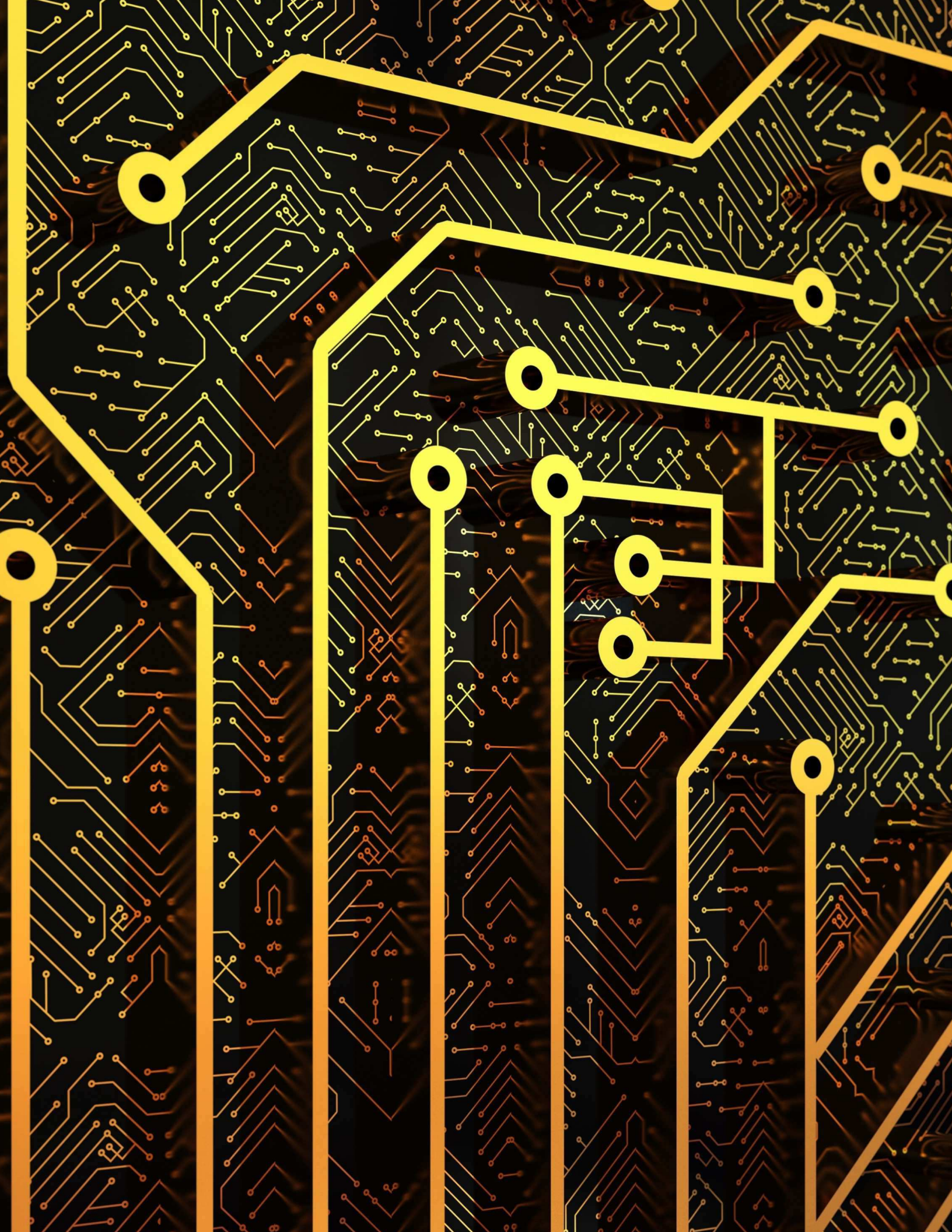
#ONE
MARCH 2021

EXPLORING EDTECH

IRELAND



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EXPLORING EDTECH #ONE

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www.exploringedtech.ie

Editorial

Tim Lavery FRCGS FRGS FLS

Founder of World Explorers Bureau, an award-winning consultancy representing world-class explorers, educators and field scientists. A professional entomologist and edtech specialist.
Intel Master Tutor, Microsoft Innovative Educator Expert

Welcome to the first issue of Exploring EdTech Ireland!

When I first mooted the idea for this magazine and accompanying web-based hub the first COVID 19 Lockdown had just been announced and the teaching community throughout the country rallied to provide emergency remote teaching and learning.

As a parent and an educator, I was very impressed with the level of skills, innovation and dogged determination of so many of our fellow teachers to overcome obstacles, from basic lack of suitable equipment to poor bandwidth, not to mention having to do this from home with only days notice.

A year later, this publication finally sees the light of day after much discussion and the unwavering assistance of the contributors, behind the scenes helpers and advisers who could see the value and timeliness of publishing a monthly digital magazine which would highlight the world of education technology with a particular focus on the Irish primary and secondary education community. It is a return to home for me as my career in IT began the day our local school received their first Apple IIe computer back in the 80's, it spurred me to a lifelong passion for both teaching and technology.

I hope Exploring EdTech will help stimulate teachers, leaders and management of our schools to make the best use of education technology to enhance and develop the whole school community, to quote George Couros, "Technology will not replace great teachers but technology in the hands of great teachers can be transformational."

EDTECH

SPOTLIGHT

INTERACTIVE IMAGES

ThingLink

ThingLink is an award-winning education technology platform that makes it easy to augment images, videos, and virtual tours with additional information and links. Worldwide, over 4 million teachers and students use ThingLink for creating accessible, visual learning experiences in the cloud.

ThingLink offers an easy way to create audio-visual learning materials that are accessible in an integrated reading tool. All text descriptions in image or video hotspots can be read with Immersive Reader.

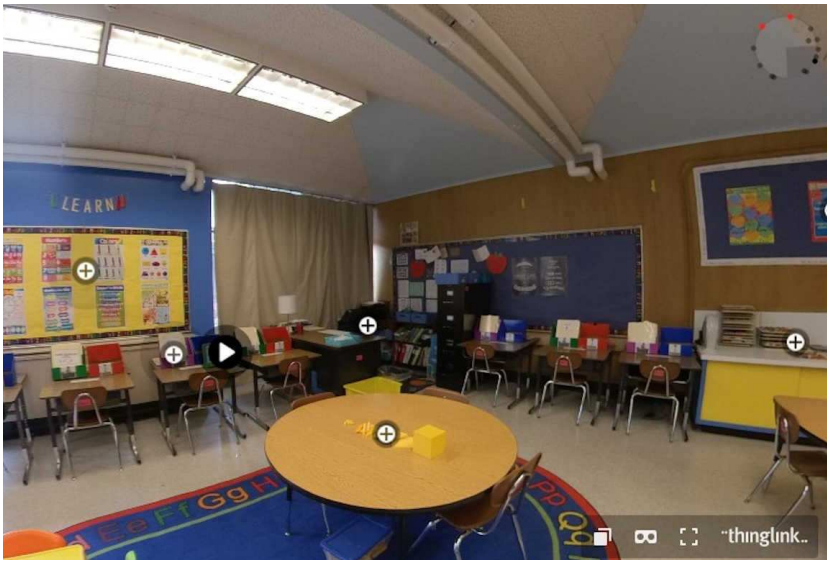
Content creation for image, video and 360 media is fully supported inside Microsoft Teams. Interactive content sharing is supported to OneNote and Teams.

For more information visit: https://www.thinglink.com/en-us/edu

ZOOM

SCHEDULER - Extension for Chrome

The Zoom Scheduler Chrome Extension allows participants to schedule Zoom meetings directly from Google Calendar. Using the extension, you can start an instant meeting or schedule a future meeting. The meeting join link and details are sent via a Google Calendar invitation so the attendee can join with a single-click from the calendar.



EDTECH

SPOTLIGHT

KAHOOT!

TO INTEGRATE WITH GOOGLE CLASSROOM

More than 1.5 billion players in over 250 million games have accessed the Kahoot! platform in the last 12 months to bring engagement to learning, including more than 7.5 million teachers and hundreds of millions of students across the globe.

Kahoot! is extending the Kahoot! learning experience by developing a Google Classroom add-on that will be available later this year.

This will enable educators to access Kahoot! features and distribute Kahoot! games directly to all students. Educators can launch live Kahoot! games hosted either face to face, or through video conferencing.

https://kahoot.com/schools/

GOOGLE

Inclusive Trainer Community

Google for Education is looking for educators across Ireland and the UK to expand on our mentoring programme, which is targeted at any educator who identifies as being a member of an **under-represented group** and is keen to explore Google Workspace tools.

We would like to support you and your colleagues to enhance your Google Workspace for Education skills and to become a **Google for Education Certified Trainer.** You will gain the expertise to have an even greater impact in your school, community and career.

The mentoring program lasts for **six months and includes 20 hours of guided professional development.** You will focus on the knowledge and skills required for Google Educator Certifications for 12 hours and will receive 6 hours of mentoring from existing Google Trainers.

This great opportunity is completely **free**, you just need an appetite for learning and a spare hour for one evening, every other week.

For more information, join the Launch Webinar on Thursday 25th March 16:00:

https://events.withgoogle.com/inclusive-google-trainer-community/

SOAPBOX LABS

GROWING DEMAND IN EDTECH MARKET FOR PIONEERING IRISH DEVELOPER OF VOICE TECHNOLOGY FOR KIDS

SoapBox Labs, pioneering developer of private and accurate voice technology for kids, today announced its expansion into the United States and the promotion of three employees to its leadership team. The announcement signals momentum for the Dublin-based company, as well as growing demand for its kid-specific voice technology in the global education technology market.

Named one of Europe's hottest startups by *Wired UK* in 2019, SoapBox Labs was founded by Dr. Patricia Scanlon, whose popular TEDx talk explains the ways in which technology can "transform a child's reading journey." In 2018, Scanlon was named to the *Forbes* list of Top 50 Women in Tech globally.

"A decade after the introduction of voice assistants like Siri and Google, brands and companies are realizing what SoapBox Labs has long known to be true: voice technology built using adult voices does not work for children," said SoapBox Labs CEO and Founder Dr. Patricia Scanlon. "In order to meet the increasing need for voice-enabled solutions that actually work in kids' play and learning, we're now scaling our diverse, committed, and world-class team—at home and abroad."

Amplify, a publisher of next-generation curriculum and assessment programs, announced last August, the release of a voice-enabled reading assessment for grades 1-6, created in collaboration with SoapBox Labs, which develops accuracy and privacy driven voice technology for children. **Text Reading Online** is the first literacy assessment of its kind to enable remote evaluation of oral reading fluency, accuracy, and comprehension—critical indicators of reading development for young readers.

The SoapBox voice engine has been built using a privacy-by-design approach. Protecting kids' fundamental right to voice data privacy is a cornerstone of our work and philosophy.

SOURCE: SoapBox Labs 18/03/2021

EDTECH

SPOTLIGHT

STEAM School is an 8 week curriculum-linked blended learning programme delivered by Make Create Innovate for young people and teachers in primary and post primary schools.

Each week participants are introduced to low-cost everyday materials (including motors, LEDs, circuitry and recycled materials, as well as microcontroller, MaKey MaKey), through a combination of video learning content and live Zoom support sessions with expert tutors.

Aim of STEAM School

• To support and guide educators' continuing professional development (CPD) in the provision of engaging, STEAM education experiences for young people.

• To engage young people in creative, hands-on maker activities in order to support the learning of STEAM subjects in addition to geography, sustainability, CSPE, SPHE and computational thinking.

STEAM School encourages:

• Meaningful engagement with technology
• Inclusive & equal learning opportunities
• Experimentation & creativity
• Collaboration & creative exchange
• Critical thinking and independence
• Innovation & problem-solving skills

Applications are now open and the programme begins week of April 19th 2021.

For more information and to submit an expression of interest visit: http://www.makecreateinnovate.ie/steam-school and fill out the survey before March 25th.

SCIENCE FOUNDATION IRELAND

DISCOVER PROGRAMME TO RECEIVE €5.2 MILLION

Minister for Further and Higher Education, Research, Innovation and Science Simon Harris TD has announced €5.2 million in funding to support 49 projects as part of Science Foundation Ireland's Discover Programme (.

