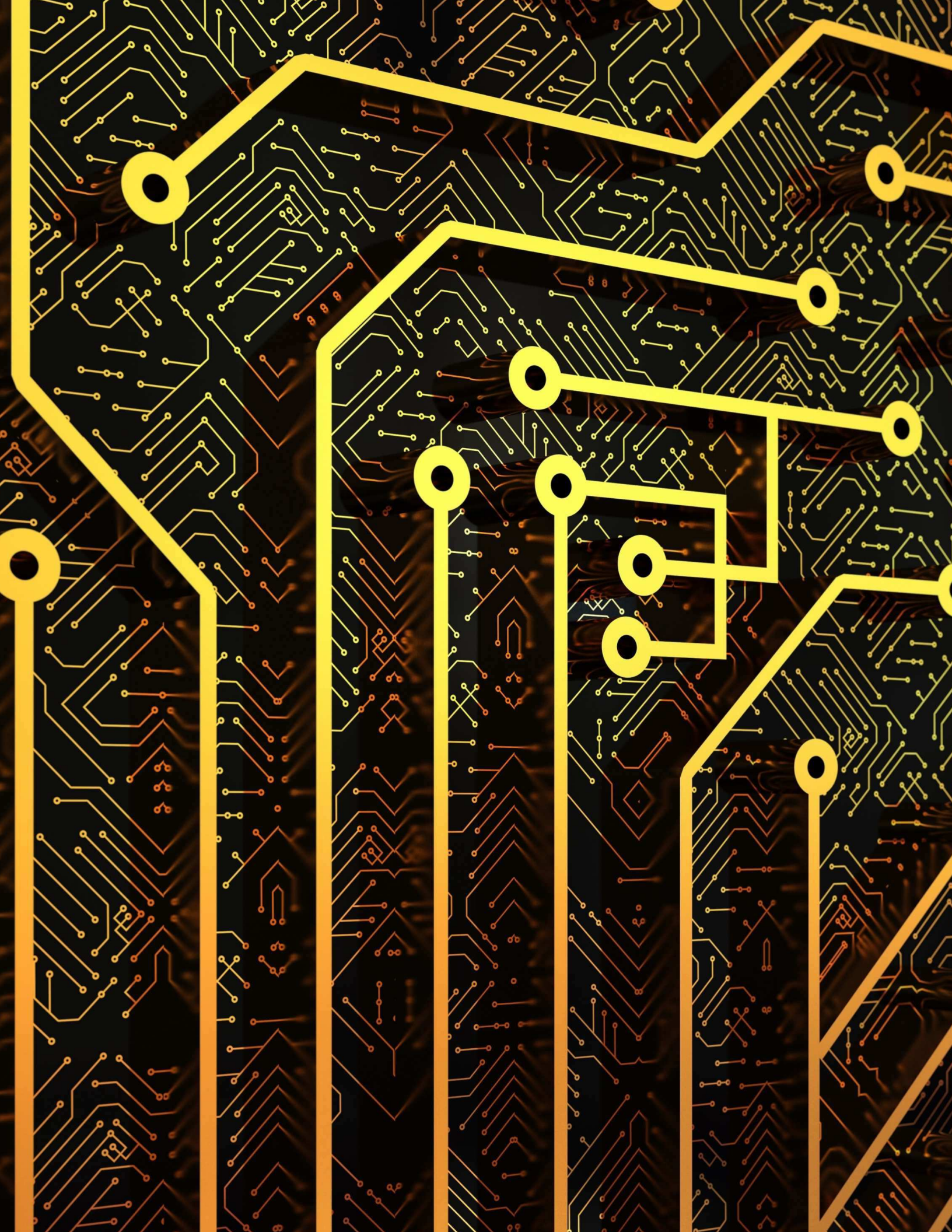# #TWO

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EXPLORING EDTECH

IRELAND

EXPLORING EDTECH #TWO
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Editorial ——————————————

Welcome to the second issue of Exploring EdTech Ireland!

In our feature article by the inspirational educator Mark Sparvell, we are looking at how social-emotional learning which is vital for the well-being of our students, can be enhanced using available edtech tools such as Teams, Flipgrid and Minecraft.

Makerspaces are collaborative spaces for making, creating, learning and sharing that use high tech to no-tech tools, Jennifer McGarry gives an insight into makerspaces in primary school, followed by an introduction to the marvellous BBC micro:bit device by Niamh Brady. Louise Jones shows us how ThingLink creates smart visual media by augmenting images with additional information, connecting visual tags to a range of apps and tools such as Padlet, Wakelet, Flipgrid, video, and audio files.

Open P-Tech from IBM is a digital skills programme operating worldwide and now in Ireland, Yvonne Conaty gives us the background to this impressive training initiative. In our first issue we had a tech feature on Virtual Desktop Infrastructure and we follow this up with a piece by Ian O'Connor on a pilot programme operating in four schools in Cork.

We are delighted to interview Pamela O'Brien, the organiser of the ICT in Education Conference which takes place online on the 15th May and Chris Reina also pens a concise summary of the tech requirements for screen mirroring in the classroom. The TCD Postgraduate Certificate in 21st Century Teaching and Learning is open for applications and Dr Jane O' Hara gives us her insights into the course.

In the second part of our regular tech support section, Val Gavin covers upgrades to hard drives and operating systems, bringing our attention to Windows 10 and Linux varieties, finishing off with a short explanation of broadband speeds and bandwidth and of course some ever-handy keyboard shortcuts.

I hope Exploring EdTech will help inspire teachers, leaders and management of our schools to make the best use of education technology to enhance and develop the whole school community.

Tim Lavery FRCGS FLS, Editor

The Heart of the Machine

MAKING THE CASE FOR EDTECH IN SUPPORT OF SOCIAL-EMOTIONAL LEARNING

Mark Sparvell

@sparvell
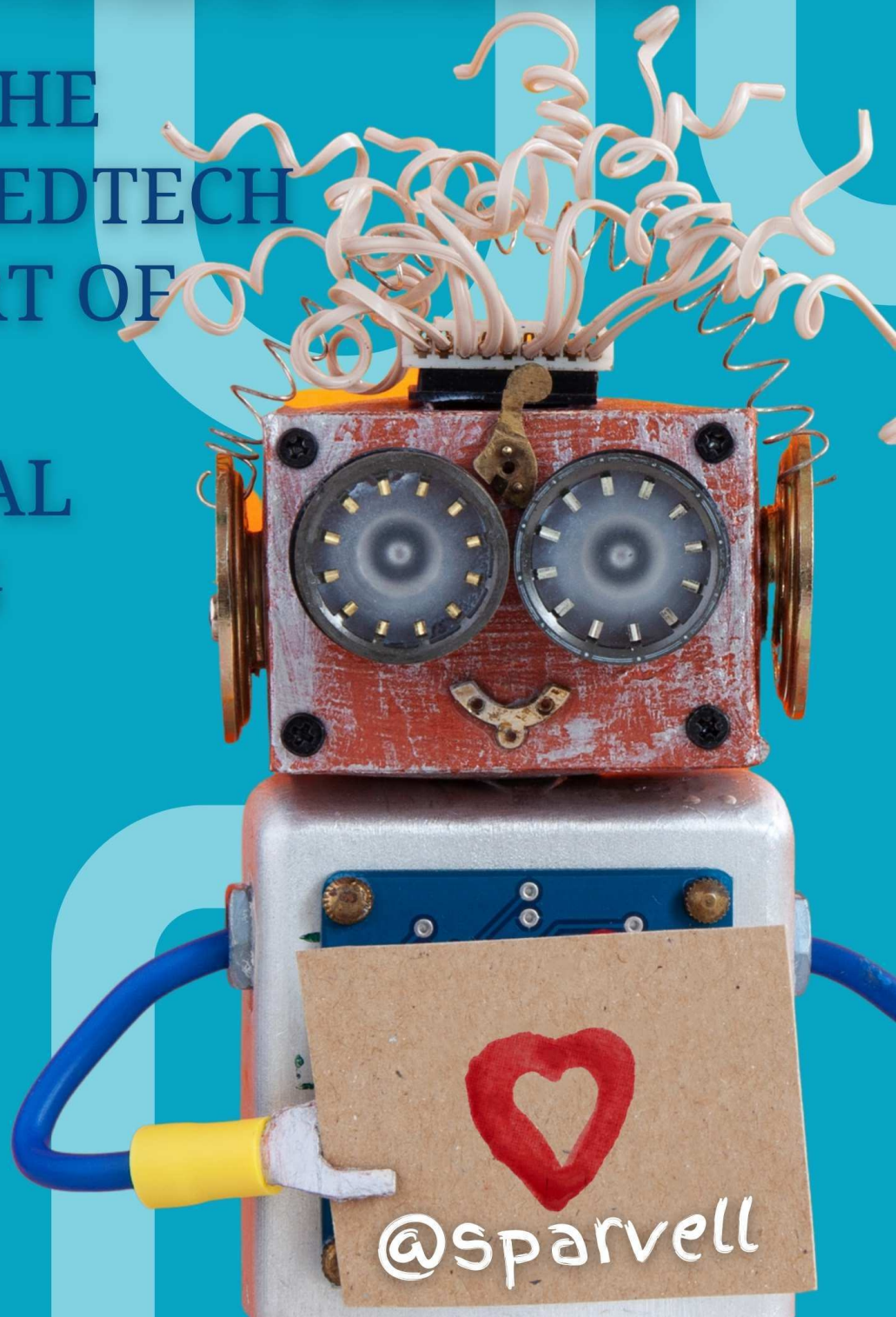
Social-Emotional Skills - The Compelling Case

One message that has come through clearly from the classroom to the staffroom, has been the significance of the social-emotional aspect of learning... this is, in a sense, no surprise, learning is inherently social, it is something best done together and therefore emotion matters.

Mental health was an escalating global issue for before the events of 2020 with the WHO noting depression as the number one disability worldwide, many countries note the same alarming 1 in 5 statistic of young people identified with mental health conditions. Social connections provide a preventative factor as we navigate challenge and stress. In our most recent survey (http://aka.ms/SELBlog2021), students were clear, they miss the physical connections made in real-spaces with peers and teachers.

When learning is not active, purposeful and engaging they struggle with motivation and attention. School has always been an emotional roller-coaster, the ride recently has just had a lot more unexpected twists and turns.

LEARNING IS INHERENTLY SOCIAL

We asked students what they missed and what they found challenging about remote learning.

Students missed	Students found challenging
52% Break times with friends	Top choices were: **52%** Lack of active/hands-on learning
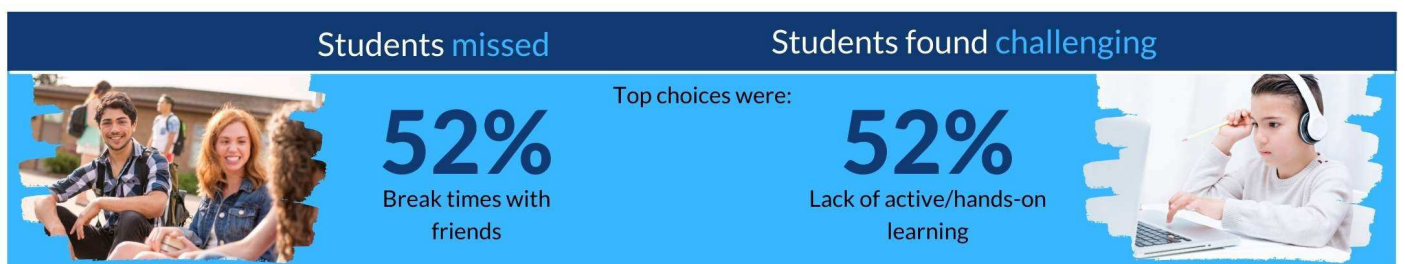
#MicrosoftEdu

Emotion, Attention, Cognition and Motivation

Social and emotional skills are critical as they drive our behaviours and where we direct our greatest resource, our attention.

These skills can help us to navigate our social and emotional world and directly influence how we build and sustain relationships, make decisions which are ethical and responsible, provide us with the tools and insights to manage ourselves, and

navigate others in work, learning and life.

How do we Best Learn Social-Emotional Skills?

Words Matter: Building an emotional vocabulary is critical if you want, as Marc Brackett, Director of the Yale Centre for Emotional Intelligence, says, "to tame it, you must name it." Consider that young people learning up to 5000 new words a year, only 10% come from direct experience, the remainder, through hearing and using them.

Be Intentional: The opportunity to observe others' intentional choosing and use of strategies to manage themselves and navigate others in social and even conflict situations is incredibly powerful learning.

Be an Emotion Explorer: We learn by doing and every time we share ideas or resources with others, listen or question decisions, we are social learning. Group work in shared-spaces, both real-world and online, are perfect simulations to explore ways of 'being.'

Take Time to Reflect: Opportunities for mindful-moments to consider our emotions, reflect upon internal and external triggers, responses, and contemplate how they influence cognition, attention and behaviour are powerful ways to develop the cornerstone capacity of self-awareness which leads to self-regulation.

Receive Feedback: We know in education that we "measure what we treasure," so the status of SES needs to be valued as highly as academic learning - there is nothing 'soft' about so-called 'soft skills,' they are hard to learn, apply and more challenging to assess. Students rank the development of SES in their top 5 learning skills which they value and up to 70% suggest that they do not receive sufficient feedback.

How can Technology Help?

Leveraging technology to support SES development is not a new space. The World Economic Forum noted in New Vision for Education: Fostering Social and Emotional Learning through Technology that, "Technology holds enormous promise to help foster 21st Century skills, including social and emotional skills."

Education technology can help teachers connect with and better understand their students, as well as facilitate students' development of social-emotional skills.

When we think how technology can support a SEL agenda, research (Class of 2030, McKinsey and Company 2019, Emotion, Cognition in the Age of AI, EIU, 2019) consistently identified 3 key areas:

- Provision of immersive learning experiences including VR, AR, simulations, and games.

- Use of analytics and AI to listen at scale, recommend, prompt, and provide visibility.

- Support profoundly personalised learning by creating inclusive and adaptive environments.

Collaborative environments such as Microsoft Teams (Free for teachers and students as part of Office 365) are social by

design, secure, and provide creative and engaging ways for students to express themselves.

Features in Teams such as **Praise badges (https://educationblog.microsoft.com/en-us/2020/09/new-features-in-teams-and-onenote-support-social-emotional-learning-approaches/),** give teachers and students more ways to recognize and celebrate one another.
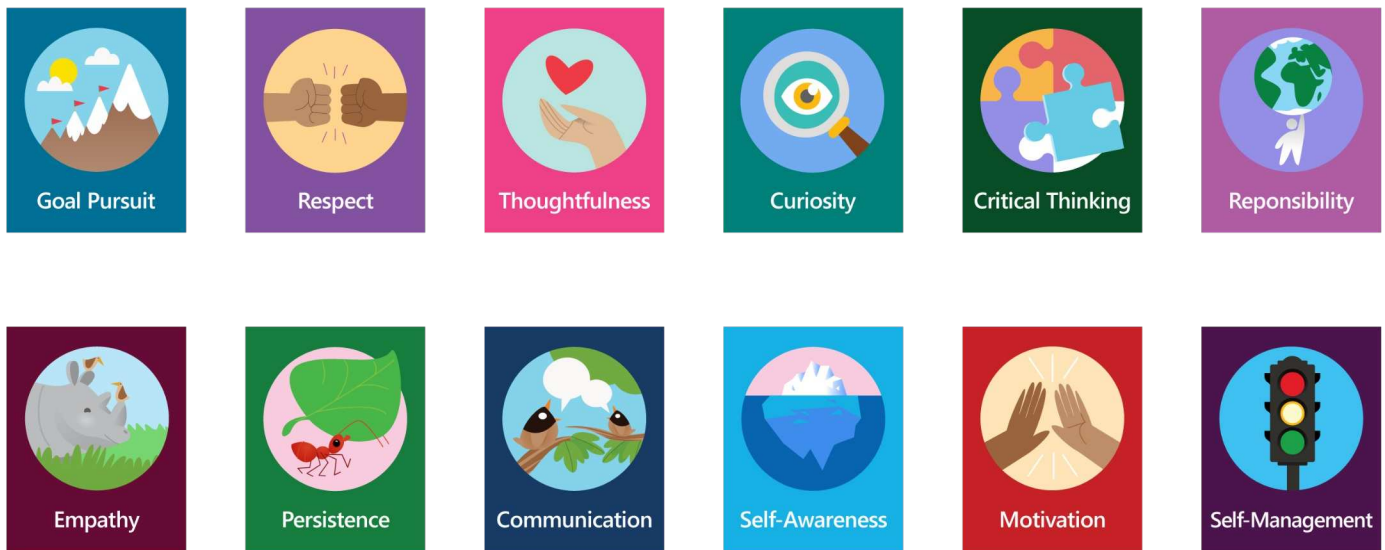
Education Insights (https://aka.ms/insights/resources) helps teachers understand and respond to student needs, and the Reflect **(https://aka.ms/EDUReflect)** extension in Teams helps students to identify and label their own emotions.

In addition to Microsoft Teams, there are other best practices, Microsoft partner solutions, and strategies to support social-emotional learning. You can visit the

Reflect can build students' emotional vocabulary and improve their ability to recognise and understand how their emotions may impact their learning. In addition, it can help teachers better identify the needs of individual students.

Microsoft Education social and emotional learning page, where you'll find the **SEL Learning Path** as well as ideas for using products like Flipgrid and Minecraft Education Edition in remote, hybrid, or in-person learning environments.

Flipgrid fosters creative discussion and helps students express themselves through video in an engaging social environment. Using Minecraft Education Edition, students identify their strengths, learn to negotiate with others, and develop leadership skills. Mindful Knight, a freely available Minecraft Education Edition world, teaches specific mindfulness strategies in an immersive setting.

The events of 2020 have demonstrated that the future is unpredictable. 3 decades of research suggest that social-emotional skills help us better navigate complexity, ambiguity, and change, and minimise the negative effects of disruption.

The changes of the past year have highlighted the importance of personal connection, accelerated the integration of technology in the classroom, and amplified the role of teachers.

The greatest potential for technology is to humanise the learning and not simply to digitise the curriculum.

Read

The Class of 2030 and Life-Ready Learning http://aka.ms/Classof2030signup
Emotion and Cognition in The Age of AI http://aka.ms/wellbeingresearch
Education Reimagined http://aka.ms/hybridlearning

Join

The Social-Emotional Learning in Education community (SELinEdu) was created as a moderated closed community on Facebook after the Salzburg Global Seminar (http://www.salzburgglobal.org/go/566) focussed on Assessment of Social-Emotional Skills. As founder and co-moderator, I welcome you to consider joining and contributing.

