



 CLASSVR

A GUIDE TO VR & AR IN EDUCATION

"THE ONLY SOURCE OF KNOWLEDGE IS EXPERIENCE"

~ ALBERT EINSTEIN ~



INTRODUCTION

In today's digital world, finding new ways to engage students is ever more difficult. When home technologies such as mobile phones, tablets and games consoles are highly advanced, widely available and hugely popular with young children, finding educational engagement with technology in the classroom can be even harder, especially if the technology deployed there is less engaging than that of technology children use at home.

Virtual, Augmented and Mixed Reality technology has been available for several years, but it is only recently, towards the end of 2016, that this technology has developed to a level that will now start to rapidly penetrate the consumer space.



INCREASING ENGAGEMENT IN THE CLASSROOM

One of the biggest issues teachers face is that of student engagement. Could schools look to this new technology to re-ignite past times where classrooms were places students could discover and experience new technologies for the first time? Think back to the 80s, when early PCs were being deployed in schools. Students could, for the first time, access innovative, cutting edge technology in a classroom, long before it became available and affordable in the consumer space. Children could engage in innovative ways, and with just a screen and keyboard they could create simple graphics and learn the fundamentals of early computing and coding, on devices and technology they didn't have at home.

This was a time of great excitement and engagement for many students. Computer clubs were formed to allow them to access the technology during lunchtimes and after school, facilitating extracurricular activities and driving the desire to learn with this fascinating new technology. Switch back to today. Does this still apply? Do we have the same level of engagement from classroom technology? Or does the student's smartphone provide more engagement and interest than anything else in the classroom? Can anything change that, or is cutting edge technology and engagement no longer possible in schools?

Einstein wisely stated, 'The only source of knowledge is experience'. So how do we deliver new experiences to students within the limitations of the classroom? What technology can provide a range of immersive and engaging experiences they couldn't normally have at school?

ONE OF THE
BIGGEST ISSUES
TEACHERS FACE IS
THAT OF STUDENT
ENGAGEMENT



HISTORIC TECHNOLOGY ADOPTION CURVE IN SCHOOLS

Staying ahead of the curve in schools seems almost impossible these days, with consumer adoption of technology driving down prices and commoditising the latest innovations, making them readily available for the home user. Most new emerging technologies are quickly adapted for the home consumer. In fact, these days it is rare to see technology deployed in schools that students haven't already seen, or already own, themselves. It's no wonder that classroom technology often now falls short of student's expectations; they've 'been there, done that'. So all that budget you've just spent on more tablets, laptops, or an interactive whiteboard won't drive the engagement or excitement we need to stimulate their imagination and drive their creativity. Our students have become accustomed to this technology, and somewhat dismissive of it. Is it time to usher in a new wave of technological excitement?

VIRTUAL AND AUGMENTED REALITY – THE 4TH WAVE

Virtual, Augmented and Mixed Reality have been referred to as the '4th wave' of technological innovation and change in the world of computing. The first three, namely PCs, the Internet, and mobile, have seen monumental shifts in the way that we interact, engage and communicate, with fundamental and life changing effects for us all. Think back to the end of the 20th century. We were not checking our friend's status every few minutes, sending instant pictures and videos to our family, or checking our bank balances on our phones. These are now every day (every minute?) activities, and a natural and somewhat expected pattern of behaviour in modern society. What impact then will this 4th wave have on society in 10 or 20 years, and how will that affect the development of our children now? Where does learning with this new technology fit?

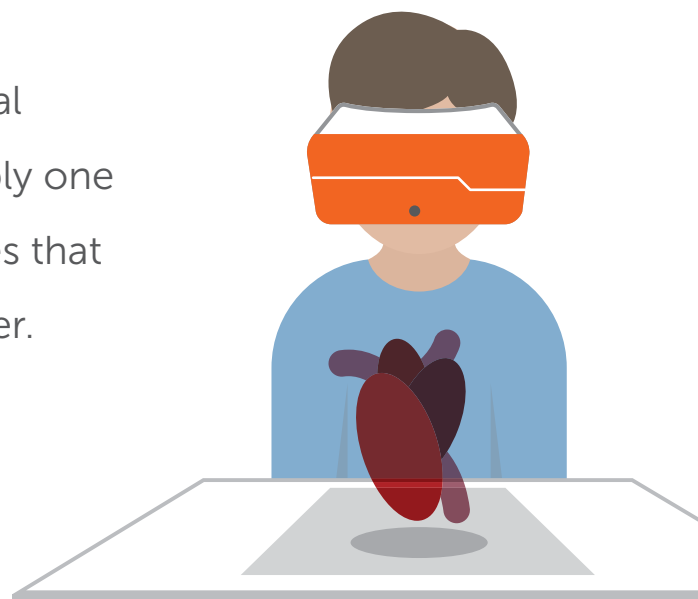
VIRTUAL REALITY

WHAT CAN IT OFFER EDUCATION?

