THE ESSENTIAL GUIDE

EdTech at School

REAL EXPERIENCES SHARED BY EDUCATORS AROUND THE WORLD

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EdTech at School

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This E-book is co-authored by international educators:

Dr. Sonny Magana EdD	Dr. Beth Holland
Miriam Walsh	Steve Bambury
Yungjin Oh	Chad Lewis
Matt Hood	Raghad Alshiekh
Jenna (DeShaney) Linskens	Dr.Anne-Marie Clarke
Bonnie Cazer	Lisa Bradley-Coates
David Weston	Dr Ger Graus OBE

We would also like to show our gratitude to each one of them for their contribution in sharing their professional opinion on the topic education technology at school.

EDUCATION TECHNOLOGY AT SCHOOL

This E-book is designed to support educators with case studies of education technology use at school.

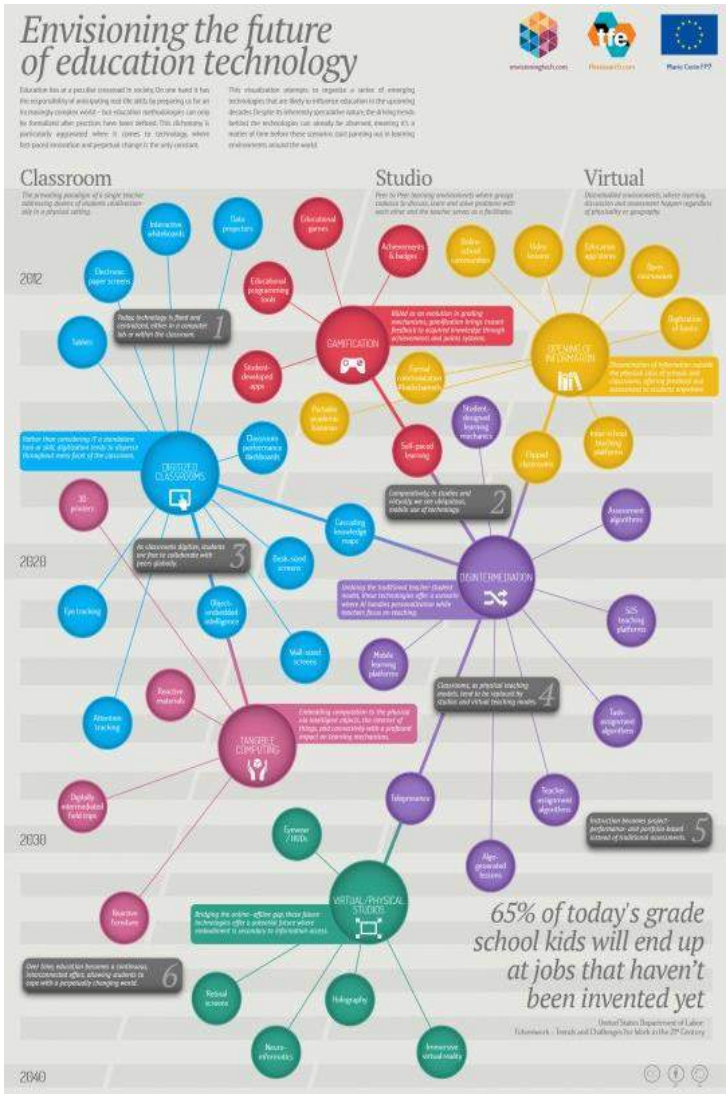
Table of Contents

The Future of Education Technology

Books were driving **education** for many years. They still remain an essential part. Interesting enough that the world changes and **technologies** like **Augmented Reality**, cloud computing, mobile apps are taking over the drive.

by mz.

From Visually.

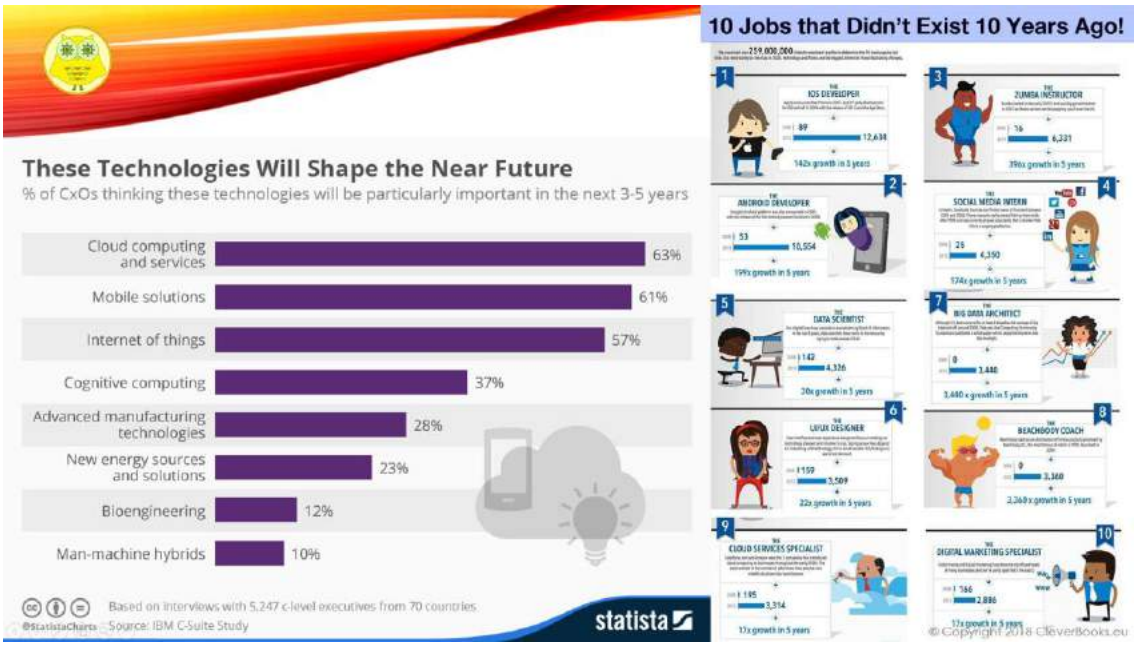


How EdTech has Re-shaped the Education Landscape

We all can agree that the **education landscape** has changed over the years. The advent of computers, mobile phones, and the Internet, has produced so many **technologies** that were not present five or six decades ago.

Education technology (normally known as **EdTech**) is a field of **technology** that deals with the application and development of tools designed to enhance **education**. It helps to create and manage appropriate **technological resources** and processes that improve performance and facilitate **learning**. The future of **education** will rely on how **educators** will be able to assimilate these technical processes when **teaching**.

The World Economic Forum presented the top skills that will be required for the jobs of the future in the next 10 years: problem-solving, critical thinking and creativity. Those skills will differentiate humans from machines in the **digitized era**. The skills that today's *children* need to develop to prepare for the **future workforce**.



Images sources:

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https://assets.weforum.org/editor/CvCvMERWTV5BUjnCJoBgoWaWof8zAtQj37LV43X--Ww.jpg

The **21st century** Bloom's Taxonomy lists "Creation" as the highest order of thinking skills. There are Seven **21st century** Lifelong Skills students are expected to develop, and again creation is listed among them. Consistent in Bloom's, the 7 Lifelong Skills **students** need for the future, the Constructivist Learning Theory, and the International Society for Technology in Education standards, creativity is what experts deem as a highly important skill for all **students** to develop. Tools that promote creativity allow **students** to express their **learning** and understanding in unique and meaningful ways (Jenna A. Linskens, EdD, Instructional Technology Specialist. Full article - LINK).

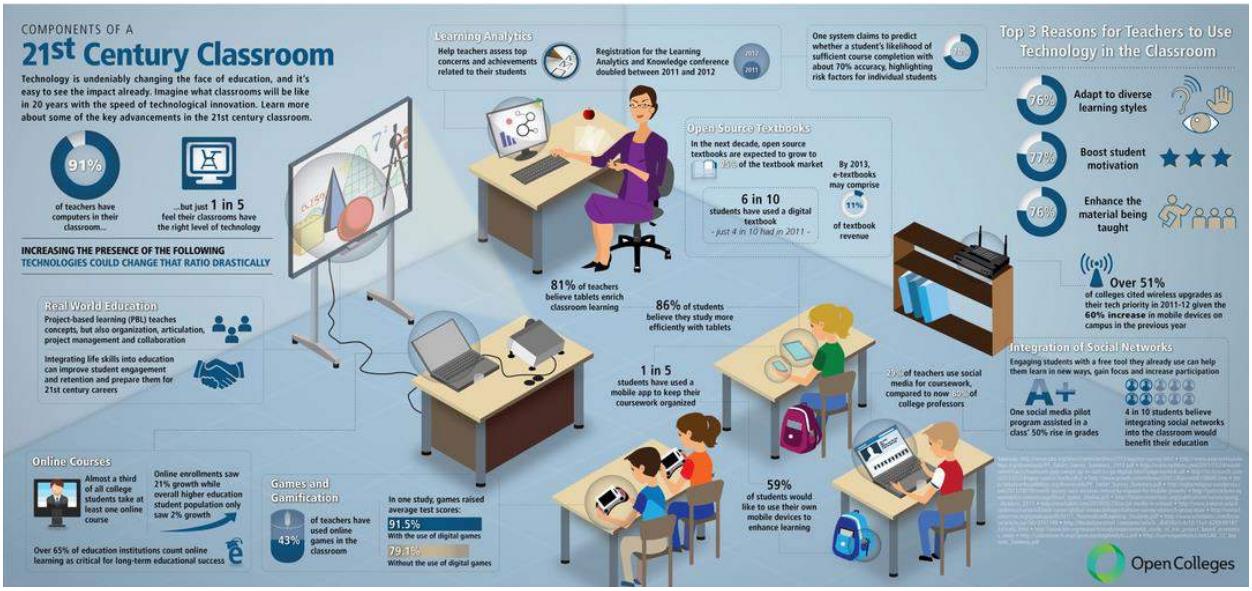
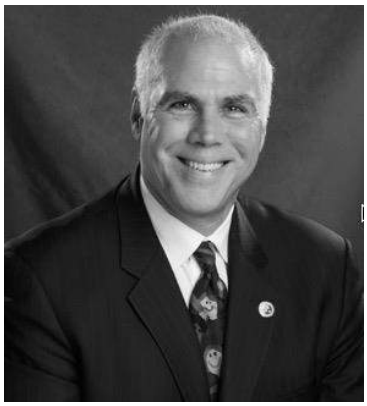


Image source:
https://elearninginfographics.com/wp-content/uploads/21st_century_classroom.jpg

Disruptive Classroom Technologies: Transcending the Status Quo with the T3 Framework



Dr. Sonny Magana is an award-winning teacher, best-selling author, and pioneering educational technology researcher. Painstakingly synthesizing four decades of groundbreaking research into his latest book, Disruptive Classroom Technologies, Dr. Magana introduced the T3 Framework for Innovation to wide international acclaim. Dr. Magana's research methods and findings underpinning the T3 Framework were recently peer-reviewed and inducted into The University of Oxford Research Encyclopedia for Education.
Dr. Magana founded and served as Principal of Washington State's first CyberSchool in 1996, a groundbreaking blended learning program that continues to meet the needs of at-risk students in Washington. He holds a bachelor of science degree from Stockton University, a master of education degree from City University, and a doctorate in educational leadership from Seattle University.

Educators and **educational leaders** bear enormous responsibilities for orchestrating and shaping the future. We do so by empowering our current **students** to interact and develop deeper connections with knowledge, each other, and themselves, in a modern world context. This is what makes teaching the noblest, and perhaps most portentous profession.

Arguably, the modern world is experiencing a profoundly disruptive period. Across the globe, **digital technologies** have enabled radical transformations in nearly every imaginable endeavor from archeology to zoology. It stands to reason that **educators** must effectively manage **modern teaching** and **learning tools** and processes in order to better prepare **students** for social and professional success many years down the track.

A meaningful way to look at the evidence of **technology's impact** in education is to use a measurement called effect size—a statistical construct that was advanced by internationally renowned **education** researcher John Hattie. One can think of effect size as a scale starting with practices that negatively impact **student learning**, and incrementally moving towards methods that positively impact **student learning** and achievement. The tipping point on Hattie's scale of effect sizes is the average impact of the hundreds of **educational** interventions that were analyzed. This average is .4 and can also be considered the entry point for practices that have a desirable effect on **student** achievement (see Figure 1). Practices with an effect size above .4 can be considered desirable—in fact, the higher on the scale, the more desirable—anything below an effect size of .4, not so much.