Join 10,000 educators in this moderated free collective SELinEdu: http://bit.ly/SELinEdu

Follow

@sparvell #MicrosoftEdu

Explore

World Economic Forum, 2016, www3.weforum.org/docs/WEF_New_Vision_for_Education.pdf
Social and Emotional Learning from Microsoft http://aka.ms/SELBlog2021
A virtual series with Goldie Hawns MindUp foundation http://aka.ms/MindUpVirtual
The Karanga Global SEL Alliance http://www.karanga.org
Yale Centre for Emotional Intelligence www.ycei.org/
The Collaborative for Academic and Social Emotional Learning (CASEL) https://casel.org/
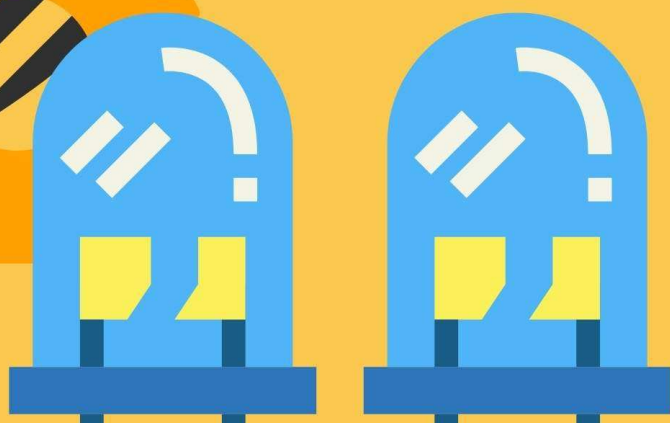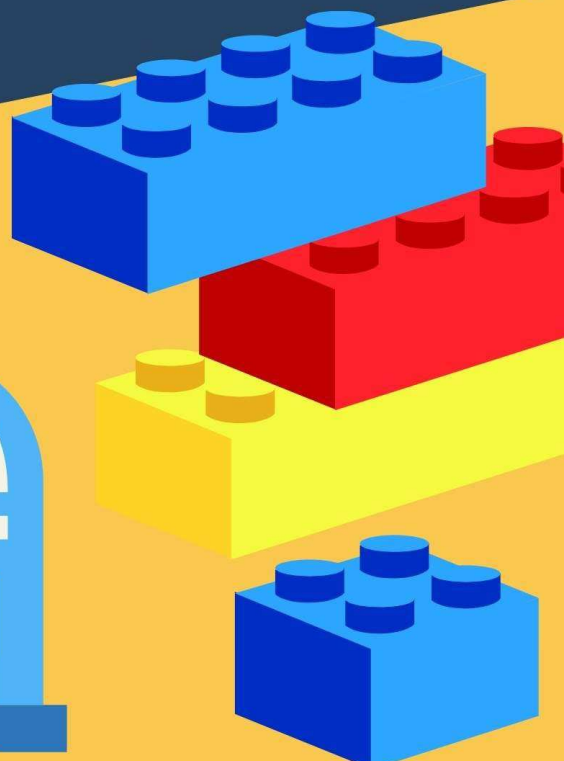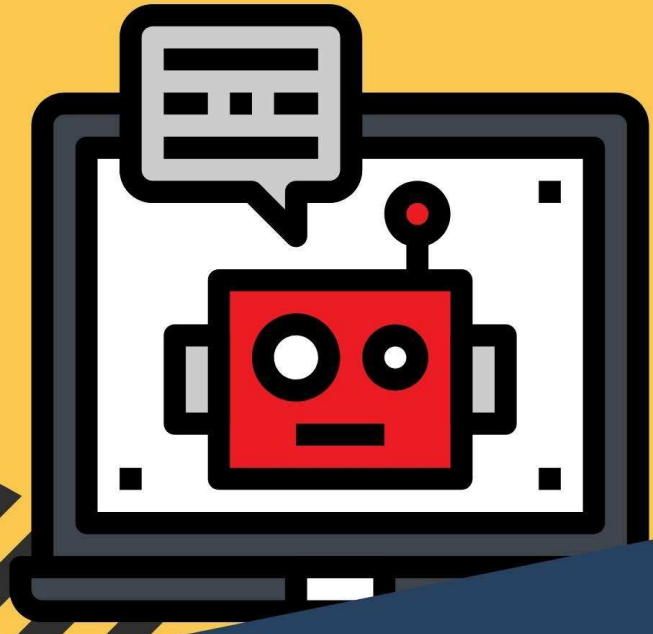A parent, family, and guardian's guide for SEL in Education from Microsoft Education https://sway.office.com/a3NMQv7Hgv3JuANi

GETTING STARTED WITH MAKERSPACES

JENNIFER MCGARRY

What are Makerspaces

Makerspaces are collaborative work spaces that are designed for students to engage in hands-on, creative and synergetic projects. Students focus on tasks that promote flexible thinking and teamwork as they work together to create and problem solve [1]. As makerspaces have roots in the hackerspace culture, computing and technology also play a key role in problem solving and the subsequent creation of a tangible product [2]. Furthermore, the maker environment is built upon dispositions that *"enhance computational thinking, such as perseverance, tolerance for ambiguity, communication, and collaboration"* [2]. Traditionally, makerspaces are associated with informal learning environments. However, the potential exists for them to be interwoven with formal education providing an inclusive environment that paves a pathway for students to foster an interest in the STEAM (science, technology, engineering, art, maths) subjects.

Makerspaces and the Maker Environment in schools

So what could a makerspace in a school look like? Well, the beauty of makerspaces is that there is no one-size-fits all approach. Makerspaces will vary according to factors such as *"the level, type and size of school; the nature of the physical space available; the funding available; the interests, aims and skills of school leaders and teachers; the support available from, and the involvement of industry partners, local community decision makers, or local education authorities"* [3] so on.

However, at the heart of any makerspace no matter what the set-up is; is the idea of constructivist learning, whereby students construct their own knowledge through direct, hands-on experience giving room for *"serendipitous discoveries"* [4] to be made.

Setting the scene for "serendipitous discoveries"

From my experience of working with students in makerspaces, open-ended and self-determined projects that encourage students to collaborate, sharing their skills and knowledge in a playful manner work best.

Play is a valuable resource as, during play, students often find themselves in the in the zone, a positive psychological state described by Hungarian-American psychologist Dr. Mihaly Csikszentmihalyi as the balance the student perceives between

Above left: Students work together to program an Edison robot.

Above right: A collaborative effort is called upon to realise the creation of a functioning leg prosthetic.

Below: A selection of recycled materials and teddy bears get brough to life with some coding blocks and a MakeyMakey.
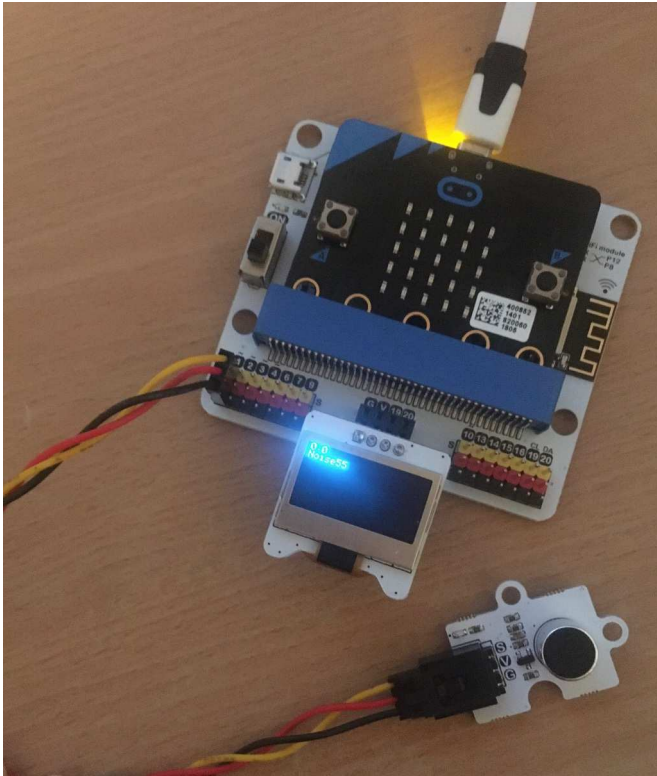
Above left: Additional functionality can be added to a Micro:bit through an expansion board such as the iot:bit.
Above right: County colours inspiring the creation of a board game in the makerspace!

the challenges associated with a problem and their ability to meet the demands of the challenge and achieve success [5]. In the maker environment, being in the zone can be recognised through the intensity with which students engage in their work - they are absorbed in their playful activity as they make things up, trying out new ideas and inventions - and it can often be difficult to draw the session to an end!

Furthermore, the playful nature of makerspace activities lends itself to collaborative efforts developing organically between students as they share their skills and knowledge. Opportunities present themselves for individuals to emerge as leaders in a certain area, for example;

helping to problem solve coding blocks, drawing a good circle or creating some useful origami. These mini "*experts*" are called upon by their peers for the skills they have to contribute and this can be a very rewarding and powerful experience for the students [6]. Playing and working together in this group setting helps students to meet the demands of the challenge and succeed.

Projects can begin small and within a short time frame as students learn the basics of, say, building a paper circuit or engineering a lollipop truss bridge. As students' knowledge and confidence increase, projects can expand and be determined by the interests of the individual.

Materials for makerspaces

Ideas and vocabulary (the software as such!)

Having a clear(-ish!) idea of what you want your makerspace to do and develop into will help with establishing a strong foundation and identifying materials that you will need.

Seymour Papert's concept of Microworlds can be very handy to keep in mind when deciding what it is you want your makerspace to focus on. In his well-known book, "*Mindstorms*" [7], Papert discusses his idea of the self-contained places he calls "*microworlds*". Each self-defined world comes with its own set of beliefs and limitations that allow students to explore the properties of the chosen Microworld, thus providing a model for students to discover what it is like to get to know an idea/concept thoroughly.

One of the examples that Papert gives is that of "*Mathland*" - an imagined country that utilises computers to provide a context for Maths concepts, helping to engage students in Maths class. Students could enter into the microworld of "*Mathland*", akin Papert notes to living in France and learning French, providing them with the context and vocabulary to naturally enter into mathematical conversations, giving students a sense of the possibilities of achieving things that were previously considered too hard.

Applying this model to a series of activities in a makerspace gives a focus to them; facilitators could decide to create a Geographyland, or Scienceland etc, pinpointing variables that could be explored through technology and identifying useful, topic-specific vocabulary to support students with understanding concepts and deepening their knowledge. This model might also allow for the makerspace activities to develop into a larger project that is more open-ended and determined by the interests of the individual student within that microworld, or for the facilitator to link the learning from the first microworld to other microworlds.

Recyclables and resources (the hardware!)

As mentioned above, one of the positive aspects of makerspaces is that they promote flexible thinking centered around playful tasks. Therefore, the physical materials that the students play and create with, must also be flexible in nature. Few materials are as flexible, dexterous and easy to come by as cardboard! Cardboard is familiar to students and malleable; it can be cut and worked into a variety of shapes; it can have holes easily punched into it; it can be used to scale something up or down; it can be painted or coloured on and it can lower the barrier to entry considering the ease with which it can be sourced and the assortment of things that students can build from it [8].

Other items to complement the use of cardboard in the classroom are any number of recycled materials such as egg cartons,
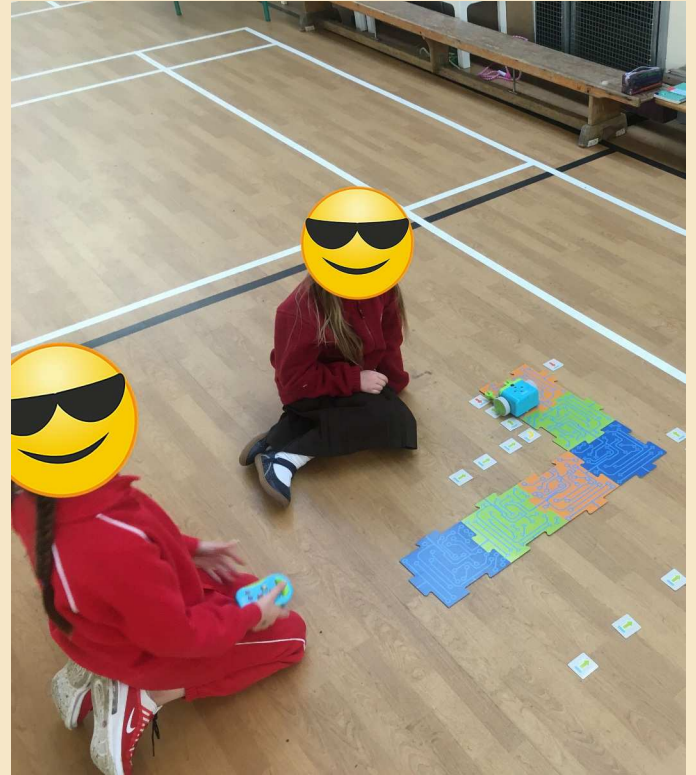
Above left: Collaboration underway on a STEAM project investigating how things fly.

Above right: Tangible blocks and cards can be useful when trying to figure out how to get robots to cooporate!

Below:The team figure out how to upload different sounds to Scratch as they have 'installed' a state-of-the-art shower system in their cardboard house and want it to sound realistic!
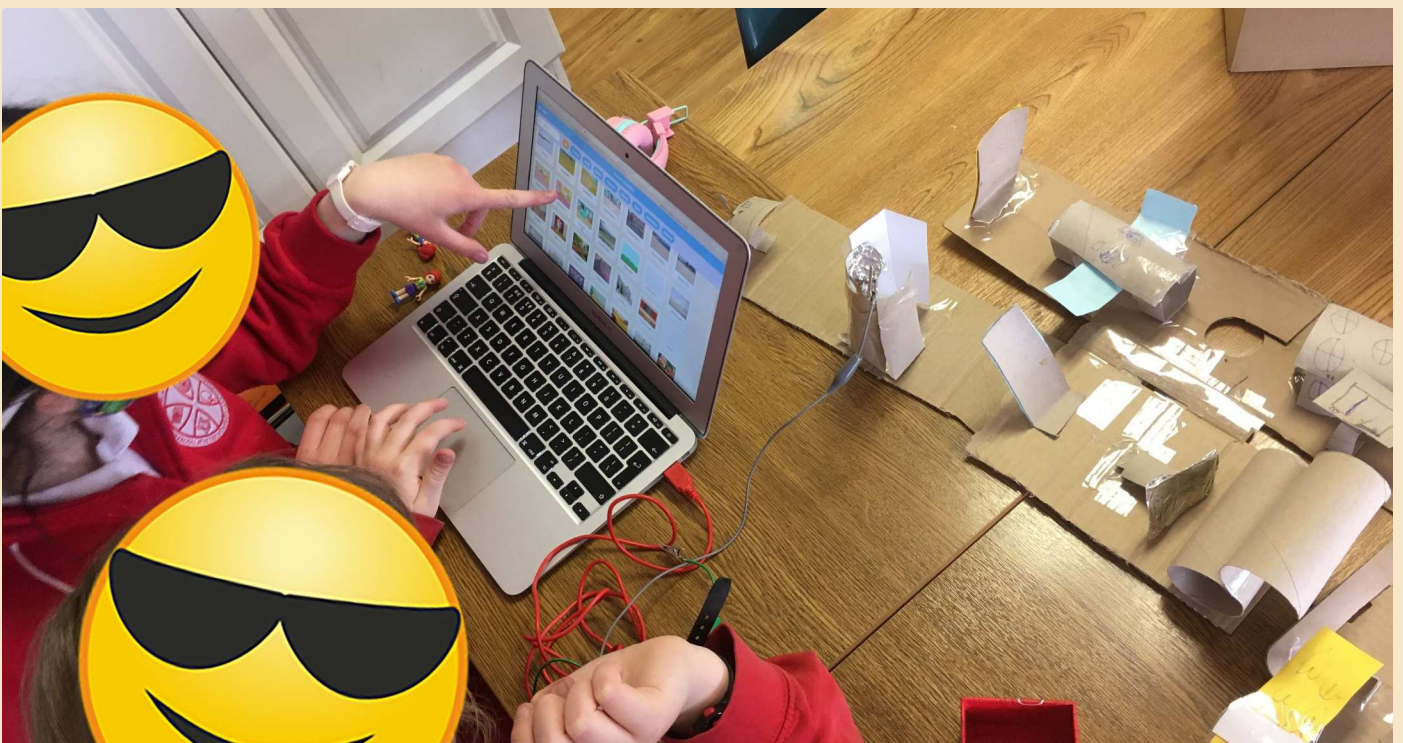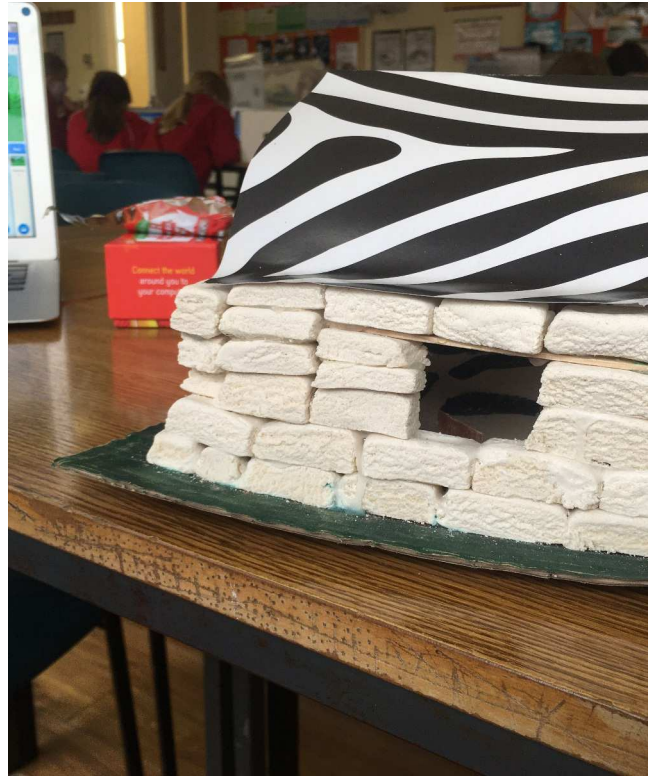
Above left: A house constructed solely from cardboard, left over bits and pieces, and some LED lights.

Above right: This student chose to use salt dough bricks to create her house instead of cardboard.

Below (left and right): Cardboard being used to create an interactive maze along with some Micro:bits.
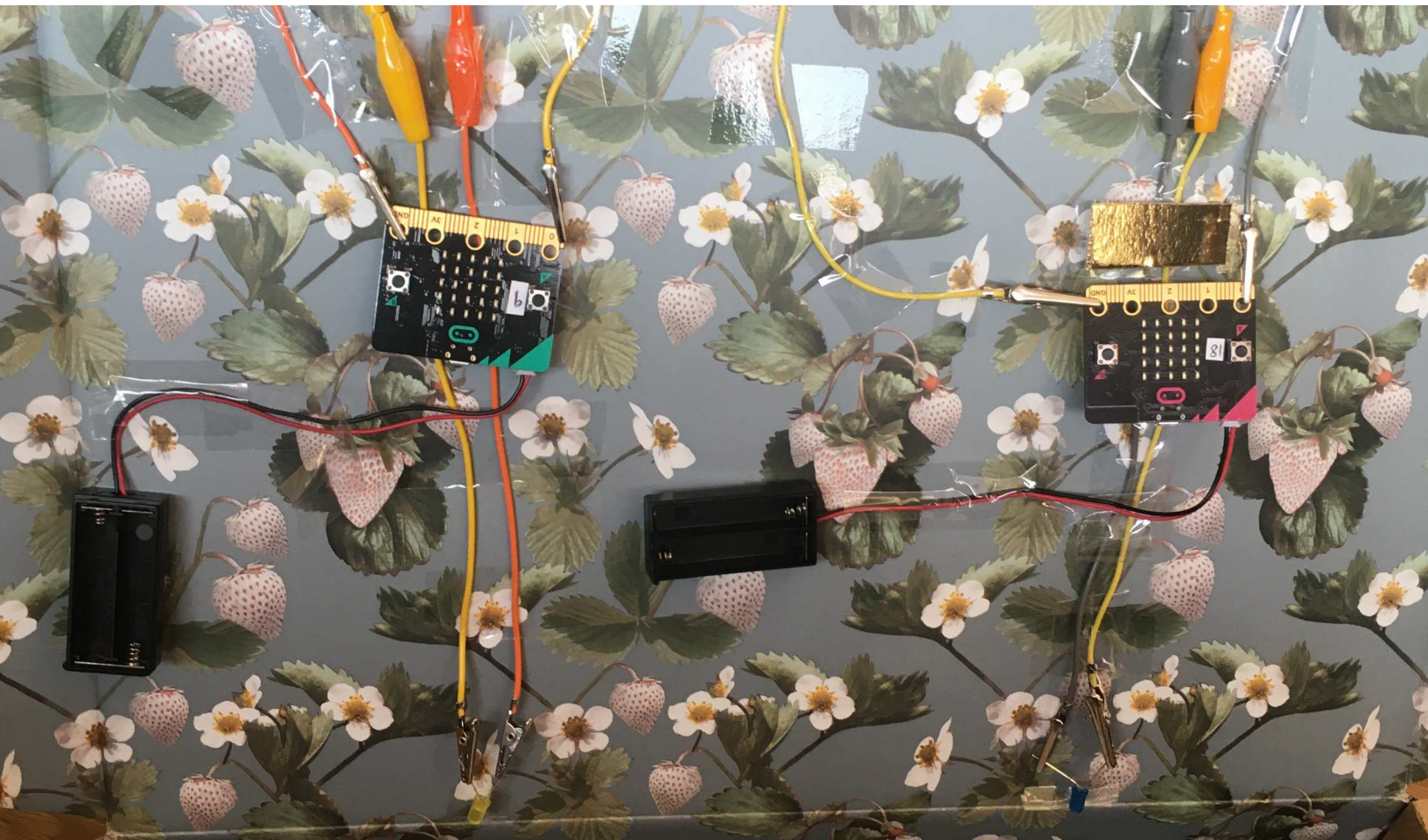
unwanted chocolate tins, unwanted fabrics such as curtains, yoghurt tubs, the blue boxes that mushrooms come in...the list of potential recycled materials really is endless. Using these materials as resources also helps students to see potential in discarded items. The act of playful invention repurposes and reframes the items that have been deemed as rubbish, affording the student the opportunity to transform the 'rubbish' into something recycled and sustainable.