Virtual Reality, by its pure definition, can deliver experiences and interactions for students that are either not practical or not possible in the 'real world', provides an unparalleled way to immerse and captivate students of all ages.

Virtual Reality helps students feel immersed in an experience, gripping their imagination and stimulating thought in ways not possible with traditional books, pictures or videos, and facilitates a far higher level of knowledge retention.

Enhancing and extending the learning experience is at the heart of what Virtual Reality can offer students, and is possibly one of the most powerful of all technologies that could help change how we learn forever.



IMMERSIVE, ENGAGING EXPERIENCES

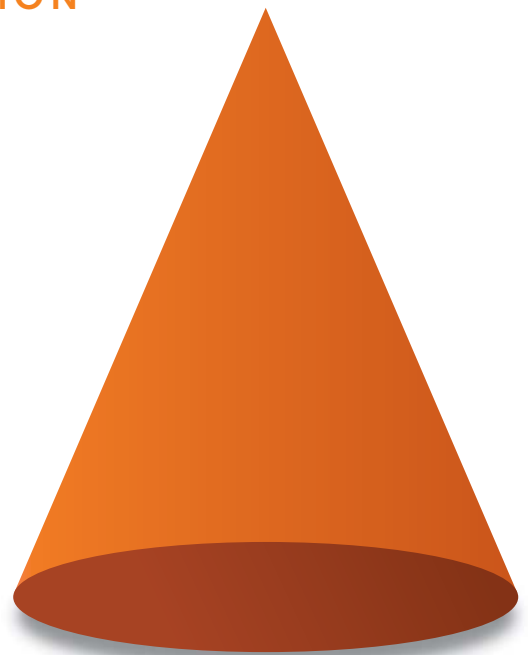
With virtual reality students can visit places not practical, or even possible in real life, all from the safety of the classroom. Imagine exploring the inside of a blood vessel, the structure of an atom, the depths of the ocean, or the surface of the moon. With Virtual Reality, places can be explored as if you were actually there, and students can experience and interact with creatures they will likely never see in their lifetimes.

With virtual reality, we can put children in simulated dangerous and compromising situations, in places they should never have to experience in the real world, and from this they can learn empathy, safety and emotion, and gain an understanding that is simply unobtainable from traditional media. Imagine the immersion, understanding and emotional experience a student could gain from standing in the trenches during World War 1?

WE RETAIN
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WHAT WE READ,
YET 90% OF WHAT
WE EXPERIENCE
OURSELVES

INCREASED KNOWLEDGE RETENTION

Virtual reality provides one of the most important aspects of learning that no other technology can match, that of experience. In his Cone of Experience, Edgar Dale theorised that we retain around 10% of what we read, yet 90% of what we experience ourselves. Virtual Reality facilitates knowledge retention at the highest possible level, through immersive and engaging personal experience. Bringing personal experience into the classroom, and engaging children in new activities not normally possible, holds the potential to truly transform knowledge retention.



Virtual reality has the potential to be a ground-breaking technology for the education of our children, but there are many barriers to classroom use. So how can we bring this incredible new technology to the classroom, and what things must we consider?