After reviewing over 160 meta-analyses from over 10,000 studies on the impact of computers in **education**, Professor Hattie observed that the average effect of **digital tools** in **schools** is an anemic .34, which is well below the zone of desirable effects. Worse still, this meager impact has not changed in over 50 years, despite vast leaps in **digital technologies** since the swinging 60s. The meter for **innovation in education** appears to be stuck—on low.

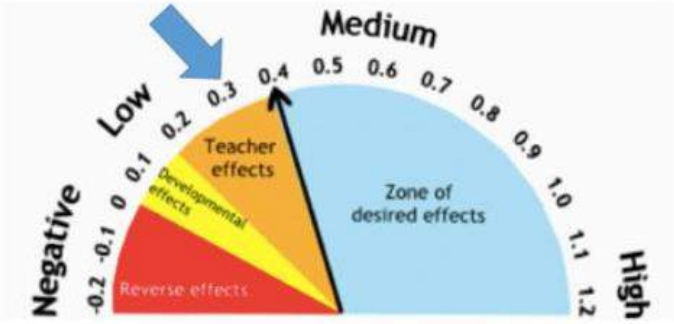


Figure 1: 50-Year Average Effect Size of Ed Tech is .34

Fortunately, there is indeed cause for renewed optimism—once again based on evidence provided by rigorous research. After more than 30 years of investigating the wicked problem of advancing **technology** and **innovation in education**, my colleague Dr. Robert J. Marzano and I have observed that when **technology tools** are used to enhance **innovative** practices that are grounded in sound research and theory, one can expect large to very large gains in **student** achievement and **learning** productivity.

I've synthesized my life's work into a new book, ***Disruptive Classroom Technologies: A Framework for Innovation in Education***. The overarching goal is to disrupt the predominant use of **educational technology** tools by using T3 Framework for **Innovation in Education** as a lens through which to view **schools** and schooling. The T3 Framework is an evidence-based model which increments **technology** usage in **school**s into three distinct domains: T1: Translational, T2: Transformational, and T3: Transcendent (See Figure 2).

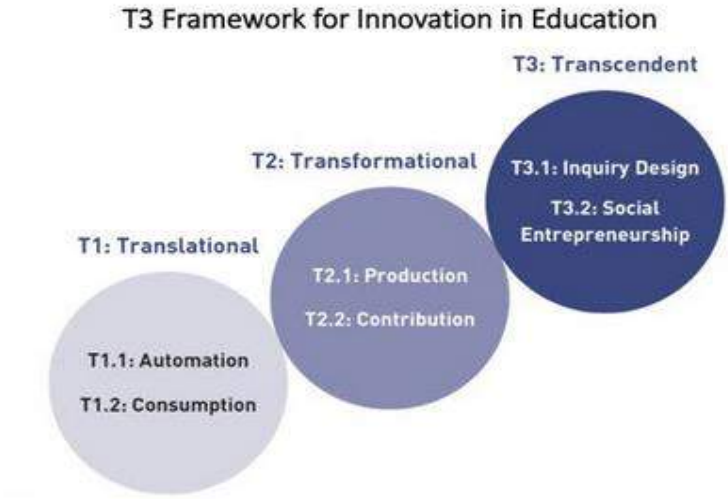


Figure 2: The T3 Framework for Innovation in Education

No one can predict the future. However, together we can use guidance provided by the T3 Framework to not only disrupt the historic pattern of low **technology** use in **education**, but to transcend the expectations and limitations of organized **educational systems** to unlock **students**' limitless **learning** potential. That is arguably a set of ideas worth pursuing and sharing by today's pipers at the gates of dawn.

Read full article - LINK

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Want to touch Geometry?

LAUNCH THE app "CleverBooks Geometry", SELECT – SHAPES, FACE THE CAMERA ON THE PICTURE BELOW

Download App for Android from Google Play (CleverBooks Geometry):

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Apply for a full FREE DEMO pilot program "**Diversity in learning STEM concepts using visual Augmented Reality technology**" – LINK.

Do you have any questions? Please e-mail me (Helena Smith) at marketing@cleverbooks.eu

A Teacher's Voice on Technology in Education

Miriam Walsh *is a Further Education teacher interested in emerging technologies and accessible learning. She is currently part of the Technology Enhanced Learning team at St. John's Central College which aims to promote the integration of technology across further education.*

She has been an Apple Distinguished Educator since 2013 and has also served on the ADE Advisory Board for EMEIA. As part of this role, she has helped to organise #AppleEDUchat which enables engagement between educators through an online weekly chat on Twitter.

Listen a full podcast recording – LINK.

CB: *Are you positive about using technology for educational purposes?*

MW: Yeah, we use technology in class all the time. My class have 1:1 iPads as well as computers.

The **technology** has made my class a lot different to the one that I taught in when I started 8 years ago. My **classes back then** were very much theory based. So, you would talk about doing something and you wouldn't have very much chance to do what you were talking about. I would give handouts and just talk through the process. But now with the **mobile devices**, the students are much more engaged we talk about **creating** videos and then they create. The students are more engaged, they become authors and directors film makers and designers. And they show up to class and always leave with some example of what they've learned that day. **Reactions to technology and education is definitely positive.** I've seen the difference that technology has made to my own classroom.

CB: *Maybe you can give examples from your own practice with what you use?*

MW: I'm really lucky, my students have iPads, as well as computers. We do a lot of film-making, designing and coding. With **coding** students can become **computational thinkers** and **problem solvers**. They are more creative. We code light shows with spheres; they create app

prototypes with Keynore. I'm a strong believer that **everyone can code** and I'm seeing this to the students, they may not know where to start, but when they're shown what to do, they can then find their own motivations, figure out how they can code and how it will work for them.

I've also been using **virtual and augmented reality** a lot in my classroom over the past few years. This has really accelerated last year, especially since the introduction of the **ARkit** so there's a whole world outside of the classroom for students. We have created **virtual videos** using 360 images, they visit a country, and then they make video on that country that they've been to. But they don't actually have to leave the classroom. The virtual reality apps, and similar augmented reality make a lot of things more accessible for them.

We haven't really done augmented reality yet this year. That's the next topic that we're going into. But I have examples of how it's used in particular in medicine and science. And things like the IKEA app, we will be looking at and then hopefully they'll go on and create their own project. I like **ArMakr**, **AR kit**, I have only just come in I the ones that will be looking at examples of what other people have done. And then they'll hopefully create some different projects.

Last year, I had **a student created a project** where she teaches young kids how to learn different colors and different numbers by making them pop up out of the page. And she actually put them all in a digital book at the end of it, which was really interesting to see.

CB: *Why would you think some teachers will not implement tech in their classroom?*

MW: I think fear is the probably the biggest thing the with fear of **change**. Nobody wants to learn something new or try something new, it's totally different to what they have been doing for the last maybe in 20-30 years, they've learned how to write on the **blackboard,** then a whiteboard, then an **interactive whiteboard**. And then you have devices. And some people just don't want to change, they don't want to embrace technology, they just want to do things the way

they know. But you're kind of missing out, you're missing out on all the things like the worldwide field trips that my students get to go on.

We have a lot of teachers coming to us for professional development courses in our training center, which is really, really good to see, we have had over 300 teachers in the last year, come to us just to learn something new. They come to learn coding, film-making, digital book creation or even just making assessments digitally, or creating digital portfolios. And that kind of gives me hope that **people do want to change**, you just need to know where to start.

Useful Links:

- Apple Regional Education Center for Teachers (free courses)
- EduCreatorBlog
- TheEDtechportal.com
- Linkedin
- Twitter
- Instagram
- Clips for video
- Free courses for teachers on technology for education
- Simulink for virtual trips to different countries and places
- GeoGebra
- Apple Global Community of Educators

Technology Became an Essential Tool for the Classroom

Yungjin Oh *began his teaching career after 5 years working in the marketing industry in New York City. After receiving his M.Ed in elementary education from Lesley University, Mr. Oh started his international teaching career teaching in several schools in Switzerland. Currently, Mr. Oh is the primary school principal and the director of technology at formatio Privatschule, a bilingual school (primary, secondary and high school) in Triesen, Liechtenstein.*

Starting in 2012 using his own iPad in the classroom, Mr. Oh sparked the integration of technology at formatio Privatschule. Mr. Oh was responsible for the transition from a shared computer room to a 1 to 1 iPad environment which was achieved in 2016 across the entire school.

Listen a full podcast recording – LINK.

CB*: Do you support* ***technology*** *integration in the* ***classroom****?*

YO: Yes. 100%. When I first started here, we had the traditional set up of having a **computer room** which were all **Windows PC**. We had maybe 12 computers, which was shared across the entire **school**, from **primary school** to high school.

When I took over as the **primary school** director, I decided that I would like to bring in my private **iPad**, see how that works in the **primary school**. And I realized that I can do a lot with **Apple iPad**. Back then, this was six years ago, the apple universe really had more for the **education world** than the Androids. The next step was to ask the kids to bring in **their own private devices**. And so, we got a whole mixture of devices from **Samsung tablets** to **iPads**, and so on.

That was very interesting time for me to manage all these different devices. Kids really appreciated **technology** in the **classroom** and we did a lot of great stuff we couldn't do before. By the third or fourth year, all the kids started to **bring their own devices**. Even for a normal **teacher** who's very interested in **technology** it was very difficult to manage all the different operating systems at once and also **teach** at the same time because there's always problems

with devices. So, we evolved into becoming **a 1:1 iPad school** in the **primary school**, middle **school** and high **school** is a **bring your own laptop**.

CB: *What is your opinion on the core difference between the public and the* ***private school*** *sector when it comes to implementing* ***1:1 iPad*** *program.*

YO: Yeah, it's very, it's very different. We are a small **private school**, but we do have recognition from the **department of education** in Liechtenstein. But because we're a **private school**, and because we are a whole day **school,** from the morning to the afternoon, we have a lot more time and a lot more room to play around with things.

We are not really governed by the **Department of Education**, so when we want to implement a new project, for example, **technology, 1:1 iPad program**, we could move a lot faster. We just have to talk to the board and get their approval. Obviously, we have to organize our own budget. We don't have as much funding as **public schools**. As long as we are within our budget, we can move forward what the project we're very interested in. So, we were able to move very, very fast with the development of **technology** compared to the **public school**.

CB: *Now that you've implemented* ***1:1 iPad program****, what would you say are the main advantages of it?*

YO: There are a lot of advantages. What I find very special at our **school**, because we are small and like a family, is that the communication between the **school** and the parents, for example, **teachers** and parents, **students** and parents, **students** and **teachers** have been incredible just because of **technology**. Parents these days are really interested in what's going on with their child's **classroom**. With certain apps, it's very, very easy to take a picture or a video of the kids, reflect or talk about kids work. And all that can be sent directly to the parents to their smartphone, they get a little notification that something was posted on their account, they can have a look and see their child talking to them or even showing some work they did in the

classroom. That has been a huge plus, with using **technology** at our **school**. The parents are very, very pleased to be informed and have an idea of what we are doing throughout the week. So, **technology** can really help with communication between all the parties involved and that has been really great for us.

CB: *I know that some parents are always a little bit reluctant in terms of how much the kids use* ***technology*** *in the* ***classroom****. What was your experience and how did you overcome that barrier? Are there any parents who are still concerned about it?*

YO: When we started asking kids to **bring their own device**, that's when the parents starting to get very uncomfortable with the idea. Because at home all they saw was their child consuming, playing games, watching YouTube films, and for them, it was just a toy. And now they were also asked to bring the same tablet into **school**. There was a lot of misunderstanding and worries towards this whole program.

What's really important and helpful, is when I invited the parents and showed them exactly what we're doing with the **technology** and that really changed their opinion. They saw the positive experience of a tablet or **technology in the classroom**. And that really helped to eliminate a lot of the worries from the parents. But of course, the worry is constant so we are always talking to parents about screen time. So that's why we do have a balance. We are not a school where we just use **iPads** all the time and the kids stare at a screen; we are fully aware that we have a good balance.