Aside from an assortment of cardboard and recycled materials, other resources such as small LEDs, copper/masking/Sellotape tape, Lego and coin cell batteries are extremely useful. If the opportunity presents itself depending on each schools' unique situation, micro-programming boards (such as MakeyMakeys and Micro:bits), soldering irons, robotics, tablets, laptops and 3D printers all make a welcome addition to the creative environment of the makerspace.

Overcoming obstacles [9]

As with any endeavour that involves technology and people, there are bound to be multifarious obstacles that present themselves whilst working in the makerspace!

These obstacles are great opportunities to model a growth mindset to your students and to discuss alternative strategies to attempt to salvage whatever it is that hasn't quite worked out. However, in order to minimise these obstacles so that students can feel success, there are a number of

things that one can do to prepare beforehand;

Test software prior to a session;

As technology is always changing and updating, it is beneficial to test the software that you intend to use ahead of time. What works on one operating system might not work in the same manner on another, or in some cases, it might not work at all.

Build the model yourself first;

Not only is this fun to do so, it also helps you to identify and envision any problems that might arise, giving you the time to modify the intended activity accordingly. Furthermore, if you have built the model that you are going to use yourself then you can easily fix it if something goes wrong. From your built sample, students also have the opportunity to see the inner workings of the model which allows them to adapt it to their own liking and personal style of expression.

Invest in items that can be used for several projects;

Some gadgets and devices can look very shiny and enticing, however often there is not much learning to be gained from a resource that can only be used once. Resources that can be constantly re-used and extended upon build confidence in students and this helps them to really get

to know the idea/concept they are working with. Familiarity with the technology also fosters a continuity of learning, allowing students to expand and broaden their understanding.

Reflect on projects undertaken;

Observing how your students manipulate the materials can help you assess their engagement and make modifications to create a more enjoyable task, for example pre-cutting lengths of copper tape for younger students. Observing how your students follow directions can also help you modify your instructions if clarity is needed. On the spot modifications can be useful, as often students might come up with an alternative way of doing something, or an analogy, that perhaps you had not previously thought of which can help with the final point of how to...

Address varying skill levels;

Activities in makerspaces are knowledge and learner centered; knowledge centered in the sense that students get the opportunity to work as if they were experts in the field, directly manipulating the materials; and learner centered in the sense that prior, personal knowledge is valued and drawn upon allowing students to realise what they are capable of [10]. Awareness of this in the maker environment is a powerful tool for facilitators as it helps to oust the idea that the facilitator is the sole source of
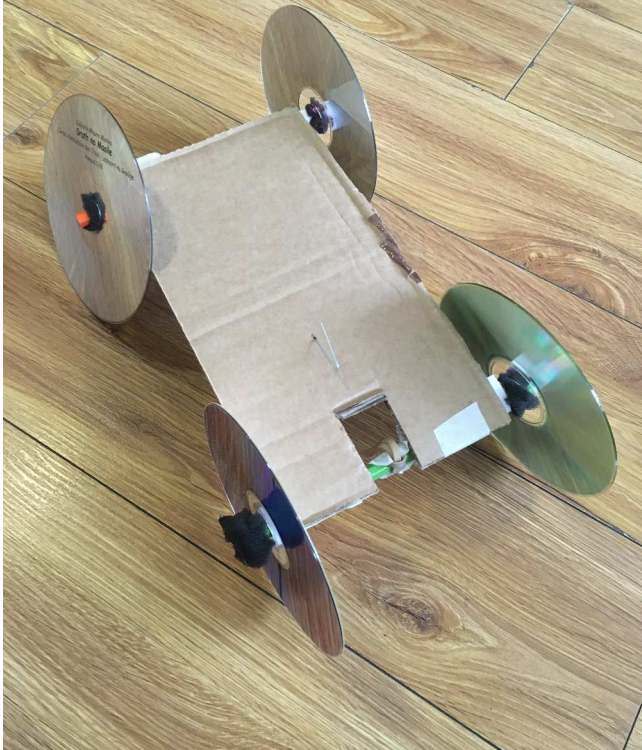
Above: Testing a project idea before a class and all appears successful...

knowledge in the room. Instead of the facilitator being pulled in all directions trying to help everyone, facilitators can encourage students to share their skills/knowledge as each is a potential expert in some area and this sort of teamwork can lead to serendipitous discoveries.

Seeing the bigger picture

Makerspaces are a great way to involve students with what is going on in the wider world. Topics that can provide a stimulus for a series of lessons can range far and wide such as climate change, robots that paint or buildings that can "*walk*" to a new location, such as a primary school building in Shanghai, China did in 2020! Alternatively, topics a little closer to home can be

investigated which can involve exploring something that a student has expressed an interest in, addressing a litter problem in the school/community or encouraging an interest in bird watching. Not only are makerspaces knowledge and learner centered, they are also community centered [11].

This is an important part of the makerspace culture as students create within a community, looking outward to see what factors are affecting the community. This encourages students to consider all the different types of systems at work in their community and the world at large. A holistic approach to problem solving is then

Below: ...that is until a few minutes later, when the wheels quite literally fall off the project!
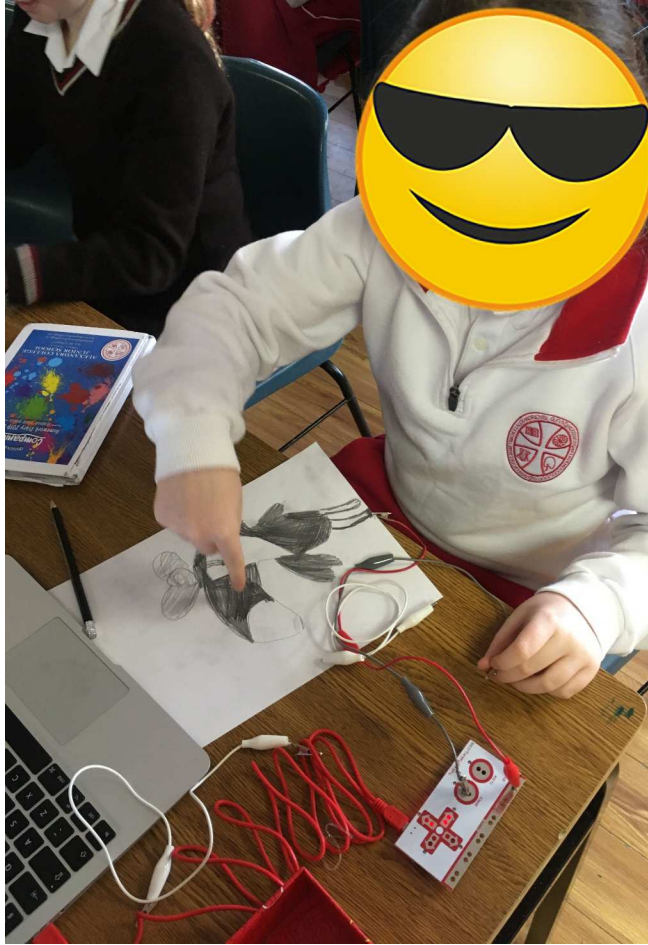
As a student's confidence and understanding grows, so too does the level of complexity in their projects.
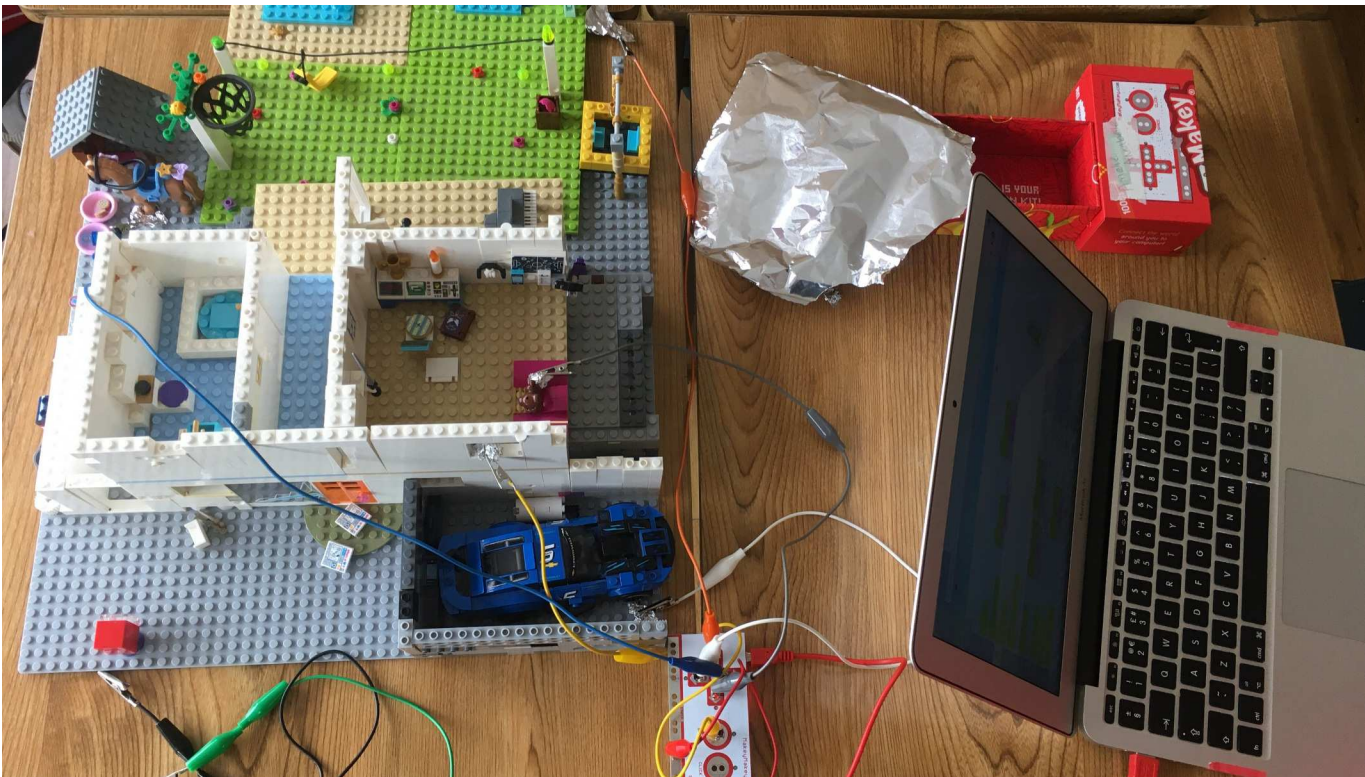
encouraged, one which *"identifies and examines the components of a system to understand how they interact and relate with one another and influence the functioning of an entire system"* [12].

What next?

Stock up on lots of cardboard and other recycled materials and start making! Here are some other tips to help you on your way…

Collaborations;

Makerspaces can draw upon a range of pedagogical approaches, such as project, inquiry or challenge based learning to name but a few. These varied approaches add to the richness of the making that happens and allow for different aspects to be explored. Collaborations are one of the best ways of accessing a range of teaching approaches, new ideas and more experienced people.

Guidelines;

As makerspaces have started to gain in popularity around the world, various initiatives have developed alongside this increased interest. One of these is the work of the Interactive Classroom Working Group (ICWG) of European Schoolnet who put together a set of practical guidelines for developing makerspaces in schools [13].

Online resources;

The PDST have a fantastic range of resources and challenges through their website STEM Smaointe [14] to support facilitators in planning and undertaking lessons in the area of STEM, science and maths.

Go n-éirí libh - happy making :)

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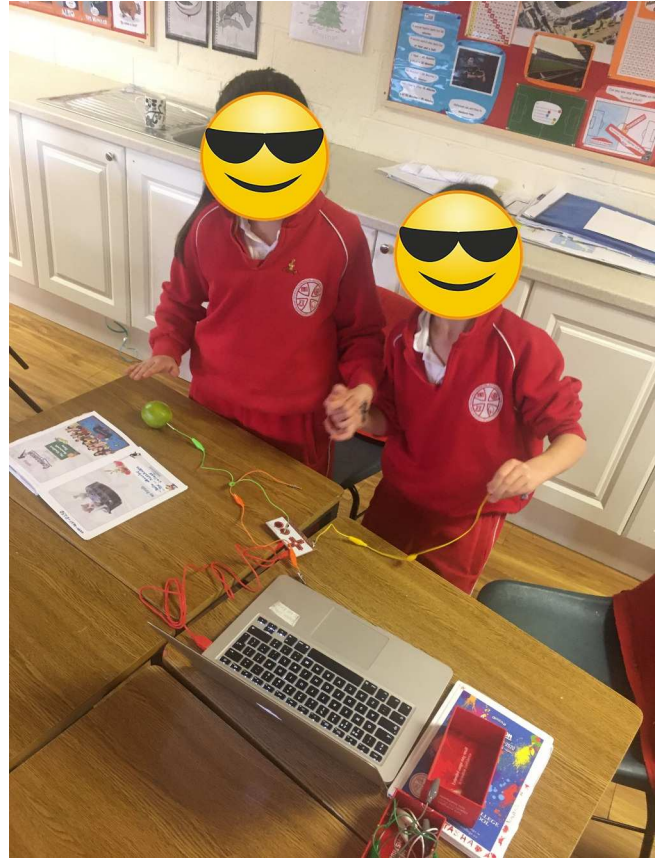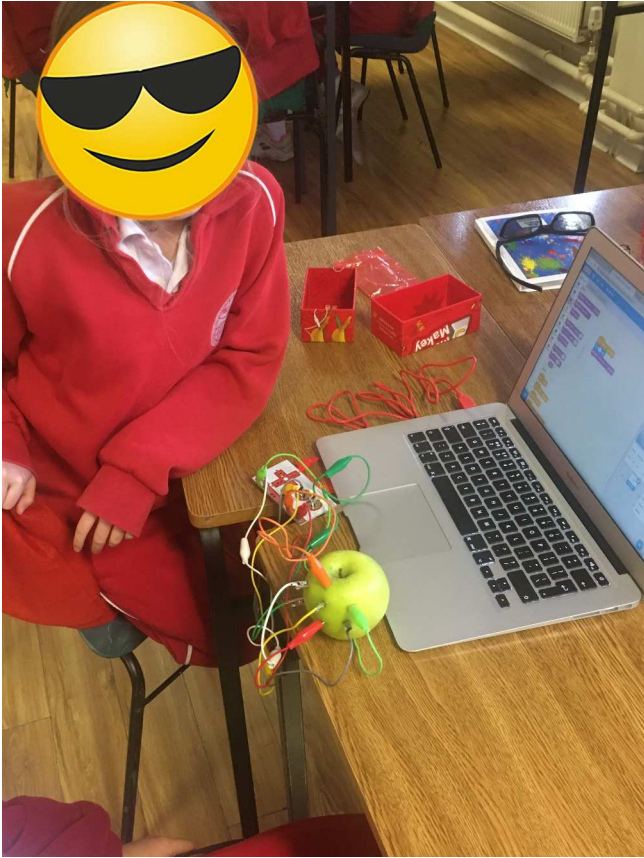
Above left: Students get over enthusiastic with the attachment of crocodile clips to a poor apple! This led to a lot of puzzlement over why the basic circuit wasn't functioning...

Above right: ...until, at last -success! Many attempts (and a new piece of fruit) later, the circuit works.

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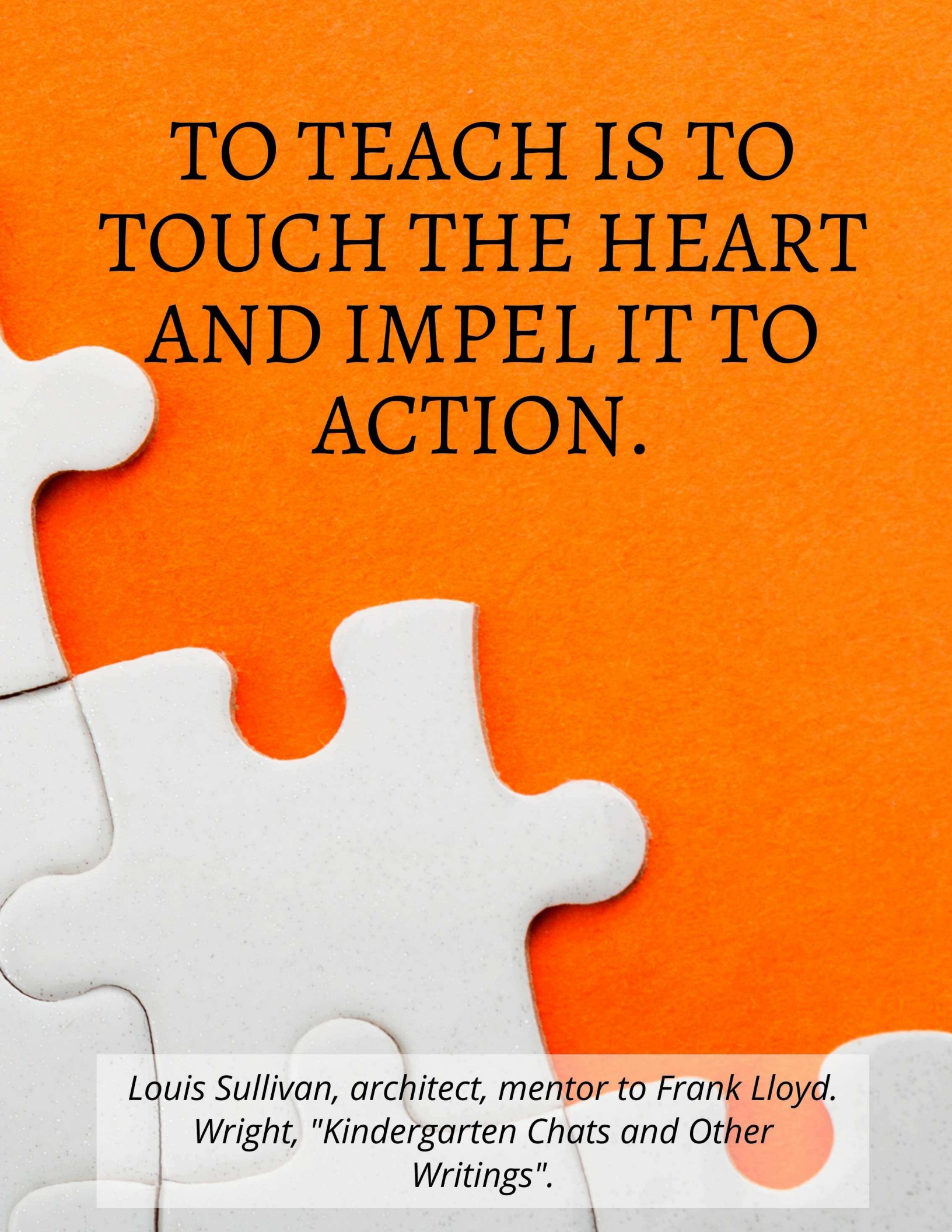
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TO TEACH IS TO TOUCH THE HEART AND IMPEL IT TO ACTION.

Louis Sullivan, architect, mentor to Frank Lloyd. Wright, "Kindergarten Chats and Other Writings".

OPEN P-TECH: SKILLS FOR TOMORROW'S DIGITAL WORLD

P-TECH
IRELAND

YVONNE CONAGHTY

Skills for Tomorrow's Digital World

We have been through an incredible year, for students and teachers the global pandemic has sparked an urgent desire to develop our digital learning skills. The pandemic resulted in a scramble to deploy new virtual teaching approaches and methodologies. It also created a serious gap in terms of the student enrichment activities and opportunities that usually supplement our core curriculum. Work-based learning, workshops, hands-on activities, and enrichment opportunities have been side-lined and had a serious impact on all post-primary students and young adults.

