In the centre of the room there may be a work table that can be shared or a couple of sofas and a low-level table around which students can come together to discuss work and collaborate – bringing their devices with them. The table itself maybe a touch-table through which screens and documents and images can be shared, viewed and manipulated.

ENVISIONING A DIFFERENT KIND OF CLASSROOM

The teacher, meanwhile, will no longer be at the front of the class at all times, holding forth and watching over the students. They will move around the room, working through a tablet, talking to their students whilst they share their screens or images, video and audio content on the large communal screen. Having set pupils a task to carry out, they will then move around the room to support students as they work.

They will also be able to monitor the work being done by each student and, when it's time to move on or a key point needs to be made, take control of students' own displays.

The whole of the classroom will be connected to fast and reliable WiFi that will be connected to a fast network infrastructure and broadband service, allowing students right across the school or college to access virtual learning environments (VLEs), and information stored on local or – and this is increasingly the case now – cloud-based resources. And with remote access made easy, it will be possible for pupils to make use of learning resources wherever they are, so they can easily pick up on the work they did in the classroom in a shared study area, or at home. In this sense, the classroom of the future will reach well beyond the four walls of the traditional learning space.

Underlying all of this will be a layer of security and digital protection that will safeguard both the data and identities of individual students and teachers and ensure compliance with regulations such as GDPR. There will also be software that will monitor for online bullying and inappropriate behaviour, without imposing some kind of 'Big Brother' regime.

The classroom of the future will be one that makes use of the latest and best technologies to provide a more intuitive, interactive, inspiring, collaborative and, most importantly, a more effective learning experience for students. It will enable them to understand ideas and concepts in new and different ways. It will stimulate their curiosity, encourage them to seek out answers and to explore and discover much more. It will enable them to communicate and share easily. Put simply, it will revolutionise the way that teachers teach, and the way students learn.

Many schools and colleges are already adopting many of these technologies and – with the help our educational technology experts – creating their own vision of what their classroom of the future will look like and moving towards it as swiftly as their governance and budgets will allow.

In this guide, we outline the practical steps that schools can take towards creating their own vision and turning it into a reality.

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Creating a vision...

For many schools, the vision of the classroom of the future may well be very close to what we have already described – with touch-sensitive displays and seamless connectivity making collaboration easy, and with the teacher able to move around the class, controlling the main display and also monitoring what students are doing on their own devices.

Reaching that goal, however, won't be simple and straight-forward. It will almost certainly be a matter of taking one step at a time, ensuring you have a firm foundation in place, then building on that platform to deliver the classroom that meets the needs of your school or college.

What you should certainly not do is go out and spend whatever budget you have available on, for example, 100 of the latest hi-spec tablets, or the very newest and best interactive large-format display. While both may have a part to play, you need to take a smarter approach in moving towards your vision. It is important then to first define that vision and then to set out how it can be achieved in specific, achievable and realistic steps.

To create your own vision of the classroom of the future, you will almost certainly need to call on someone with real expertise in educational technology, who can understand both what you want to achieve and the technology itself, and how it all fits together.