CB: *It's a matter of using* ***technology*** *strategically to supplement the* ***curriculum****. Correct?*

YO: To enhance it, yes. Because we were able to do stuff we couldn't do before. And the parents really, really are happy that their child is using **technology** in a positive effective way and **learning from technology**. So that was a real game changer.

CB: *How did the* ***teachers*** *perceive the whole* ***technology integration program****? Did you face any resistance from their side?*

YO: Yes. There definitely was the resistance. My experience is probably very similar to a lot of the readers' experience with starting a **1:1 iPad** program at their **school**. You have to battle parents, and also within your own **educational institution**, the **teachers**. And it is very difficult, so my advice based on my experience is that it takes time and patience to talk to the **teachers**. To sit with them one on one, help them design the **lessons** and plan it together. Also, to encourage, that “I will be with you when you teach it in the classroom so if it's any tech problems, I'll be there to help you”.

This approach really helped them because a lot of **teachers** are just being scared and concerned. But then they have positive feedback from using **technology** in their first lesson, they get excited and want to do some more. It's like a spark, then they get curious about it and then try on their own.

Of course, there will always be **teachers** who are against it. And that's my job to convince them as they're there for a reason because we believed in them that they follow our school concept. As a leader, you have to pass on the vision and make it clear to everyone so they understand the vision. it's constant communication and the balance between the challenges and also the rewards that can come out as a result of the **integration of technology**. And if it, unfortunately, doesn't work for someone, it usually comes from the teacher side so then we come usually to a friendly agreement.

CB: *How did the kids perceive the* ***technology*** *integration program?*

YO: You're hitting right to the point. This is the third important part of the formula. Because a lot of people think: ” Oh, these are digital native children, they know exactly what to do. They

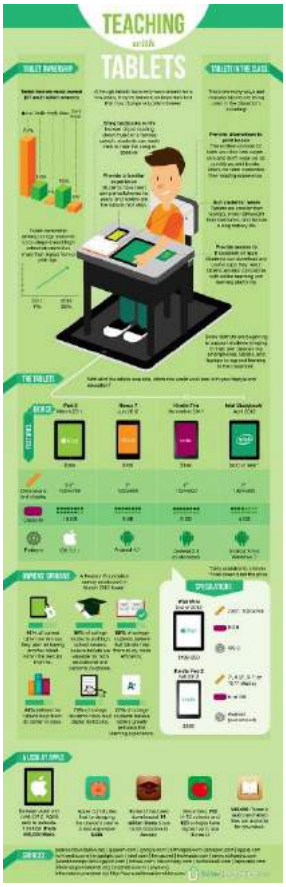
know how to open **the iPad** and then go right to the word processing program and some writing". The reality is that they do not.

Through my experience, their experience is very limited. Just as I said before consuming content, they like to watch videos and play some games. So again, this third party, the **students** need to be taught how to work with this device, not just to play. They need to learn and find the benefits as well. The **students** also need time.

This whole change with **technology**, the whole process takes years and a lot of patience and a lot of communication to make it work. The **students** need to be aware, they're just as important as the **teachers** and the parents and the management team, and the board. Everyone needs to get on board and everyone needs to be aware of what's going to happen, what's going on. And I think **students** do value that they're part of the process as well.

Ashley Wainwright on September 20, 2013

iPads in the Classroom: Changing Education (Infographic)



Facilitating Innovation for Educators: Tools without experts to use them are a waste of time

Matt Hood *is the Chief Education Officer at Ambition Institute – a graduate school for teachers, school leaders and system leaders that helps educators serving children in disadvantaged areas to keep getting better.*

Alongside his role for Ambition, Matt is a government policy advisor in the Department for Education, and has worked on a wide range of policies including teacher development, special educational needs, student participation and education system design.

Listen a full podcast recording – LINK.

CB: What are your ideas in terms of using **technology** in general for **education**? Are you positive or negative about that?

MH: I'm optimistic about the role that **technology** can play in both **teaching** and **teacher education**, which is the area that obviously were particularly interested in, but it's worth saying that I start off somewhat skeptical about this.

The **English education system** is closest to me - most notably interactive whiteboards and **iPads in classrooms**. And, whilst I said at the start that I'm optimistic and I think there are lots of benefits, lots of **teachers, teacher educators** and **school leaders** haven't always seen the benefits of **technology** - at least the benefits that were originally promised. And we find ourselves in a situation where these false starts have made big parts of the sector quite skeptical.

We did some research last year on **educators** around the world, and one of the major points that was mentioned was the expense. Also, they're going to go outside their comfort zones in order to use the **technology in the classroom**.

I often meet organizations who want to talk to me about the great tech that they've got, but their expertise isn't what it needs to be. And that means that these ventures often lack rigor in that underpinning theory of **learning**. **Technology** advocates are often on the side of the futurists

and the people who peddle neuro myths - the “kids don't need to learn anything because of Google” gang. And while that's not everybody, I think it is a decent chunk. And so their credibility holds them back. Invest in **educator development** - make that bit more important than the tech, until they're thinking clearly about the tech being a solution to a real problem.

CB: Which **technologies** do you find useful for the **classroom**?

MH: I've got **three examples**, none of which fall into those traps that I mentioned. All three of these **innovations** solve a very real problem for **teachers, school leaders or teacher educators**, and double down on the **education** and **pedagogy** that sits behind the **technology** and not the other way around.

The first one is an organization called **No More Marking**. The problem that no more marketing is trying to solve is that as humans - not specifically teachers, or leaders, but just us humans generally - our brains are pretty bad at making a judgment between any given thing and a set of criteria against which we're going to mark it. So take an essay for an **English GCSE** - the way that we usually assess that essay is we have a list of criteria which denote what a good essay is, and a teacher tries to compare the essay to the list of criteria. No more marking offers a better alternative.

The second example is an organization called **Assembly**. The problem that they're trying to solve is that schools collect lots and lots and lots of data. And it's often locked away in systems that aren't very good at sharing it, and aren't very good at helping **school leaders** make sense of it. What assembly does is use **technology** to extract that data and present it in a way that helps school leaders make better quality decisions about the things that they need to do in their **school**: their curriculum; their methods of instruction; their assessment; behavior policies; the list goes on. Again, at the heart of that organization are **smart education people** who also draw on **technology** expertise to make that product really, really good.

The third organization is called **Times Tables Rock Stars**. We know that learning your times tables when you're in **Primary School** is critical to progressing a good pace through **mathematics curriculum**. If you've got your times tables at your fingertips, that is a great advantage to you. It's something that is really important for all people, regardless of their background, to master.

Now, the best approach to doing that involves a **carefully sequenced curriculum** and really determined and enthusiastic **teaching**. What the **technology** allows is for the sequence to be carefully **designed**, and centrally by a group of **experts**, and then quickly **scaled up** using the **Times Tables Rock Stars platform**. The skin then also allows 10-year olds to work towards becoming a rock god in their time tables. It's engaging, it's interesting, it's fun, and kids love to get involved with it using **that technology**.

Three examples - one of which is about **teacher** workload and for teachers, one of which is for **schools** and **school leaders**, one of which for pupils themselves - where **education** is at the heart of what they're doing. **Technology**, at its best, is enabling **educators** do a really good job, by solving problems.

Useful Links:

1. Professional Learning
2. No More Marking
3. Assembly
4. Times Table Rockstars
5. Teacher Tap
6. IFT Education

How to Use Technology for Learning Outside the Classroom?

***Jenna (DeShaney) Linskens**, EdD, CETL, holds an Educational Doctorate in Technology and eLearning. Currently, she is an Associate Director of Learning Technologies and provides training to K-20 schools. She is a Certified Educational Technology Leader, Google Certified Innovator and Google Educator Level 2. Jenna is also a Certified BrainPop Educator.*

Listen a full podcast recording – LINK.

***CB:** What's your attitude towards **technology** and **education** and why?*

JL: I believe that **technology** is a catalyst for **learning**. It is an opportunity for **students** to use **tools** and to become innovative designers of their own **education** where they can explore things that are of their interests, that really excite them, and allow them to become **global learners**. Instead of the traditional learning we saw in the 20th century where we were very eccentric, and in our own four walls. I believe that **technology** is a is a great way for kids to really explore and learn more about the world around them.

***CB:** Are there any specific particular **technologies** that you would think would benefit the using in the **classroom** or for **home education**?*

JL: I think the key pieces to look at, when you're looking at **technology**, is first looking at a **learning management system**, something that is going to allow the **students** to take their learning outside the four walls, so it becomes anytime, anywhere. **Cloud** based **learning tools**, for example, **Google Classroom**, **Schoology, Canvas**, **Moodle**, any of those types of online **learning management systems** where **students** can continue to have conversations outside of the **classroom** and with their peers. Where they can access resources, materials, and videos that really allow them to extend their learning beyond the four walls.

Another awesome tool is the idea of **virtual reality**, or virtual field trips. Which allows **students** to explore, whether it be through a computer where they are using **Google Maps and Google Earth or Google Moon**, and going out into virtual worlds and **learning** about other places they normally are not able to see. I have a **high school class** I worked with and they just finished up learning about Romeo and Juliet. We can take them right to the Globe Theatre and let them see what that looks like from a perspective of actually being there in London. There are many other **virtual field trips** you can take kids through. For example, you can take a **virtual field trip** to the ocean using **Google Expeditions,** and many other different companies have developed a variety of **virtual field trips** that **students** can explore. **Students** do not have to have those really cool **virtual goggles**, although that sometimes helps to bring it to light. You can still take a **virtual field trip** on your personal handheld device and see things from your own screen. The idea is to put the **students** into a virtual ocean and let them see what the reef would look like if they were off the coast of Australia. Learning the answer to "what does that Great Barrier Reef look like" really brings that to life and makes that **learning** real and authentic.

One of the other big things that supports that idea of that anytime anywhere learning, is the idea of using **e-textbooks** or **digital textbooks**. A lot of the **eBooks** today have additional pieces that are embedded in them, whether it be videos or maps that they can click on, to see and explore. For example, I have a group of social studies **students** that are looking at the Mediterranean Sea, the countries around the Mediterranean, and how those civilizations developed because of the water resources and the rivers that once were present there. The **students** are able to go back after a **lesson** and click on those maps, that often times are now archived as paper, but when we turn them into a digital artifact the students can **interact with that map**. So those would be the big tools that I think are really impacting the way our **students** are able to engage in their learning.

CB: Any mixed tools for education?

JL: One of the amazing tools that I really like to use with my **teachers**, is actually something that doesn't even have a lot of **digital technology** in it, but it promotes **creativity**. It promotes **collaboration**. It creates and promotes **critical thinking or problem solving**. That tool is the **Breakout EDU box**. The idea is to have a box that has anywhere between three locks or six locks on it that **students** need to solve a series of puzzles or clues in order to unlock and open the box. The puzzles might be looking at a poem and trying to find the clues within a poem. It might be looking at a map and having to follow clues to figure out specific coordinates or directions in order to get your character around the map. Solving those clues will help you figure how you are going to open the lock on the box. I always say **technology** does have a place and time and when you are using something like the Breakout EDU box you do not have to use **digital tools**. It can be very hands on and a great learning opportunity, where **students** are learning those soft skills of collaboration, communication, problem solving and critical thinking.

Useful Links:

1. What is a learning management system?
2. Learning Management Systems (LMS) overview – 20 best
3. Google Classroom
4. Schoology
5. Canvas
6. Moodle
7. Virtual School Trips
8. Google Expeditions
9. E-Textbooks, Digital Textbooks
10. Soft skills
11. Importance of soft skills
12. ISTE
13. Future Ready Frameworks
14. CoSN
15. Breakout EDU

Why Do Teachers Believe in Technology for Education?

Bonnie Cazer *is Principal of Pre-School – Second Grade Elementary School in upstate NY. Middlesex Valley Elementary School is a rural school with approximately 320 students. The district, Marcus Whitman Central School District, is in the third year of a Blended Learning Initiative where teachers receive specific professional development to expand their practice to include opportunities for students to learn in ways other than direct lecture and have different technologies incorporated into their practices. The district will be a fully 1:1 district in 2019-2020.*

Bonnie is a Principal, National Board-Certified Teacher, former Adjunct Professor for SUNY (State University of New York) Brockport where she taught Evidence Based Techniques for Teacher Assessment for future administrators and is active on Twitter.

Listen a full podcast recording – LINK.

CB: How do you feel about **technology** empowering the **education** process?