Open P-TECH (https://www.ptech.org/open-p-tech/) is a free online digital learning platform with content created by IBM experts in partnership with education specialists and is designed to prepare students in Ireland for the future of work. This freely available educational platform presents students with both digital and professional skills to help them succeed in today's workplace whatever learning or career path they decide to explore. Engaging videos and gamified assessments spark and keep students interested, while complex topics are explained at a level suitable for young adults. While the platform primarily serves students, teachers can also benefit from leveraging Open P-TECH through a unique teacher-facing digital library to facilitate blended learning and enable individual teacher professional development on emerging career trends.

Along with students, teachers can quickly become familiar with technologies such as artificial intelligence, blockchain, cybersecurity, quantum computing, mindfulness, and more. Teachers have access to activities and lessons plans that they can use to extend the learning students complete on the platform. The digital platform also provides teachers the reporting capability to monitor student progress and completions and assign new content to their students.

Technology and jobs are changing faster than our education system. Open P-TECH helps students and teachers to close this gap. Students can take a variety of courses on the platform and when complete, they gain industry recognised 'Badges' or 'Digital Credentials' in both technical and business professional skills. The technology areas on the platform include the 'in demand' digital skills areas of artificial intelligence, cybersecurity, cloud as well as collaborative critical thinking, mindfulness, and design thinking. There are many other areas of learning to explore for personal development and classroom work including Sustainability, Diversity & Inclusion, Multimedia Creation, and an area that certainly would generate classroom discussion - Unconscious Bias.

WORLD ECONOMIC FORUM

Top 10 skills of 2025

Analytical thinking and innovation

Active learning and learning strategies

Complex problem-solving

Critical thinking and analysis

Creativity, originality and initiative

Leadership and social influence

Technology use, monitoring and control

Technology design and programming

Resilience, stress tolerance and flexibility

Reasoning, problem-solving and ideation

Type of skill
- Problem-solving
- Self-management
- Working with people
- Technology use and development

Source: Future of Jobs Report 2020, World Economic Forum.

In Ireland all the Open P-TECH content and courses have been mapped by IBM in partnership with the National Centre for Guidance in Education (NCGE), to Junior Cycle and Senior Cycle Skills and Whole School Guidance Framework.

Ciara Dowling, * P-TECH Coordinator at St Joseph's CBS, Fairview, Dublin, who has been using Open P-TECH, commented: "*Open P-TECH is an innovative digital resource that compliments and enhances our current curriculum. It allows students to engage with highly relevant content to boost their academic, technical, and professional workplace skills in an interactive and exciting way. Students get a great*

sense of accomplishment by earning badges that will feature on their CV after school and will support them in the competitive jobs market of tomorrow. As a teacher, the implementation of Open P-TECH has made learning more meaningful for students."

What are the skills for tomorrow's digital world?

A recent IBM study, "The Enterprise Guide to Closing the Skills Gap" predicts that more than 120 million people will need up-skilling or re-skilling in the next three years. By providing free access to Open P-TECH, IBM is sharing the tools to boost early career

prospects for students and provide a route to work that is more inclusive than ever before.

We know that the world of work is rapidly transforming and evolving, according to the World Economic Forum's Future of Jobs Report the best way we can prepare our young people to navigate this rapidly changing world is to empower them with adaptable skills, the ability to think critically, be creative and problem solve. The 10 key professional skills that were identified by the World Economic Forum are mapped to the Professional Skills Badge that IBM offers on Open P-TECH. These skills are about problem-solving, working with others, technology, and personal development.

Are your students prepared to work collaboratively with other professionals? Can they dream up design ideas that help people? Can they use modern project methods to bring those ideas to life? Professional skills, design thinking, and agile work methods are some of the cornerstones of professional success. Open P-TECH offers high quality activities and courses on these skills.

Keith Gibbons, a teacher at Kildare Town Community School, has been putting Open P-TECH into practice with his Transition Year students, he said, "*Open P-TECH has been particularly useful while my students have been learning remotely, what I like about it is that it makes teaching and learning fun. Students are learning and discovering topics and skills that are relevant in today's innovation space. Open P-*

TECH is relevant, it's creative and it's worthwhile for my students."

Access to Digital Credentials and Badges

A badge is an industry-recognised credential earned by completing certain courses. This can really pump up your student's CV since these courses support and develop skills many professionals learn in the workplace.

Open P-TECH offers a variety of IBM's badge courses & digital credentials, these are recognised and valued around the world, not just at IBM but by other employers too. When you earn a badge on Open P-TECH you will be able to easily and quickly share a verified record of your achievement wherever and whenever you decide. All IBM credentials are represented by a fully portable and digital object that when clicked will surface vital information such as what was required to earn the credential, when it was earned, and what outcomes were achieved. Students can earn a badge for lots of different topics from many different organisations. What makes the badges issued to students from Open P-TECH unique is that they represent achievements valued by employers.

Click here to check out Open P-TECH's available badge learning experiences.

What is special about Open P-TECH?

The Open P-TECH platform has been built

and designed with your students in mind. Its content is designed for young people in a way that they can engage and understand technical content without needing any prior technical knowledge. Open P-TECH provides a space for students to explore careers and topics, the platform focuses on giving young people a glimpse into the technologies like data science, cybersecurity and blockchain that are shaping our world while also giving students an understanding of what professional skills is about and what it means to "show up" in a professional environment.

With technology changing so rapidly, many adults—including teachers—are unaware of what the cutting-edge jobs are. Many students have not yet formed the personal networks that might expose them to these opportunities. Open P-TECH provides a way for students to explore these new possible careers and develop the required skills. Students who are hooked by the content can dig deeper, perhaps earning a digital badge that would give their CV a boost and help them land a future job interview.

"We want to help young people actually understand the breadth of what's in front of them. We want to facilitate early exposure to emerging fields and help them build the skills that are required in these fields."

Joel Mangan, Executive Director, IBM's P-TECH and one of the leaders behind Open P-TECH.

Interested in bringing Open P-TECH to your school?

You can access Open P-TECH as an individual or use it in your school as a Teacher. Educator Toolkits are also provided which include lesson plans, worksheets, and additional resources to bring to life the online content in the classroom.

Your students are digital natives who spend much of their time on their phones and playing video games, Open P-TECH can help them level up their skills and get workplace ready using the technology they love through any Open P-TECH course.

Ready for some live events? Get tips and strategies to get your students career-ready in this free event series from IBM's Open P-TECH we'll be offering short, 20-minute sessions hosted by subject matter experts from IBM, designed to help you get your students prepared for the working world.

You will leave this series with key resources, recommendations, and curriculum enhancements. Do not worry if you cannot make the live event, all virtual events will be recorded and shared with those who have registered.

Sign up here: https://www.eventbrite.com/e/help-your-students-skill-up-with-ibm-tickets-144685964615

Badge Competition for Students and Teachers

IBM and Exit Entry entered a collaborative agreement in late 2020, making Open P-TECH accessible through the Exit Entry App. This allows students to access accredited professional and technical skills learning, insight into careers compatible with their interests and to discover new skills and careers that they may not have considered previously.

IBM and Exit Entry have launched a nationwide Open P-TECH Badge Challenge for the final term of this academic year, (April 19th – June 10th, 2021). Every badge* a student earns through the Exit Entry app or through their school on the Open P-TECH platform during this final term will automatically be entered into a draw for 1st,

2nd, and 3rd prize.

Guidance Counsellors and Teachers are also in with a chance of winning prizes. Contact yvonne.conaty@ibm.com for further information on setting your school up as an organisation to participate in this challenge or click here to find out how to enter through the Exit Entry app.

*P-TECH (www.ptech.org) is an education model for bricks and mortar schools across the world, the programme is currently being piloted with 3 DEIS post-primary schools in Dublin's North East Inner City.

* Students can choose to complete 1 or more of the 4 badges available on the Exit Entry App or 1 or more of the 12 available badges on the Open P-TECH platform.

BBC MICRO-BIT IN THE PRIMARY CLASSROOM

3V

9

15

6

14

13

USB
BLE ANTENNA
MICROPHONE
RESET / ⏻
BATTERY

10

1

12

BBC
micro:bit

V2.00

11

2

SPEAKER
PROCESSOR
ACCELEROMETER
COMPASS
PINS

3

4

5
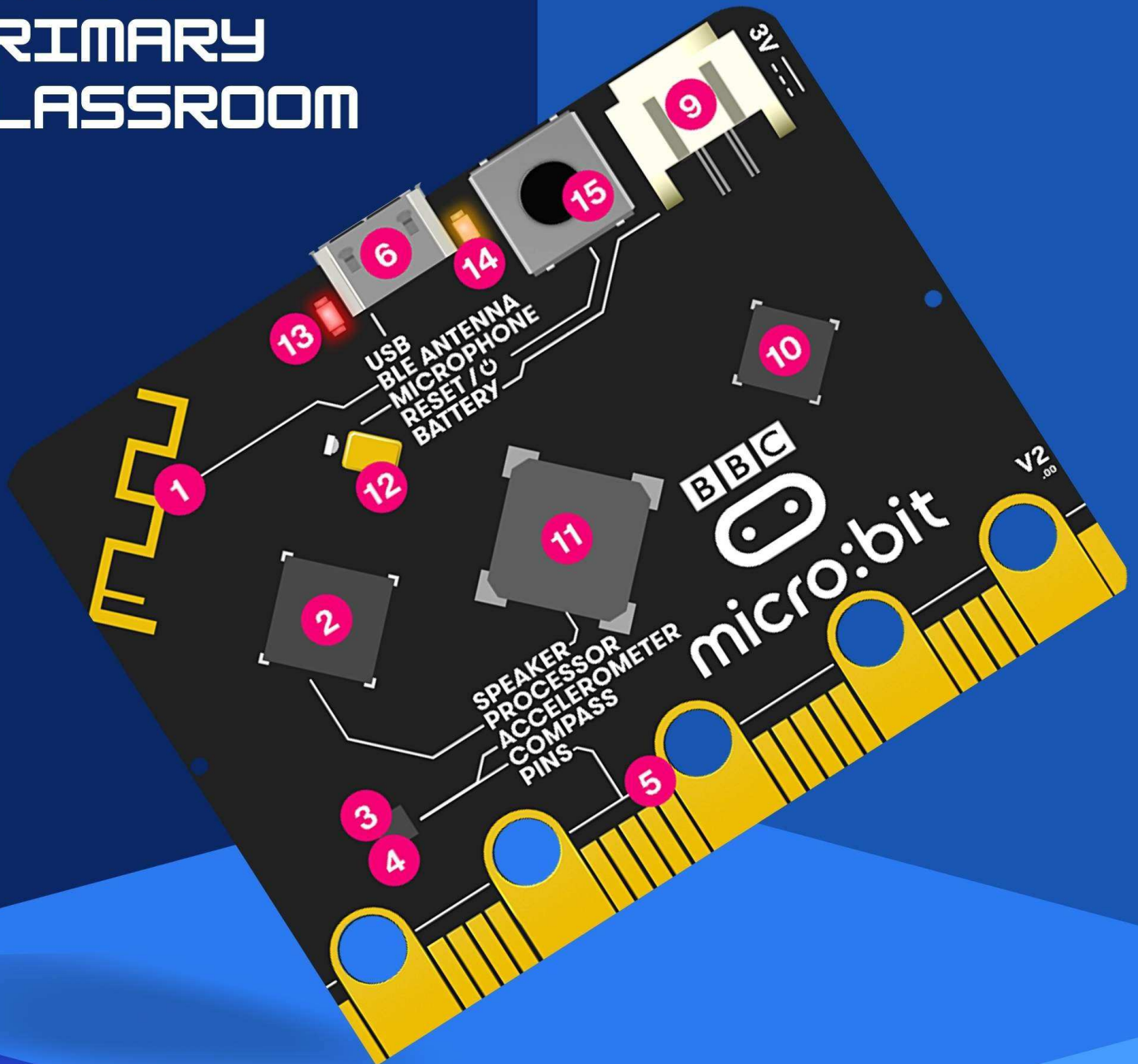
NIAMH BRADY
@MsNiamhBrady

What is a Micro:bit?

The BBC Micro:bit is an extremely versatile micro-computer. It has a built in 25 LED matrix display, two programmable buttons, physical connection pins, motion detectors, light and temperature sensors, wireless communication and a USB interface.

As a result of all these features it is visually appealing, tactile, easy to use and extensible.

In comparison to traditional screen-based experiences of computing, physical computing, such as using the Micro:bit, can be much more positive because it allows for a focus on ideas and is less restrictive.

It is suitable for students from 2nd class onwards and can be programmed using free online resources such as scratch.mit.edu and makecode.microbit.org
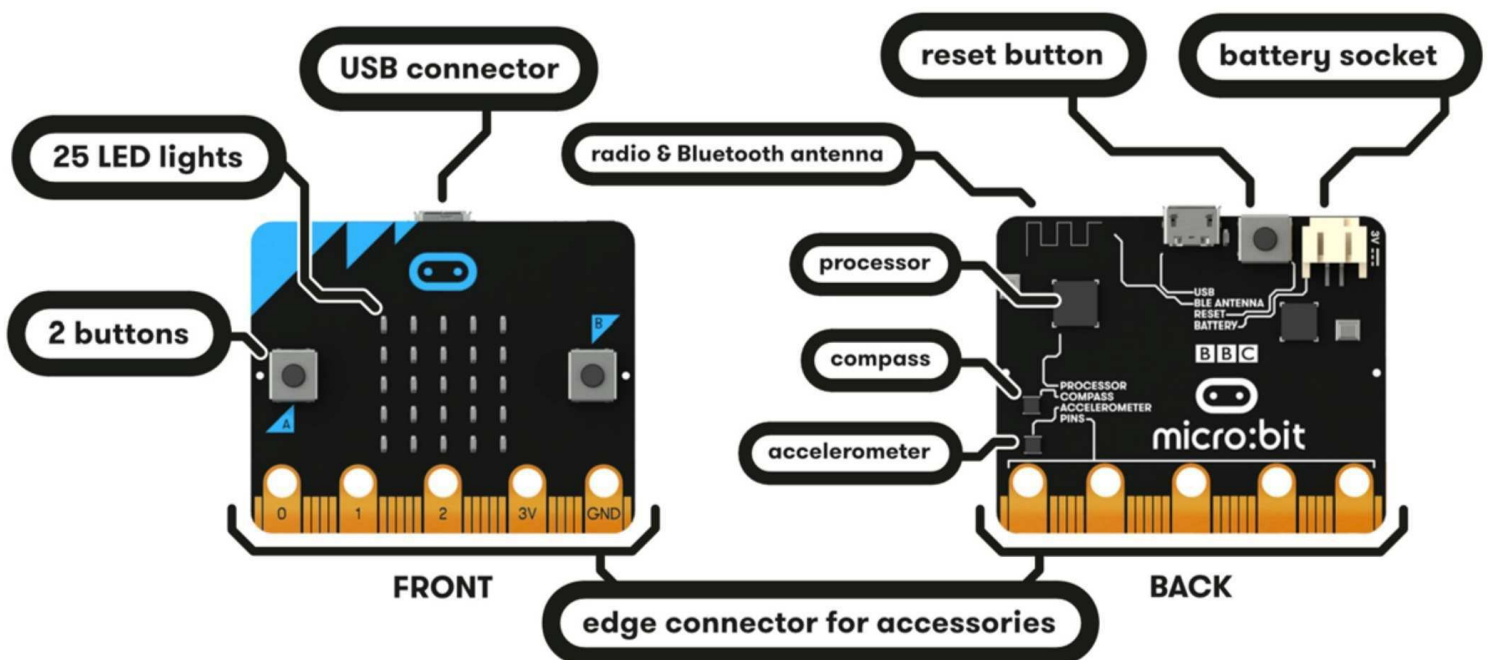
This is what the MakeCode Editor looks like (see below). As you can see there are three main sections.

1. The micro:bit simulator on the left is where you can see your programme happening in real time as you build your code.

2. The middle section is where you will find the various toolbox categories. Each category is colour coded making it extremely user friendly and easy to locate the various blocks of code.

3. The workspace is where you drag & drop your code and 'snap' it together in order for your programme to run.

If Wi-Fi is an issue in your school there is an offline version of the editor available. It can be downloaded from here: https://makecode.microbit.org/offline-app

Once installed you can create, run, and download your projects to a micro:bit
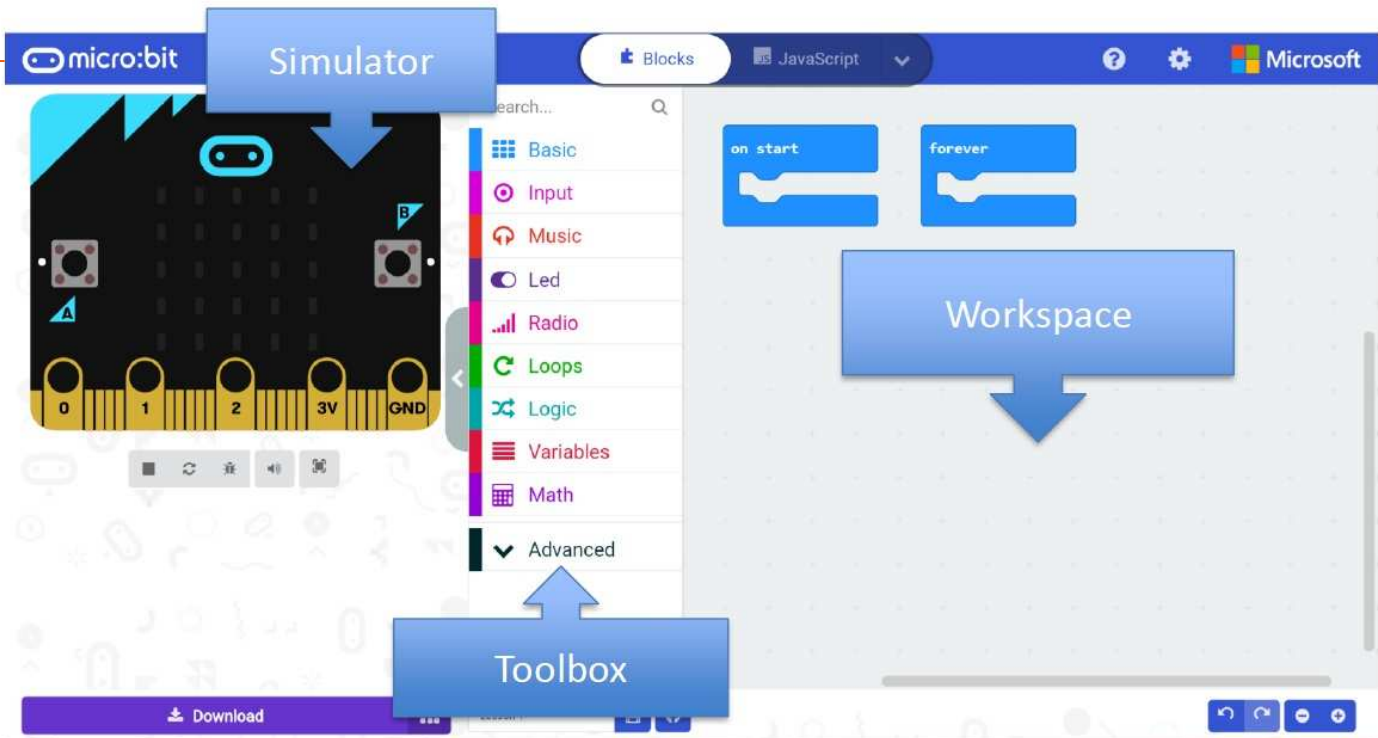
device. It works the same as the Web application does in your browser but it is a stand-alone application that will work when a connection to the internet is restricted or not available.

The micro:bit, with all its inbuilt features,

can lead to some very nice experiments in the primary classroom. A newer version of the micro:bit, released in November 2020, includes an inbuilt microphone, speaker and touch sensor. Now there are even more exciting things you can add to your projects!