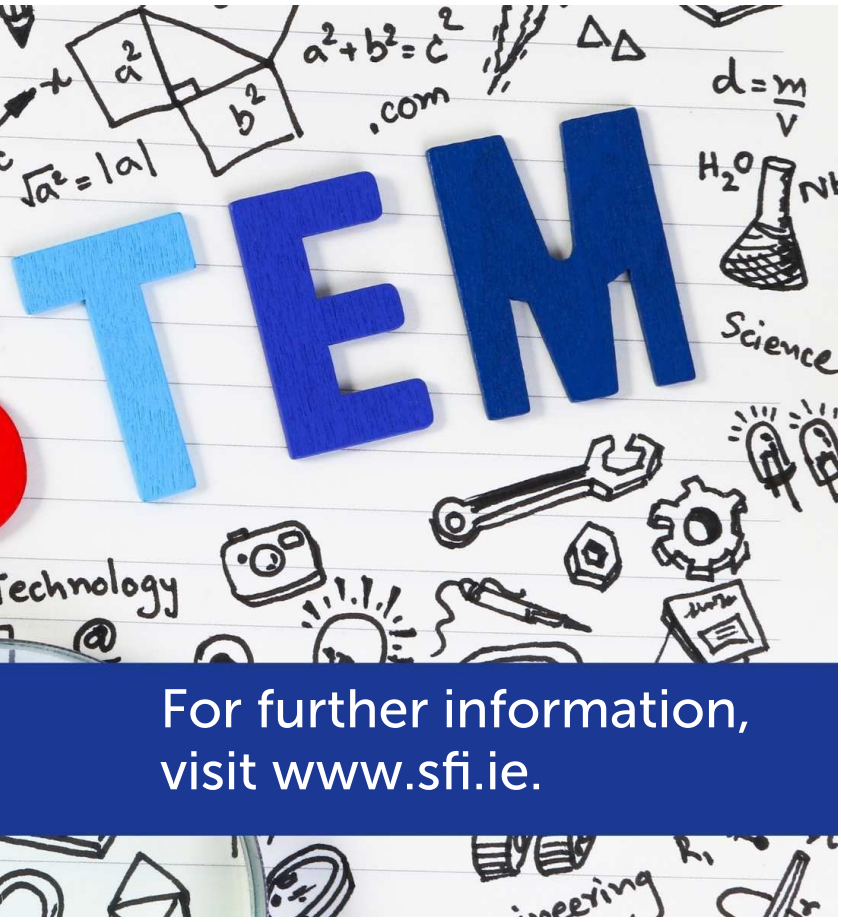
The funding will support a number of exciting projects including supports for deaf and hard of hearing people who wish to learn Science, Technology, Engineering or Maths, or Girls Coding which seeks to address imbalance by encouraging, facilitating, and providing opportunities to teenage female students to engage with Computer Science.

The projects also include 'AI in My Life' led by DCU which will engage 500 Dublin teenagers from disadvantaged backgrounds in a 15-week (20-hour) co-created, interactive workshop series encouraging them to reflect on their experiences in a world shaped by artificial intelligence, personal data processing and digital transformation.

Students will be empowered to evaluate the ethical and privacy implications of AI in their lives, to protect their digital privacy and to activate STEM career and university awareness. Speaking today, Minister Harris said:

"The COVID-19 pandemic has brought home to us just how important the science, technology, engineering and mathematics, or STEM, fields are. It's vital that younger people in particular feel encouraged to participate in STEM careers, and that there are no barriers to entry."

The 49 projects will take place local and nationally across Ireland covering topics including biodiversity, STEM sign language, climate action and sustainability, coding, epilepsy, understanding pandemics, digital wellbeing, and the link between music, maths, and physics. The initiatives also target a wide range of ages including young children, teens, and adults as well as some initiatives designed for young people from disadvantaged backgrounds and attending DEIS schools and those living with sight loss - encouraging inclusivity and diversity.



For further information, visit www.sfi.ie.

The projects supported include:

Girls Coding – CodePlus – seeks to address imbalance by encouraging, facilitating, and providing opportunities to teenage female students to engage with Computer Science.

The Cyber Academy led by Munster TU is a series of fun and engaging activities for young people (11-18 year olds) to help them explore their passion for tech by introducing them to the world of cyber security.

Quavers to Quadratics (Q2Q) led by the National Concert Hall, is a series of workshops for primary school children, primarily from DEIS schools, highlighting the overlap between music, maths and physics, and responding to the lack of STEM engagement typical in such schools.

Science 4 Sight Loss – will help stimulate engagement and curiosity in STEM and inspire this underrepresented group to have confidence in their ability to tackle the barriers of diversity and inclusion in STEM.


Do more with 3D
Model view
Mixed reality
Remix 3D
Paint 3D
Photos

Full STEAM Ahead with Microsoft DreamSpace

Suzanne Sullivan

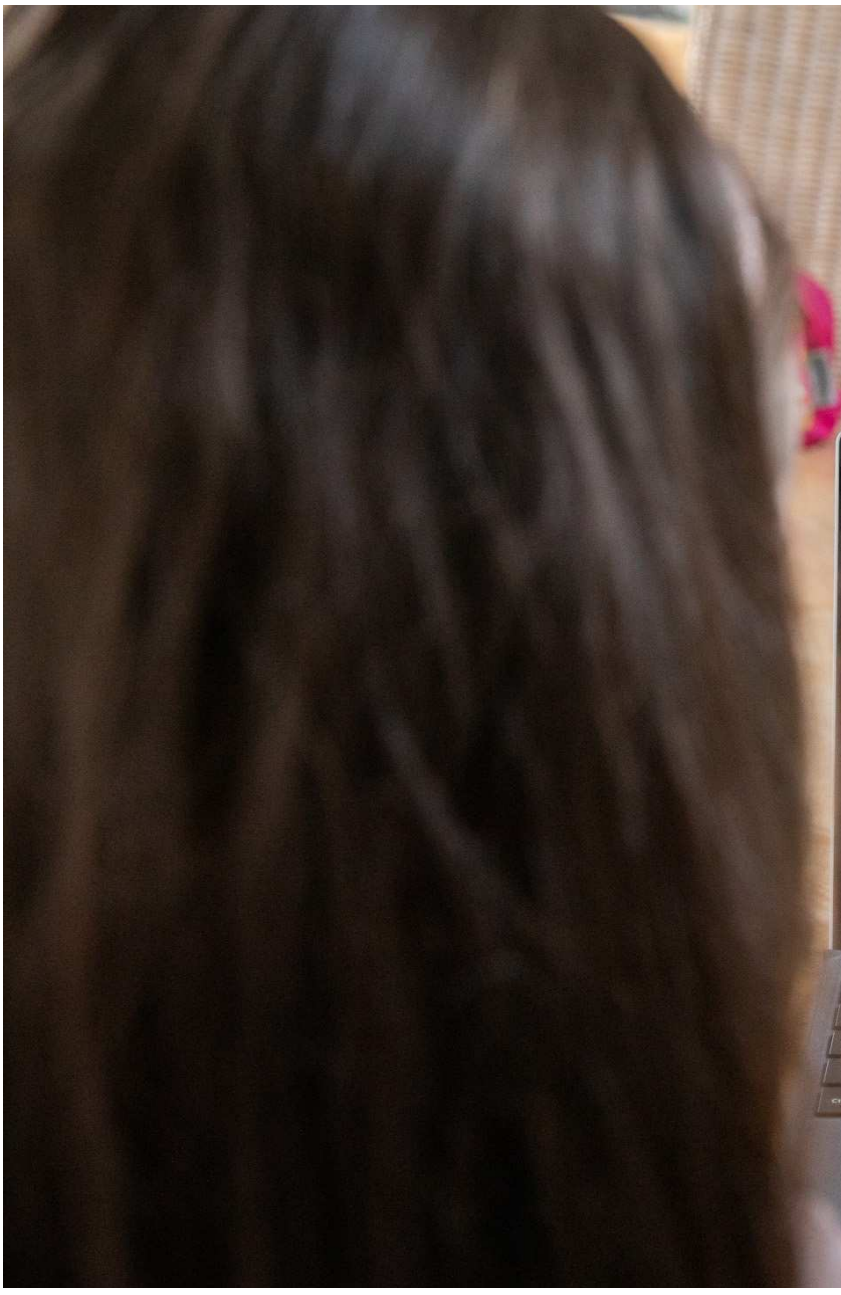
Microsoft's mission is to empower every person and organisation on the planet to achieve more. As technology permeates every aspect of our lives, it is critical that the next generation has the skills for the jobs of the future and that's why, in 2018, Microsoft Ireland invested €5million in the development of a dedicated STEM innovation and education hub called DreamSpace at its campus in Leopardstown, Dublin.

Through the DreamSpace experience, the company is helping young people to shift their perception of the role that technology can play in their future career choices and cultivating the critical and creative thinking skills increasingly recognised as essential for the jobs of the future amongst primary and secondary school students.

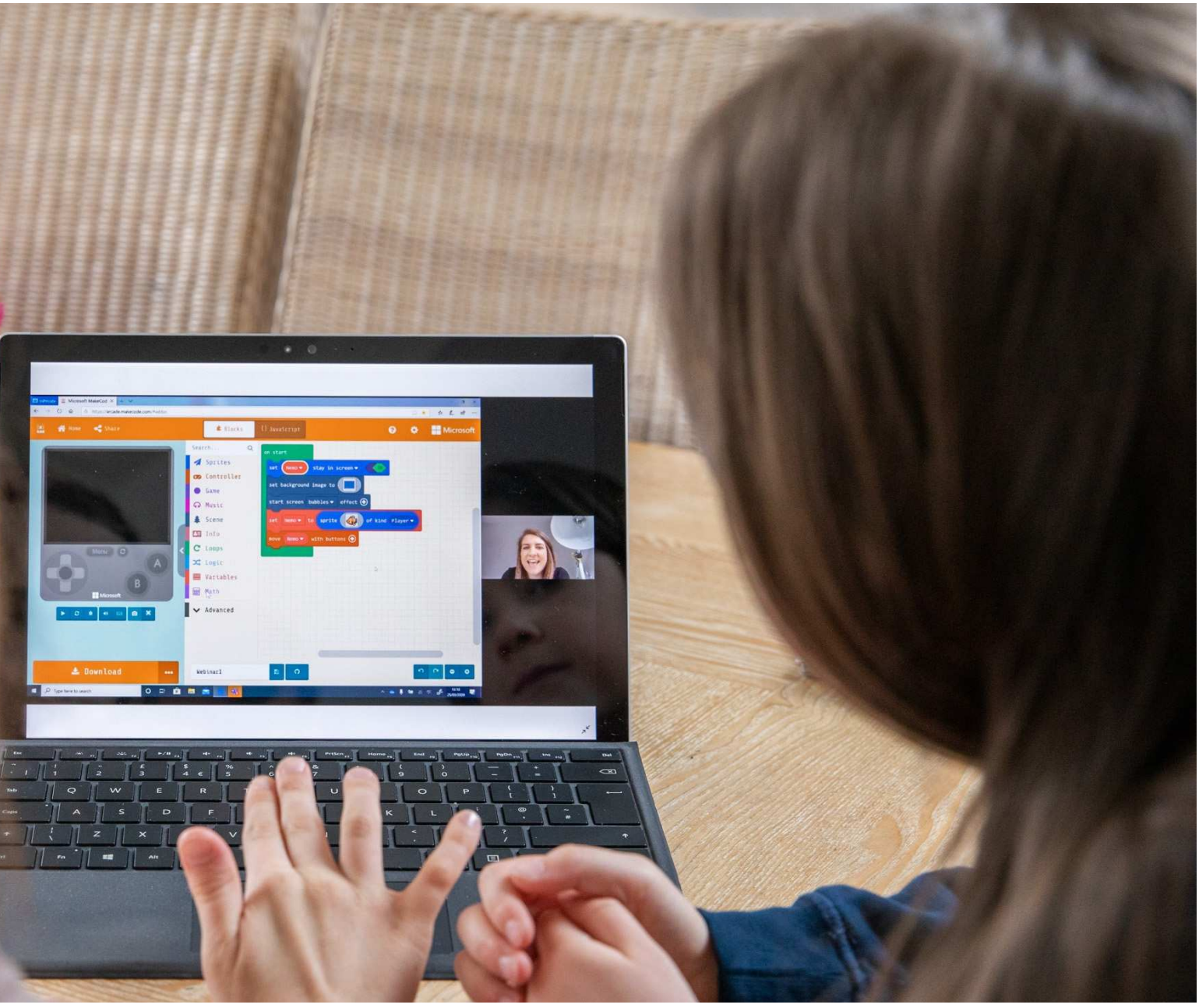
At DreamSpace, young people engage in a digital skills experience that inspires them to unbox their ambition, spark their creativity and supercharge their ideas. Grounded in innovative teaching practice, DreamSpace was developed and is led by teachers. With an estimated 70% of future jobs requiring skills in the field of STEM, coding, computer science, data analytics, AI and computational thinking, it's important we rethink and align education.

Research undertaken by NUI Maynooth on the impact of Microsoft's DreamSpace on visiting students shows that it has been a catalyst for a change in perception. It found that young girls were particularly more open to considering careers in STEM having engaged with DreamSpace.

Since its launch, Microsoft Ireland has continued to invest in and evolve the DreamSpace initiative. For instance, a series of pop-up events were held across Munster, Ulster and Connacht to enable students to engage in the experience without having to travel to Dublin. The company also announced a 10-year partnership with W5, the Science & Discovery Centre in Belfast, to bring the DreamSpace experience to an additional 15,000 students in Northern Ireland.



"When the pandemic hit, people embraced technology in a way that we never could have fully imagined. The reality of students learning from home served to demonstrate the vital role technology can play in not only connecting students and teachers but in transforming our education system."



As the certainty of restrictions and school closures were understood, Microsoft Ireland and the DreamSpace team quickly transitioned the experience online through the creation of the 'DreamSpace HomeSpace' series. The series aimed to build on the goals of the DreamSpace hub by helping students aged six to 16 to engage with technology in new ways. Through daily webinars, students were engaged with several STEM learning initiatives, giving them the opportunity to learn new skills from home. It is also provided guidance and tools to equip parents and teachers with resources for use in supporting their children and students in a remote learning environment.

As the new school year started and students returned to the classroom, the Microsoft Ireland team once again transformed the DreamSpace through the creation of a suite of supports for both primary and secondary level students.