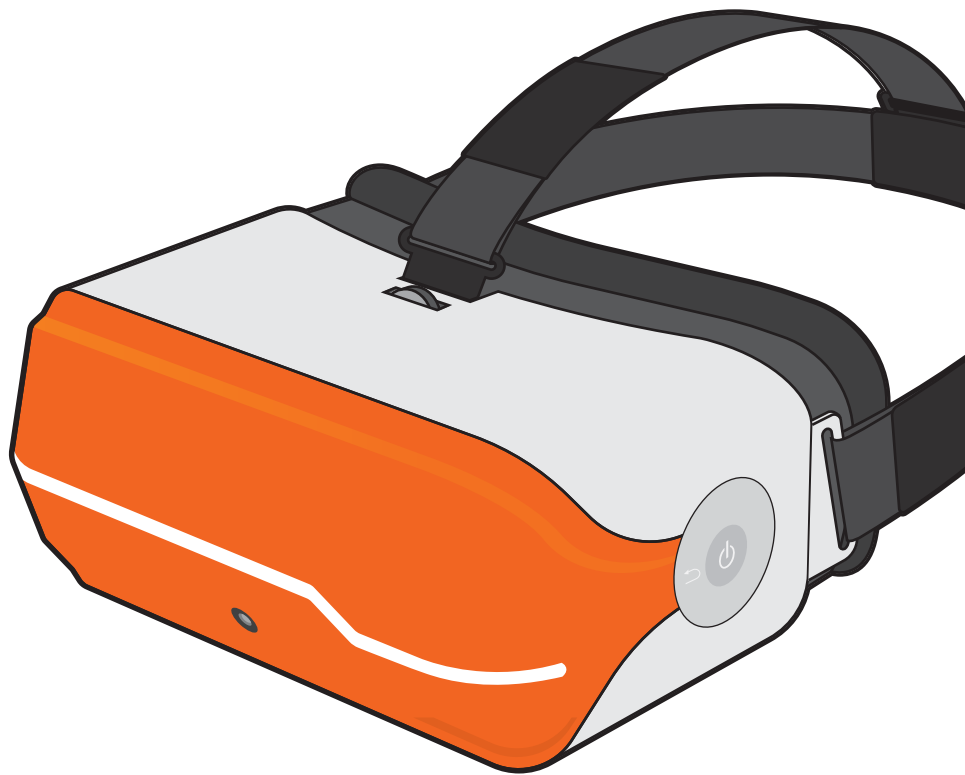
“VR OFFERS A UNIQUE, MULTI-SENSORY AND FULLY IMMERSIVE LEARNING EXPERIENCE FOR CHILDREN THROUGHOUT ALL KEY STAGES. BY PROVIDING CHILDREN WITH THE EXPERIENCE OF VR, THEY ARE ABLE TO ACCESS ENHANCED AND SENSORY-BASED EXPERIENTIAL LEARNING. THIS CAN BE USED AS A TRULY ORIGINAL HOOK FOR BOTH GREATER DEPTH WRITING, AS WELL AS SUPPORTING CHILDREN WHO HAVE ADDITIONAL NEEDS. THE POTENTIAL SUBJECT AND TOPIC LINKS FOR THIS LEARNING RESOURCE ARE CONSIDERABLE.”

~ MR ANDREW SHELTON ~

YEAR 6 / PPA TEACHER – HILLVIEW SCHOOL

DOES VR HAVE A PLACE IN THE CLASSROOM?

Virtual and Augmented Reality clearly offer unique and unparalleled ways to engage and stimulate students. However, before there is any consideration of what technology to use, or how to use it, there needs to be a clear and fundamental understanding of exactly what the needs are.



KEY CONSIDERATIONS

Before adopting a brand new technology like Virtual Reality into the classroom, a number of key questions need to be considered:

- Why do we need Virtual Reality?
- What purpose and function will it fulfil?
- How will the technology be used and managed?
- How will these devices fit into our existing ICT resources and at what cost?
- How will we train our teachers to use VR?

Considering these questions and more, and fully understanding how virtual reality could be used in an educational institution, is essential. Some of the most important considerations are detailed below.

HOW WILL THIS TECHNOLOGY HELP ENHANCE LEARNING?

LEARNING SHOULD NEVER BE LED BY TECHNOLOGY. TEACHERS TEACH, TECHNOLOGY ASSISTS.

This is an important statement, and one that is often forgotten. Focus should be placed on how the technology can be used to aid learning. There are clear educational benefits to be drawn from the use of virtual reality, as previously discussed, including better engagement, increased stimulation, decreased 'time to learn' and enhanced knowledge retention.

Additionally, at the time of writing, Virtual Reality offers the chance for many students to experience this technology for the first time at school, bringing back the focus of the classroom as a place of excitement and learning experiences.

VIRTUAL REALITY
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It also offers a change to the traditional use of ICT such as fixed computers or laptops, allowing for additional usage scenarios and inclusion in learning activities not previously associated with ICT.

HOW WILL IT BE USED FOR TEACHING?

Virtual reality provides a unique opportunity to create a truly exciting and engaging learning experience. They can be used in a cross curricular way, supporting engagement across all subject areas, from improving creative writing to understanding science and maths topics through enhanced visualisation and immersion. However it is important to fully understand how virtual reality can be used to support curriculum teaching and classroom use in your school.