Project Ideas

Here are ten examples of how the micro:bit can be used to solve some simple scientific and non-scientific questions in the classroom:

1. Turn your micro:bit into a simple compass which shows its bearing from magnetic North in degrees and figure out what direction you are facing (Using the inbuilt compass)

2. A simple project to help you count skips, jumps, daisies, insects, birds you see out of your window - anything! (Using a button push to increase a counter)
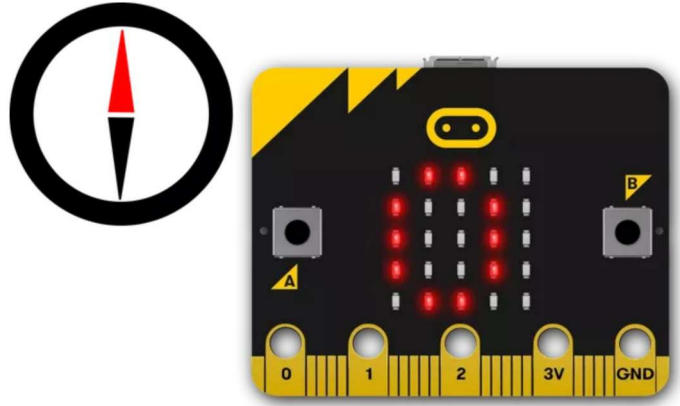
3. Use the micro:bit's accelerometer and radio features to make a prototype of a device to help scientists track polar bears or other animals and discover how they are being affected by climate change.

4. How loud is it in the classroom? Measure how noisy it is around you using the new micro:bit's microphone sensor and a simple bar chart display.

5. Create your own electronic metronome that makes regular beats which you can slow down and speed up as you practice music in class (Using the inbuilt speaker).

6. Track the highest and lowest temperatures of your classroom by running a programme on a micro:bit that uses the inbuilt thermometer.
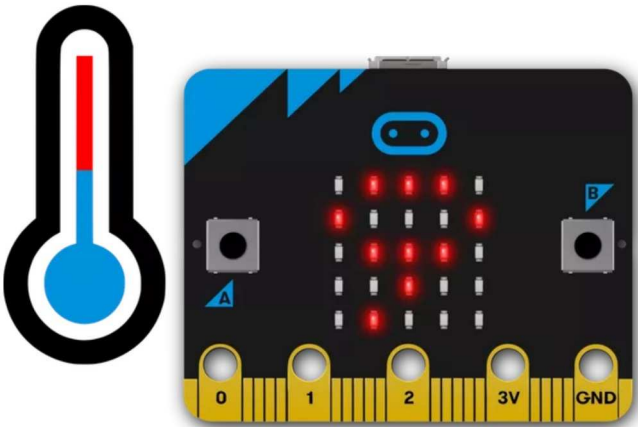
7. Use several micro:bits to make a physical treasure hunt game using radio communication.

8. Create a step-counter using the inbuilt accelerometer that you can make more

accurate by tailoring it to your own walking style.

9. Recreate the classic game 'Rock Paper Scissors' with two micro:bits and learn about selection, variables and random numbers at the same time (Using the inbuilt accelerometer).

10. Lastly, more fun than scientific, here is a lovely project called 'Tell me a secret'. Use the micro:bit's radio feature to answer questions in secret!

Here's the full lesson details.

Step 1: Make it

How it works

• Flash this program on to two micro:bits. You and a friend ask each other questions that have 'yes' or 'no' as the answer.

• Press input button A to send 'yes' and button B to send 'no' messages. A tick or cross will flash on both micro:bits' LED
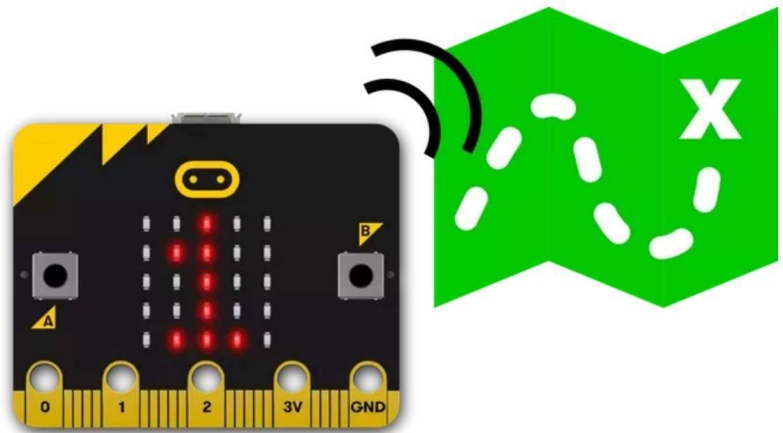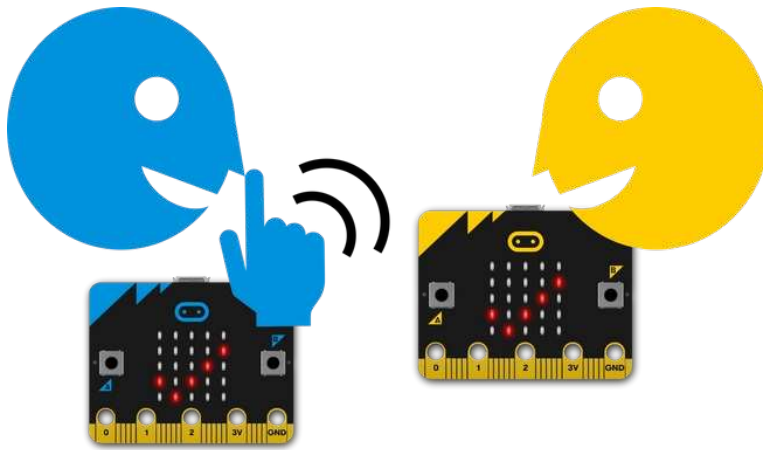
display outputs for half a second.

· The program uses radio to send your answer secretly - no-one (except your partner) can hear the radio signal.

· When a radio message is received, the program uses **selection** to test the message: **if** the received message **is equal to** 'yes', **then** it shows a tick on the LED display, but **if** the message **is equal to** 'no' **then** it shows a cross.

· Make sure the radio group number is the same on both micro:bits – you can use any number between 0 and 255.

· If many people are using this program in the same place, you'll want to make sure each group of two people has their own radio group number.

· Keep your radio group number a secret if you don't want anyone snooping on your messages!

What you need:

· Two micro:bits
· MakeCode editor

· Battery pack (optional)
· A friend and a secret to share!

Step 2: Code it (see example on the next page)

Step 3: Improve it

· Show different icons or messages for 'yes' and 'no'.

· Use shake, tilt or buttons A and B together to send different answers such as 'maybe.'

· Change 'yes' and 'no' to 'dot' and 'dash' and send Morse code messages.

This lesson along with all the lessons mentioned in this article can be accessed here: https://microbit.org/projects/make-it-code-it/

Downloading a program to a micro:bit

Step 1

· To download the hex file to your micro:bit, you must connect it to your computer's USB port using a micro-USB cable.

· Once plugged in, the micro:bit shows up on your computer like a USB flash drive.

Step 2

· Click the purple Download button in the lower left of the MakeCode editor screen.
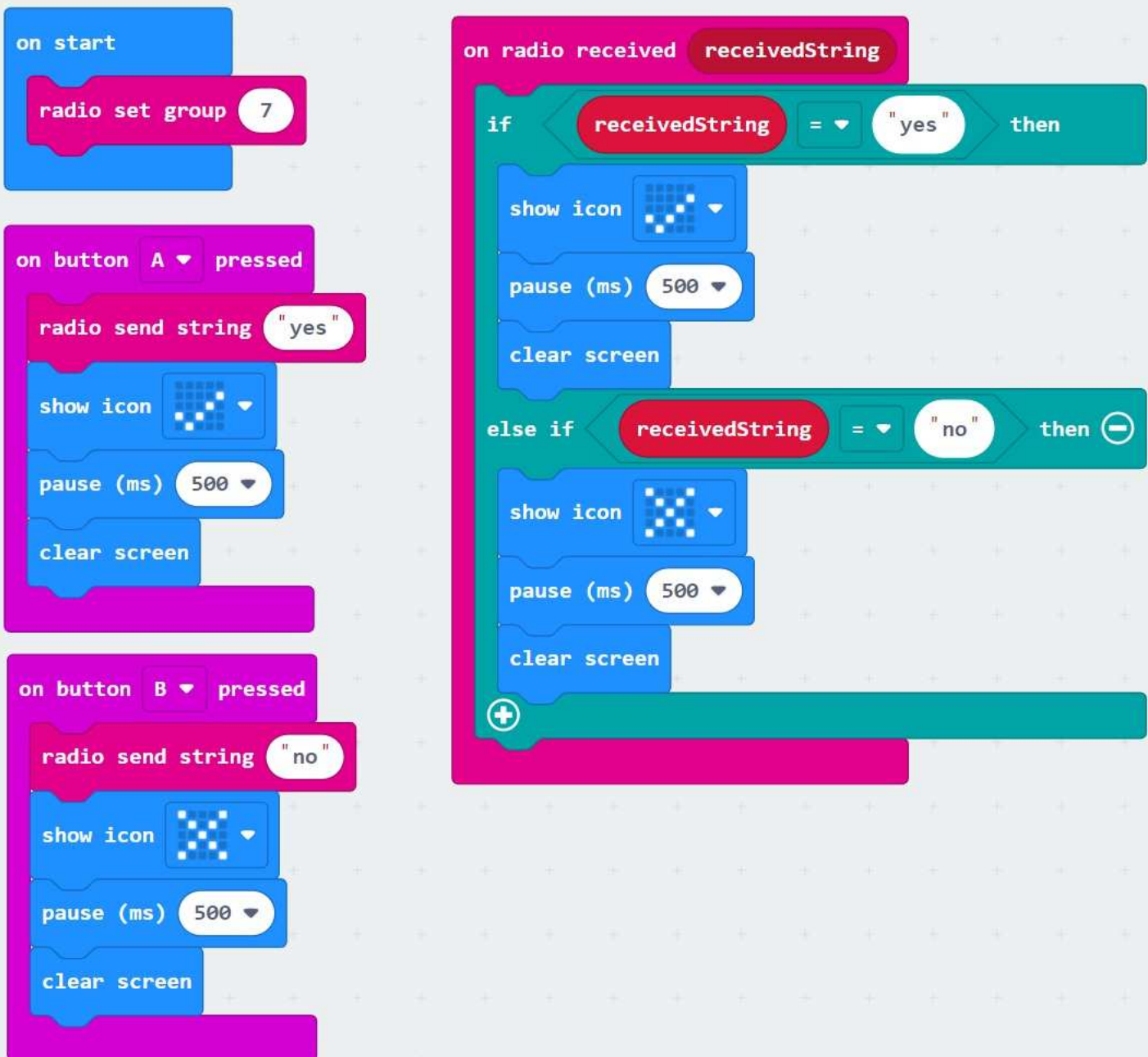
· This will download the file to your computer, to the location where your browser is set to save downloads.

Step 3

· To move the program to your micro:bit, drag the downloaded "microbit-xxxx.hex" file to the MICROBIT drive, as if you were copying a file to a flash drive.

· The program will copy over, and it will begin running on the micro:bit immediately.

Step 4

• The micro:bit will draw power from your computer through the USB connection, or you can connect an optional battery pack so it can function even after it is unplugged from the computer.

• The micro:bit will hold one program at a time. It is not necessary to delete files off the micro:bit before you copy another onto the micro:bit; a new file will just replace the old one.

Micro:bit Classroom

'Micro:bit Classroom' is MakeCode's latest feature and it allows you to distribute code to your class, save and resume students' work, all without the need to register an account. Once you have launched your classroom session you will have the option to add your own code to the classroom editor to share with your students. Note this is still in Beta version.

For more information on Micro:bit Classroom and how to get started click here:https://microbit.org/get-started/user-guide/remote-teaching/#micro:bit-classroom

In Summary

The micro:bit is a credit card sized microcomputer. It can be programmed using block based code or text based code (Python, JavaScript).

They are relatively inexpensive and are available to purchase from SG Education
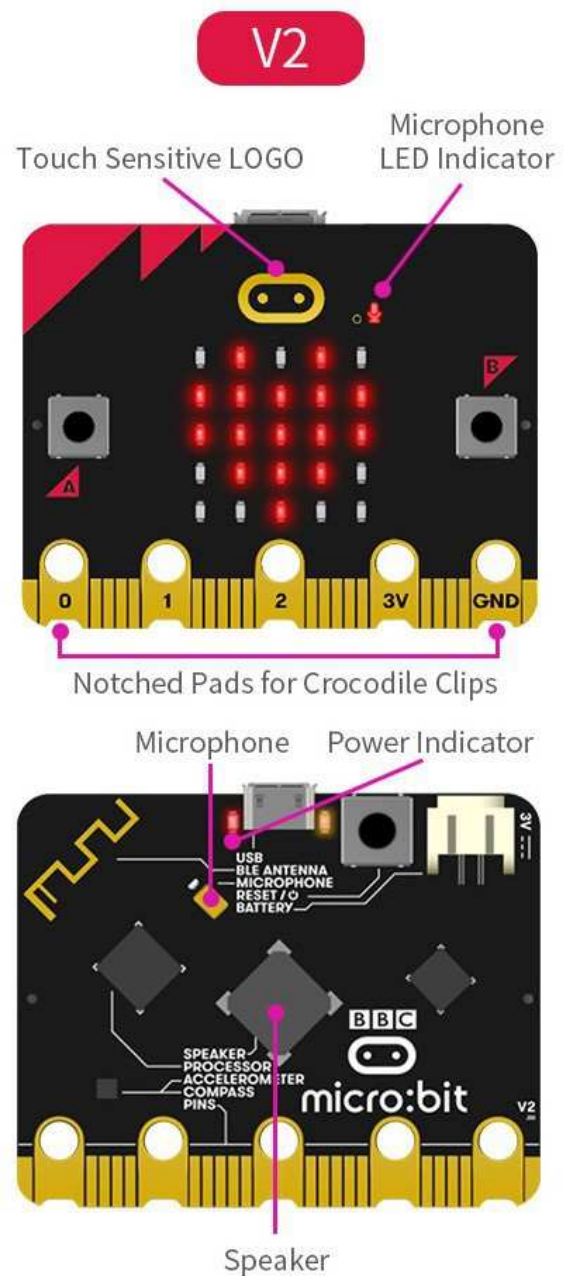
Details of Version 2 of the micro:bit can be found here: https://microbit.org/get-started/user-guide/overview/

The micro:bit brings a whole new dimension to your STEM projects and opens a world of possibilities in your classroom. I would highly recommend trying them out! You can also check to see if they are available to borrow from your local Education Centre.

thinglink..

in the Classroom

Louise Jones

What is ThingLink?

Launched in 2011, ThingLink is an award-winning education and media technology solution which enables anyone to create smart visual media by augmenting images with additional information. Originally designed to connect physical objects in images to more information about them, ThingLink is now used across multiple industries as a hypermedia platform for creating immersive materials - for training, marketing and product information as well as for learning. Through 2020 and 2021, ThingLink has proved invaluable in the education sphere as a virtual classroom for K12 students and their teachers.

How Does it Work?

Starting with an image, a video, or 360 media, creators add rich media tags which can include images (singles or carousels), video, text, audio and external links. Using the "text and media" tag, the creator can add a combination of any of the above into the same tag.

Embed In

One of the most useful of the tags is the "Content from website" or Embed tag in which you can place embeds or links to a huge range of apps, websites and tools. These range from videos on YouTube or Vimeo, to teacher favourites from Google Workspace and Microsoft O365, Adobe tools and popular apps like Wakelet and Book Creator, Flipgrid and Padlet.

You can even embed 3D objects created on Sketchfab. Embedding content straight into your ThingLink means your audience stays on the same page rather than moving from site to site and possibly losing focus. Your content therefore stays accessible, secure and all in one easy-to-find place.

Primary teacher and Digital Learning Specialist Amanda Pickard embeds a wide range of apps and tools in the ThingLinks she creates for her class in Scotland:

"I love the Embed Tag because I want my little learners to be as independent as possible. The Embed Tag lets me gather different resources, activities and place them inside my ThingLink classroom for my wee ones to do. This keeps them in one place, no need to navigate the internet, a browser, a website, it keeps them safe and builds confidence and independence."

Tour the World Virtually

Tags can also contain a link to another thinglink, creating a virtual tour. When 360 images are linked this way, teachers or students can create virtual tours of real places - from school interiors, galleries, museums or historic buildings, to landmarks and celebrated sites across the world.

In fact all users can use and copy images from ThingLink's own 360 image library which features world heritage sites and natural wonders including Antarctica, CERN and the Palace of Versailles. Virtual walk-throughs and tours can give students access to real-world environments and situations that would otherwise be out of their reach.

Interactive 360° images and videos help develop contextual understanding, academic vocabulary and skills in remote locations, cultures, work environments, or social situations. Importantly, this tour function will help teachers fill the gap created by Google Expeditions and Tour Creator, which will be discontinued from June 2021. ThingLink can also easily be viewed in a wide range of VR headsets to create a truly immersive experience for your class.

Accessibility at the Heart

The multi-media nature of ThingLink means that information is naturally more accessible to learners with a wide range of learning styles and needs. Making learning more accessible has always been at the heart of ThingLink, now helped in a big way with the integration of Microsoft Immersive Reader.

This tool can translate text in the tags into 60 different languages, and either in the original language or in the translation can convert the text into audio. The reader can also increase the text size and spacing and even change the font to aid with reading. There is also a picture dictionary which can be used for unfamiliar words.

Simplicity, Always

When we ran focus groups recently and asked regular users for words they used to describe ThingLink, the one we heard the most was "simple". The main benefit of ThingLink for creators is without doubt its simplicity and ease of use. Most teachers and learners can pick up the basics incredibly quickly, and the reason for this is that no matter the type of media you are adding in a tag, the creation process is the same.

For this reason, as well as using it to create

and present interactive and immersive materials for learners, many teachers also encourage students to create and collaborate on their own thinglinks.

In our single teacher account, Premium Teacher for Classrooms, up to 60 students can create their own thinglinks - but can also collaborate with each other or with the teacher to create their work. It allows for a wide variety of approaches to presenting information - whether a learner prefers a textual, audio, video or infographic presentation - or a mixture of all of these.

Trusted by Schools

Used by 30 million learners per month globally, ThingLink is a safe and secure platform trusted by educators around the world. With a school account, schools can embed ThingLinks into most commonly used LMS platforms: Moodle, Canvas, Microsoft Teams and Google Classroom.

It supports secure user authentication methods such as Microsoft and Google Logins, Clever, Azure Tenant ID, and other single sign-on options.
https://blog.thinglink.com/marketing/learning-management-system

Making it Easy for Educators

We are constantly developing and releasing improvements, new integrations and partnerships, many in direct response to feedback from educators. In early 2021 we released an integration with Unsplash

Image library, meaning that creators now have instant easy access to over a million searchable, freely usable images for use in all their thinglinks.

The image library is built into the editor providing one-step search and drop process directly within the ThingLink editor.

Canva - Our Newest Partner

In April 2021 ThingLink integrated with Canva, the popular online design and publishing tool with a mission to empower everyone in the world to design anything and publish anywhere.

We know from our educator communities that many ThingLinkers are also keen Canva creators, and the feedback on this game-changing partnership has been nothing short of celebratory! The Canva integration provides millions more free-to-use images and graphics, as well as professional templates and free access to the priceless Canva Design School. Best of all, from your ThingLink account you can access everything you have already created in your own Canva account.

MAKE YOUR DESIGNS

INTERACTIVE & ENGAGING!

¨thinglink.. Canva

Educators on the ThingLink and Canva school plans can now collaborate with colleagues from initial concept to finished product.

Some Inspiration from our Education Community

Take a look at these 5 recent examples which showcase some of the different ways that teachers and schools have been using ThingLink over the past year or so:

● Teacher Amanda Pickard (see above) creates fun virtual Bitmoji classrooms, adding audio and video to the tags to help explain the weekly tasks for the 5 year olds in her class.

● Lorrie Salome and her colleagues in Austin TX created weekly classroom planners to help her slightly older students Using ThingLink, they created 'choice boards', to simplify the visual presentation of many different learning resources for students and their parents and carers during remote learning. Lorrie says:

"Using this choice board, families can access a variety of resource types (online, printable, etc) at a wide-range of levels for tailored, differentiated options within one landing page. It allows us to seamlessly weave together a massive amount of content into a format that was a simple, organized, visually-appealing (one-page!) landing page."