Amongst the supports was the option for schools to participate in a **DreamSpace Virtual Field Trip.** Designed by the Microsoft Education team, these were made available to primary and post-primary students who wished to get a glimpse into the world of STEM and key skills for many future careers. Engaging two schools per day for two hours each, these experiences were tailored for each school context. They proved really successful with over 400 virtual classroom visits taking place between September and December.

While the team couldn't provide virtual visits to every school, they wanted to ensure every school had access to a package of STEM learning resources that would be easy to deliver in the

classroom. With this in mind, **DreamSpace TV** was created. DreamSpace TV brings students, whilst at school or at home, on a STEAM learning journey focused on computational thinking, creativity and problem-solving. With lessons available for primary school students (4th to 6th class) and secondary school students (all years), there is something for everyone.

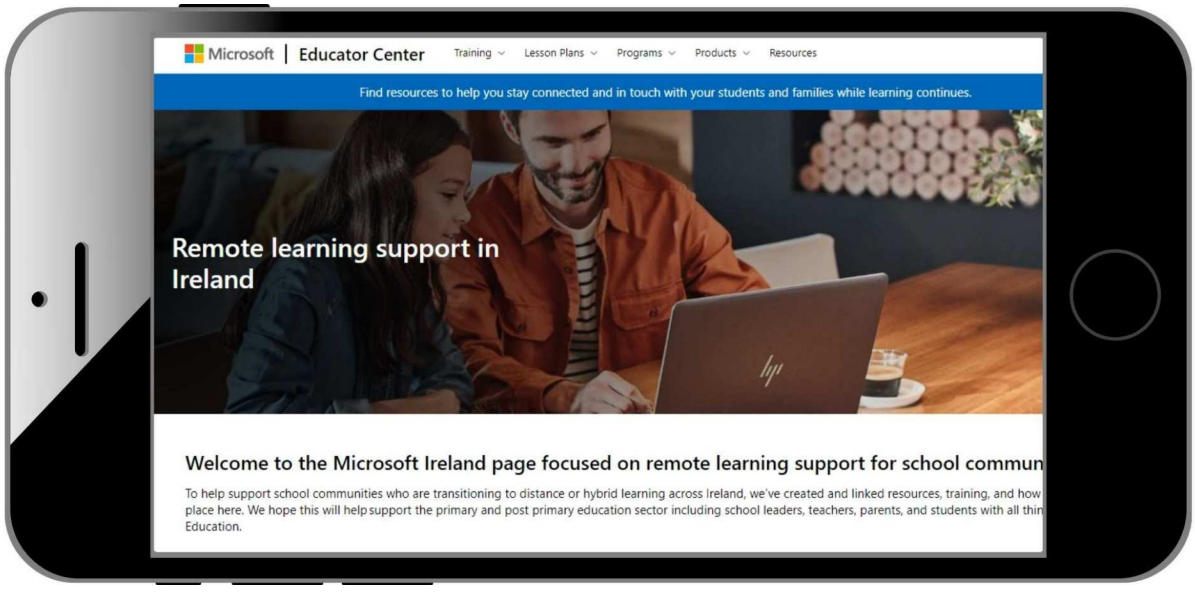
To extend the reach of the lessons to as many teachers and students as possible Microsoft partnered with RTE to make the lessons available to view via its learning hub. These on-demand episodes can be accessed at https://aka.ms/DreamSpaceTV and www.rte.ie/learn.

For teachers looking to deliver their own DreamSpace experience in the classroom or by way of independent

learning modules for students, the team created **DreamSpace Teacher**. With two packages for primary and post-primary level, Microsoft's team of teachers has worked hard to make these as accessible and easy to implement as possible. Each package contains a structured scheme of work, classroom resources including tutorial videos, worksheets, challenge activities and extension activities. DreamSpace Teacher is also a community that the team will support through regular check-in calls and with additional support and resources where possible. You can read more and register for it here: https://aka.ms/DreamSpaceTeacher

Microsoft DreamSpace has transformed in the past year to ensure that every student, teacher and parent in the country can access its innovative and

In addition to DreamSpace, Microsoft Ireland's Education team has also created a dedicated and customised resource page for Irish school communities to support all aspects of teaching and learning using Office 365. With guidance for school leaders, teachers and supports for parents and guardians, the page is a one-stop-shop of guides and quick links https://aka.ms/RemoteLearnIRE.



interactive STEM materials. Since launching in 2018, 65000 students have been engaged in a Microsoft DreamSpace experience and it's Microsoft Ireland's ambition that engagements will continue to grow and students' will see technology in exciting new ways, helping them to realise the full potential of what they can achieve.

While the schools remain closed the team at Microsoft Ireland is continuing to support educators to adapt to the remote teaching environment.

To stay up to date with training, events and opportunities with Microsoft Education in Ireland, follow the team on Twitter @MS_eduIRL. For access to all of the Microsoft DreamSpace resources log onto www.microsoft.com/dreamspace.

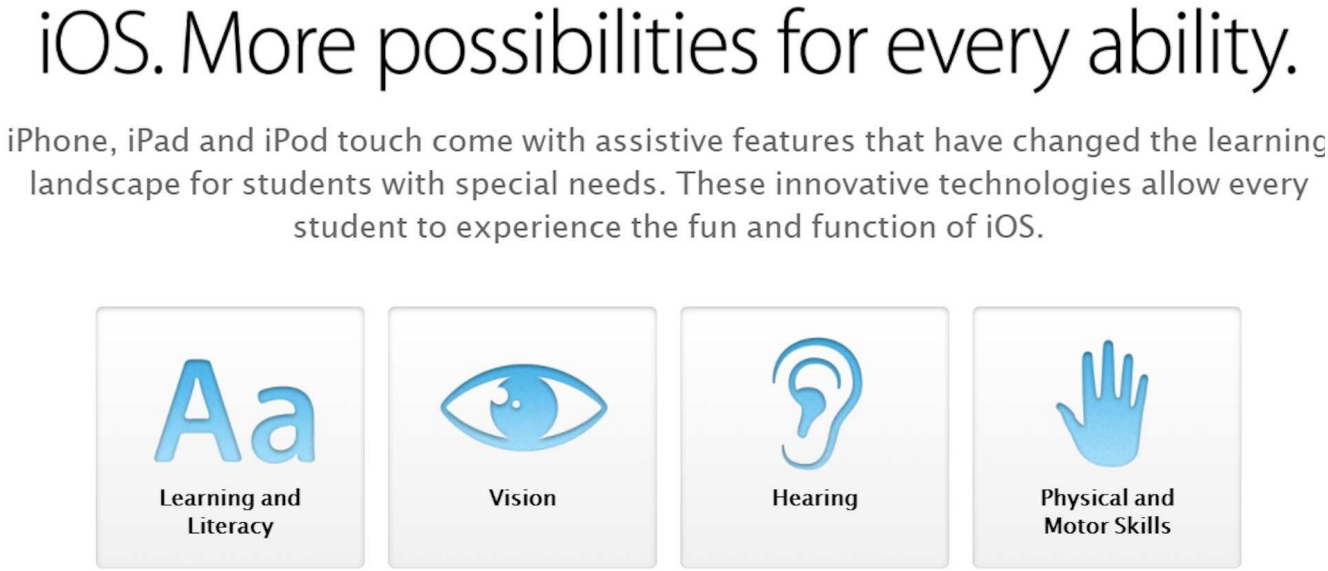
TECHNOLOGY WILL NOT REPLACE GREAT TEACHERS BUT TECHNOLOGY IN THE HANDS OF GREAT TEACHERS CAN BE TRANSFORMATIONAL

GEORGE COUROS
THE INNOVATOR'S MINDSET

Supporting Online Learning
for Pupils with Additional Learning Needs

Niamh Brady

During this period of remote teaching and learning it is imperative we are meeting the needs of all our students in terms of accessibility and inclusion. Accessing digital content can be problematic for students at the best of times, never mind remotely. Luckily, there are lots of readily available resources out there to assist.

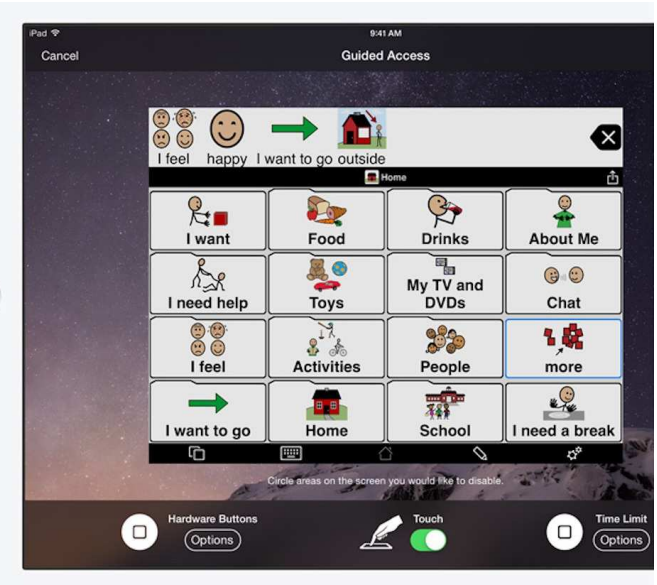


iOS Accessibility Features

For any students using an iPad, Apple have extensive information on their accessibility range for SEN on their website. As you can see from the image below, they have sections covering 'Learning and Literacy', 'Vision', 'Hearing' and 'Physical and Motor Skills'.

Examples of their accessibility range include:

Guided Access - helps students with autism or other attention and sensory challenges stay on task. A teacher or parent can limit an iOS device to stay on one app by disabling the Home button, and even restrict touch input on certain areas of the screen.



Speak Selection – can read a student's email, webpage & book out loud. Students can have the words highlighted as they're being read so that they can follow along.

iBooks - supports VoiceOver, Speak Selection and closed-captioned videos to help all types of learners. It also gives teachers a way to create customised learning materials for iPad to support a wide range of learning needs. Features like multicolour highlighting, notes, search, study cards and the glossary help students be better organised and better prepared.

Safari Reader - For some students, navigating the web can be a sensory overload. Safari Reader reduces the visual clutter on a web page by removing distractions. It strips away ads, buttons and navigation bars, allowing students to focus on just the content they want. And Safari Reader works with Speak Selection and VoiceOver, so students with print disabilities can get auditory feedback.

Dictionary - Students can look up words by using the dictionary integrated in iOS. They'll have quick access to definitions and commonly used phrases to help with grammar, spelling and pronunciation – even if they're offline.

INVERT COLOURS

If a higher contrast helps students better see what's on the screen, iOS lets them invert the colours onscreen. This works with text, graphics and even video. This feature is also compatible with Zoom.

Face Time - is ideal for students who communicate using sign language.

Photo Booth – gives pupils another way to communicate. They may find it easier to begin communicating if they can see their own face on the screen.

Voice Over- is a gesture-based screen reader that lets students know what is happening on their Multi-Touch screen and helps them navigate it, even if they can't see it.

Word Prediction - Word prediction in iOS can help students who have dyslexia or cognitive challenges or are learning English improve their vocabulary and word-building skills.

Assistive Touch - allows students with limited motor capabilities to adapt the Multi-Touch screen of their iOS device to their needs.

Braille Display – more than 40 Bluetooth wireless braille displays are compatible with iOS. iOS also includes braille tables for multiple languages.

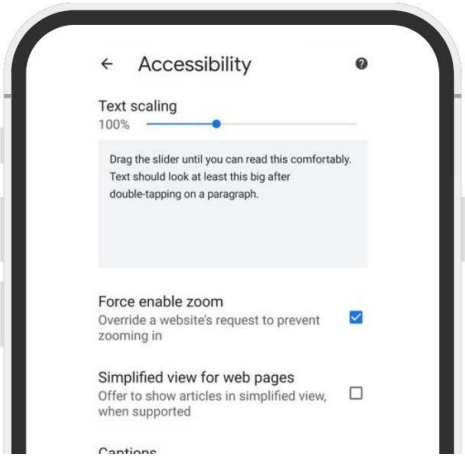
This is just a selection of the iOS accessibility features for education.

More information on general accessibility features can be found here: https://www.apple.com/accessibility/

This webpage looks at specific in-built features for **'Vision'**, **'Hearing'**, **'Mobility'** and **'Cognitive'** needs. It also informs you as to what iOS device each of the features are available on.

Web Browser In-Built Accessibility Features

Most web browsers have in-built accessibility features such as increasing the size of text, changing the font and zooming-in/out on a webpage.



Firefox also allows you to change the background colour of your webpage to assist those with visual impairments or Dyslexia.

Microsoft Edge has a built in 'High Contrast for Reading', 'Read Aloud, 'Immersive Reader' and 'Translate' features in their web browser.

It is worth finding out what web browsers your students are using at home during remote learning and sharing the relevant accessibility features webpage with them and their parents.