HOW WILL IT SUPPORT CURRICULUM BASED LEARNING?

At the time of writing, most Virtual Reality headsets and systems have been designed specifically for the gaming industry. So how does this technology facilitate curriculum based learning? Do these systems provide educational content and if so how does that support our traditional teaching methods? Where would we find educational, curriculum aligned content that can be integrated to our lessons and does it meet my teaching needs? Can we create and add our own content to support our own teaching methods and practises?

If there is going to be an investment in virtual reality technology, there should be careful consideration to what applications and content can be used with them.

MOST VIRTUAL
REALITY HEADSETS
AND SYSTEMS HAVE
BEEN DESIGNED
SPECIFICALLY FOR
THE GAMING
INDUSTRY

Are there solutions that provide bespoke educational content, or can these devices be used in a more creative way, to enhance our existing teaching methodology and resources?

HOW WILL IT BE USED FOR TEACHING?

Careful consideration needs to be given to how these devices will be used, and managed, in the classroom. Virtual Reality does present one major challenge within the classroom: the total immersion the device provides limits the teachers ability to interact with the students. Imagine a classroom with thirty children, all immersed in virtual reality with their eyes and ears covered. How will the teacher communicate and control the class? How can you capture individual students' attention?

Another important consideration is that of shared resource usage. Do these devices lend themselves to sharing between classrooms and students? Can a school maximise its investment in this technology by ensuring the devices are used by as many students as possible? What implications are there for sharing and using devices across the whole school?

With a new physical way to use technology (a headset), what further implications are there for use in the classroom? Understanding the use cases will help define how to manage and control the devices and deliver the resources effectively in the school.

SUPPORTING
ENGAGEMENT
ACROSS ALL
SUBJECT AREAS,
FROM IMPROVING
CREATIVE
WRITING TO
UNDERSTANDING
SCIENCE AND
MATHS TOPICS
THROUGH
ENHANCED
VISUALISATION AND
IMMERSION

HOW WILL THEY INTEGRATE WITH OUR CURRENT ICT RESOURCES?

Virtual Reality headsets may have a different operating system to solutions currently in place in schools. This leads to many important questions such as:

- Will they connect with our current network infrastructure?
- Will they work with our other Information Technology devices?
- How will we control usage?
- Are there any specific additional requirements we will need to implement?

Fully understanding how this new technology will fit with existing infrastructure and resources is a key consideration. A school will have made significant investment over the years on ICT provisions and eLearning resources, so ensuring a device's compatibility with these is critical.

Understanding any device limitations, such as connectivity, content, accessibility or security is vital. Deploying Virtual Reality, just as computers and laptops, requires a system to manage, maintain and control them. Without such a solution, Virtual Reality could create an even bigger burden on ICT management in schools than existing resources.

DEPLOYING
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& CONTROL THEM

WILL WE SEE IMPROVED OUTCOMES??

Ultimately, any investment in teaching resources should yield improved outcomes for students. So, what outcomes can be improved through an investment in Virtual Reality??

It's clear to see that investments made in resources for specific equipment, such as science materials, can impact outcomes by subjects or topics, so should VR be used to increase outcomes in focused areas or subject? Should we look to increase student attainment in STEM using innovative VR applications for that? Or can the use of VR in a more generic way yield improved outcomes for students across all topics? Where should this investment best be focused?

We have yet to see definitive research papers or studies detailing the benefits and results of long term use of VR in education, but ask anyone who has seen a child put on a VR headset and watched their reaction, and the engagement benefits are unmistakable. So, can we simply use Virtual Reality to stimulate imaginations and engagement? Can that alone yield outcome improvements for every child? If Virtual Reality can improve knowledge retention and increase engagement, by supporting our existing teaching methods, is that not a goal itself?



WHAT IS THE TOTAL COST OF OWNERSHIP?

The question of Total Cost of Ownership (TCO) is often ignored. Virtual Reality systems can be expensive items themselves, but what about the cost of managing and maintaining them? What happens when these devices break or are damaged? As Virtual Reality is a new technology, how quickly will hardware and software improve and change? What support will there be in a year's time for the technology available now? With some devices, only proprietary content can be used, so what is the overall cost of adding new activities and resources? Are there ongoing costs to manage and maintain the systems, and if so will that be affordable in years to come?

There are many considerations that will impact the overall cost of the solution and these questions should be thought through thoroughly before any investment is made.

WHAT CONCERNS ARE THERE WITH USING VIRTUAL REALITY?