● In Kuwait, teacher Jennifer Ivory created a haunted house-themed thinglink to engage her students in a story by Edgar Allen Poe. She gave the students clues to solve and created a virtual escape room.

ThingLink tip: With the arrival of our new Conditional Transitions feature, this concept is even easier to apply, as students have to answer a question correctly before moving on to the next image or scene. Conditional transitions are a great way to check comprehension during asynchronous online learning.

● In Finland, a technical university put together a virtual workshop introductory tour in ThingLink when lessons had to move online. Learners were given lessons and demos on the various workshop tools and the exam was also hosted within the thinglink. Only by passing it could they earn their workshop pass.

● And finally, schools are increasingly using ThingLink to create introductory infographics and virtual campus and site tours for new students. Stirling High School created an interactive infographic to welcome their new joiners from primary, and ICS Budapest created a campus tour which allows you to explore the areas in 360. They have embedded the tour directly in the school website.

Some of these examples and many more were included in ThingLink's 2020 End of Year Celebration of our favourite educational thinglinks of the year.

The Education Plans

ThingLink provides free teacher accounts with access to all the functionality of the ThingLink editor, publishing an unlimited number of interactive thinglinks for your learners to use.

With Premium Teacher for Classrooms (29 Euros) you receive an additional 60 seats for your students, and can collaborate with them on work via shared folders.

Whole school accounts start at (835 Euros)

and provide your school with unlimited views, the potential for collaboration across the whole organization and full integration with your LMS. A full breakdown can be seen on our website.

Unmatched Potential

Quite simply, no other edtech platform can offer such a huge variety of applications and uses as ThingLink for educators and their learners. From reaching out to potential and new students and their parents, to providing secure and immersive learning experiences, and providing a personalised way for students to present information, ThingLink is one the best value for money platforms that any educational institution could invest in. Get in touch today to learn more about the phenomenal benefits that ThingLink can bring to your school.

ThingLink also has a vibrant Facebook Education Community which you can find here

You are welcome to contact them directly on
education@thinglink.com

or

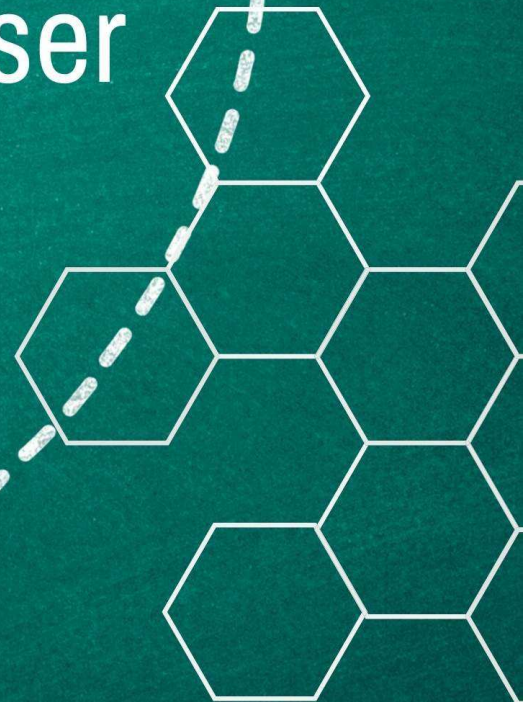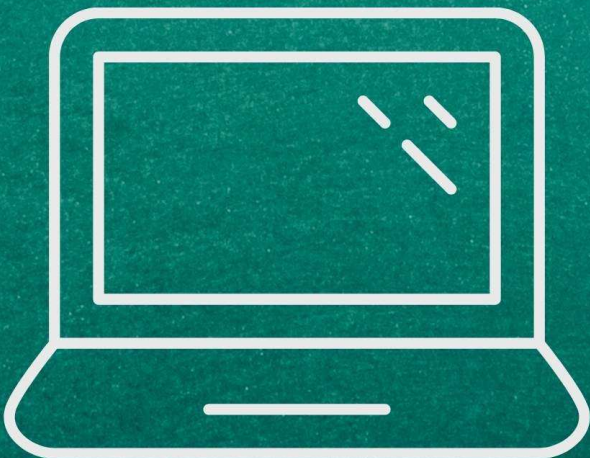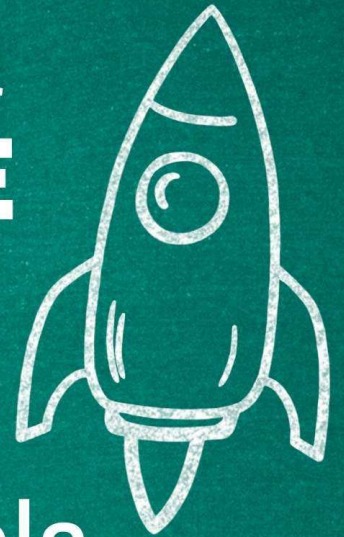Director of Education, Community & Partnerships
louise@thinglink.com

ICT

in Education

CONFERENCE

Interview with Pamela
O'Brien - Organiser

CHRIS REINA

1) How long has the ICT in Education conference been running?

The conference has been running since 2004. For the first few years it was called the Broadband in Education event but was renamed to ICT in Education as ICT became more prevalent.

2) Is the conference happening this year?

Yes, we have made the decision to host a virtual conference this year. One of the strengths of the traditional face to face event is the opportunity it provides to meet and chat with other educators interested in the integration of technology in the classroom. This year will be a little different, but we have a "Cantina" organised for people to meet and chat with each other.

Due to the Covid restrictions in 2020 a decision was made not to hold the conference that year. Those restrictions are still largely in place, so the organizing committee have decided to go virtual for the 2021 conference. The conference will provide a space for educators to reflect on the significant changes that we have all faced in our teaching and learning in the last 14 months. It is more important than ever to share best practice on the use of technology in education.

3) Who is the conference aimed at?

The conference is aimed at anyone interested in the usage of technology in the classroom. If the past year has shown us anything, it is that to a greater or lesser extent, educators and parents are all interested in this topic. The move to emergency remote teaching, as a result of Covid-19, has made this conference more relevant than ever before.

4) Who can/should attend the conference?

Teachers, lecturers, tutors, parents and all educators interested in ICT integration in the classroom.

5) How much does the conference cost?

The conference is free to attend this year.

6) I see it's run by LIT - is the conference only for third-level educators?

Traditionally, the ICT in Education conference has brought together educators from primary, secondary and third level education. The aim is to share ideas about how technology can be successfully integrated into teaching and learning at all levels, not just third-level and the speakers and workshops reflect this.

7) Where can I get tickets?

Full details of the conference and booking

tickets can be found at: www.ictedu.ie.

8) I don't know that much about ICT – is there anything in it for me?

Absolutely! As long as you have an interest in using technology in the classroom you will come away from the conference with ideas for your classroom.

9) I've seen there's a "Makermeet" a week before the conference… can you tell me more about that?

A MakerMeet is similar to a TeachMeet. (https://en.wikipedia.org/wiki/TeachMeet) The main difference being that the focus is on practical skills almost exclusively in the S.T.E.A.M. arena.

Maker Education is a fun and engaging way for students to build the 21st century skills they need to succeed in an increasingly diverse workforce. These skills include critical thinking; creative problem-solving and collaboration as students 'make' with others – while developing the ability to prototype, fail and continue trying.

Constructivist learning theories espoused by Jean Piaget and Seymour Papert are often referenced in Maker Education as Project-Based Learning is used to teach a wide variety of skills simultaneously in a single project.

Other skills that are often incorporated in this methodology are flexibility; leadership; initiative; productivity and social skills. In addition to these important competencies are also literacy skills such as learning how to present information through media and technology.
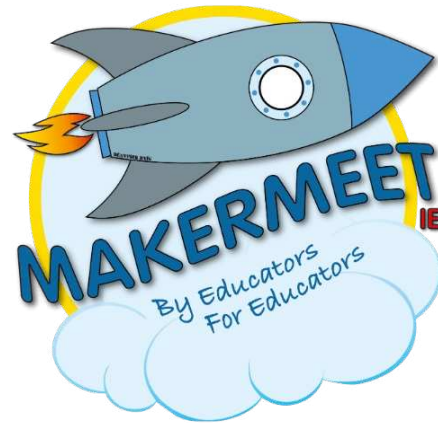
At the pre-ICT in Education MakerMeet – presenters will show projects they have completed or are in the process of creating and presentations will last between 10 – 30 minutes. Most projects can be re-created easily in any classroom.

10) What are some of your favourite memories associated with ICT in Education conference?

For me it's about providing the space for others to come and share their experiences with other educators and learn from each other. It's a bonus if people have a bit of fun along the way. So my favourite memories are of people's reactions to the sessions they have attended.

11) What have been some

takeaways that you've learned from previous conferences?

With the broad range of fantastic speakers, presenters and attendees we've had over the years, that's a hard question. The greatest takeaway from my involvement in organizing the conference is that, once educators are given the chance to share their experiences with others, it benefits everyone greatly. The other takeaway is that we are all lifelong learners and there is always something new to discover.

Background on Pamela O'Brien

1) What led you to get involved in education?

If I'm honest, I never saw a future in education for myself when I started out on my career. I worked for over 11 years in industry and began to look at lecturing as a possible avenue for a future career around the end of 2000. As it turns out - it was a great choice!

2) You're a Lecturer at LIT - how long have you been a lecturer?

I'm just coming to the end of my 20th year of teaching and, if anything, I am loving it as much, if not more, than I ever did.

3) What do you lecture on?

I lecture at undergraduate level in the areas of Mathematics, Computer Programming and Applications Development. At postgraduate level I lecture in the areas of Programming and Computer Science for Teachers.

4) Can you give us an idea of people who inspired you along your journey to being an educator?

The two people who come to mind are my first primary school teacher Maura Slattery and my secondary school Maths teacher Mary Hough. What they both brought to their classrooms was an atmosphere of support and encouragement while still expecting hard work. I have endeavoured to cultivate a similar atmosphere in my classes for both students and teachers.

5) Would you have any advice for young people who are looking to get involved in education / your subject area / their chosen field?

Firstly - try not to be a slave to the CAO points – which is easier said than done given the current focus on points. My advice would be to look at your strengths and the subjects that you particularly enjoy when looking to choose an area to pursue a career in. For me that was Mathematics - so that gave me my focus when choosing my college course.

Secondly, be open to all possibilities. As previously mentioned, I would never have foreseen a career in education when I graduated and now, I couldn't imagine doing anything else! In my working life so far I have had 3 very different careers, I started out as a programmer before becoming a statistician and finally a lecturer. The best part is that I am not finished yet!

6) Are you involved in any other projects / conferences / areas?

Those who know me would probably say too much! I'm a mentor with the Youth Media Team and with CoderDojo. I'm an EU CodeWek Ambassador (https://codeweek.eu/) and I'm also involved in MakerMeetIE (https://www.makermeet.ie/) and MathsMeetIE (https://twitter.com/mathsmeetie). I am a PhD student in University College Dublin researching Informal Learning.

7) What are some of your other interests / passions that aren't connected to your job?

I love origami – the more intricate the better! In this alternate reality we now find ourselves in I have also discovered a love of walking which provides lots of opportunities to indulge my other passion of photography.

8) Tell us something that's true and that almost nobody agrees with you on.

It might surprise people to know that I was originally a very reluctant coder – just ask my friends from college! My love of coding didn't happen to me for a long time but once it did, I was truly bitten by the coding bug!

How can people get in touch with you if they'd like to contact you?

You can find me on:
Twitter @pamelaaobrien · **Email** pamela.obrien@lit.ie · **LinkedIn:** https://www.linkedin.com/in/pamelaaobrien/
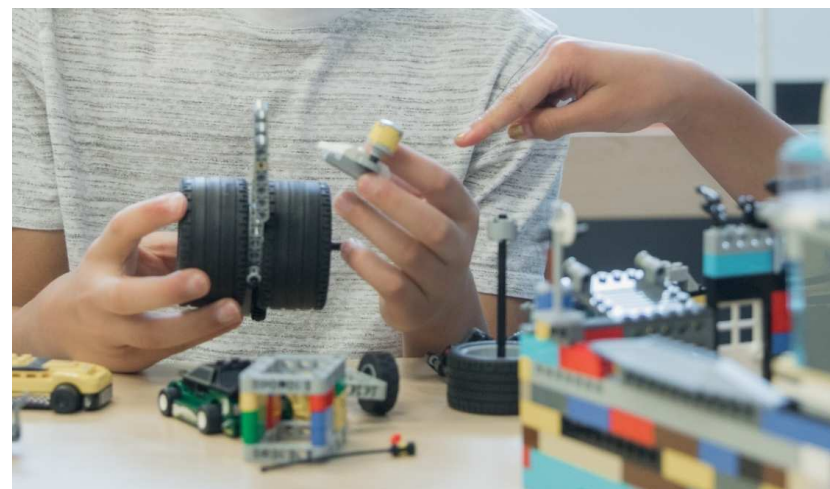
ICT in Education 2021

Reflecting on Teaching and Learning

Effective practices and processes in a pandemic.

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15th May 2021

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9.30-15.30

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Pre-Conference
Makermeet

DATE 8th May 2021 • **TIME** 11.00-13.00

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MIRROR, MIRROR ON THE WALL...

CHRIS REINA

As classroom ICT knowledge expands - one request I often hear in classrooms is *"Now that we have [iPads, Chromebooks, etc.] - how can students / teachers show the image to our projector / screen / whiteboard?"*

This process is called **Screen Mirroring** - and is always limited to your local network. It should not be confused with *"screen sharing"* when on a Zoom (or similar) call or with continuous *"media streaming"* (such as digital signage, video or audio playback). There can be some cross-over between all of these and the terminology of them may differ.

Prior to seeking an answer to the above question - you should first consider these few additional questions...

1) Can our Wifi accommodate this? (See last weeks article)
2) What type of devices am I mirroring from / to? (Apple / Android / Windows)
3) How many devices will need to mirror? (student / teacher / class)

The three main tech companies all offer their own hardware solutions: (Note that each company's device will {mostly} only work with their own hardware)

It's also worth noting that there are limitations on some of these devices as to what they can receive a screen mirror <u>from</u>.

1) Apple TV
   Mirroring Protocol : AirPlay
   URL : https://www.apple.com/ie-edu/shop/buy-tv/apple-tv-hd/32gb

   Cost : €159.00

2) Google Chromecast
   Mirroring Protocol : GoogleCast
   URL : https://store.google.com/ie/product/chromecast
   Cost : €39.00

3) Windows 4K Wireless Display Adaptor
   Mirroring Protocol : Miracast
   URL : https://bit.ly/3dfkjGy
   Cost : €72.00

Another (third-party) hardware option is the **AirServer Connect** (https://www.airserver.com/Connect).

This is a standalone box that is completely cross-platform and works with all devices and protocols. The biggest difficulty with this device is the eye-watering cost of £399.00. (I haven't tested it - if the company would like to send me a demo model however...)

There are also many software solutions - the caveat here being that you will need to install software on your device already attached to your projector.

Then you or your students simply mirror their mobile device to your computer… which in turn displays that image on your projector. This can be slightly more complicated - but certainly a cheaper option.

Note that your Wifi network should be robust enough to allow this - video streaming takes a lot of bandwidth. (Not, however, your internet connection - just your internal wifi).

Some software solutions are listed below. There are quite a few options to choose from, some are ad-supported and others are very expensive - I always recommend looking for a company that offers an educational discount.

Also some of the same limitations can apply with different software solutions… eg: some are Apple only, others Windows only - while some others are cross-platform. (All the software solutions listed are cross-platform)

AirServer ($11.99 per device)
URL : https://www.airserver.com

AirParrot (€16.88 per device)
URL : https://www.airsquirrels.com

Screen Mirroring App (Free - $12.00)
URL : https://screenmirroring.app

LonelyScreen (Free)
URL : https://www.lonelyscreen.com

Regardless of what solution is best for you - almost all will offer a free evaluation period. I strongly suggest you "*try before you buy*" as every setup in every classroom is different and there are many variables to consider.

The potential for classroom change using Screen Mirroring is substantial. When students and teachers share their work with the whole class, the 21st Century skills of collaboration, creativity, communication and critical thinking can be transformative.

> **It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow**
>
> Robert H. Goddard

POSTGRADUATE CERTIFICATE IN 21ST CENTURY TEACHING AND LEARNING

Dr Jane O' Hara

"The most dangerous phrase is: We've always done it this way" –
Grace Hopper (inventor of a 'compiler', which enabled the translation
of programmers' instructions into machine language (coding), in
1952).

The Postgraduate Certificate in 21st Century Teaching and Learning is a one year, part-time professional development programme for in-service teachers, provided by Trinity College Dublin. A collaboration between the Schools of Education and Computer Science, and the Trinity Access programmes, this level 9 Certificate brings 60-80 teachers on board each year to complete six modules, spanning from Digital Media Literacy and various levels of coding/programming, to Leadership and Inclusive Education. Since its inception in 2014, when it was aimed at Dublin schools linked with Trinity Access, the course has spread nationwide. In 2020/21, 19 counties were represented.

The aim of this course is to equip practicing teachers with the requisite knowledge, skills and competence to support the development of an innovative learning culture within schools; a culture that is student-led and team-based; as well as technology-mediated, project-focused and cross-curricular. The course modules, which are also offered on an á la carte/non-accredited basis for teachers and educators, are designed to leverage current technologies and to release students' potential through a structured move away from individualised, teacher-led learning.

Based on the pedagogy of the Bridge21 model, the course provides approaches and techniques to those who wish to design skills-based learning experiences. It aims to empower schools to build on what already works well for teachers and students, while shifting focus from the teaching of individual subjects to the teaching of key competencies and 21st Century learning skills. Our graduates are inspired to continue to make a difference in their classrooms and schools.

A key aspect of the success of this course is that many of the teachers who complete it return to teach and co-facilitate workshops in future iterations, thus ensuring that knowledge and experience are passed on throughout the years and widening the impact of the programme.

Here are some testimonials from teachers who have completed the course:

Colette Smith

Largy College, Monaghan (PG Cert 2019/20)

Participating in this course has had a profound impact on my teaching, and I start my lessons with a newfound confidence in my own abilities to use technology more. The confidence I gained meant that I had no concerns about preparing lessons for distance learning during the Coronavirus pandemic, which helped to alleviate

*unnecessary stress for me at a time of great
uncertainty.*

Deirdre Brennan

Firhouse Educate Together Secondary
School (PG Cert 2016-17)

*Participating in the Postgraduate Certificate
has helped our school introduce and embrace
21st century skills in our classrooms. We
have developed a team of teachers and
students that are engaged in project-based
learning in the Arts, Sciences and
Technology using the Bridge21 model of
teaching and learning. Personally, I am
enjoying a more facilitatory, creative role in
my classroom, and my students have become
more active learners.*

Stephen Burns

Drimnagh Castle Secondary School (PG Cert
2018/19)

*As a Science teacher the course has made me
think differently about my approach to
methods of investigation and in particular
inquiry based learning. The practical nature
of the assignments has given me more
confidence to allow students to solve
problems on their own and take more
control of their learning.*

Important information

Our course webpage provides information
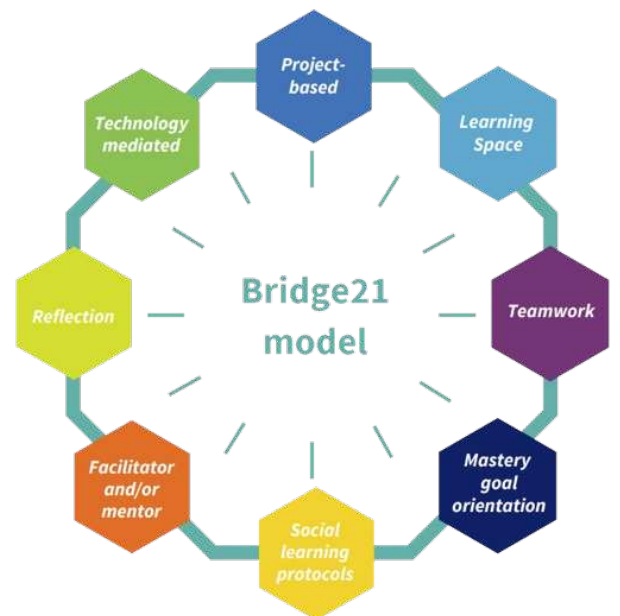
about eligibility, the course modules and how to apply: https://www.tcd.ie/Education/programmes/certificate-21Century-Teaching-Learning/

The course is open to classroom teachers anywhere in Ireland. Content is aimed mainly at post-primary teachers, but Further Education/third level teachers and primary teachers who work with the older end of primary school can also apply and benefit from the course.