Google Chrome

Mozilla Firefox

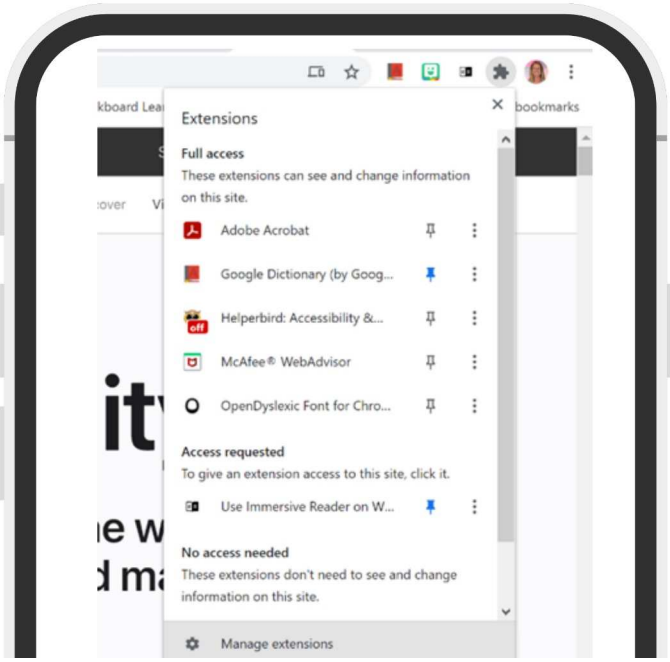
Microsoft Edge

For more information on the accessibility features of these three web browsers see their dedicated accessibility pages.

Google Chrome Extension Store

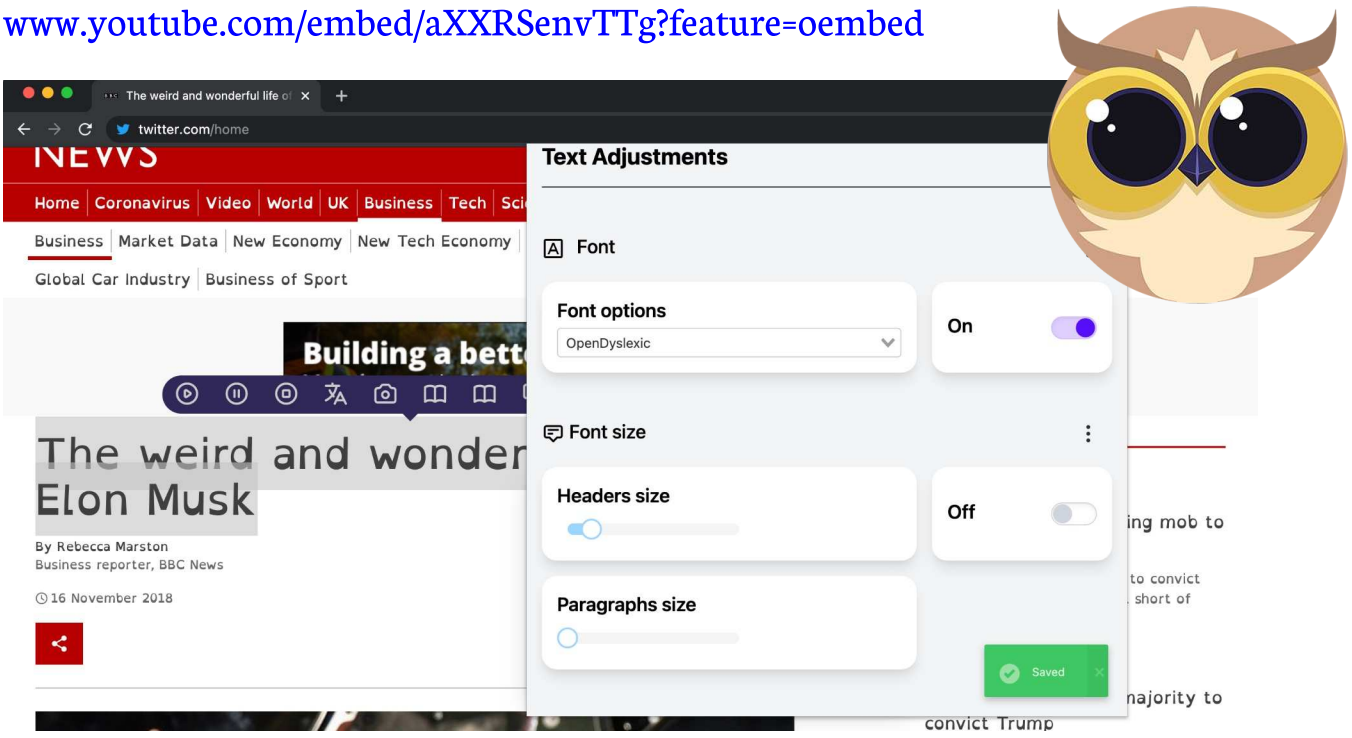
Google Chrome Store contains a plethora of extensions and apps available to download that make accessing the web easier for pupils with additional needs.

Extensions can be turned on/off by clicking on 'jigsaw' icon on the top right of the browser and selecting 'manage extensions'. From here you can disable/enable extensions as appropriate.



An excellent extension to download to support students with additional needs is called 'Helperbird' It's an all-in-one app that makes it easier for all to access the internet. It contains over thirty accessibility features making it a very powerful and favourable extension. Features include dyslexia fonts, text to speech with natural voices, OCR, dyslexia support, dictation, immersive reader, overlays, dyslexia rulers, immersive reader, reader mode, and much more to tailor the web to your needs.

For more information on Helperbird's software visit this video: https://www.youtube.com/embed/aXXRSenvTTg?feature=oembed



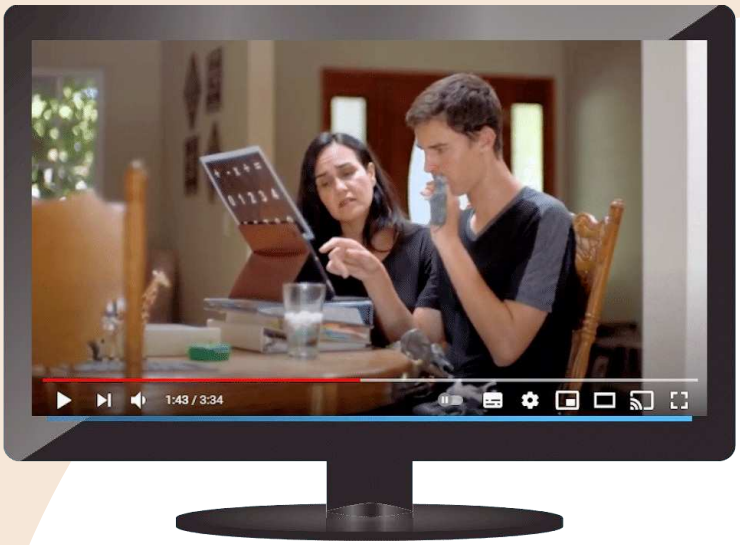
When technology is designed with everybody in mind, it gives everyone equal access and a voice.

Watch 'Dillan's Path' to see the positive effect that technology has on those with additional needs:

https://www.youtube.com/embed/9Pby4kS3_AU?feature=oembed

The assistive technology that we see Dillan using in this video is called 'Keedogo Plus'. It is an augmented and alternative communication app that allows Dillan to communicate with his family, friends and peers.

LetMeTalk is a free AAC talker app which supports communication in all areas of life and therefore providing a voice to everyone. LetMeTalk enables you to line up images in a meaningful way to read this row of images as a sentence.



To line up images is known as AAC (Augmentative and Alternative Communication).

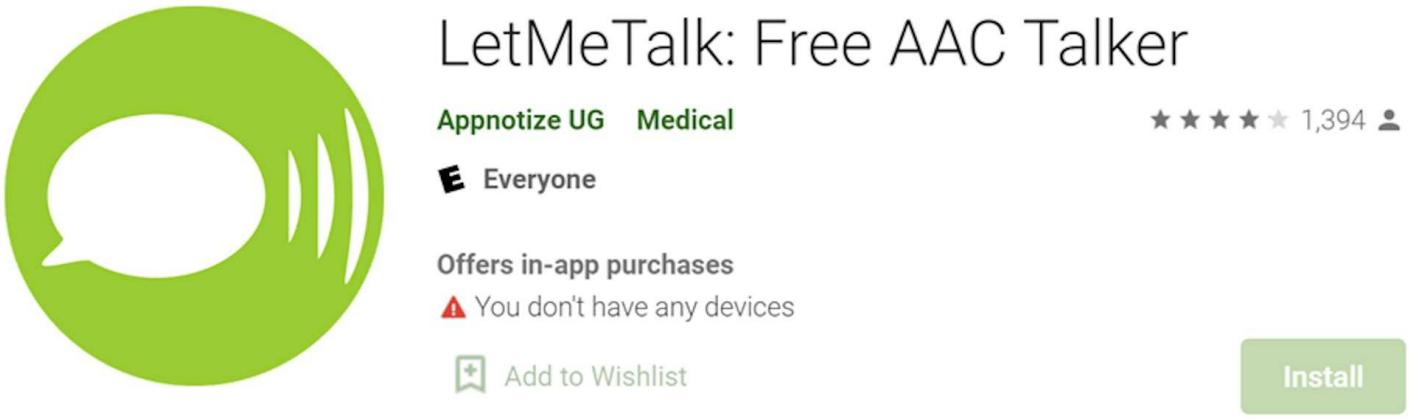
It is suitable for people with:

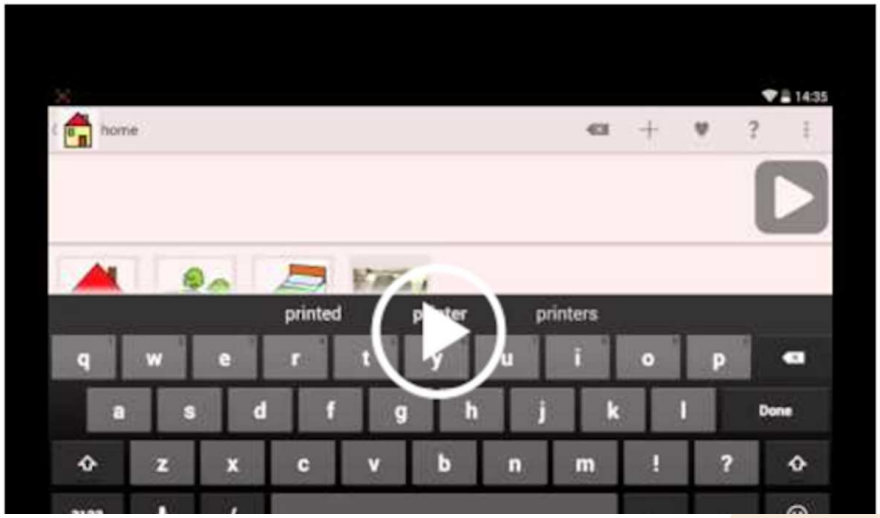
- autistic spectrum disorder (ASD)
- aphasia
- speech apraxia
- articulation/phonological disorder
- cerebral palsy
- down syndrome

Accessible Search Engines

Kidrex, Swiggle and Kiddle provide child orientated results and the language is age appropriate. They use Google Safe Search but also have an extra list of inappropriate websites and keywords. These search engines are excellent for students with visual impairments or reading difficulties as they always include a thumbnail of an image beside the search results. Swiggle is free of advertisements and has a clear and accessible design. It has configured the results to prioritise educational resources.

Other alternative search engines include Yippy, Sweet Search, Duck Duck Go.





This is just a selection of what is available out there and I have written this article to hopefully create an awareness around the area of accessibility for remote learning.

For more advice and specific information check out SEN Teacher and the ICT resource page of the NCSE website.

When planning your remote teaching lessons always consider your audience and the varying needs of your students.

TECH2STUDENTS WANTS TO ENSURE NO STUDENT IS LEFT OFFLINE

A collaboration between Trinity College Dublin's Access programme and Camara Education Ireland, Tech2Students is supporting teachers and students by aiming to secure 5,000 donated laptops or €1 million for devices for students around Ireland, who need them most.

A recent survey showed 58%-70% of students in rural areas have limited access to online resources.

Since its launch in April 2020, Tech2Students has been repurposing laptops and Chromebooks for Leaving Cert Students from disadvantaged groups including those in DEIS schools and Direct Provision, as well adult

TECH2STUDENTS
No student left offline

learners in vulnerable groups, and in youth groups including Foróige and An Cosán.

With support from Rethink Ireland, the initiative delivered 1,000 devices to Dublin students in March 2020, and now they are trying to tackle a nationwide problem.

RTÉ have joined the initiative to promote the campaign, bringing An Post on board as delivery partner alongside programme partners ESB and NUI Galway's Access Centre.

School closures caused by COVID-19 have highlighted the stark digital divide between students from different socio-economic backgrounds.

One recipient, Leaving Cert student Laurence from Raheny in Dublin, spoke about what a difference it made to his education:

"*You truly don't know how much it means being able to keep up with your other peers who have been able to access the work due to them having laptops*".

Many students have been forced to attempt to do their work from a smartphone, while others have had to share devices with their parents or siblings.

TEACHER IAN HOGAN, WHOSE STUDENTS HAVE RECEIVED DEVICES FROM TECH2STUDENTS, SAID:

> "It has had a huge impact in our school. Students are engaging more and are becoming more IT literate. It has helped with their confidence in taking a lead in their own learning."

While teachers in DEIS Schools spoke of the challenges of the difficulties students face, the effects of lockdown learning were not wholly negative.