BC: I am very positive about it. I've been a **principal** for five years but even years back as a **classroom teacher**, I was already exploring different opportunities for **students** to have a blended or a personalized experience using **technology** as a support to enhance my **lessons**.

CB: How do you feel about the statement that the **technology** is actually empowering the **personalized learning**.

BC: I do believe it is. I think those **students**, especially in a rural district, like the one I'm in, are not going to have the opportunities they might have in a bigger district that has a lot more funding. So, using **technology**, it gives students an opportunity to reach out not just locally, but nationally and internationally, to **learn** about different topics that we just don't have **coursework** to fund for the **students**. So, it's going to be a very important piece and I believe it levels the playing field, nationally and internationally.

CB: What is your professional opinion as an **ex-teacher** or from a **principal position** on which **emerging technologies** (such as **Augmented Reality, Virtual Reality, 3D printing**, etc.) have higher potential for the **education** and why you think so?

BC: It's a really good question. There're so many different things out there. And I'm not an expert on any but I've dabbled in all. One of the pieces, is **digital libraries** which to my opinion is going to be an important piece for **students**, for **educators** and upcoming **educators**. There is so much information out there, we just can't sift through enough of it and all of it. Looking at the funding I have available, for example, I have to make decisions as to where we're going to spend that money. If I'm spending that money on **digital libraries**, for example, I feel like I'm opening a whole world to **students**, not just limited to those hand on paper text.

I love paper text and I think everybody **student** needs to have those opportunities, but some of the subject areas that they can delve into by using **digital libraries** is going to be a very important piece. And it's something that they can do independently. So, when a **teacher** is working with children at a small reading group, for example, the other children that are not with the **teacher** could be reading independently on topics of their own choice. And we know research shows that if children are reading on topics of their own choice, they're going to be more engaged, their reading levels increase, and they just do better in school in general. So, I think when you say **digital libraries**, that's a really important piece.

We also have a **makerspace** currently in the **elementary** building so those children are doing hands on **learning**. We have the **3D printers** that fits perfectly in that **makerspace** area, and it gives children those skills from a very young age to work up into industry and so they understand the engineering pieces, the science and the **technology**.

CB: What resources do you follow in order to keep yourself up to date with current **technology** trends and how to demand it?

BC: I do. Eric Sheninger is a really big resource that I follow. George Couros, who wrote "**The Innovator's Mindset**". We also follow Eureka Math.

CB: With rapidly changed world of **technology** we are not sure which jobs are going to come up in the next decade and which **skills students** need to develop to fit the **future workforce**. How do you get the kids ready for the uncertain future?

BC: I think that is the big question that many **educators** are looking at. So looking at those **21st century skills** of collaboration, creativity, communication skills, those are really the important pieces.

I'm a facilitator for the Seven Habits of Highly Effective People, Stephen Covey's work. He really works on how to communicate and collaborate, and we brought that to the **school district** here. Those are the two big pieces we look at when we're looking at those seven habits. We work even at the youngest **grades** with practicing with **children** modeling, role playing with them of looking at each other and talking and problem solving, rather than trying to solve the problem for them we go deeper. Also, the staff members are wonderful about looking at higher level questioning, which really engages the **children** in that cognition of not just looking at a problem on the surface level, but asking those questions why and what and the **teachers** are asking why and what and don't always have the answers for the **students**. It really gets the **students** used to asking the questions, answering the questions, and talking to each other, but also those important pieces of high vocabulary. So, we we(delete) focus a great deal on vocabulary as well.

We also focus on the **MakerSpace** movement which is a big piece of supporting that also. When **children** can have hands on experiences about building things, taking things apart, they're making those connections. And when we're looking at them working on coding or working in other industries, we're hoping that they have an understanding of how things are put together, how to build things, and how-to problem solve. Even if they're making an imaginary product out of their **MakerSpace**, at least they have to start with a vision and work towards that vision and work through failing forward or asking for help of their **classmates** that have the skills.

That's going to be an important piece in the **workforce** too when they're working in teams to be able to recognize that if I don't have a skill, I can ask somebody else or I can learn that skill to get better at that. I think one of the important skills is to be able to find the information on where to get the skill.

Useful Links:

1. Eric Sheninger
2. George Couros
3. Zern
4. Smore
5. Eureka Math
6. Personal Account @BonnieCazer
7. Middlesex Valley Account: @MWCSD_Valley

How Teachers Can Do Their Job Better?

David Weston *is the founder and Chief Executive of the Teacher Development Trust, the United Kingdom's national non-profit organisation for effective professional development in schools and colleges. David has steered the Trust to be one of the foremost voices in education on the subject of professional development. In March 2015 he was appointed by the UK's Secretary of State for Education as Chair of the Teachers' Professional Development Expert Group for England's Department for Education.*

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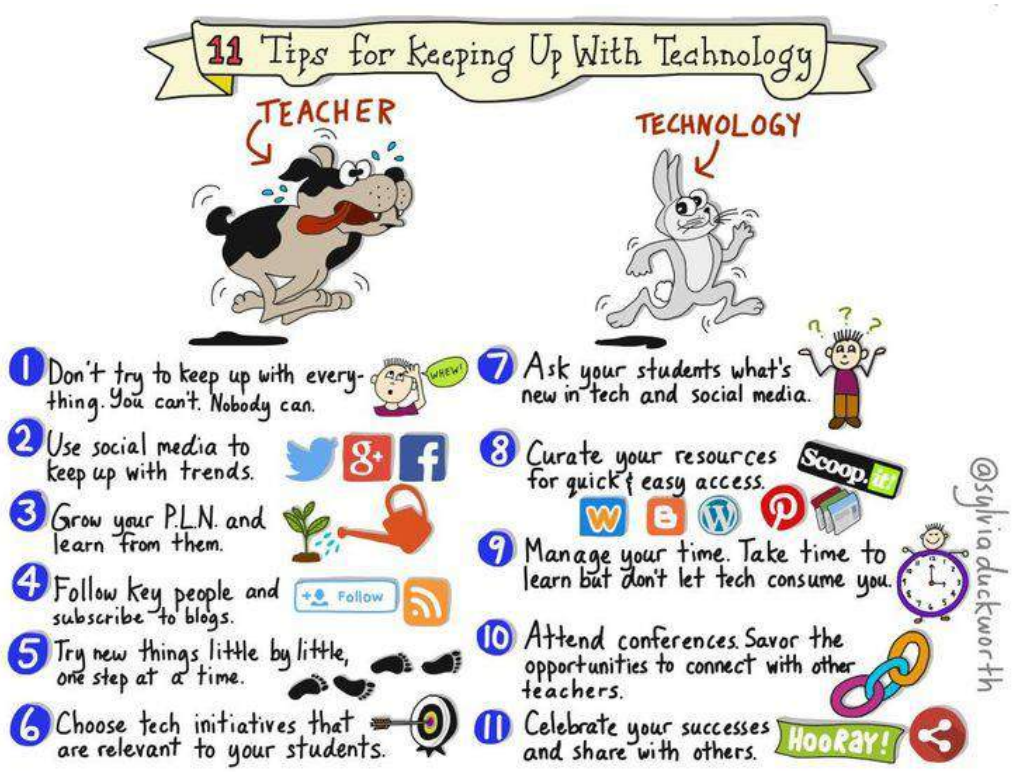
CB: What is your professional opinion on the use of **technology in education**?

DW: At the heart of great **teaching** as a relationship, it's the **teacher** understanding and connecting with the **student,** the student believing in that teacher so that that teacher can push them through challenges. They say "you might not know the way forward but I can help". And that relationship, that's the hardest thing to do.

Sometimes I think what we could do much better is give **teachers** a toolkit, which can empower them to make **schools** even more effective than they are now. And I think sometimes we've seen some really good work there. And in particular, there are some fantastic **simple tools** which **teachers** and **students** can use to improve **communication,** to make sure there's less time wasted in **classrooms**. Trouble is, there's lots of money in this. In the UK, for example, there was a massive explosion, a huge investment, billions spent on **interactive whiteboards**. And what they didn't do was **ask the teachers**, they didn't explain what you need to help you teach with the board. They said, "you need an interactive whiteboard, and you must use it". And I remember myself going into these **classrooms** with **interactive whiteboards**, and they look so shiny and lovely. But it was a huge pain. And I used to avoid using them as much as I could, because in most cases, it wasted minutes and minutes before and after my **lesson**, they kept not being set up properly, the **computers** were too slow, they kept crashing. And I ended up going

back to the manual approach. And for me, that's exactly what was wrong with **technology**. We're trying to help the **teachers**, but we end up hindering them. I think we could do a lot. I'm very excited about some of the use of really flexible, almost **artificial intelligence-led software** that can prompt **students** to make better decisions. I think it's incredible.

The amount of info that **students** have at their fingertips at home, using the **internet** using various different websites. But I don't think we're there yet. I think somehow unless we focus on helping **students** have a great **learning relationship** with other people, and not just trying to replace the relationships that I don't think we're ever going to really achieve the promise of **educational technology**.



11 Tips for Keeping Up with Technology by Dr. Z Reflects

And that was a problem because of course, **schools** ended up getting these white boards, and they didn't want to spend lots of their own money on the support that should have gone alongside. I think it was a problem right from the beginning, actually, that they didn't roll out slowly. They should have not only sold the **whiteboard**, but also sold the training and the technical support. They didn't do an audit of the **schools** to make sure that they had the infrastructure in place. They didn't do work with **teachers** so that you can get a few champions going around and supporting and helping. I think all of these things could have worked better. And to be honest, we've seen the same issues in with mass adoption of **1:1 technology and tablets and notebooks**, for example, people haven't piloted carefully, they've just rolled out in a fit of enthusiasm. They didn't get people on side. They didn't do the homework. They didn't do the ongoing support, and ultimately ended up not working, which is a shame, because now there are **teachers** who think, oh, **technology** doesn't work.

I think you know, you and I probably both believe it has great potential for the future. But I think now there are lots of people who are very cynical and skeptical, saying, well, it didn't work before. Maybe it won't work now. And I think we can have great rollouts, and great use of **technology**. But we've, sort of, poisoned the well, if you like with bad experiences, and there's a lot of work to do to build trust back up.

CB: What **technology** is mostly used in **classrooms** in the UK, in your opinion?

DW: I've seen **teachers** go around with visualizers and they can say, “Hey, everyone stops, I'm just going to show you an image of what the **student** has written.” And they show right up on the board. And they maybe leave an image up on the board, and then they draw on top of it and can show information about why this is good, and what they can work on next. And there's great opportunity for **learning**. It's such a simple piece of **technology**, but it enables us to do

something we could have never done before. And that's really that's perfect. That's exactly the sorts of **technology,** you know, we should be thinking about.

I've seen lots of schools try very hard to do rollouts of **Chromebooks and iPads** and things like that. In some cases, I've seen **schools** which have done really great work. And eventually they've managed to build this **culture** up where a lot of the work they do is done, for example, via **Google Sweet** and **Google Docs**, and spreadsheets and so on.

What is technology? To be honest, the **technology** that excites me a lot at the moment supports **teachers** learning from each other and with each other. And I think it's very exciting seeing the cameras and the cloud-based video systems, where teachers can put a camera in the back of their **classroom**, that video can be shared live with their colleagues in different **schools**, they can record clips, they can annotate it.

I also think there is some really interesting ways where people can just use simple things like video calls and make them cells feel less isolated, have coaching conversations do training. For me, it's actually **new technology** we've had for a long time, but she's using it to help **teachers** to help each other. And I'm very excited by that.

Useful Links:

1. Teacher Development Trust
2. Teacher Confidence in Using Technology
3. Twitter
4. Unleashing Greatness in Teachers | David Weston | TEDxGrandRapids
5. Visualizer for Education (example)
6. 3D printing

Tips on Leveraging Tech and Non-Tech-based Teaching

Dr. Beth Holland *is a postdoctoral research fellow at the University of Rhode Island as well as the Digital Equity Project Director for the Consortium for School Networking (CoSN). Over the past 20 years, she has taught in K-12 classrooms, served as Director of Academic Technology in a PS-8 independent school, designed professional learning programs for schools around the world, and developed leadership programs to support systemic change. Additionally, she is a prolific writer, researcher, and speaker. Dr. Holland holds an Education Doctorate (EdD) in Entrepreneurial Leadership in Education from Johns Hopkins University, a Master's degree (EdM) in Technology, Innovation, and Education from Harvard University, as well as a Bachelor of Science (B.S.) degree in Communications from Northwestern University.*

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CB: How do you feel about using **technology** for **educational** purposes in general? Is it positive, or is it negative?