...and making it reality
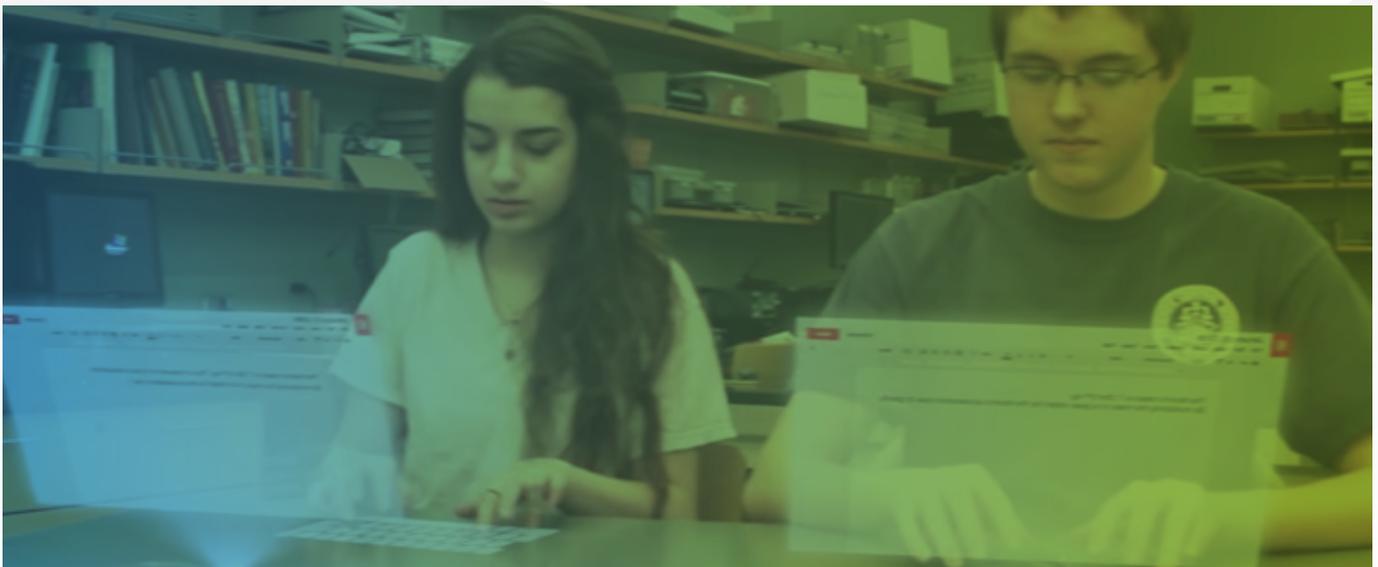
They will help you set out an action plan for the delivery and use of technology that will work and ensure that appropriate training is provided for teachers. This is vitally important. To prove its worth, technology has to improve experiences and the outcomes. Without teachers knowing exactly how to use the technology, that won't happen.

This also raises another important point, which is that the leadership team – senior staff and governors – have to have bought into the vision of what the classroom and the school will look like in the future. They must therefore be closely involved from the very start and have a clear idea of what will happen, when it will happen, how much it's likely to cost and what kind of benefits and improvements it will bring. All investments must deliver a tangible and sustainable return.

Teachers must also be convinced that it's the right way forward. While some are already using new technology in the classroom to a degree, many others remain sceptical and would certainly not yet feel confident about using a tablet to deliver a lesson while moving around the class and displaying content on a large screen. From the outset, teachers need to be part of the vision and given the confidence to make proper use of the technology.

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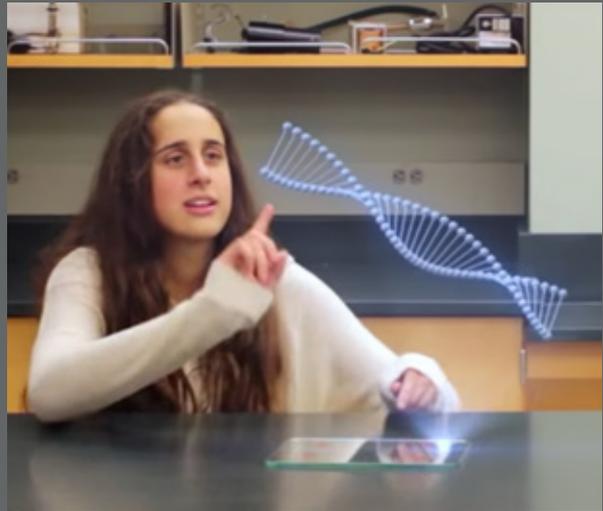
Practical consideration

PLATFORMS

You will need your operating system to be up to date and capable of meeting your long-term needs. This is fundamental and will have an impact on the options that are available to you in the wider sense. If you are still on Windows 7, you need to upgrade to Windows 10 as quickly as possible. If you have chosen Apple of Google Chrome as your platform, you also need to make sure you are up to date and that it's absolutely the right choice for your vision.

SOFTWARE

You will need basic, every-day software tools and what you use will be dictated to a degree by the platform you choose. If you are on Windows 10, for example, you will almost certainly be using Office 365 Education or better still the entire Microsoft 365 Education suite (which includes advanced security) and apps such as SharePoint, Sway and OneNote Class Notebook. On Apple and Chrome, you may have other options. A lot of this basic software is free to use, always updated and always backed up, so work is never lost.