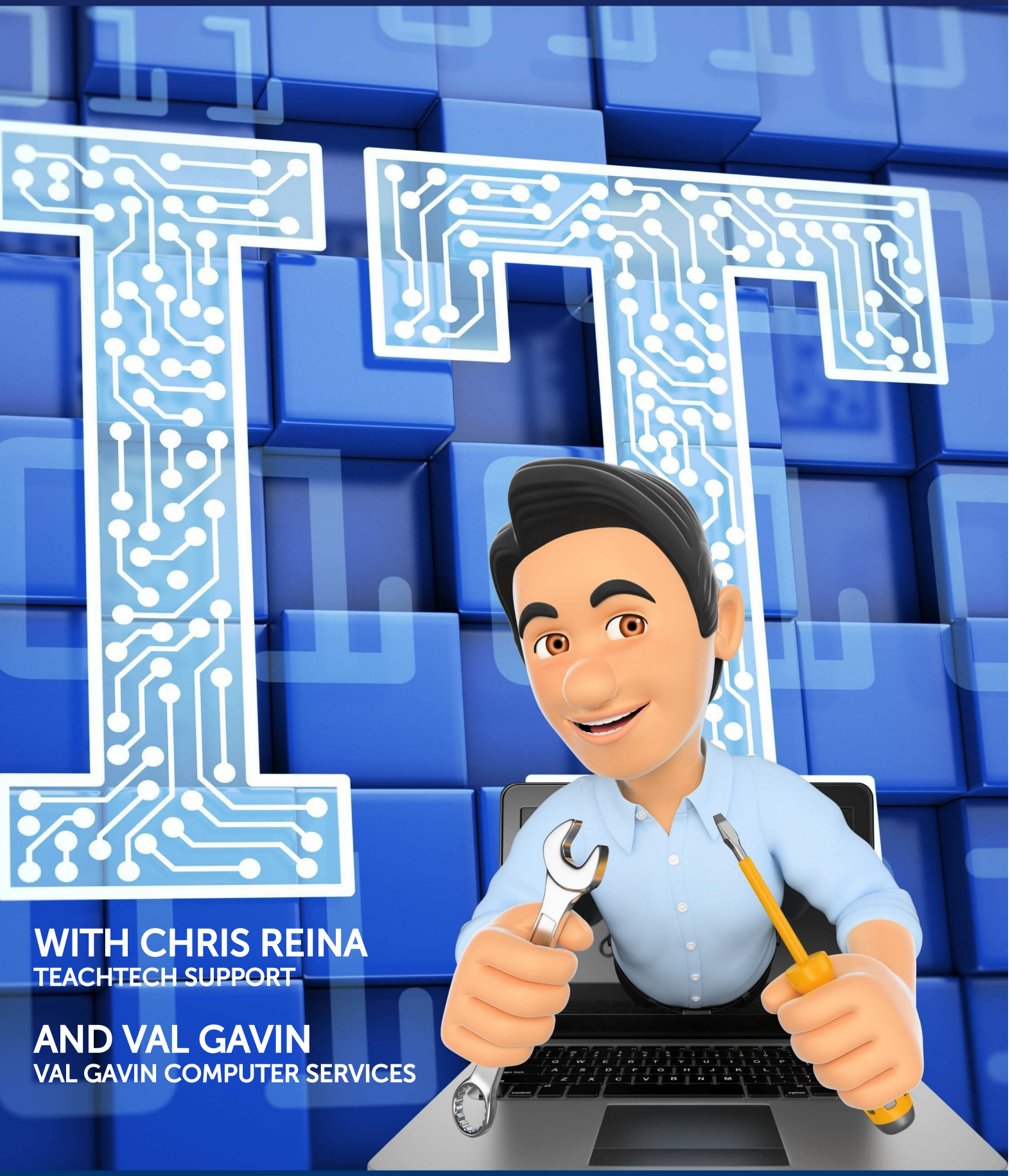
Something as simple as donating a disused device can open a world of possibilities for a student who may otherwise be at risk of falling behind.

We can only hope initiatives like Tech2Students continue to provide a simple solution to a serious problem.

If you would like to support the programme or request a laptop for your organisation, you can find more information at:

https://www.tcd.ie/trinityaccess/tech2students/

TECH SUPPORT



WITH CHRIS REINA
TEACHTECH SUPPORT

AND VAL GAVIN
VAL GAVIN COMPUTER SERVICES

GETTING TO GRIPS WITH WIFI

Chris Reina

Why WiFi?

WiFi began life in 1971 in Hawaii but not until 1991 did the standards begin to be ratified in The Netherlands. By 1997 the first international standards were released and it has grown significantly in the last 24 years.

Nearly all schools are using some form of wireless technology and the need to connect to a WiFi network is a critical infrastructure for schools and educational institutions nationwide.

Like many technologies, WiFi has a complicated backend. While front-end users generally simply have to choose the SSID (network name) and enter a password to connect - understanding to a small extent what happens to allow the simplicity of this is important.

There is often common confusion as to how wireless networks work and I hope to go some small distance to explaining this.

Basic Equipment

An internet connection comes in to your premises. Ideally, this is via DSL (digital subscriber line) or Fibre, both of which are a physical cable coming in either over your phone line or a separate direct connection. You may also have a wireless internet connection via satellite or even 4G/5G.

Any of these connections will ultimately terminate at a point in the wall. From here, it will connect to a modem/router.

The modem/router can either be a single device or may be separate devices. In schools - almost all internet connections are provided by the PDST. (https://www.pdsttechnologyineducation.ie/en/Technology/)

The PDST will provide you with the modem/router which should arrive pre-configured. This connection will then run to another "box" which acts as a content filtering system - which is also supplied by the PDST. This will not be accessible to you as it is controlled by the PDST directly.

After this, the responsibility for your wired and wireless network falls to the school. Most schools will have wired connections in each classroom and small AP's (access points) placed liberally around the school to provide a wireless connection.

AN OLD WIFI ACCESS POINT

Problems

Some common issues I hear about frequently are:

1) No connection to wifi
2) Connection to wifi, but no connection to internet
3) Sporadic connection to either
4) Dropping connection to either
5) Slow connection (even with good internet speed)
6) Only some people can connect

WI FI

There are a range of reasons why any of these issues can occur. However - in my experience what often happens is the AP's are frequently cheap, home-user based devices.

First issue:

Home AP's are produced to be able to handle between 10-20 concurrent devices. This would rarely be enough for schools - note that every device counts... such as staff mobile phones, student devices, laptops, tablets and printers.

Second issue:

Home AP's each broadcast their own individual network regardless of SSID (network name). When in close proximity to each other, each network crashes down on top of one other and can cause significant problems. This means devices become confused about which network they should connect to - and jump back and forth between them.

Fourth issue:

Each device connected to your network requires an IP address. Every school is allocated a limited amount - you can request more, this is a consideration if you are purchasing a new suite of devices. A connection issue may be that you do not have enough IP address' allocated to your school.

Planning

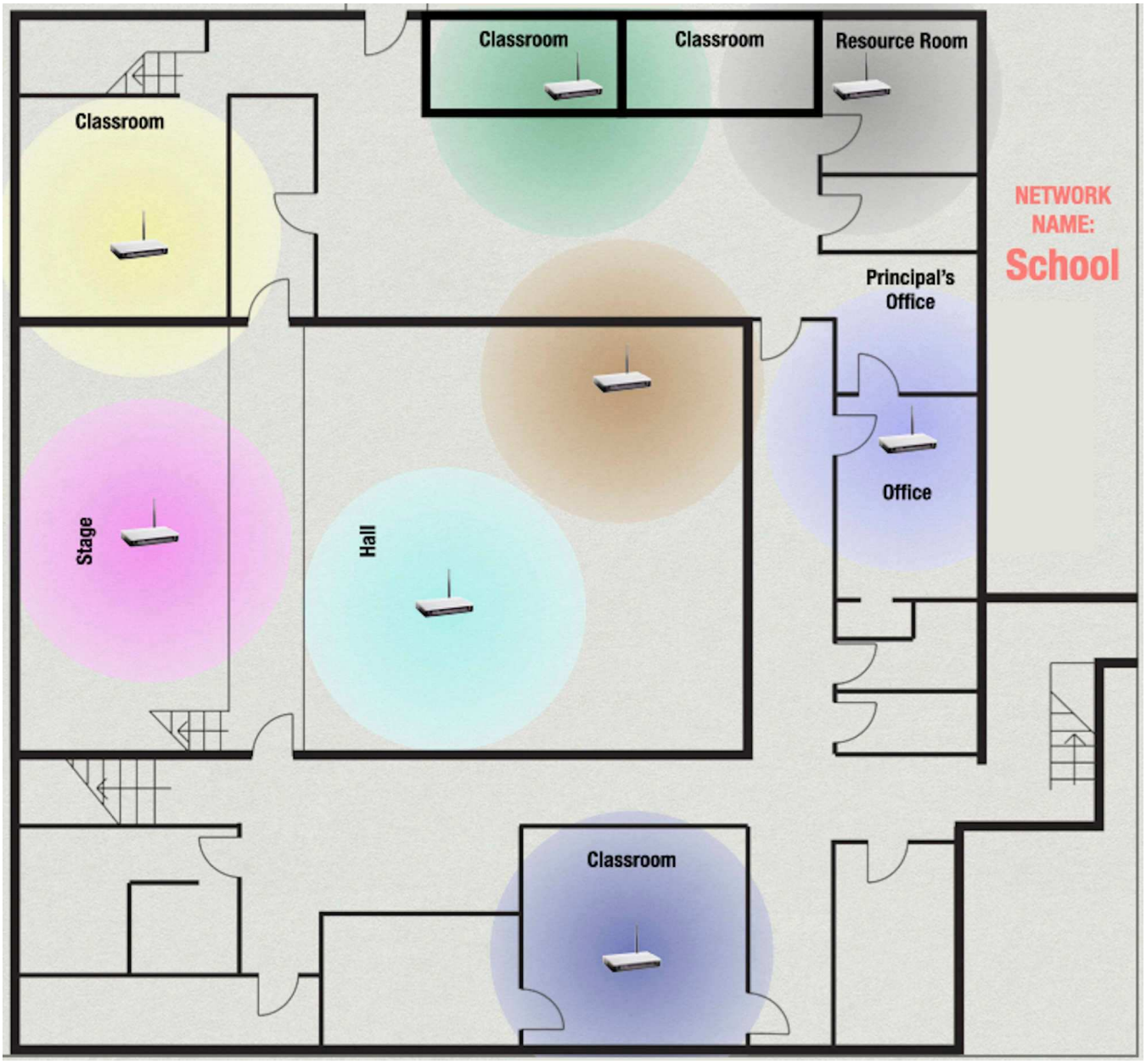
When planning for and deploying wireless infrastructure, there are quite a few considerations: distance, coverage, structure/type of walls, existing networks, interference, quantity of devices, device capability, student/ teacher requirements, security, controller access, density, range and more. It would always be recommended to seek out a network engineer familiar with medium to large installations.

What should I look for?

The first thing to do is get a site survey

THIRD ISSUE:

Old networking connections can often be 10/100gbps - rather than 10/100/1000gbps. Imagine a tiny plumbing waste pipe rather than a large one... not enough can travel through it at any given time - causing a blockage.



done by a qualified, independent wifi/ network contractor.

Ideally you are looking for a “mesh” and load-balancing type of network. This will allow each access point to speak to one another and distribute the external internet requests to all AP’s thereby easing network traffic.

A single controller for this network (usually a web interface) is recommended - which you should ensure you have access to. It would also be suggested that your network is easily expandable and future proofed as your school grows.

Most current devices wireless standards

operate on a minimum of 802.11a/b/g - but your network should be prepared for 802.11n/ac/ax.

Wifi is often overlooked as it is “invisible” - and it can be presumed that “it just works” - clearly, this is not the case.

Like with all technology - knowing the correct questions to ask, the terminology and understanding your own requirements are important to a safe and smooth running of wifi.

This in turn will ease teacher and student frustrations and mitigate problems within the school environment.