BH: I think that's a really loaded question. And I've been thinking about it a lot lately in terms, first off, of how are we defining **technology**? Because if we take a historical perspective, there's always been **educational technology**.

At one point in time, your pencils and **textbooks** were considered a **technology**. And I think as it became more **digital**, what's happened is, the **digital technology** really contradicts a lot of what we think about when we think about **school** because of how it allows **students** unprecedented access to information, access to experts in the field, access to **learning** studies that were never before conceived. I think that's what's created a lot of this tension around is it positive, or is it negative? Instead, what we really need to think about is how are we taking advantage of both the analog and the **digital world** so that we're really addressing that greater purpose of how we want our **students** to develop as **learners** in this new environment where they have so much access and so much opportunity.

I don't really see this as a positive or a negative, because I've seen **digital tools** used in fabulous, wonderful ways. And I've seen them used in ways that would make you cringe and think, why would you bother wasting that amount of money to do something that could have just as easily been done on paper and obviously didn't provide an extreme benefit to the **students**?

One of the things I would like to look at more is not the actual **technology**, but the opportunity and the experience that it creates for the **students**. So that might have been more of a non-answer, but I think it's time that we really need to separate out what are we actually doing, what are we **learning** and how are we **learning**, what are we using as a **tool** to experience that **learning** and to engage in those kinds of opportunities instead of the devices.

CB: If we go deeply into the **technology** itself, do you have any examples of the **technology** that you personally prefer to use in the **class** with greater benefit for **learning**? Or share some examples of trends or **technologies** themselves and your opinion on that?

BH: Sure. I like to think of **technology** like a cardboard box. If you think about a little **kid**, and you know, like a toddler and you give them a box, and suddenly a box becomes a boat or an airplane, or a castle, or cave or becomes anything that you want. I gravitate towards the **tools** that are completely open and can be used in any particular way that the **student's** imagination and curiosity can allow them to do it. I guess it's going to depend on myself as a student. I've relied really heavily on having a great **note taking too**l that allows me to search my content, keep everything in one place. I've done an entire doctorate without a single piece of paper. I needed something that would allow me to search all of my thinking and **learning**, and in that instance, I really relied completely on **Microsoft OneNote**. That for me has been a game changer and I think for **students**, once they get to **upper middle grades** and in the **high school**, there's an art of understanding how do you allow yourself to curate not only content but also your own thinking. In this case, a note taking tool like OneNote really shifts the way that **students** can engage with

content, knowing that they can search it at any point in time - that it can be audio, video, handwriting, text. This capacity really changes the dynamic.

Along those lines, there are two other **apps** that I rely on extensively. One of them is **Explain Everything**, which is essentially a whiteboard **screen casting tool** that can do anything you really want it to do. It's this infinitely zooming opportunity to get your thoughts out. I think to give **students** that freedom of expression and knowing that there's absolutely no physical limitation - like with the edges of a page - is a game changer, particularly for **students** that might feel confined to the limits of an 8.5 x 11 piece of paper.

The other **app** that I really on heavily and that I absolutely recommend for teachers and parents is a **Book Creator. Book Creator** allows **students** to create **interactive eBooks** where they can record audio, draw, type, and add pictures or video. It can also be **collaborative** in the sense that two **students** can work on the same thing at the same time.

Some of my **classmates** and I actually used **Book Creator** to do a project this spring. It can be used at a **preschool** level, as a way to provide younger **students** really simple way to capture their thinking, to tell their stories. But then at a doctoral level, we used it as a means to talk about identity in a **digital era**. We incorporated video and audio reflections as well as typed a synthesis from the literature all in this one platform. We were working across multiple time zones and two different countries at the same time on this. Going back to my cardboard box metaphor, I think those three apps really epitomized what's possible with **technology** when we don't bind our thinking to that traditional sort of 8,5 x 11 framework.

CB: What do you think about the future of the **books** and where it's going?

BH: I think there will always be **books** both in a digital and a physical form. And I think one of the really important points to consider is what is the purpose of reading? For example, I like to sit down and read a physical paper **book** at the end of the day for a little while, and its

fiction, and it's fun, and it's something that relaxes me. However, that's a very different type of reading than, say, my reading for academics. In that instance, I don't want anything in analog form, because I can't search it. I can't tag it. I can't quickly curate all of my notes. I can't manage my citations with it. And I think one of the challenges is really separating out what is the purpose of our reading? What type of reading do we want to engage in?

I think one of the challenges with this idea of **books** is that we really need to go back to what is the behavior that we want to see in our **students** when they're engaging with the text. And that makes a really big difference before saying, well, it's one thing or another.

CB: What would you say if people are absolutely against using **technology** in the **classroom**? How would you encourage those people to try and use some **technology**?

BH: Honestly, I don't think it's about the **technology**. There's a great research study that was done in North Carolina, in the United States several years. They found that teachers who had a constructivist philosophy, that actually believe that **students** should be active **learners** who actively constructing their own sense of reality about the world, were way more likely to recognize the power for **technology** to enhance those constructivist type experiences.

If I'm working with a **teacher** who does not necessarily have those **student-c**entered beliefs, then the only thing that **technology** is going to do is possibly add some efficiency to the administration of their **class**. What I would rather do is take a step back and start to see what are some incremental changes we can make in their **pedagogy** first. For example, can we bring something like reflection into the **curriculum**? Maybe they can ask **students** to think about not only what did they learn, but how did they learn it? And why did they learn it?

I think that until we can make that fundamental **pedagogical** shift away from thinking that the **teachers** doing nothing but transmitting the information, then they're not going to understand what the **technolog**y could afford. One of the challenges that all of us in **EdTech** have had over

the years is we've always started with the tool. Oh, we think this tool is so revolutionary and then struggle when another **teacher** doesn't believe that it can be beneficial for **students**.

I think there's a balance that we really need to go back to and reflect to the **teacher** that just says, “absolutely not, I'm not going to use **technology** in my **class**.” I think we need to say: “Well, what can we do to **empower your students** to be a little bit more active as **learners** in your **class**?” As a result, if **technology** eventually comes around, that's great. But I've seen some fabulous **classes** that never touched a piece of **technology**. The **students** asked great questions. They were totally engaged in conversation. They were collaborating. They were reflecting. As a result, I think we really need to step back and identify what **learning experience** may be of value to our **students** to help them develop as really excellent, critical and creative thinkers rather than continue to ask what some piece of **technology** might be able to do.

In other words, I think we need to stop pushing **technology** and start pushing **pedagogy**.

Useful Links:

1. One Note – onenote.com
2. Explain Everything – explaineverything.com
3. Book Creator – bookcreator.com

Virtual Technology Is Transforming the World of Education. Learn How!

Steve Bambury *is Head of Digital Learning and Innovation across JESS Dubai where he works with staff, students, parents and school leaders to help them develop their use of education technology. Steve is an Apple Distinguished Educator as well as a Microsoft Innovative Educator Expert Fellow and is a well-respected educational speaker, presenting across the MENA region. In 2017 Steve launched VirtualiTeach (www.virtualiteach.com) – a website to share content related to the use of virtual and augmented reality in education.*

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CB: Which **technology** can be a good supplement for **education** in the **classroom**, and why and feel free to share any particular tools, instruments of **technology** you have in mind?

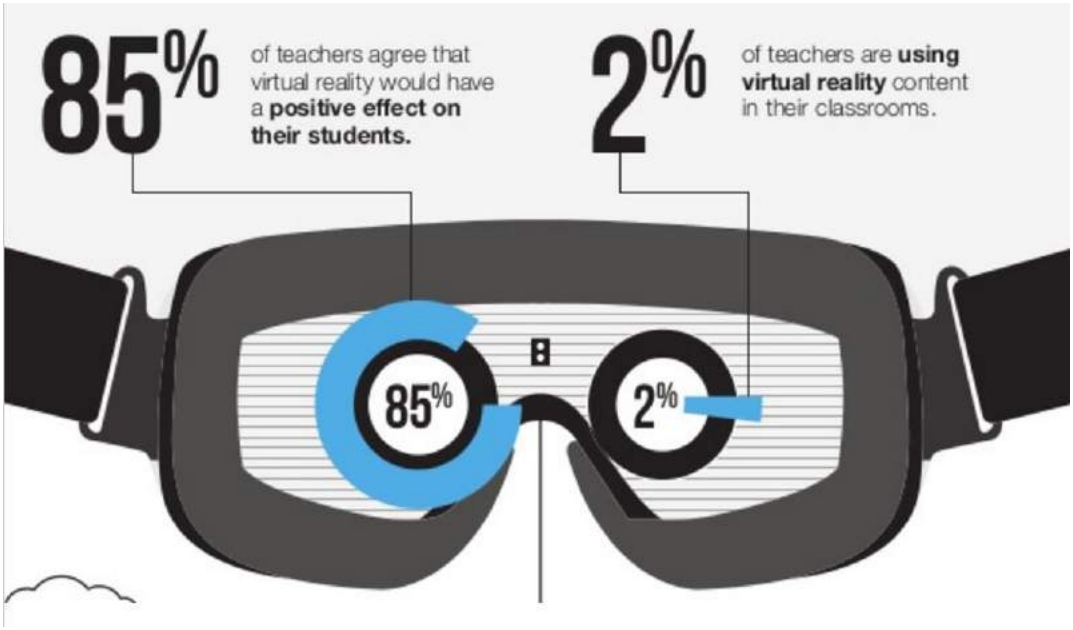
SB: We were one of the first **schools** in the Middle East, if not the world to adopt the iPad in, in the **classroom** in 2000. And was late 2011, early 2012 across both of our **primary schools** and I mean, five or six years on where it's still the main tool that are used across both the **primary schools**, the **secondary school**, two years ago adopted a different technique, a different approach. We've actually switched and in **secondary school** where we're using **Microsoft Surface Pro**.

We are a heart we're still a PC-based organization what we don't that they're not maxed in the **classroom**. What we're finding is that **students** were coming up to the **secondary school**. And at this point, they needed something that was a little bit more than the tablet so they were starting to bring in **laptop**s as well as their **iPads**. We started to look into hybrid devices so that we could, we could bring the number of devices that they needed to carry with them, bring them down.

And ultimately, in parallel with our switch to **Office 365**. We formally we use **Google Apps** in the **classroom** again from about 2011. But in 2015, we switched to **Microsoft Office 365**.

And, as a part of that, our access to wonder class notebooks opened up a whole world of new **learning opportunities** for the **students**, especially in the guest secondary. Looking into **Windows-based tablets** or **Windows-based hybrid tablets** that gave our older **students** the ability to harness the **technology** in that in the same way in that same mobile way but also to, to adopt, excuse me to adapt and use it as a laptop when they needed to.

Ultimately, what we've done has been a real game-changer in secondaries is the ability to digitally ink and for them to annotate diagrams or to hand write notes. It's been really powerful. Beyond the actual devices in the **students**' hands, again, going back to what I'm saying the lack of sleep. Right now, what I'm kind of known for is the work I'm doing it with **VR and AR**. We've been doing a lot of trials with the HTC Vive.



Teachers Ready for Virtual Reality in Education by Detlef la Grand

We just had the one which was my own one, but HTC has been really kind of given us three more recently. We are running various trials with it with the HTC Vive. I've got currently got a year-long project running with a secondary art department.

We supplement that high-end **VR headset** with banks of mobile **VR headsets** as well. So we've got banks, like a full class set in the **secondary school** which the kids use their own mobile phones in and then we've got smaller bank in the **primary schools** which I was literally just use it today with it with a group of kids a lot of this stuff you can find if you, if you get the view if you want to see some of the cool stuff we've been we've been doing with me are the best place to look, is if you go on **YouTube** and type in just digital you find the just **digital channel** on **YouTube** was what I tend to do is the trials that we've been running with it with especially with the high-end **VR stuff** with the vibe, we record them and we record testimonials from the students and we document the process and screencasts from the applications as well. And then I kind of this comes back to my history is as a filmmaker, I spend time editing the footage together, and then we publish it through the digital **YouTube channel**.

CB: Can you give me a little bit elaborate a little bit more on training topic **of AR and VR**?