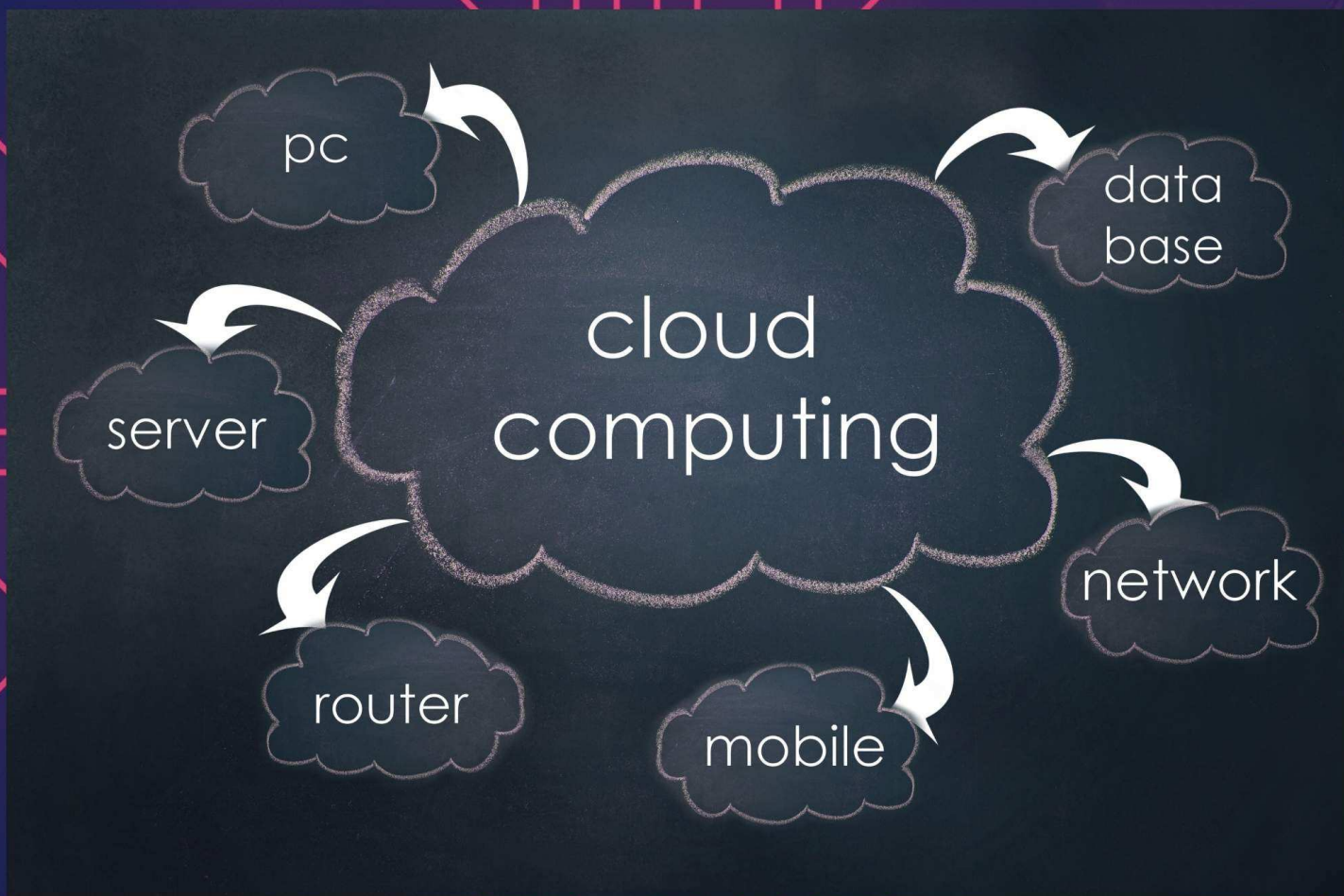Please follow us on Twitter! @TA21PGCert

Contact:

Jane O'Hara at pgcert21admin@tcd.ie for more information.

The closing date for applications to the PG Cert this year is 31st May.

CORK SCHOOLS ASCEND TO NEW HEIGHTS

PILOT VDI PROGRAMME
IAN O' CONNOR

When I first became aware of Virtual Desktop Infrastructure (VDI) over a decade ago, I distinctly remember being struck by how suitable this IT solution would be for Education providers. At the time I was an Associate Cloud Services Engineer with VMware, the global leading software solutions provider for cloud computing and indeed my first company device was a thin client connected to a VDI instance.

I started with VMware through a back to education program which was supported by the Irish Government, VMware, and Skillnet Ireland and post-recession was grateful for the opportunity. I still am grateful to this day for the career IT has given me.

As I did not arrive to a career in IT through what one may call a traditional path, I became determined to succeed and show that you can build a career in IT through many different routes. I also felt an onus to give back and have become convinced that the earlier a student can be exposed to the world of IT, particularly cloud technology, the greater the long-term benefit to the student and their options in later life.

My first opportunity to prove the suitability of Cloud based VDI for Education came earlier this year when my colleagues and I at Ascend Cloud Solutions were delighted to launch a fully funded pilot VDI programme for several schools in Cork.

As a result of the Covid 19 pandemic, schools quickly pivoted to provide remote-based learning for their students. For some schools this involved a significant investment in IT equipment to ensure that all their students had equal access to education resources. To the eternal credit of our education system, I believe that what has been achieved up to this point can be deemed a great success, I ask though, is the continuous capital investment required sustainable and what can we do to assist schools in creating a long-term sustainable digital strategy?

With this in mind, at Ascend Cloud, we wanted to build a one-stop shop solution to allow the growth of long-term digital strategies in schools and education institutes and also expose our students to technology which will play a big part in their futures. Ireland should continue to lead with regard to educating our children and providing them with the best IT

infrastructure platform from which to do so. As a company that is our aim, we need to create the next generation of IT professionals by introducing sustainable and adaptable technology to meet their education needs.

The Cork VDI Pilot Programme Overview

The Cork VDI Pilot Programme began in early 2021 and allowed students and staff of the participating schools to access cutting edge IT server power from a data center in Ireland right to their end connection point, be it on a school premises or at their home. Our data center is powered by Dell Servers with VMware's Horizon VDI software and tremendous network connectivity, it is a solution designed, hosted, and supported in Ireland. The Programme operated in two Second-Level schools, and two Primary Schools in Cork, running at zero cost to the schools as funding had been secured from Ascend Cloud and its partners, enabling it to operate until the end of school year 2021.

We adopted a complete ownership model whereby we worked with the participating schools onsite at the school location enabling the front end (school) to be configured to connect to cloud. Existing PC'S/Laptops were reconfigured where possible, thin clients, monitors and peripherals were deployed, and we even organised the carpentry and electrical design work where it was required. The Pilot Programme was built to make it as easy as possible for schools to provide cutting edge

IT resources to their staff and students and to allow teaching staff to teach, this was achievable by adopting a total support model from school to cloud!

The back-end or cloud side is also fully designed and supported by Ascend Cloud's industry leading team of Solution Architects, Support Engineers and Client Engagement team, this enables a single point of contact for all support, if required. Each school is assigned a dedicated member of our Client engagement team and Ascend Cloud are members of the prestigious VMware Cloud Provider Partner Program.

Benefits of VDI to Education

· Imagine a system that is faster, more secure, adaptable, future focused and customizable to suit the needs of students, teachers, and staff!

· VDI uses far less power than traditional devices and requires only 4mbps and upwards internet connection.

· Removes the need for schools for schools to have a skilled teacher or ICT technician available to fix issues with accounts or applications.

· Provides equality of access to high-computing power to every student, regardless of school demographic, location, and number of students.

· Minimal staff involvement required, freeing up staff for other areas of focus.

· Is remotely configured and managed, application changes, updates, patches are done at the Cloud level remotely and cascade down to each instance.

· Support provided by email to case support and on-site installation team.

· All accounts are secure, compliant, include anti-virus and secured by industry leading firewall protocols.

· Each individual school chooses what applications they need to run on their deployment, teams, SolidWorks etc.

· Current devices in schools do not need to be replaced, simply repurposed as connection endpoints to Cloud VDI. This gives a second life to older PC's and devices (Reuse/Recycle/Green IT).

· Cloud based VDI is supported and accessible from anywhere by students and staff on any device, 24/7. For example, a student can access the VDI image from home via tablet, phone, x-box etc., or a mobile VDI device can be prepared and shipped to the students' homes where necessary.

· A centrally managed VDI system results in huge economies of scale.

· No more requirements for significant capital expenditure for a school, ever!

· As the service will be subscription based, schools will only pay for what they consume and only across 8 or 9 months of the year. No more expensive devices sitting idle and depreciating over the summer holiday months.

Typical Classroom Deployment

· Total Cost for all 6 devices including labour was less than the cost of one mid-range laptop and remember these six devices can provide high-end computing resources for up to 60 students, available anywhere on any device!

· As a result of these types of deployments students are becoming digital natives and

teachers begin to integrate more ICT into their lessons.

According to the principal of Coláiste Chríost Rí, Pádraig Macanrí, the partnership of Ascend and the School has the potential to fundamentally change the digital learning landscape in schools.

"As a school we already have a well-developed digital learning plan, while our online teaching and learning capacity is very good". *"We are always interested in improving our practice and this will be hugely beneficial or both our staff and students going forward."*

"During the pilot phase we will be using our in-schools devices to access the Cloud Servers which have the potential to provide our students and staff with network internet speeds of up to 1.2gbps, using any device from any location in school or at home."

"Using the virtual desktop infrastructure, any device that even has a weak internet connection can connect to the cloud service and access high speed compute resources."

"Our role in the pilot is to operate the system and provide feedback to Ascend so they can fine tune the VDI system in advance of a nationwide roll-out."

Perhaps the most important component of any proposed Virtual Desktop Infrastructure deployment will be the initial on-site school survey completed by the Ascend Cloud team. This complimentary survey will be undertaken by staff of Ascend Cloud at your school location. Here we will build an itinerary of what can be re-purposed and used to connect to a Cloud based VDI deployment (Green IT) and understand your schools application requirements and digital roadmap allowing us to build an individual proposal for your school.

Ascend Cloud will be launching its **VDI for Education** offering in May 2021 nationwide in Ireland and are registering expressions of interest: https://www.ascendcloud.ie/ascend-for-education/
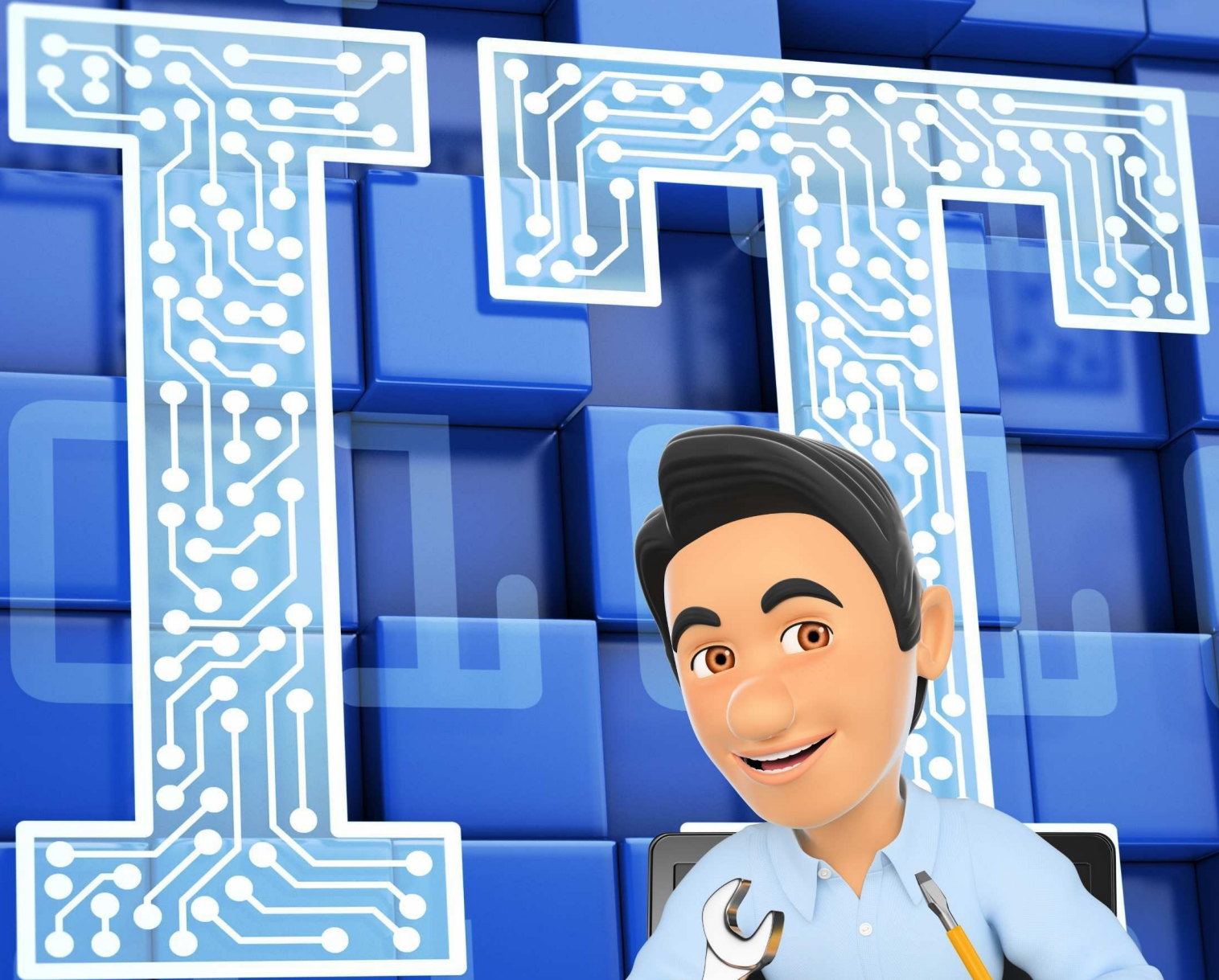
Have the courage to follow your heart and intuition. They somehow already know what you truly want to become. Everything else is secondary.

Steve Jobs

@ExploringEdtech

TECH SUPPORT

HOW TO KEEP YOUR COMPUTER RUNNING SMOOTHLY - PART 2

Val Gavin

Last time we discussed how to keep your computer running smoothly by making simple changes. For this article we will discuss how to get the most out of your older computers by fitting new SSD (Solid State Drives), installing more RAM thereby allowing these computers to compete with and even outperform low end new notebooks at a fraction of the cost. Just because these older computers are 6, 8 or even 10 year old doesn't necessarily mean that they should be binned or recycled, any computer (PC or Notebook) with an i3 or AMD equivalent CPU, no matter its current memory or hard drive size is more than capable of running all school related software once you replace the old mechanical disk with an SSD drive and fit at least 8GB RAM.

I know that many schools have perfectly good Desktop and Notebook computers running Windows 10 but these have slowed over the years and are now almost unusable in the busy classroom where boot times can be 5-10 minutes or longer.

Switching between programs in the classroom has become a nightmare because it takes way too long, teachers are busy enough without the added stress of these computer issues.

The problem is not the computer hardware,

it does not get slower with age, your computer programs and operating system runs slower now because every update of your Microsoft operating system is more complex than the last, every browser and program update demands more computing power, your hard drive is filling up with rubbish.

With less space on that drive, large files are getting fragmented which makes them harder and slower to load and read, you are also streaming software off the internet and competing with your colleagues for that limited bandwidth, your computer is ok but your demands on that 4GB of RAM and the mechanical disk have changed.

It's time to upgrade your Windows 10 Notebook or Desktop Computers

To clone the drive you will need to purchase a 2.5" SSD drive 128GB or preferably 240GB and suitable 8GB RAM chip for your computer. RAM chips for notebooks and Desktop PC's are different and not interchangeable, so to get the correct RAM chip for your computer, you can try https://www.mrmemory.co.uk/ or check the computer manufacturer's manual and you can then purchase it from your local IT supplier.

You will also need a SATA (Serial AT Attachment) to USB adaptor, this allows you to connect the drive to the computer via the USB port just like a flash drive.

Cloning is making a complete image of your existing Hard Drive so that when you swap out the drives your computer will start as normal but will be considerably faster.

For ease of use I would recommend Acronis True Image (about €49.00) for cloning, you can get it here: https://www.acronis.com/en-eu/products/true-image/ download and install; when complete it will create a shortcut icon on your desktop. Once it is installed, shutdown your computer, you must now fit the new SSD drive inside the notebook and connect the original mechanical drive with the Windows operating system to the USB port using that SATA to USB adaptor.

To install the new chip and the SSD drive, follow the instructions on the notebook

Once you are in the BIOS look for the Boot Menu and move the USB drive to the number one position, in most computers this is done by pressing the F5/F6 key, there will be information on screen to help, once complete, press F10 to save and reboot. If all went well your computer will boot as normal but from the USB drive, now you can run the Acronis True Image software and follow the instructions.

Full installation instructions here:

https://www.acronis.com/en-us/support/ documentation/ATI2020/#30481.html

Good luck and if you have any questions you can email me val@valgavin.biz

Upgrade your older Win7 computer to Windows 10 or better still to Linux Mint

I have been asked a few times if it is still possible to upgrade from Windows 7 to Windows 10, even though Microsoft has withdrawn support for it and no more updates are provided since January 14 2020, as of March 2021 that option was still available, so it is worth a try.

How to upgrade to Windows 10 from Windows 7

I would advise that before you attempt the update do the following, uninstall all AV or Malware programs from the computer, backup all files that you require to a safe

manual which you can download from your computer manufacturer's website, so that you can safely open the case and fit the new chip and that new SSD drive, it should be much more straight forwards to do this on a Desktop PC.

Now you must change the boot order so that the computer boots to the USB drive holding your Windows Operating System.

This process is completed by accessing the computer BIOS (Basic Input/Output System), the manual will tell you what key to press at start-up to get into the BIOS and the start menu, in some computers the BIOS is accessed by pressing the F2, F9 or the delete key just when the computer name and/or logo flashes on screen, it may take a few attempts to get the timing right!

place like One Drive or Google Drive or your NAS (Network Area Storage) box.

Download all the computer device drivers from the manufacturers' websites, especially network card, wireless device and video drivers and store these on a USB drive or somewhere safe that you can access later, because after the update your network card might not be working, and you will need to install these drivers so that you can connect to your local network or the internet to complete the process and install the latest Windows 10 updates.

Go to:
https://www.microsoft.com/en-gb/software-download/windows10

Scroll down to **'Download tool now'** after the download completes, run the Media Creation Tool.

When you run the media creation tool it will give you two options. Select the first option **"Upgrade this PC now"** and follow the instructions. The process typically takes about 60 minutes or so but that will depend on your computer, this upgrade doesn't require a product key (since you are upgrading from Windows 7), and when you finish you will have a digital license for Windows 10.