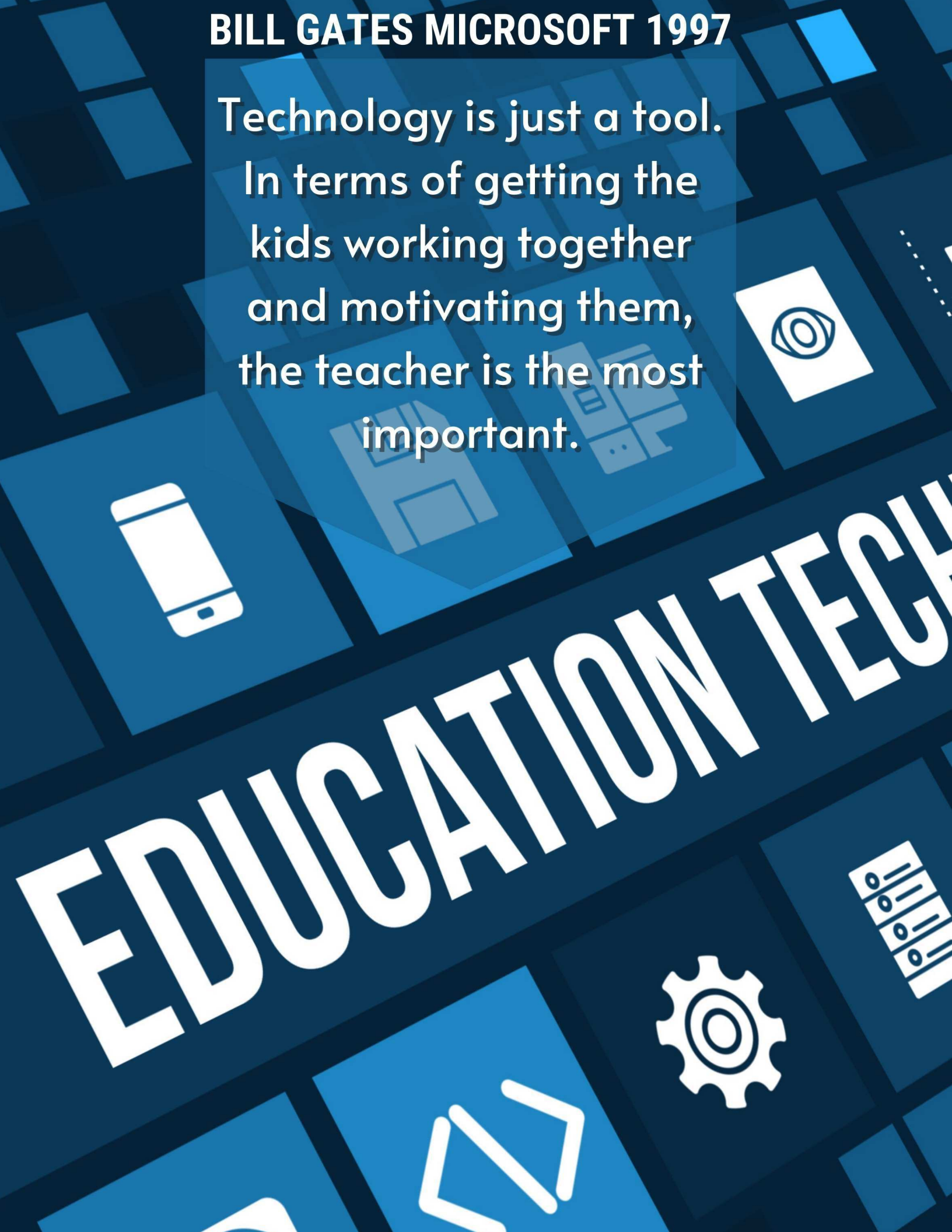
WIFI Q & A

SCHOOL WIFI

Wifi is often overlooked as it is “invisible” - and it can be presumed that “it just works” - clearly, this is not the case.

As with all technology - knowing the correct questions to ask, the terminology and understanding your own requirements are important to a safe and smooth running of wifi. This in turn will ease teacher and student frustrations and mitigate problems within the school environment.

Do I need multiple networks?	A common configuration is “Teacher, Student, Guest”.
How many devices do I have that are wireless?	Make sure all phones, tablets, printers, laptops and desktops are counted.
How will my ICT considerations change in the next 3-5 years?	The purchase of tablets, learning support devices, laptops and other wireless equipment has grown considerably and your network should prepare for this to continue.


BILL GATES MICROSOFT 1997
Technology is just a tool. In terms of getting the kids working together and motivating them, the teacher is the most important.
EDUCATION TECH

Basic Computer Maintenance

Your computer; no matter what you use it for needs a minimum amount of maintenance and servicing to keep it running fast and smooth, you wouldn't expect your car to be clean and ready on a daily basis without regularly servicing, you will clean your car of the detritus that all of us manage to accumulate regularly; like receipts, sweet and other food wrappers, drinks bottles and all the stuff that is left over from our busy lives.

Similarly your computer requires regularly physical cleaning, you can use a vacuum cleaner at a low setting to clean out air vents especially cooling fan vents, it is amazing at how much dust and lint that gets trapped in those areas causing your computer to overheat and thereby shorten the life of delicate components for other areas use a hand duster there are many out there powered or manual to clean keyboards and other hard to reach parts of your computer, I don't advise using pressurised spray cans as many of those contain liquids and can cause serious damage to sensitive circuitry.

Before you make any changes or update your windows version

Make sure that you have a complete copy of all your important files backed up somewhere safe, please do not leave it plugged into the computer, after backup disconnect and store the USB

drive in a safe place, these devices can get damaged easily so replace them regularly, my advice would be to backup to the cloud or purchase a 'NAS box' a Network Area Storage device and set to automatically backup at least once a day.

Also make sure that you have an up to date and suitable Anti-Malware, Anti-Virus program running.

Software Essential updates

If you don't see a **taskbar search box** (type here to search) just to the right of the **Windows key,** it may be hidden, to show it 'right click' on the taskbar select **search** and click **'show search box'**

In the **taskbar search box** type 'update' and select **check for updates** or click Start button, then select **Settings**, then **Update & Security**, click Windows Update and finally 'Check for updates'. This download may take some time depending on when you last updated but you must let it finish, even If the status says **'You're up to date'** check update anyways and restart.

Note: Windows 10, version 2004 released May 2020 caused serious issues but because of the Coronavirus Lockdown, teachers only realised there were issues with their computers when they returned to school and their computer systems automatically updated.

There were problems with some Conexant ISST audio drivers, issues with Interactive drivers for some Whiteboards, Projectors and network printers, other issues caused computers to freeze when plugging in or removing Mini DisplayPort and Thunderbolt devices, some users had similar problems when using USB C devices and USB SSD drives not being

recognised.

Some of the above problems were fixed with release 20H2 October 2020 but others are still ongoing, if you are still having issues with sound devices, mini DisplayPort or your whiteboard interactivity then download the latest drivers from the device manufacturers site or if these are not available then try the latest Windows updated device drivers, click on the search box on the taskbar and type **'device manager'** without the quotes; select Device Manager and in the list select the device you are having difficulties with; expand the drivers section right click and update driver, restart your computer)

Clearing out unused files, regaining disk space

Your computer's operating system requires regular cleaning, Windows 10, 8 and 7 creates temporary files or **.tmp** files every time a program is run, installed or modified, these are created to hold information while a file's being created or modified and over time these **.tmp** files and folders can take up a lot of valuable hard drive space and so you should clean these out regularly by doing the following:

In the taskbar search box type **%temp%** click on the %temp% folder, this will open the folder then press the **Ctrl key +A** to select all the files, then right click inside the selected area and click delete; click yes to continue, a few of those files will not be deleted as they are being used by Windows programs which are open at the moment.

To remove a program you no longer want and to save disk space in **Windows 10** do the following:

Click in the taskbar search box and type **'settings'** inside settings window click

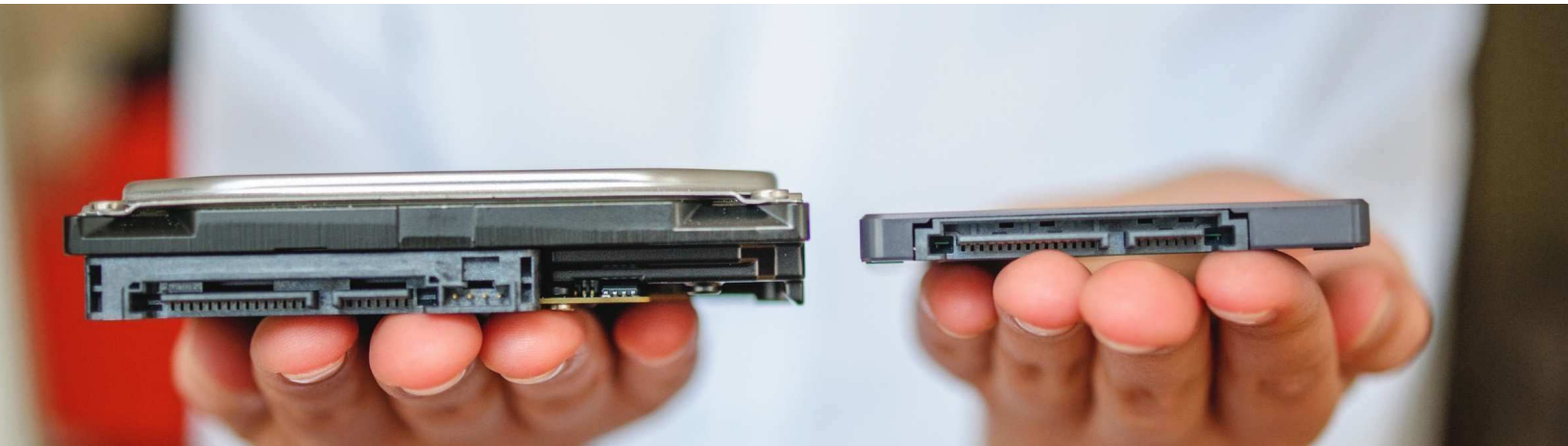
on Apps **'Uninstall optional features'** from the drop down app click on the program you wish to delete click uninstall.

For **Windows 7** users click start, **Control Panel** and click **Uninstall a Program**, select your program and uninstall it, you can then use the command '**Disk Cleanup'** to get rid of unused files, to run this at the taskbar search box type '**Disk Cleanup'** inside the App Files to Delete select the checkbox of the files you want to delete the biggest users here will be the Download folder and the Recycle bin, select and click ok.

You can set the system to do this automatically if you want **but** just be careful that you know what files and folders you want to keep, to do this Click Start inside the search box type **'settings'** when settings opens click on storage if this is not available type **'storage'** inside the 'find a setting box' and click on **'Storage Sense'** it will be most likely off; click and turn it on, just below that click **'Configure Storage Sense'** or run it now (the options here are) During low disk space, Every day, Every week, Every month or During low free disk space, I would chose during low disk space.

Below this is the Temporary Files, to delete files in the recycle bin, the options are from 1 day to 60 days, below this is the Delete Files in my download folder if they have been there for more than 1 day and up to 60 days or set to never to delete, but remember the download folder will increase with every file you download, you may wish to keep some important files but delete unimportant stuff, the same thing with OneDrive if you are using it.

If your computer is using a mechanical HDD then you should defragment or optimise it regularly, press and hold the **Windows key+E** then right click on the local disc **(C:)** and select properties, select **'tools'** and click **'optimise'** to run this as a schedule click 'change settings' and chose daily weekly or monthly.



SOLVING WINDOWS PROBLEMS

If you are having problems with running a program or some device is not being recognised then you can run **Troubleshoot**, on **Windows 7** go to the control panel click on 'find and fix a problem' and chose a suitable one for your issues.

On **Windows 10** click and type **'Troubleshoot'** inside the taskbar search box click troubleshoot settings then scroll down to 'get up and running' or 'find and fix a problem' depending on your issue, make sure you are running the latest Windows update.

Speeding up boot time

Many installed programs run automatically at start up and have a very high impact on start-up times so to control what programs start automatically click in the **taskbar search box** and type '**msconfig**' click System Configuration, click **'startup'** and click **'Open Task Manager'** look at the programs that you don't use when windows starts and programs that have a high startup impact, right click on them and disable they will still be available but won't run automatically at startup.
Many users leave their computers running because they are so slow to start but you should close all programs, check for updates, shut down and restart at least once a week.

Essential hardware upgrade

Doing all of the above will definitely speed up your slow computer but to see a real difference you should increase the RAM (Random Access Memory) minimum 8 GB and also replace the old mechanical Hard Drive with an SSD (Solid State Disk) drive.

The only difficulty here will be with your computers architecture and the maximum amount of 'RAM' memory

The advantages of SSD v Mechanical HDD

- SSD no noise or vibration
- Average boot time - SSD 8 to 10 seconds - HDD above 60 to 90+ seconds
- Increase battery run time by 35%
- Failure rate 2 million hours for SSD - 1 million hours or less for HDD
- File opening speeds SSD are 65% faster

your notebook can hold, to check this click in the **taskbar search box** and type cmd and in the command windows type '**wmic memphysical get maxcapacity**' if the answer is something like '**MaxCapacity 8388608**' then the maximum RAM your computer can take is 8GB.

To check how much ram your computer has at the moment click inside the **taskbar search box** and type '**system**' click on '**System Information**' then scroll down to Installed Physical Memory (RAM) .

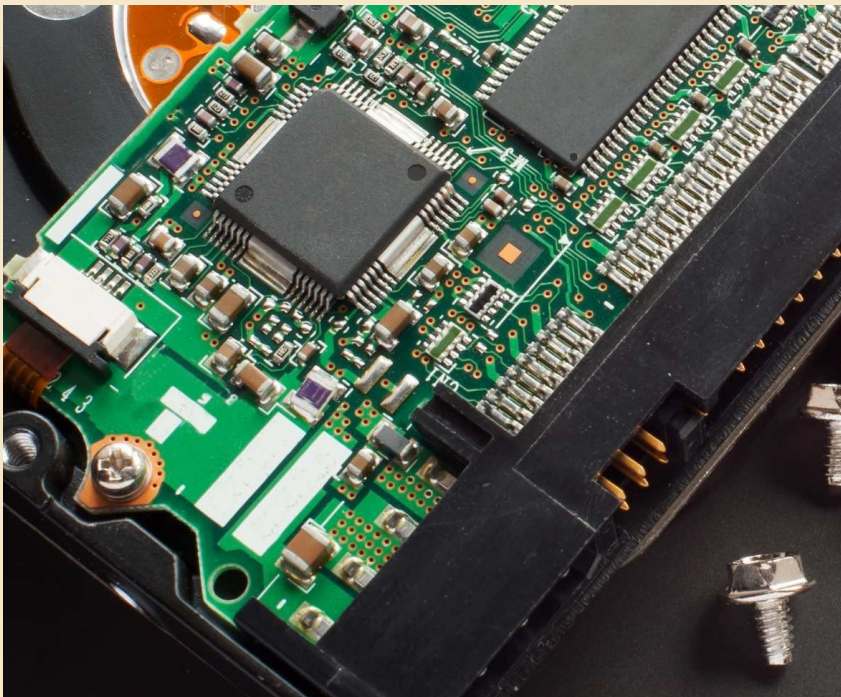
You can also try https://www.mrmemory.co.uk/ Click '**Memory and SSD Upgrades**', select your particular computer model, this site will give you the correct information to choose a RAM chip and or SSD drive.