SB: And we've been using **VR** and testing the assets 2014. We always like to be kind of ahead of the curve. And that's saying something in 2017 when both **technologies** are still so nascent. I'm starting right now a blog post I've got in draft form, which is 20 different experiences for help kids learn about space, a whole range of activities using **augmented and virtual reality** as well as **360s** on **YouTube**. And to be honest, me when most **schools** are out there over in a position where they don't have many headsets if they have any at all. And if they do have headsets, they tend to be the cardboard **headsets** that are cheap and readily available. The three places in terms of **virtual reality** I always direct new users towards firstly is **YouTube**, the simple fact that **YouTube** has so much amazing 360 content available, completely free from people like the BBC, the new times within are out there making award-winning films that this is absolutely brilliant content on there. If you look at my website, virtually, there's a post on their called “How to find the best content on YouTube”. Because it can obviously **YouTube**'s just almost infinite, isn't

it and that there's so much content on there to sift through. NASA is a good example NASA had like 5 million **YouTube** channels and only one of them shares **360 content** that you can view reality. So actually, takes some digging to find if you look, look at that post on my website, then there is this direct links to all of the main **educational channels**.

The other ones I always recommend a **Google Expeditions**, which is another free app, one of Google's many amazing virtual reality tools. What's great about expeditions is the fact that you can guide a group of **students** in a kind of shared experience, you can leave the experience from an **iPad** or another tablet, and you can direct the view towards different elements within the **360 content**. And it also comes pretty packed with all of the texts that you would need to all the information all the questioning; you need to feed into the experience. And then the third one's a near plot, which is something I've been a huge fan and a huge supporter of for a long time.

CB: Why In your opinion, **teachers** may reject **technology using technology** in the **classroom**?

SB: Traditionally **teacher** that is that that metaphor of the analogy of the guide on the side versus the stage on the stage and, and traditional **teachers** like to be the one with the power they like to be the one with who has the authority and stands at the front and imparts knowledge and, and essentially what ends up happening is the focus becomes on **teaching** the focus becomes on the teacher. Whenever a kid taught me something new, using **technology**, I would make huge fast out the fact that I was **learning** something. Because I mean, we shouldn't just consider ourselves **learners** when we're at school, and then we stop. We should always be looking to learn something new.

I think that that was the big thing. That was the hardest thing in terms of implementing the **technology**. I mean, beyond that, you've got obviously logistical, logistical factors and also

economic factors. You want it to be integrated within the **culture of learning** across **the school** on a daily basis.

I do a lot of **in-person training**, I do one on one training, department training, **home school training**. We then have a lot of asynchronous training options. We have stuff, screencasts and things like that, that are stored on our **Microsoft SharePoint**, which is essentially our **school** network in the cloud.

All of our staff have access to the **Microsoft**, educator community and the online courses are available there which ties in with our use of **Office 365.** I produce on a monthly basis an in-house magazine called the just **digital magazine**. And myself and my one of my colleagues also hosts the just **digital podcast**, which is available on iTunes and Stitcher and the tune in radio app and all of these different platforms. The idea is that if somebody wants to get a little bit of **CPD**, they want to get a little bit of training, whilst they're driving home from work fantastic. Download the podcast, listen to that, and you'll get some ideas from there. If you're somebody who's got young kids and you can't stay around for optional after-school sessions, that's fine because the screencasts available for your **SharePoint**, you can watch it in your own time. We're trying to provide options for everybody to cater to their needs because teachers are very time poor. And we want to be able to make sure that they feel supported.

Useful Links:

1. Facebook VirtualiTech
2. Facebook JESS-DIgital
3. VirtualiTech Website
4. Jess Digital Website
5. JESS Digital YouTube channel
6. Google Expeditions for group AR experience
7. Nearpod for 360 degrees interactive presentations

We Can Teach with EdTech: Virtual Reality Case at School

Chad Lewis *has been the director of technology at Tampa Preparatory School in Tampa, Florida since August of 2010. He oversees all facets of technology at the school, from network infrastructure to educational technology and training. In addition to being responsible for the school's 1:1 iPad initiative, Mr. Lewis designed and supervised the implementation of the school's Active Learning Environment (ALEs) classroom design.*

Listen a full podcast recording – LINK.

CB: How do you feel about using **technologies** for **education**?

CL: Definitely positive. Over the past 15 years in my field of **educational technology**, I've seen a lot more autonomy and power put into the hands of not only **teachers** but **students** which is absolutely exciting. I think that when you get **students** the opportunity to pursue their passions and use tools that fit their **learning styles**, it can open up a lot of opportunity for them.

We've revamped our **school**'s entire **educational** physical environment, which I think has been transformational. If you look at our **classrooms**, they're nothing like the **classrooms** that I've seen in most **schools**. It's all flexible, collaborative and the engagement level is through the roof.

We have also been an **iPad 1:1** school for the past seven years. That's been huge as well, but that in conjunction with the ability for **students** to collaborate and do **project-based learning**, in addition to the flexibility of the learning spaces, has been has been amazing.

CB: How do you feel when I say that "**technology** gives every student a voice". How do you feel the participation level in certain activities of different types of students changed thanks to technology?

CL: Well, technology has enabled the **students** to verify and back up their arguments very quickly just by pulling up a website on the **iPad** and instantly sharing it with the rest of the **class**. Using AirPlay wireless **technology,** students can connect and display their screens from their **iPad** to the projector in a second. It's been really transformational when it comes to the engagement of **students** in the **class**.

Also, kids no longer can sit at the back of the class in order to hide and not participate; there is no “back of the class”. Everyone has a front seat.

CB: What **technology** do you use at your **school** and give some examples of how you apply that in the day-to-day activities?

CL: We're big users of **Google Apps for Education** and were also an **Apple Distinguished School** two consecutive times. We use a lot of survey tools or quizzes where you can get instant feedback. That’s very powerful because no longer does a **teacher** have to give a lecture and then ask: “Does everybody understand that”, and then, of course, everybody just doesn't say anything. But then the next day, when the test is given to **students**, he or she realizes that, in fact, a lot of the kids didn't understand it and only one student did. By receiving real-time feedback from **students** taking a quick quiz, the **teacher** can understand how well the material was perceived by **students** and their level of understanding. I also think the power of **technology** is especially strong in conjunction with **project-based learning**.

CB: I can't agree more. I strongly believe that we can’t **teach** kids the same way we were taught at **school** because **technology** is changing the world so quickly. And I think the most important thing is to give the skills that they will apply in the **jobs of the future**.

CL: Definitely, we need to **teach students** to be lifelong **learners** and know how to find out how to evaluate, leverage and act upon the information. And most of them, at least in our **school**, as they progress become very proficient about finding out how to do what this.

CB: How do you feel the general acceptance of **emerging technology** (such as **3D printing, AR/VR**) in the educational sector in the US is going?

CL: I think it's definitely on the upswing. I see a lot more excitement on the side of **teachers** and what they can do with **technology**. In our **school**, for example, we have **students** who are building **VR applications with Unity3D**. Also, we have a **cross-curricular initiative** starting this year, where the art class kids will build the **3D model** assets and then hand off the models to the computer science **students** to use in their projects. I love that because I think it represents the real world where most projects are created by a team of people who have different skill sets. We're really kind of modeling that for our students so they're being prepared for the workforce.

The other thing is that **teachers** will give a new **technology** a go and see if it's beneficial. If it doesn't work the first time, they might give it one more chance. But then, the second time it absolutely has to work for them to continue using it further. And that's completely understandable. They don't want to be embarrassed and waste **class** time. It all goes back to the support that needs to be provided to them. It’s absolutely critical to have support personnel around.

I know that if I give a **teacher** that has interest in certain **technologies**, especially for their particular curriculum, 100% of my support and as a result they are successful, the other **teachers** will be more willing to try. Sometimes **teachers** need other teachers as role models to take the first step.

Useful links:

- https://thejournal.com/articles/2018/04/12/vr.aspx
- http://www.smartbrief.com/original/2018/04/when-students-lead-active-learning
- https://edscoop.com/florida-school-eliminates-classroom-walls-with-interactive-projectors

Use of Technology at the International Baccalaureate Middle Years Program (MYP)

Raghad Alshiekh *is MYP consultant, workshop leader and School visitor at IBO. Raghad is an extremely knowledgeable specialist and gives valuable recommendations for math teachers in technology to use in the classroom.*

Listen a full podcast recording – LINK.

CB: Are you positive or negative in regards to **technology**, in **education,** at **school** or in the **classroom**? And why would be that?

RA: In today's world, there is no question that **technology** has become part of our everyday lives. Moreover, I believe that **schools** should be the place that reflects this world to give **students** a sense of belonging, rather than feeling strangers or uncomfortable. Definitely, like any other invention, there are positives and drawbacks. **Studies** have shown that **technology** has so many positive effects on **students' learning skills**, including cognitive and metacognitive skills. **Students** can focus more, think better, and analyze. Which helps them enhance their critical thinking skills.

I think **technology** is a great tool for differentiation techniques, especially with the presence of a variety of learning apps and games with different levels. **Technology** can also be a great support for **students** with special needs with special apps for them. One of the major drawbacks for **technology** will be the excessive use of it.

CB: Which **technology** can be, in your opinion, a good supplement for **a classroom** use?

RA: As teachers, we really appreciate the use of different the software's in our **classroom**. Graphing software, like GEO Gebra and sketchpad. These soft wares support **students**' in

learning functions, graphs, and three-dimensional figures. The use of calculators has become part of our assessments to allow **students** to solve more real-life situation problems.

Technology has supported **teaching** and **learning** for **math teachers**, in the middle years and primary years with the basic concepts of math and number sense where it develops their critical thinking skills. **Google Classroom** is a great example.

The IB has started the e-assessment, and I think many other programs are moving towards it. It is just a matter of time to be adapted fully in all sides of **education**. What scares us is with the use of **technology** is how it has been used effectively in the **classroom**. It's not about using tablets or software. It is how effective the use of these software's and tablets, or **iPads** in the **classroom**. This is what we should focus on **technology** and **education**.

CB: What would be your opinion of the **teachers** who would not be comfortable in using the **technology**?

RA: Okay, I think until now, there are a lot of **teachers** who are still worried to leave their comfort zone and there is nothing wrong with it. Even **students**, they need this time where they are comfortable. Sometimes we need traditional **teaching** where **students** still use a paper and a pencil, I still think there are some basic skills the **students** still need away from **technology**, which they still going to learn and apply and use.

The key word key here is a balance. As **educators**, we have to keep the balance between traditional **teaching** and the use of **technology in the classroom**, as effective as possible.

CB: Is there something done in Emirates on government level **school** level, or basically the mainly the teacher initiative to drive **EdTech**?

RA: We have the same movement towards the emphasis of **technology** in the new curriculum. The government has changed a lot of their curriculum based on **teachers** and **students**' feedback. They have started implementing the use of **technology** within the new

books. All the **teachers** have received training on how to use smart boards, special soft wares for their subjects, and to be upgraded all the time.

I think there is huge support from the government towards this change. We know the world is moving in this direction, and everyone has to catch up with it. They have specific links and some books. They come with on a CD, a software with extra explanations; the students can click on it directly it gives them **3D images**, things they can play with. We really like these books. This supports all-different the **learning styles** for the **students** and allows for differentiation.

CB: How about the **Augmented Reality** in Saudi Arabia?

RA: Okay, I know we have a lot of challenges. And I think until now that the biggest challenge for us is to be up to date with the fastest growing changes in the world within the **technology**. I think as educators we have other challenges we need to face and work on and fix. Besides this huge change in **technology** and day-to-day changes.

I think **teachers** are being supported in this area, there are big improvements. But still, it's not an easy shift to be done. We have to face our fears from dealing with these **high-tech tools** in the **classroom**. I know it's not easy, sometimes all of us as human beings, we rush into our safety zones where we are more comfortable with things we grew up with. I again repeat I think balance is the key word here. Take the risk. We should still keep a variety of things around the **students**, as long as they are comfortable with it, and make them move gradually when they are competent.