There is a very detailed set of instructions on the following link as to how you complete the upgrade and the method you chose, scroll down and expand the options:

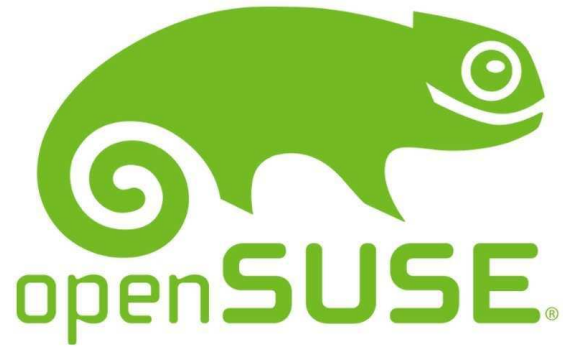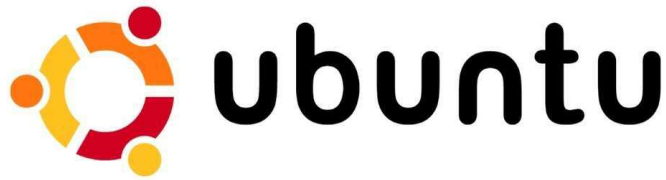https://www.microsoft.com/en-us/software-download/windows10

The second option will allow you to create installation media for another computer and for that you will need an 8GB USB flash disk, you would do this if your hard drive had failed and you purchased a new one for that computer, for this option you will need the original product key or purchase a new licence key for windows 10, to find your existing Windows or MS Office product key download this app:

https://www.nirsoft.net/utils/produkey-x64.zip extract and run it.

And now a look at Linux

I have been installing Linux on computers for many years and on older school computers for the last 5 years, here is a description of the OS, its uses and users. I will go through the process of installing it on an older computer (notebook or desktop) that might have otherwise been marked for the recycle bin.

Linux is the most versatile and widely used operating system in the world, today you'll find Linux on smartphones, TVs, cars, home appliances, desktop computers, notebooks and Chromebooks, but that is just the beginning, it is said that every Supercomputer in the world uses Linux, other users are Social Media Networks, NASA, ISS, JPL, LHC Cern, TESLA, and even Nuclear Submarines. I'm sure we've all been watching that tiny helicopter '*Ingenuity*' making the first powered, controlled flight

by an aircraft over the surface of another planet, well that too is using Linux:

https://mars.nasa.gov/resources/25828/first-video-of-nasas-ingenuity-mars-helicopter-in-flight/

Linux is a freely distributable version of Unix, originally developed by Linus Torvalds, who started work on the Kernel in 1991 while he was a computer science student at the University of Helsinki. Torvalds and other students were working on another open source Unix-like Operating System called MINIX (MINi-**unIX**), created by Andrew Stuart Tanenbaum as an educational tool to teach students how Operating Systems worked.

MINIX was released in 1987, MINIX was Torvalds inspiration to develop his own operating system which he called Linux, which is said stands for '*Lovable Intellect Not Using XP*' but more likely it was named after Linus's MiniX, either way it has his name!

Linux isn't a complete Operating System — it's a kernel. Linux developers take the Linus Torvalds kernel and combine it with other free software to create complete packages and this is where we get the modern distributions or (distros) of which there are many. The most widely known distros are Ubuntu, Debian, Red Hat, Suse, Mint and Fedora...

For anyone interested, the following texts were written by Linus Torvalds between '91 and '92:

https://www.cs.cmu.edu/~awb/linux.history.html

Installing Linux Mint

So why not try it on one of your old notebooks, anything will do, an old Intel Core 2 computer, even a Pentium with 1GB RAM, but preferably with 2GB and a 15GB hard drive with a graphics resolution of 1024*768.

Before you install Linux on a computer, you can download the .iso and run it off a 4GB USB flash drive, so why not give a try.

I would recommend using a distribution of Linux called Mint, it is easy to use and looks a lot like Windows, to download the correct file will depend on your computer, if it is 64 or 32 bit.

Modern computers from the Intel Core Duo onwards should be 64bit and before that like the Core Duo Solo and previous were 32bit - to check which you have go to computer explorer right click on 'This PC' or 'My Computer' and click properties and check System Type, 64 or 32 bit, then download the version that suits your computer architecture.

Linux Mint 20.1 "Ulyssa" Cinnamon, 64bit you can download it from here:

http://ftp.heanet.ie/pub/linuxmint.com/
stable/20.1/linuxmint-20.1-
cinnamon-64bit.iso

And the 32bit Linux Mint 19.2 "Tina" - Cinnamon (32-bit) from here:

http://ftp.heanet.ie/pub/linuxmint.com/
stable/19.2/linuxmint-19.2-
cinnamon-32bit.iso

Go to https://rufus.ie and download rufus 3.13, this is a program you will need in order to compile the linuxmint-20.1-cinnamon-64bit.iso or the linuxmint-19.2-cinnamon-32bit.iso file onto a bootable USB flash drive. Insert the USB Flash Disk it should be 4GB at least but preferably 8GB.

You can run the program from the download folder so browse to the download folder, find the file called Rufus-3.13 and double click it, it will find the USB flash
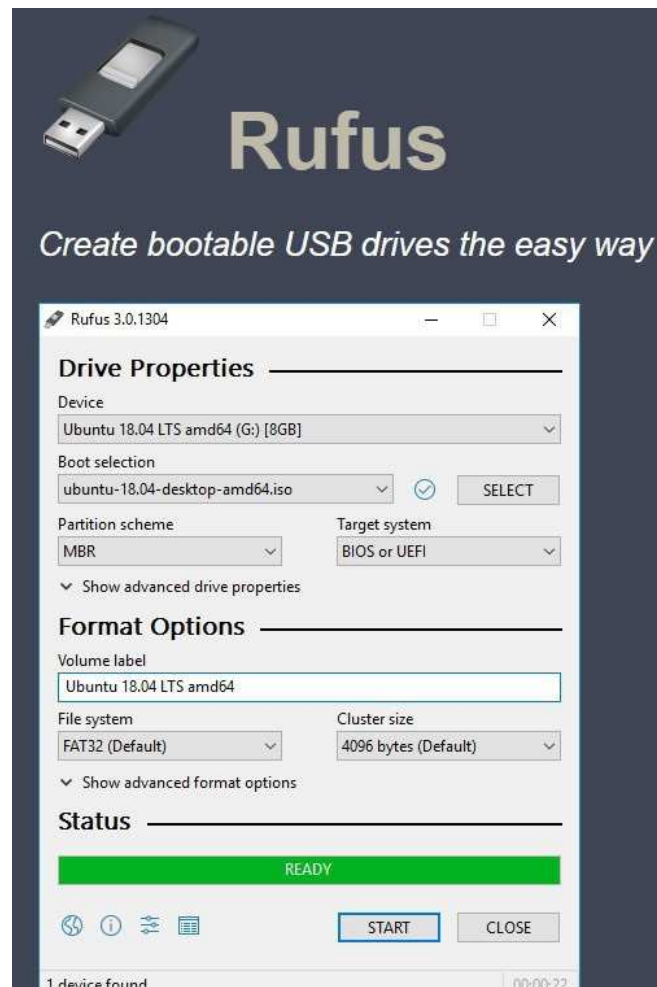
drive – you will see this under device, under that is boot selection (Disk or ISO Image (please select) - to the right of that click on select and browse to the Linuxmint .iso image you downloaded and click open.

Next choice is Partition Scheme, the default is MBR which is suitable for older computers, 'more modern chose GPT" so leave it as it is, you can rename the volume label or leave it as is, click start. If asked to download 2 files Idlinux.sys and Idlinux.bss click yes and continue, the process shouldn't take much more than 5 minutes.

Once it is done, restart your computer and

force it to boot into the USB drive. To do that you must change the boot order so that the computer boots to the USB drive holding your Linux operating system (as detailed earlier in this article). If all went well your computer will boot into Linux.

This is what your Linux Mint desktop looks like, connect to your network the WiFi icon (in the same place as the Windows 10 one), if you like it, you can install it on that notebook or PC, just click on the Install Linux Mint icon on the desktop, you will be given the choice to install it alongside the Windows OS or format the disk and do a clean install, the choice is yours.
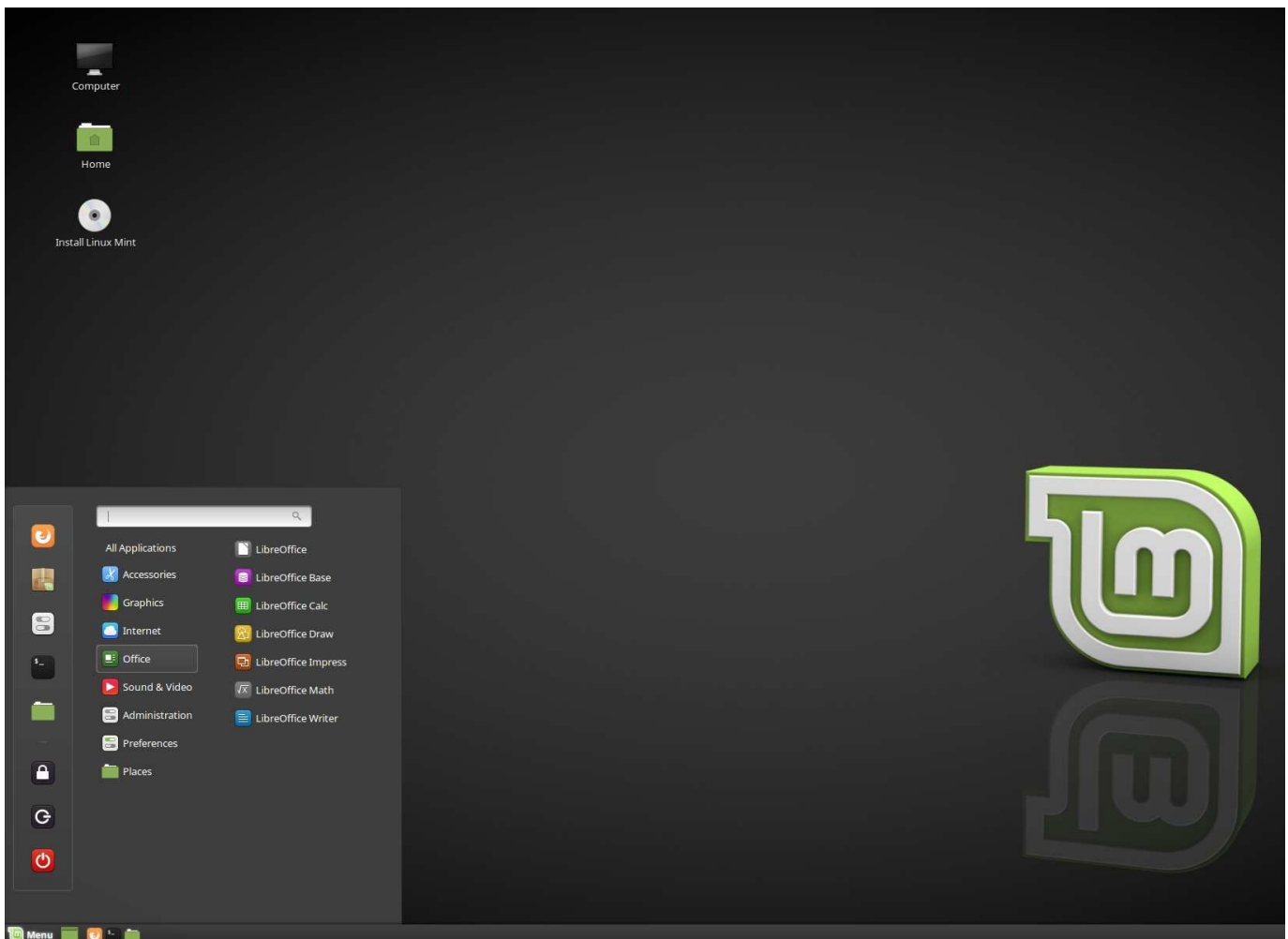
A QUICK EXPLANATION OF BROADBAND SPEEDS AND BANDWIDTH

Your Broadband connection to the Internet is measured in (MBps) or Megabits per second this is the maximum amount of data measured in bits (0's or 1's) that can be transferred per second over a network link between two computers.

Internet speed is just the quickness of the data transfer, the actual data transferred over the link is measured in (MB) Megabytes, this is the physical size of the file.

To download a 100 (MB) Megabyte file (for instance this might be a small program you are purchasing online) over a 100MBps will take about 9 seconds, providing everything works perfectly and you have all that bandwidth to yourself.

If you were to download a Windows10.iso installation file sized at 3.5 GB, this is equal to 3,758,094,460 Bytes each of those bytes is made up of 8 bits and that is equal to 30,064,755,679 Bits of data, downloading this file would take just 5 minutes if you have full access to that 100MBps bandwidth and no other issues, if you have only 10MBps it would take 44 minutes.

SOME MORE USEFUL KEYBOARD SHORTCUTS

Windows Key + Tab = Launch Windows 10 Task View

Windows Key + A = Open the Windows 10 Action Center

Windows Key + I = Open Windows 10 Settings

Windows Key + K = Connect to wireless displays and audio devices

Windows Key + E = Open File Explorer

Windows Key + P = Project a screen

Windows Key + , = Peek at the Windows desktop

Windows Key + . = Emoji App

Windows Key + T = Select a Taskbar icon

Windows Key + Down Arrow = Minimizes the screen

Windows Key + R = Opens the Run box into which you can type commands or keystrokes to access your computer.

contributors and credits

Exploring EdTech Ireland is grateful to all our writers for permission to publish their work in the magazine and on the hub.

MARK SPARVELL

Mark Sparvell is an award-winning educator and leader with 30 years' experience globally. Mark is interested in the role technology can play in humanising learning, not simply digitising content at scale.

Currently, Mark is a Director of Education Marketing for Microsoft, an advisor for Goldie Hawn's MindUp Foundation, Ambassador for the Australian Emotional Intelligence Society, member of the BETT Global Education Council and a founding steering-committee member for Karanga Global SEL Alliance

Follow Mark on Twitter @sparvell

JENNIFER MCGARRY

Jennifer is a 5th class primary school teacher and eLearning Coordinator in Alexandra College Junior School in Milltown, Co. Dublin and has an interest in all things tech, art, science and wildlife related. As well as teaching her mainstream 5th class, Jennifer runs the Junior School's Makerspace and Code Clubs as part of the after-school programme.

Furthermore, Jennifer is the Primary School Specialist with Irish company Make Create Innovate and collaborates with them to create educational resources linking computational thinking and technology to the primary school curriculum from 3rd to 6th class.

Jennifer is also one of two lead coordinators with European Schoolnet on the ARETE Pilot 1 project, working with 40 teachers across several European countries to investigate the effects of augmented reality (AR) on English language attainment through the WordsWorthLearning interactive mobile AR application.

Jennifer recently completed her Higher Diploma in Science in Computing with TUD Tallaght and is looking forward to undertaking new challenges and collaborations in the future.

Make Create Innovate: https://www.makecreateinnovate.ie/about-us

CHRIS REINA

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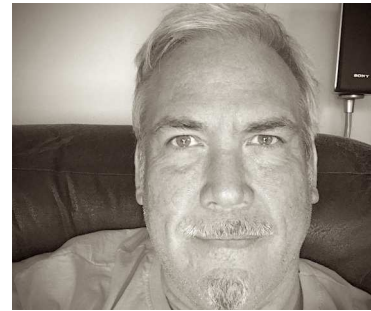
As a Maker - for the last 4 years Chris has been combined his tech and Maker skills to devise and deliver workshops to educational organisations in a wide variety of areas.

Chris can be reached at: **087-2685020** or at:
Web: www.makermeet.ie / www.teachtech.support
Email: chris@makermeet.ie and
chris@teachtech.support
Twitter: @chrisreina · @MakerMeetIE

VAL GAVIN

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 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.

Tel: 0872671234
Email: val@valgavin.biz

NIAMH BRADY

Niamh is currently working as a special class teacher in St. Mark's Special School in Newbridge, Co. Kildare having spent 14 years in a mainstream setting. She is passionate about all things STEAM related and successfully completed the Postgraduate Certificate in 21st Century Teaching & Learning (STEM) in 2019 from Trinity College Dublin.

As well as her daily teaching, Niamh regularly delivers her own CPD courses along with facilitating courses for the PDST Technology in Education and Discovery Primary Science and Maths.

Furthermore, Niamh is a Creative Associate with the Creative Schools Initiative. She is working in partnership with Donore NS in Co. Meath and supporting the school to deepen the arts and creative opportunities for their pupils.

Niamh is in her final semester of a Higher Diploma in Science in Computing in TUD Tallaght and is looking forward to new opportunities after her course.

Follow Niamh on Twitter: @MsNiamhBrady

TIM LAVERY FRCGS FLS

Founder of World Explorers Bureau, an award-winning agency representing world-class explorers, educators and field scientists. A professional entomologist and edtech specialist.

Intel Master Tutor, Microsoft Innovative Educator Expert

Twitter @timalavery

YVONNE CONATY

Yvonne Conaty is the P-TECH Programme Manager for IBM in Ireland.

An experienced teacher of 11 years, prior to joining IBM, Yvonne taught in Coláiste De Lacy, Ashbourne actively promoting the use of ICT and digital technologies across the curriculum.
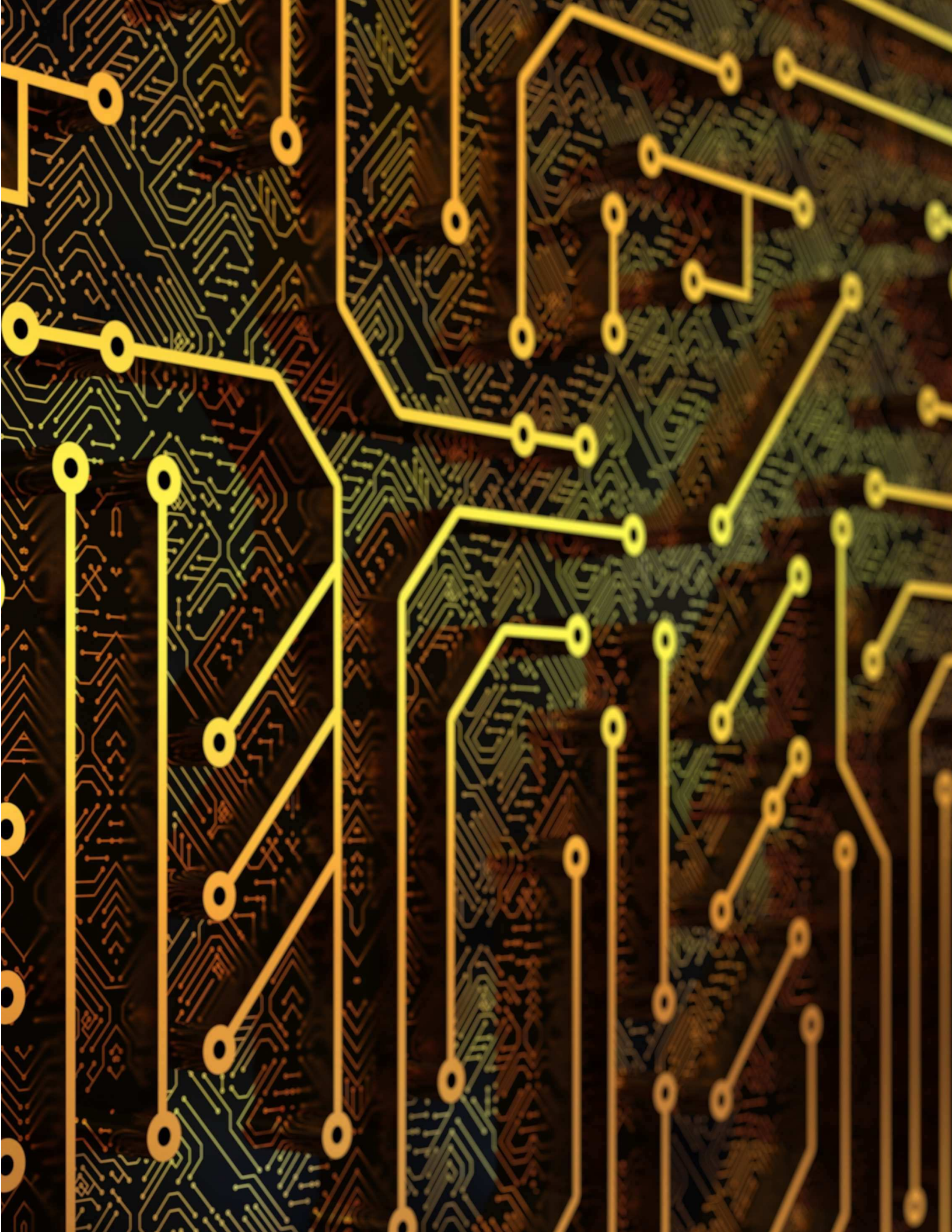
yvonne.conaty@ibm.com

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