Specialist tools, such as classroom management software that enables a teacher to freeze or take-over pupils' screens at any time, can be very useful. You may also want to deploy specific educational and teaching software that is designed for your kind of school, subject range or specialism. You need to think about this at an early stage to ensure the solutions you need will be available on your platform of choice.

Microsoft 365 Education

Empower teachers with a single, affordable and safe solution for better learning outcomes

Unlock creativity in each student

Keep students engaged and inspired

Promote teamwork

A collaborative single hub toolkit

Provide a simple and safe experience

Simplify IT and keep data safe

Introducing Microsoft 365 Education

Office 365	Windows 10	Enterprise Mobility + Security	Minecraft: Education Edition

Productivity	Security	Safeguarding	Backup	Infrastructure	Firewalls
Microsoft Tier 1 Cloud Solutions Provider	SOPHOS	smoothwall	Azure	vmware	Barracuda
Adobe	Symantec	senso.	veeAM	Microsoft Hyper-V	FORTINET
G Suite	TREND MICRO	NetSupport	VERITAS	Azure	SONICWALL

DEVICES

In most schools now, having a ratio of one device per pupil is regarded as essential. In such cases, all 'PC' devices will need to be mobile devices. This enables students to work in any classroom on any subject – and they can work at home, or just about anywhere.

The notebooks, tablets, accessories and other equipment you use will depend on your specific needs. In some schools, pupils will need the performance and capabilities of a Windows or Apple laptop, in others, Chromebooks may be more suitable. Aspects such as the battery-life of a notebook, and whether peripherals like keyboards and mice support wireless technology or not, are important considerations as are features such as touch and Ink. You may also want to consider what happens if devices get damaged or stolen – not only from a security perspective, but also how that device can be replaced for the student.

SERVERS, STORAGE AND CLOUD

You may want to keep servers and storage on-site or use more flexible cloud options. The latter must, of course, be very secure and you may prefer a private cloud approach if this is a concern. It may be that you would use a hybrid solution, with software such as Microsoft 365 Education residing in the cloud, and internal systems, such as registration, school information management systems, and data that you hold on students and staff, remaining on-site. That said, security of cloud services is now very good, and some schools are already moving towards having all their server and storage resources in the cloud.

TRAINING

Every new technology or app will require some training of teachers and staff. This is very important and is often not considered until technology is purchased. Without being trained, teaching and administrative staff will not be able to make the most of the investments you make.

KEY AREAS
YOU WILL NEED
TO THINK ABOUT

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BYOD

Bring your own device (BYOD) is already happening in many schools – but staff need to know how to manage it within the classroom. There are some very simple, practical considerations here. Devices will have to be PAT tested, for example, and there will need to be anti-virus protection on each device.

It will also be a good idea to have devices formally registered for use, so that you always know exactly what students are using for their work. There may be other safety and insurance considerations as well.

After all that, you can look at the technicalities of how devices will connect to the school network, to VLEs and to any cloud-based resources that are made available to students. All this must be done securely – and the network will need to be able to cope with the bandwidth that's likely to be generated by many different kinds of devices connecting throughout the day.

WIFI

If you are using high-resolution and rich content and media on multiple displays within a classroom, and also making use of video and collaboration, the WiFi capability will need to be very good. It probably won't be enough to have a single hub and a few access points dotted around the school. The WiFi network will need to be carefully considered, powerful and resilient enough to meet all requirements, both within and outside the classroom.

INFRASTRUCTURE

As well as the WiFi, the wired network backbone within the school will need to be capable of carrying the increased traffic load that a more digitally-connected school will generate. Almost every pupil will be connected for the whole time they are in school and this will generate a massive amount of bandwidth demand on the core infrastructure. The broadband connections will also need to be capable of coping with the increased bandwidth and there will need to be appropriate security at the perimeter of the network to guard against infiltration and malware.

AUDIOVISUAL & COLLABORATION

Large interactive, high-definition flat panel displays with immersive audio are now being adopted in most classrooms for collaboration and conferencing – and give teachers a much more vivid and versatile way of getting their key points across to pupils. Usually, there will be one large device per classroom, but smaller displays and touchscreens can also be used within the classroom. Collaboration tools are now being provided as part of standard every-day software. Within Microsoft Office 365, for example, the Teams app (which includes Skype) provides an easy way for users to connect and work together.