Useful Links:

- The International Baccalaureate® (IB) Middle Years Programme (MYP)
- GeoGebra
- SketchPad
- Google Classroom

Digital Story about Using Technology in Schools in Ireland

Dr.Anne-Marie Clarke *is a member of Adjunct Research Faculty, Academic Board and Research Committee at Hibernia College, Dublin. She is also Art and religion teacher at Post Primary and QQI levels 5&^, co-ordinates Transition Year and Leaving Certificate Vocational programs. Anne-Marie is a strorytelling teacher, constantly reaching out to real life situations through which to teach new knowledge.*

Listen to full podcast recording - LINK

CB: What is your attitude towards **technology** and **education**?

AMC: In answer to your question, I would like to give you a little bit of history of my view of t**echnology** throughout my **teaching career**. Let me begin by defining technology from my point of view.

As far back as the 1970s, when I was training to teach, I was introduced to what we call the duplicating machine. It was called a Banda, and that machine was a means of getting the **teachers** notes out to large numbers of **students**. For me, that was the start of my **technology** journey. And this progressed to a machine known as a Gestetner. It was powered by electricity, whereas with the Banda you had to keep rotating the handle. The Gestetner, named after its creator, reached a much wider audience because of its speed.

Then things started progressing and speeding up. The video recorder was introduced into **classrooms,** which enabled the **teacher** to bring the outside world into the lesson. It enabled **teachers** to record places and events and share with **students** making the **lessons** more meaningful.

Then along came the internet. My first whole staff computer course was actually way back in the 1980s, and I found it very exciting. I knew it was going to open new avenues. But I quickly realized I was not going to develop my use of the internet and **technology** unless I could practice it. Just like a piano **student** is wasting time taking piano lessons, unless they have a piano to practice on at home. I needed a computer, and they were very, very expensive. I saved hard, and I bought a desktop computer for the family home. And the rest is history.

When **technology** arrived in Irish **schools**, I would say that I was ahead with my positive attitude towards using it within the **classroom**. So much that I would be the **teacher** who says to my **students** "Okay, take out your phones" because they are carrying such valuable **technology** in their pockets. I take advantage of that every day. Young people are using mobile phones and **technology** for social purposes. I am a **teacher**, and it is my job to teach them how to use those phones for **educational purposes**."

So basically, that's my attitude towards the use of **technology** in the **classroom**. I'm very positive about it. It can enhance **student learning**, and I integrate it into most of my **lessons**.

CB: Which **technology** can be a good supplement for education in your opinion nowadays?

AMC: There are many apps, which **students** can download onto their phones, tablets, and computers. I would regularly use apps such as Kahoot and Plickers to develop **students** engagement and **Google Classroom** and Dropbox for homework. It can make the homework more engaging and more exciting. It does not take away the writing homework if it is necessary or the drawing homework for their art, but it does engage them and can serve to enhance their **learning.** New apps are developing all the time. There are programs which as an art **teacher** I would naturally use such as **Movie Maker, Photoshop**, and I really would like to recommend

MYTY.ie as a program because it is something that **post-primary students** use and they are trained into what to expect when they get into college.

They can place all their work into a library, building up a portfolio. They can blog, develop a personal calendar, create PowerPoints, and research projects. They can create films, and upload these all into the one place. They can access this from anywhere in the **school** and from home. I also try and promote this as a way of engaging parents too.

However, if you were to really tie me down, my passion is **digital storytelling**. My **students** create reflective digital stories, but I also create **digital stories** as an instructional tool. There is lots of research out there as to the value of digital storytelling for **student learning**.

Digital Storytelling Process

Edtechteacher.org

CB: Would you like to explain to me about your research into **digital storytelling** for instruction? What is the outcome? And maybe feedback on the **students** like anything that you can share on this topic?

AMC: What is **digital storytelling**? It's basically a story. We all tell stories. We live storied lives. Our **students** have stories, they bring their stories into the **classroom**. The **teachers** have stories. Some **teachers** are storytelling **teachers**. I am a storytelling teacher. A digital story is where you knit and integrate visual images with the story and possibly enhance it by sound or music. **Digital stories** are usually only approximately three minutes in length. So as a method of evaluating a topic, a **student** can reflect on their **learning** by creating a digital story based on their knowledge, the challenges they faced, the successes they experienced, and basically how they feel about it.

As an art **teacher**, my **students** come to me, and they love the practical side of the subject. In Ireland, art history is 33% of the final grade for the senior cycle, Leaving Certificate Art. I would create instructional **Digital Stories** for Art History **lessons**.

I am a **teacher** who is continually looking for **innovative ways** to engage **students** with their **learning**. I would provide my **students** with **interactive learning** using **YouTube,** virtual galleries, visuals. This is done using laptops, I have laptops in the art room for art history as well as practical work such as Photoshop.

However, continuing my work with **Digital Story**, it acts as a 'hook' in a **lesson**. Especially if the story is about yourself. Of course, all this depends on the relationship you have with your class. An example was when I was **teaching** the Renaissance, I created the **digital story** based on my experience of seeing the statue of David in Florence for the first time.

I had taught all about the statue of David: the sheer enormity of its size and beauty for so many years. While in Florence I saw "David" and was so emotional, I cried at the beauty of this

statue. I created a digital story based on my experience. I had 100% engagement from the **class**, and the standard of **student** work in the form of written essays based on the statue was excellent. The **students** had embraced my experience in understanding the beauty of the work of the statue of David by Michelangelo. After that, I proceeded to make lots of **digital stories**. I now have a bank of them and my students can access that bank anytime and watch the digital story. I use keywords, terms, concepts, things that I want the students to learn. While listening to a story, they were inadvertently learning new knowledge at the same time.

I just find digital storytelling is useful because it is not from a textbook written by someone else. It is the teachers own lesson, tailor-made for **students**. This is an excellent example of how **technology** can be re-engaging, and supplementary for the **teachers**.

Useful Links:

1. MyTy.ie
2. MovieMaker
3. Clicker
4. Photoshop
5. Digital Composition, Storytelling & Multimodal Literacy
6. Educational Use of Digital Storytelling
7. Virtual Gallery: example 1, example 2.
8. TPACK
9. TPACK explained in video

Technology Is the New Universal Language in Education

Lisa Bradley-Coates *is a Teacher Leader at Chesterfield County Public Schools and an Emerging Leader with ASCD (Association of Supervision and Curriculum Development), with a great experience and passion in using technologies for the education process.*

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CB: How do you feel about using **technology** in the **classroom** or for **education** in general?

LB: I feel two-pronged. Technology definitely has its advantages for working with **students** with **special needs**. Certain **technologies** can definitely level the playing field for them to be able to access the **curriculum**, allow for **teachers** to develop and to be very creative and **innovative** in how they can present information and get **students** to synthesize information. But again, also with that becomes a **learning curve**, not only for **students**, sometimes because a lot of them are **digital natives,** but for **teachers** to get to understand and grasp the concepts of using **technology** and how you can effectively integrate technology with fidelity into a **class lesson** that is meaningful and engaging. It's a two-prong situation for me, but overall, I think it's a necessity in today's **classrooms**. It's here to stay. Most of our students have grown up with **technology**, so they crave the stimulation. And it's a great way to make connections with **students**.

CB: Would you share your experience which **technology** is good for the **classroom**, or for a specific subject or specific group of kids?

LB: Sure. I have a **1:1 laptop initiative** with our **students.** All of our **students** have **laptops**, and we are really embracing **Google Classroom and Canvas**, which is a platform

where teachers can create learning modules for **students**. If **students** miss a **lesson**, they can log on and see what was being done for the day. I'm able to record my lectures and upload them to the **platform** for **students** to go back. I can use different modalities to based on student needs and learning style. Allowing for students being able to engage with lectures, go back, stop and rewind if they miss something. That is really been accessible for **students** to reach. With the **Google classroom/Canvas, in** conjunction with the laptop initiative, you're **teaching kids** to be digitally organized. Everything is on the **laptop**, so you're not losing the papers in the shuffle because everything is right there. However, it can come with its frustrations of losing charge or forgetting to bring to **class**.

More specifically, with **teaching science**-my passion, is the fact that **students** can engage in different modalities, as I talked about, if you're dissecting. We don't have to have live specimens; we can do it interactively and **virtually**. It's a great modality for **students** to practice without feeling like they're going to mess something up, or they're not going to be successful, because you can restart again. And kids really like that, because it's like a video game.

CB: Have you investigate the topic of using some **emerging technologies**, like **virtual reality** or **augmented reality** in the **classroom**?

LB: Absolutely. We use **Google Goggles** in past years. We've used them to take a **virtual** dive into a human cell or an animal cell. The kids are virtually within these structures, using l**Google Goggles** or **VR goggles,** to be inside the cell- to see the mitochondria, to see the nucleus. It's very interesting to see them engage with that because they're actually inside something that they weren't necessarily able to get inside of.

I know other colleagues that use **3D virtual field trips** to take their **students** on to really make a connection to the subject they are **learning** about. The **students** who necessarily may not have those experiences can actually connect and understand the content so much deeper.

CB: What resources or media are you currently following in order to keep yourself on track on the topic of using **technology in education**?

LB: I'm a strong supporter of **Google**. **Google** offers different certificates and badges for **teachers** to earn. You can become **Google certified** as you work up the ranks. It really keeps you abreast and it's a great **professional development**. You understand the tools and how to apply them in your **classroom**. Also, for literature purposes, **Tech K12**, which is put out by the Association for Curriculum Development **(ASCD)** and **EdTech** really keeps me up to date on different **technologies** and **teacher** perspective as well as how the **technology solutions** are really driving **education**.

It's also amazing what you can learn of **Twitter and** different focused social media platforms, to get a glimpse into what other teacher leaders are doing, because everyone's so **virtual** now. Educators and networks are t sharing a lot of their experiences in the **classroom**, especially around **innovation and improvement.**

CB: You are based in the US. In your opinion, what's the current state of general use **technology in the classroom**? How do you see it developing in the next three to five years?

LB: It's a culture change right now with **technology** because some **teachers** who may have not been **educated** with the tools, way now have to **learn** how to grasp the most effective ways to use technology in the **classrooms**. Digital open access is where the state of education is at. So really **learning** how to embrace it, and use it with fidelity to make learning meaningful in the **classroom i**s vital to creating a generation of citizens that can compete on a global arena with jobs, sustainability, and innovation.

As far as problem-based **learning, STEM** and problem solving, we are moving more and more into a further **digital age**. But we're moving also further into an age that **education** is outside our boundaries and our borders, it's universal, it's widespread. So being able to learn how to

communicate and collaborate, and problem solve **virtually** is important now. As well as **learn** how we can interact and problem solves with a wide variety of individuals across the world. That's what's really going to be the edge of **technology,** as far as being able to out-innovate and problem solve, and to sustain culture. And it seems that **technology** is this new **universal language**.

Useful Links:

1. Google Classroom
2. Google Goggles
3. Virtual Field Trips
4. Google Training for Educators
5. ASCD
6. Problem-based Learning (PBL)

The World of Education through a Role Play

Dr Ger Graus OBE *is a renowned figure in the field of education where he is currently Global Director of Education for KidZania. Previously, he was the Founder of the Children's University Trust.*

KidZania, where children aged 4 to14 can experience the world of work through role-play, is designed to inspire and empower: "from inspiration to aspiration". Since its inception in 1999 in Mexico City, KidZania now has a presence in 27 cities on 5 continents with plans for further developments in some 20 locations including the USA, Canada and South Africa.

Listen a full podcast recording – LINK.

GG: Children can only aspire to what they know exists. And what we know from our research is that children from certain parts of our society might not immediately think of becoming an airline pilot for example, at least in part because it falls outside their menu of experiences thus far. We at KidZania allow **the children** to experience, to be curious to try things out, to play to do jobs, to learn to like and to dislike - and that works particularly well: **learning** in the sense that it is **experienced-based learning**, that it's okay to get it wrong and it's okay to get it slightly less wrong the next time; you're not going to get marked in red, or even you're not going to get marked at all. We are in an **education system** that's increasingly about the system, rather than about the children. We need places that are child-focused, and child driven.

CB: I think that **school teaches** a lot of things apart from real life. And I think the good thing is something that is really useful for kids to gain your real-life skills, at least in the play mode.

GG: You're right. The government sets the rules as to which skills and knowledge need to be delivered or taught, in a school environment. And then when people come to real life, it's

completely different, better, real and through play learning makes sense - but this is my point of view, obviously.

CB: What do you think about **technology** and **education**?