If your computer is fairly modern at least an i3 CPU and you have Windows 10 then it will be worthwhile replacing the old mechanical HDD and replacing it with a high speed (SSD) Solid State Disk, you should also increase the amount of RAM at least to 8GB and an SSD disk size of 240GB.

Cloning software is available that allows you to 'clone' or duplicate exactly your old Hard Drive onto the new SSD Disk so you do not lose any programs or files and you can enjoy the benefits of the new hardware and more memory, there are many free cloning programs available but they are more suited to users with a good knowledge of software and hardware.

I recommend **Acronis True Image** (not free, purchase only) Acronis True Image is easy to use and allows you to easily image or clone your old mechanical hard disk onto a new Solid State Drive disk drive.

To do this you will need a SATA to USB-A adaptor and a 128GB or preferably a 240GB high speed SSD drive and a suitable 8GB Ram chip for your notebook, you will also need a decent set of magnetic tipped screwdrivers and an anti-static strap, a clean surface and a magnetic pad or jar lid to hold the screws as these can be tiny.



Next, go online and search for 'manual for your computer model/ serial number' this will show you how to open the notebook case to get access to the Ram chip and SSD drive, before continuing, remove the battery; press and hold the power button for a few seconds, put on the anti-static strap and follow the manual instructions.

This is not for the faint hearted, remember that opening your pc/ laptop to install any components will void an existing warranty, so it is best saved for machines that are out of warranty and need a bit of tlc.

If you are unsure, do not attempt it, but for those who wish to do this on their own I will go into much more detail in the next article; in the meantime if you need any further help email me at val@valgavin.biz

And finally, a few helpful Windows keyboard shortcuts

F1 Display help screen in whatever window you have open
F11 Enter or exit full screen mode
Ctrl+A Select/highlight all text or files
Ctrl+C Copy all selected text or files
Ctrl+V Paste text, files or folders
Ctrl+W Close down whatever windows you are viewing
Ctrl+X Delete all selected text, files or folders
Ctrl+Z Undo last action **Ctrl+Y** redo last action
Alt+Tab Switch between active windows
Win key+D Instantly hide or show your desktop
Win Key+Tab (task view) show or hides all your open files, programs and virtual desktops
Win+Ctrl+D create a new virtual desktop

Key Shortcuts to Insert Symbols in Windows

Numlock must be on and use the numeric keypad press and hold the **Alt key** and press each number in turn
± Alt+0177 Plus or minus symbol
¼ Alt+0188
½ Alt+0189
¾ Alt+0190
² Alt+0178 Power of two (square)
é Alt+0233 Acute e Small

To get a full set of these symbols in the taskbar search type 'Character Map' and press return

Virtual Desktop Infrastructure

A virtual world where the benefits are real

Trevor Collins
Assistant Principal
Bandon Grammar School

ICT initiatives in Irish education in recent years have led to many changes in teaching and learning, including what is taught, how it is taught, and the infrastructure for teaching and learning. This article focuses on the use of Virtual Desktop Infrastructure (VDI). It describes a journey of a school changing from the traditional ICT model to one of the newest (and hopefully best) systems available in using cloud-based VDI. It also discusses an action-based pilot programme undertaken in the local area.

The work undertaken has been solidly founded in the best practice of education literature. Those behind the change in infrastructure have won awards at local and national level and have been positively reviewed by business and academic management.

This is an ongoing journey, bringing about a transformation in the conservative world of education may prove difficult – but difficult roads often lead to the most wonderful destinations. Virtual Desktop Infrastructure is here to stay, and it is becoming standard practice in business. This article explains how VDI can improve ICT infrastructure in education in Ireland. The system is virtual, but as we will see, the benefits are very tangible!

INFRASTRUCTURE

The concept arose from the benefits that staff in Bandon Grammar School (BGS) experienced when using VDI after they upgraded their ICT system around 2012. In conjunction with VMware, a local software company, the school adopted a system that would normally have been used in the banking, insurance, and finance sectors at the time.

Since the system is relatively new, there is a lack of academic research and literature on cloud-based VDI in both Secondary and Third-Level education. It is hoped that this article may stimulate further study and investigation in the area.

THE PATHWAY TO CHANGE

In Ireland, some schools do not have computer rooms and do not provide ICT training to students. Others may have a dedicated computer room with an average of 25 devices, each typically comprising a monitor, keyboard, mouse, and terminal. We can assume that devices would have applications for writing documents (e.g. Word) creating presentations (e.g. PowerPoint), and accessing the internet (e.g. Chrome).

Over the years, various State initiatives have attempted to develop ICT in schools. The Schools IT 2000 programme was a key initiative with over €50 million in investment. It financed equipment and improved connectivity and teacher training [Mulkeen, 2003]. This investment by government in education continues under the Digital Strategy for Schools programme which has seen an additional €210 million spent in recent years, mainly on the purchase of ICT infrastructure.

Some schools may have a portable

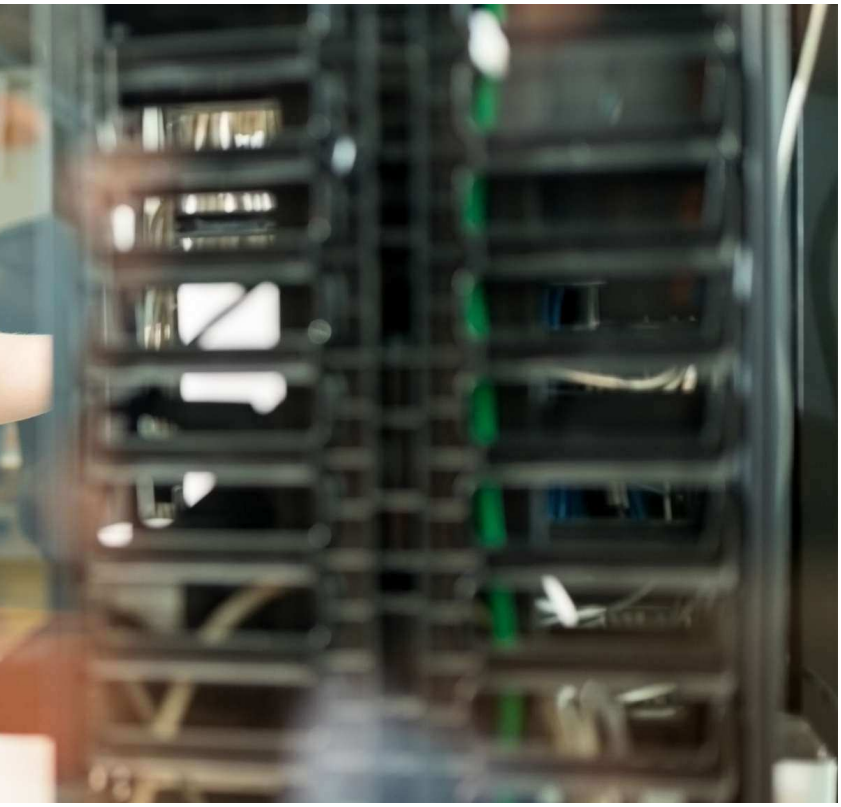
trolley with laptops or handheld devices to do something like regular PCs. Costs to maintain and upgrade these devices would be incurred by the school.

Each such device is a standalone unit and typically updated individually. Maintaining these systems can be costly and time-consuming and depends on a member of staff having a certain level of ICT skills. Often this responsibility falls to a teacher with an already full teaching timetable, with additional varied demands being made on them.

While various bodies such as the Professional Development Service for Teachers (PDST) and Financial Support Services Unit (FSSU) provide guidelines for schools to develop their ICT infrastructure, many schools simply do not have the personnel and/or time to research, develop and implement a suitable system. As difficult as it is for a secondary school in Ireland, primary schools face an even tougher task.

GENERATION 1: THE START OF A JOURNEY TO VDI

Bandon Grammar School undertook a major extension in 2011/12, which created an opportunity to redevelop its ICT infrastructure. Prior to this, the school had one dedicated computer room with 28 PCs. There was also a woodwork room with several PCs.



Management's willingness to empower staff with decision-making rights was a key factor. As Ghamrawi [2011] wrote, in an article on improving ICT in schools, it fostered "*collegial dialogue, collective problem-solving…and a strong commitment to continual instructional development and design.*"

BGS staff researched ICT systems and joined up with VMware, a firm with specialist software used mainly in the financial and technical sectors. Since the school essentially had a 'green-field' site on which to build and test a new ICT infrastructure, VMware used the school as a test case to see VDI in operating in an education environment.

While the Irish Digital Learning Framework [DES, 2017] acknowledges that "*schools are at different stages of the school improvement journey with regards to embedding of the use of digital technologies into teaching and learning,*" we felt that from our experience that VDI has many benefits over the traditional ICT model in schools.

Following 'Universal Design for Learning' principles, our design and implementation of this system facilitated "*autonomy and control in order to develop a sense of ownership*" [Valstad, 2010]. The team recognised that access to information did not imply access to learning. For students to have the opportunity to reach their potential, a student-friendly, efficient, and durable system was required.

VDI IN OPERATION

Our main investment was the purchase of servers that would process all accounts, personas, desktops, data, and applications. A special '*master computer*' (Golden Image) is made using software and it is then copied ('*cloned*') for each user.

A key point is that instead of using the components of the computer you are sitting at (CPU, RAM, ROM etc.), all the processing is done by a more powerful,

central server that manages the accounts, apps, software, virus protection, and everything else. The only function of the PC, laptop, tablet, or smartphone is to send the keyboard taps and mouse strokes to the central server. Cheap, second-hand devices can therefore be used instead of expensive, state-of-the-art devices.

BENEFITS OF VDI

1. Since the central server does all the processing, you no longer need to spend large sums of money on new ICT devices. In our case, we had collected many second-hand PCs over the years. We now have five dedicated rooms with around 120 PCs, all sourced for free.

2. Different groups of users can be created for different needs (e.g. alternative software for different years). You can customise the desktops to suit specific needs.

3. You no longer need to spend heavily on updating current devices as maintenance costs are much reduced.

4. Students see the exact same desktop on every device.

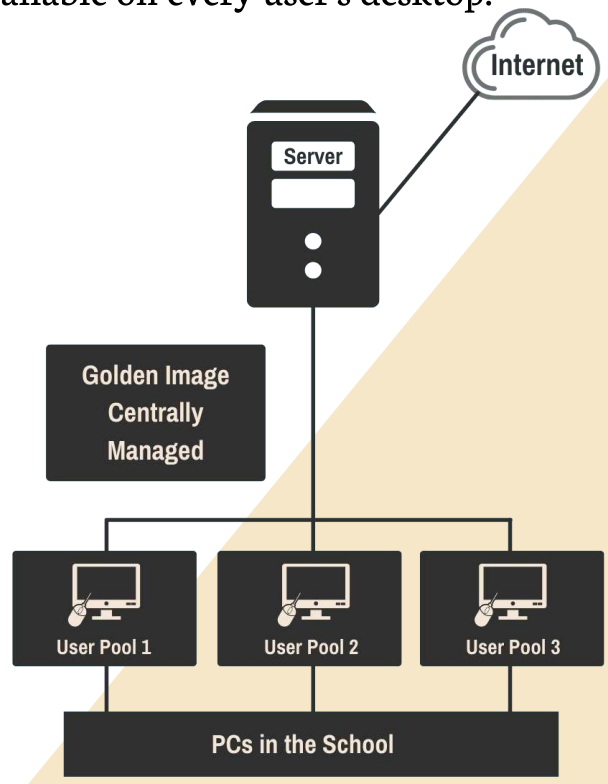
5. Once the master (‘*golden image*’) is updated, all users get the update the next time they log-on, resulting in massive savings on time and labour.

6. The devices work consistently and mostly very reliably.

7. Green/Sustainability factor: Devices that otherwise would have been dumped now get a second life (Dasilva et al., 2012).

8. If made available on a national level, every school, regardless of location, could get access to the same resources.

9. If managed centrally by a state agency such as the DES, the Department could make all necessary resources available on every user’s desktop.



CURRENT VDI SYSTEM IN SCHOOL

Delivering equality of access for all, regardless of location, types of school, or background, once a student has access to a device).

FACTORS TO CONSIDER WHEN ADOPTING VDI

1. There are considerable costs in purchasing and setting up a server.

2. Licensing costs need to be factored into budgets.

3. Understanding how the system operates is vital.

4. Be willing to change one's perception of ICT in schools. Decision-makers and stakeholders must become less conservative. VDI changes the focus on expensive, fancy, '*front-of-house*' devices to capital infrastructure spending on devices that operate in the background.