SECURITY

Good authentication and protection of data is vital to data security and safeguarding. It is also important that good security policies and practices are put in place and that the school is able to monitor for inappropriate use of websites and social media, and any instances of cyber-bullying. Appropriate measures and solutions will need to be in place to ensure pupils are always safe when they are online.

GDPR AND GOVERNANCE

GDPR is as important in schools as it is in the commercial world. Data on every student and individual must be kept secure and permission must be given for any personal data or images to be used. If data is being taken off-site, on memory sticks for example, it will need to be secured and probably encrypted as well. How data is shared within the school will need to be carefully managed.

CLASSROOM LAYOUT

The layout of your classroom of the future is going to be very important as it will dictate how students and teachers can interact with each other. There are several approaches you can take, and it is worth taking expert advice and looking at the different options and the experiences of other schools.

VIRTUAL LEARNING ENVIRONMENTS (VLES)

VLEs are the centrepiece of many multi-school or multi-academy trust systems now and providing simple, yet secure, anytime access to them will be important. You will need to consider exactly how you provide that access, what sort of log-on and authentication process is used, and how it will be secured, monitored and managed.

VIRTUAL & AUGMENTED REALITY

There are some excellent and very usable VR and AR systems available for education. Google Cardboard for example, provides very inexpensive way to use smartphones and apps on Google Expeditions. The new generation of 360-degree cameras are very affordable and VR/AR can be used very effectively to show children 3D representations of, for example, the human body or chemical elements, or to experience what it was like to be in a World War One trench. Such experiences can be extremely stimulating and engaging for pupils and students. For schools that have specific requirements, such as children with special needs or learning difficulties, VR/AR may be tremendously useful and worthy of immediate investment.

RECYCLING

Every school will want to ensure that old and unwanted equipment can be recycled ethically and efficiently – or traded-in when new systems are being purchased. Another important consideration here is how to make sure that data residing on systems that are no longer required is permanently erased.

How can Stone help?

With so many technology options available, schools have in one sense, never had it so good. But having more choice also makes it harder to make decisions. And when you are selecting the direction in which to take your IT investment in the future, it's important to do everything you can to ensure you make the right choices.

Stone has been meeting the IT needs of education for almost 30 years. We can provide both the expertise to help you define your vision and the practical, technical services to assess your current IT set-up and then recommend and install the solutions you need – as and when it suits you and your budget.

We can help you implement each stage of your plan, arrange the necessary training that staff will need and then provide hands-on and every-day support as required.

We have vast experience of working with educational establishments. We understand their needs and the pressures and restrictions they are often under.

We know what works and can help you at every stage of your journey, from the initial concept of your future classroom, to its eventual delivery.

If you would like to know more, please contact our Education team by calling 08448 549 800 or emailing SchoolsTeam@stonegroup.co.uk

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Ready or not?

learning to walk before you run

Documents like this often tell you that you must make a change immediately or risk being left behind. Stone will never do that. Technology is already playing an important role in teaching and, as we hope we have described in this document, it can play a much bigger role in the future. It's certainly the case that the use of technology now has an influence on both students and parents when they are deciding on the schools they should apply to attend.

But it may be that your school and staff are just not ready yet to completely change the way they teach just yet. You may have other, more fundamental challenges or goals that you want to address first, such as simply bringing your classroom technology up to date or increasing the technical ability and understanding of pupils. Sometimes it is just a matter of being as good at IT as other schools in the area.

It may be that, while you are not talking about a definitive 'classroom of the future' vision, you are looking for something innovative or cutting-edge that will set your school apart and give pupils a specific benefit or advantage. Something that will take the school and the students to the next level.

Whatever the situation, before you set out on your journey, you will need to make sure that you have a firm foundation to build on – the right platform for your school, a solid infrastructure and appropriate security.

The ultimate destination is always the same; to improve the quality of teaching and learning. Technology can certainly do that but – as noted earlier – it is usually a matter of taking one step at a time, of walking before you try to run. Whatever you decide to prioritise with respect to technology investment, most of the practical advice we offer in this guide will still apply.

It may be some time until you are ready to talk about your own vision for the classroom of the future and setting out an action plan that will move you toward that ambition. When you are ready to do that, Stone will be ready to help.

Contact us

For your first steps towards the classroom of the future, Stone are here to help.

Email: SchoolsTeam@stonegroup.co.uk
Tel: 08448 549 800

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