GG: Good question. I am both positive and negative - that's the wrong word as I'm never negative - … cautious. I think we should be a bit more sophisticated when we talk about **technology** and **education**. And what we mean by that. Too often when you see **technology** in **education**, or you see adverts or articles or indeed a conference, you see the latest **iPad** version or the latest **iPhone version** - just the 'what', not the 'how' or 'why'. We need to ask ourselves the question what it's for and how we use **technology**, and in a sense, what **education** is for. We try to create a better world where our children are becoming better equipped, in many ways, not just in terms of the world of work or **technology** but, better-equipped adults, certainly than we are. That has to be the aim of our **education systems**. We also need to be cautious that we don't widen the **education** gap through **technology**: that we don't move towards 'have access' and 'don't have access'. One of the areas that does concern me, is the area where the word 'cautious' comes in: **elements of technology** and what others do with the data that **technology** generates about us - we need to call for transparency and, at least for now, urge caution.

CB: Which **technology** can be a good supplement for **education**?

GG: I think the **technology** that can be a good supplement for **education** depends significantly on the quality of **teaching** of and by the **teacher**. **Technology** doesn't replace something. It isn't instead of, but it enhances, it adds value. It makes **learning** better, quicker, more colorful, more fun, more real.

Let me give you a very practical example that I often use with my children. When as a child I got homework at **school**, the homework more often than not was finding the correct

answer. What you did when **school** finished at 4 pm for the afternoon, you jumped on your bicycle, you cycled to the library, you picked up a book and you found the correct answer.

Incidentally, the library would then close at 4.45pm, so you had to cycle really fast. So, your **learning** times were dictated by opening and closing hours of the library and your speedy cycling. When I look at my children now, the library if you wish, that access to knowledge, is online. It's often called **Google**. It might be called Wikipedia. It might be essential in their pocket. No more cycling and no more closing times.

The issue also for my children is not just to find the right answer, not just to find the one answer. But actually, when they are asked the question, using the **technology**, 500 answers may come up. So, the differences in skill sets are, that it is not being able to read and find the one right answer, but it is actually being able to judge which one of all the answers that you're given is most likely to be the correct one.

I think the exciting thing for me about **technology** in education is that very good **teachers** will use the **technology** to make for very good **learning.** That is absolutely right. I was recently talking to a group of **teachers** who mentioned that children have mobile phones with them, in their pockets, and they, of course, use those mobile phones for social interaction. The point these **teachers** made was that **teachers** could be there to help convert and extend those pocket social interactions and help children to understand how to get the information from the internet and how to source and analyze it correctly. And which **technology** could be helpful for them.

We have to be very careful that we approach this whole **technology** thing from the child's point of view that we put ourselves in their shoes. And also hat we don't do the normal average middle-class top-down approach to **education** but that we consider all children in all

circumstances. We have to also acknowledge that we don't necessarily have all the answers. We have to be very blunt and very, very, very, very frank about that. That's the first point.

I think the second thing is, we need to be respectful of the dilemma that **schools** find themselves in, in terms of risk, child, safeguarding, firewalls, and all the 'house-keeping' troublesome things that come with this territory often. And we need to look at being much clearer as to what actually can and cannot be done. I know, for example, from a previous life when I was CEO of the Children's University, that we had participating **schools** where children couldn't Google the word 'children' because one firewall or other would not permit it. We need to be clear what's legal, what's guidance, but also what's common sense; a lot of it doesn't seem to be currently - common sense that is.

This seems to me out of sync, we have some very significant perception, safety and equality issues that we need to be always mindful of and learn to balance. We have become a safety-obsessed to the point where we are in danger of bringing up a generation of children who are so risk-averse, that there is a danger of no risk-taking - not even calculated, no sense of social entrepreneurialism in those children, because they're not allowed to do anything. It is all by the safety book. All **teachers** but especially good **teachers** are a victim of this today. They haven't written the book. So, in that sense, they're a victim of that circumstance as are the children of course. I think incidentally that children are often much better with **technology** than **teachers** are; they are just not quite grown-up about it at times - and neither should they be. This is where the **learning** partnership should lie: we are all pieces of a jigsaw.

Governments globally have approached **technology** as an add-on. So, it is about how do I use the whiteboard and how do I use the iPad, rather than as an integrated resource into **teaching and learning** - 'what for' and 'why'? No teacher is asked to sit down and say to him or herself, how do I get children to use a pencil, a rubber or a pen, in the lesson - it is part of the

whole **education** planning. We need to think about **technology** much more as tools and means rather than as an outcome - very exciting tools by the way.

And that requires training and thinking-time and requires development. So, we need to give these things a little bit of time too. We should always remain optimistic though – it's about children and better futures after all!

Useful links:

1. Dr Ger Graus OBE, Director of KidZania UK (suggest LinkedIn profile) http://linkedin.com/in/dr-ger-graus-obe-335bb6115
2. Dr Ger Graus from KidZania speaking about their innovative model (YouTube link) https://youtu.be/7Nz8VCa8-1A
3. KidZania Website www.KidZania.com
4. Article by Dr.Graus "The mind once enlightened cannot again become dark" https://www.linkedin.com/pulse/mind-once-enlightened-cannot-again-become-dark-dr-ger-graus-obe

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10. Educational Use of Digital Storytelling
11. Virtual Gallery: example 1, example 2.
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18. TPACK explained in video
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20. Dr Ger Graus from KidZania speaking about their innovative model
21. KidZania Website
22. Article by Dr.Graus "The mind once enlightened cannot again become dark"
23. The International Baccalaureate® (IB) Middle Years Programme (MYP)
24. GeoGebra
25. SketchPad
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27. Augmented Reality for Education
28. What is Augmented Reality?
29. Facebook VirtualiTech
30. Facebook JESS-DIgital
31. VirtualiTech Website
32. JESS Digital YouTube channel
33. Google Expeditions for group AR experience
34. Nearpod for 360 degrees interactive presentations
35. Augmented Reality
36. Machine Learning

37. Educational Robotics
38. Drones for Coding
39. Drones for Classroom
40. Microbit Website
41. Duke of York iDEA (Inspiring Digital Enterprise Award) – Free Award Programme for people of all ages linked to learning digital skills.
42. Tablet Academy. Team members at Tablet Academy are happy to visit UK schools and give a FREE, impartial consultancy visit
43. YouTube channel. Tablet Academy offers a number of FREE Learning Festivals funded by Industry to schools across the country in STEM, Computing, Aeronautical Engineering, Computing, Robotics, Critical Thinking (CSI), and many more. Tablet-academy/com/youtube
44. Reward teachers for their CPD efforts with credits towards a US M.Ed degree
45. Twitter
46. Creating the Digital Educator by Steve Molyneux
47. Cloud Computing
48. Tute
49. Article "Disruptive Classroom Technologies: Transcending the Status Quo with the T3 Framework"
50. What is a disruption in education?
51. Book "Disruptive Classroom Technologies: A Framework for Innovation in Education"
52. 30 Examples of Disruption in the Classroom
53. Professor John Hattie
54. Book by John Hattie "Visible Learning for Teachers: Maximizing Impact on Learning"
55. Visible Learning website
56. "Digital Natives, Digital Immigrants" by Marc Prensky
57. Google Productivity Tools
58. Screencasting tools
59. Magana Education website
60. Apple Regional Education Center for Teachers (free courses)
61. EduCreatorBlog
62. TheEDtechportal.com
63. Linkedin
64. Twitter
65. Instagram
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67. Free courses for teachers on technology for education
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71. Hololens
72. Mixed Reality 1 and Mixed Reality 2
73. Mindset Consulting
74. CleverMachines
75. Clever Machines as the engine that enables schooling to learning
76. 3D Printing
77. 3D Printing for education
78. CodeMonkey
79. Gamification in Learning
80. 6 Examples of gamification in learning
81. 23 Examples of gamification in learning
82. Gamification in education
83. Technology and Creativity
84. Gamification. Creativity. Learning
85. Research Results
86. CET World
87. Mindset
88. Digital Learner. Who is this?
89. Thomas Friedman
90. Thomas Friedman "Owning Your Own Future"
91. Mobile Phones in Education
92. Mobile Phones at Schools
93. How to use a mobile phone as a learning tool?
94. The importance of mobile phones in education
95. Digital textbook
96. Teacher Development Trust
97. Teacher Confidence in Using Technology
98. Twitter
99. Unleashing Greatness in Teachers | David Weston | TEDxGrandRapids
100. Visualizer for Education (example)
101. 3D printing
102. TeachThought
103. Hashtags for Education
104. A Dictionary For 21st Century Teachers
105. 12 Ideas That Will Probably Break Education
106. Podcasts from TeachThought
107. TeachThought Professional Development

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109. Creating Shows in VR
110. Kahoot Game-based learning
111. Free Language Learning
112. Scratch – learn to code
113. Turn idea into simulation
114. English Learning
115. Technology-enhanced assessments
116. 3D Learning Tool
117. Quizlet
118. Effective Teaching – Tophat
119. Article by Conall Ryan "Gamification and Technology-Based Approach to K-12"
120. Are we still practicing eminence-based teaching? by James de Bass
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122. Amazon Inspire
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124. Capita SIMS
125. Personalized Learning Definition
126. What is Personalized Learning?
127. George Couros
128. Zern
129. Smore
130. What is a learning management system?
131. Learning Management Systems (LMS) overview – 20 best
132. Schoology
133. Canvas
134. Moodle
135. Virtual School Trips
136. E-Textbooks, Digital Textbooks
137. Soft skills
138. Importance of soft skills
139. ISTE
140. Future Ready Frameworks
141. CoSN
142. New Cambridge University study highlights six models for transformational change
143. List of free MOOCs
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145. Coursera
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151. Digital vs Digitized Learning
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153. How can machine learning improve education?
154. Digital curriculum
155. Personalized education
156. Research
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159. The importance of teaching critical thinking
160. 12 strategies for teaching critical thinking
161. 20$ Boss Program
162. Etsy
163. AI
164. The fourth industrial revolution
165. Project Educate
166. What is EdTech?
167. Is my child an algorithm? by Carla
168. Artificial Intelligence
169. Understanding Machine Learning
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181. No More Marking

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198. 20 Tech Skills each Teacher should have
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200. Free Lessons from Teachhub
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Lee's Summit Connect2Learn (1:1 Initiative) Site
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208. MIT Language Learning
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212. John Hattie
213. Ken Robinson – Creative Schools
214. Website Eric Sheninger
215. Books Eric Sheninger
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217. GoFormative for student's growth and learning

218. Digital skills development SeeSaw
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224. Snipping Tool
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226. Bulk resources for educators
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228. Our Lady of Lourdes National School, Bunclody, Co. Wexford – More Able & Talented Programme – an innovative and pioneering school supporting the needs of highly able students across a variety of disciplines.
229. A case for affective education: Addressing the social and emotional needs of gifted students in the classroom. SENG (Supporting Emotional Needs of the Gifted)
230. Dabrowski's Theory of Positive Disintegration: Some implications for teachers of gifted students. SENG
231. National Association for Gifted Children (US) – Resources for Educators
232. Teachtidbytes – Gifted Education Resources – information on Enrichment
233. Hoagies List of Online Resources for Educators
234. Visual Spatial Resouces for Teachers from Visualspatial.org
235. National Disability Authority See Education for Persons with Special Educational Needs Act 2004 – Assessment
236. Department of Education See Special Educational Needs A Continuum of Support – Guidelines for Teachers
237. National Council for Curriuclum and Assessment See Exceptionally Able Students, Draft Guidelines for Teachers
238. Chart Comparing High Achievers, Gifted Learners, or Creative Thinkers from About.com
239. High Achiever, Gifted Learner, Creative Thinker Bertie Kingore, Ph.D.
240. Teaching Strategies for Twice-Exceptional Students
241. Young Social Innovators is a unique programme that gets young people (15-18yrs) involved in action which helps improve the lives of others in their community. Schools can download an application form for 2009/2010 from the YSI website.
242. Tracy co-hosts the podcasts: Product Launch Hazzards, Feed Your Brand
243. 3D Printing: the 3D Start Point for disruptive technology
244. Tracy's Inc. Column
245. Capterra
246. Handbook on best practices in Gamification
247. Springer

248. Upside Learning
249. Tech Learning
250. Edutopia: Game-based Learning
251. CoolCat Teacher: Game-based Learning
252. Flipgrid
253. iMovie
254. GreenStream app