5. The school will need a skilled teacher or technician to maintain the servers and accounts if the schools use their own central server (This has been a major stumbling-block with the first generation of VDI in schools and is now virtually eliminated with the advent of cloud-based VDI).

6. Since the whole system is internet-based, all functionality is lost is the internet is down.

7. Schools need an administrator to help set up the accounts and to decide what applications different users will have access to (Less important than #5 above).

OUR EXPERIENCE

The system was designed and maintained by practising teachers in a school. Problems at ground level were flagged and appropriate solutions were found - classroom-based solutions to classroom-based problems.

The accounts using the server worked more consistently. With a traditional PC system, a user could change settings (accidentally or deliberately), denying the next user access to applications. Individual user accounts stop this from happening. Users can log on to their accounts more consistently, with the same desktop on their screen no matter which of the 120 PCs in the school they use. The applications on the devices worked consistently.

For readers unfamiliar with computer rooms in a school, these may sound like obvious advantages, but in some schools, a typical classroom could have up to half of the devices not functioning

properly. More devices being able to work for more time is key.

Since updates can now be rolled out centrally, device functionality has improved. With more devices available, teachers started to use more ICT applications with their students than before. More classes were brought to the computer rooms. More assignments were done using ICT.

Teachers used the system to allow students to research topics and projects. There was a shift in the teaching pedagogies. Our change in ICT culture replicated many of the advantages described in Lai and Pratt's (2008) investigation on the effects of ICT use in New Zealand secondary schools – for both teaching and learning.

The infrastructure has proven to be the foundation on which we built our ICT framework. But three applications, which depend on good infrastructure helped to change the working ethos in the school. The applications are core to administration, teaching and learning in the school.

1. School Portal: The student school-day roll, exams reports, boarder roll, and detention system are now all managed electronically.

2. With Google Workspace For Education, every student (and family) now has a school email address and Google Drive has been very beneficial.

3. Google Classroom has opened lines of communication between the teacher or coach and the student like never before. Teachers can post notes, resources, attachments, web-links, and notices to their students. Sports coaches can put up teams and fixtures arrangements. Students can access all of these through their email account. Importantly, they can download an app to their smart devices, phones or tablets and get notifications via their device: the message comes to them rather than them having to chase the message!

4. There has been a shift in school culture: ICT is now part of everyday life

in the school. Historically, students would have been excited going into the computer room, but nowadays it is simply a room where they do things in a different way to a normal classroom.

KEY ISSUES

The system is now nearly a victim of its own success. The demands made of it – number of devices required, quality of applications used, speed of processing required, and volume of data being transferred – have all increased considerably over the duration of our use of the VDI system.

After we gave a presentation at the ICT Advisory Group of the Joint Managerial Body in 2017, an important piece of feedback resonated with us. Our system was over-dependent on key personnel. What would happen if they fell ill, moved away, or retired? Not every school can have personnel with the necessary skills. While schools may have a designated ICT coordinator, "*coordinator may mean different things in different schools,*" as Mulkeen (2003) wrote.

How can schools adopt a VDI system without the same level of skills or commitment? One solution that has come in to being since we first developed this venture in our school, the opportunity for schools to utilise a Cloud-based rather than local server-based VDI.

GENERATION 2: CLOUD-BASED VDI IN ACTION

With a cloud-based system, much of the software and mechanics remains the same, except that instead of using a server on-site or nearby, all the processing is done by an external server located and managed off-site. Advantages of cloud-based VDI include:

1. This second-generation system removes schools' need to have a skilled teacher or technician available to fix issues with accounts or applications.

2. The school no longer needs to buy a server or pay to maintain and run it.

cloud-based VDI

With cloud-based VDI there are huge economies of scale, as a school will only need to pay for the service as they use it. No capital, depreciation, or maintenance costs, just pay-per-use.

3. The school no longer must pay for electricity to run the servers.

4. Labour costs are reduced hugely because fewer staff are needed to maintain the system, and less time is required to update applications and devices.

5. The applications available can be the same as the first-generation, school-based server system or can be enlarged based on advice from the cloud-based VDI provider.

With this updated model, servers, user profiles and accounts are all managed off-site. While Stoll and Kools (2017) write that "the education sector does not have a track record of innovating itself," the literature suggests that this system empowers schools as learning organisations.

It is innovative and far-reaching, with the potential to transform education infrastructure. The author feels it can be a catalyst to change the very dynamics of education in the future.

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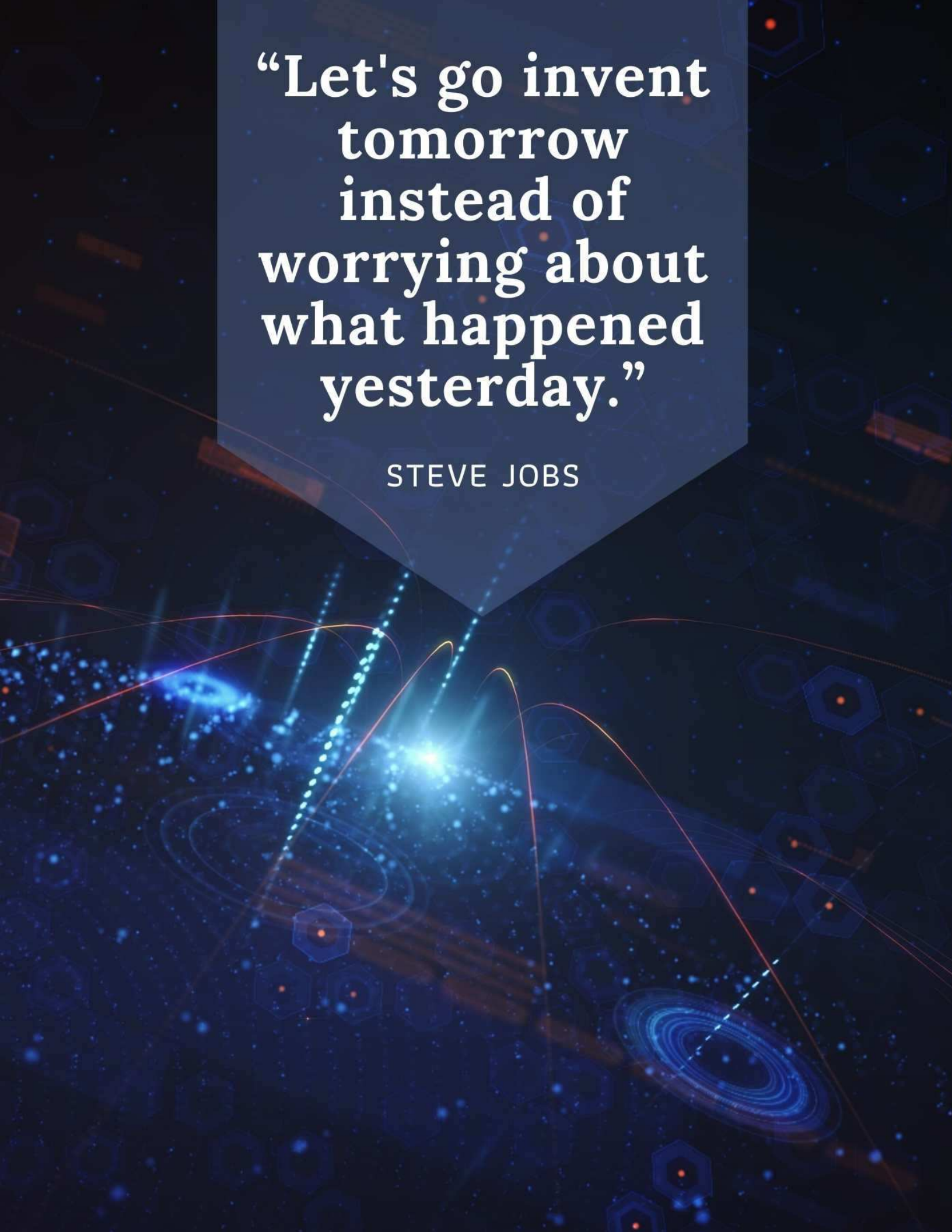
“Let's go invent tomorrow instead of worrying about what happened yesterday.”
STEVE JOBS

contributors and credits

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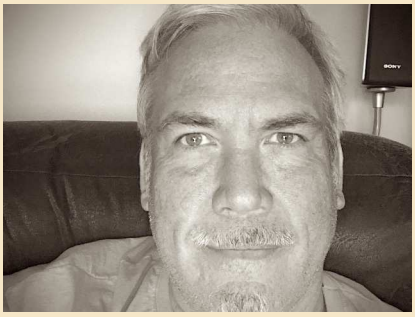

Chris Reina has been involved in education since 2002, technology since 1981 and Making since 1971. (You do the maths). He currently runs TeachTech Support which provides technical training, consultancy and support to educational institutions nationwide.

He is also 1/3 of MakerMeet IE - who deliver Maker-led, project-based S.T.E.A.M. workshops nationwide to primary, secondary, third-level and other institutions.

As Ireland's only Apple Certified T3 Trainer - he has given workshops to students and teachers on a wide variety of subjects. As well as training to the Education, SME, B2B and Corporate sectors.

As a Maker - for the last 4 years Chris has been combined his tech and Maker skills to devise and deliver workshops to educational organisations in a wide variety of areas.

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Val has been building electronic projects as far back as he can remember, his first love was/is Amateur Radio and got his Class A HAM Radio licence in early 80's. Val's got his first computer in 84/85 and has been working with them ever since. In 1993, Val started the company Val Gavin Computer Services and has been providing IT services and support to schools since then.

Val Gavin Computer Services provides a wide range of sales and services, provide and install computers, projectors, large screen Interactive LED panels (reseller for Clever Touch), manage Wireless and Wired networks, limited data recovery.

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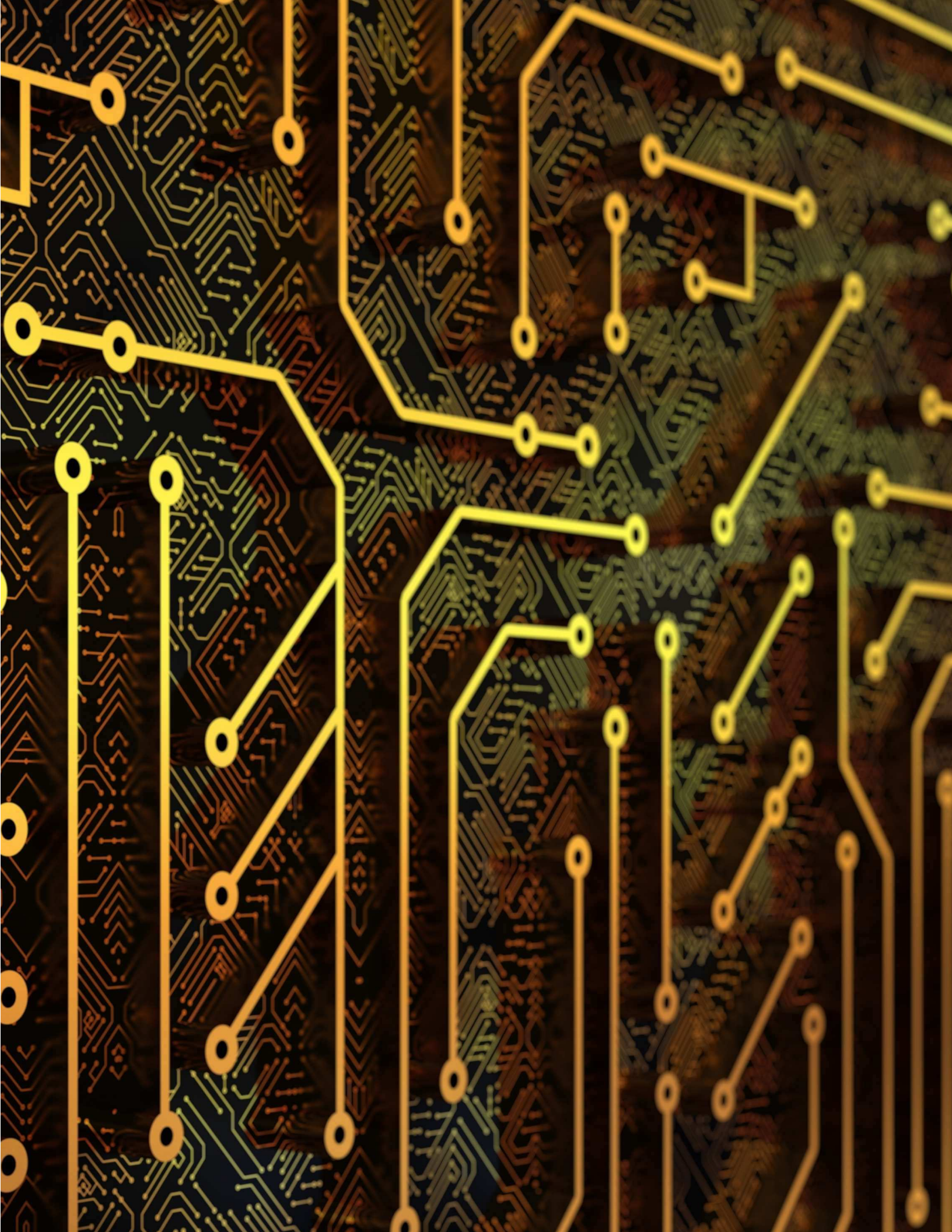

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