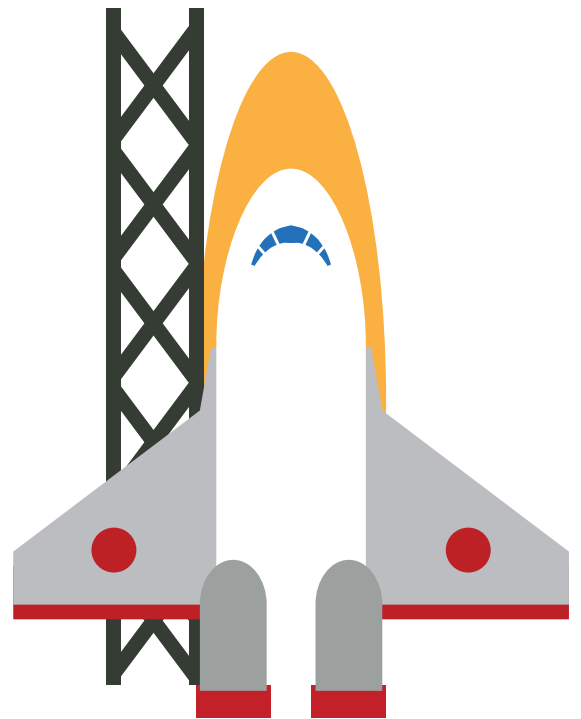
Virtual reality opens up a wide range of concerns and fears, from health and safety, to emotional well-being.

There are many important factors to consider, such as the long term effect on children's vision, the transfer and spread of diseases from the shared use of headsets or the emotional development of children using immersive and sensory manipulation.

Careful consideration should be given to these issues, and strategies to address them, before any equipment is purchased and used.

IMPLEMENTING VR IN THE CLASSROOM

Considering all the positive factors Virtual and Augmented Reality can bring to education, and understanding the needs and desires to integrate VR within our school, we must now understand how we would implement this groundbreaking technology within our classrooms



KICKSTARTING A VR IMPLEMENTATION PROJECT IN YOUR ESTABLISHMENT

How would we go about a project like this? Some key considerations you should have in mind are:

- HOW DO WE FIND THE RIGHT EQUIPMENT?
- HOW WILL WE INSTALL AND MANAGE IT?
- HOW DO WE INTEGRATE IT INTO OUR LESSONS AND CURRICULUM?
- WHAT TRAINING IS REQUIRED FOR OUR TEACHERS TO USE IT EFFECTIVELY?
- WHAT ONGOING SUPPORT AND TRAINING IS AVAILABLE?
- HOW CAN WE MEASURE THE SUCCESS AND OUTCOMES FROM USING IT?

Ensuring that there is a clear plan to research, procure, install, use and measure the results of your project will ensure its success.

Many innovative technology projects have failed due to poor planning, implementation or lack of training and support. Virtual Reality is no different, and careful planning, understanding and implementation are required to ensure students ultimately benefit from the investment in the technology.

CAREFUL PLANNING,
UNDERSTANDING AND
IMPLEMENTATION ARE REQUIRED
TO ENSURE STUDENTS ULTIMATELY
BENEFIT FROM THE INVESTMENT IN
THE TECHNOLOGY

DO YOUR RESEARCH

As with any technology purchase, understanding what options are available in the market, what each system can do, their advantages, limitations and their costs, are the key aspects to helping guide you towards the most effective solution to implement. Below is a summary of the main, commercially available VR systems at the time of writing:

OCULUS RIFT

The Oculus Rift was one of the very first commercially available VR headsets. Now owned by Facebook, Oculus is an integrated headset that requires a tethered connection to an external PC. Oculus is primarily a gaming device and as such has limited educational content.



ADVANTAGES	LIMITATIONS
High Performance Device	PC Required to Operate
Headset Positional Tracking	Primarily a Gaming Device
Immersive Experience	Expensive
	No Curriculum Content
	No Classroom Controls

HTC VIVE

Backed by mobile phone maker HTC, Vive is an integrated VR headset driven by a Windows PC or Mac. Vive predominantly targets the gaming market, but has recently started targeting education with the Vive Group Edition bundle of headsets and PCs.



ADVANTAGES	LIMITATIONS
Top Quality Experience	High Price
Active Developer Community	Limited Educational Content
Wide Range of Hardware Peripherals	Requires High-end PC
	Complex Setup & Management
	External Sensors Needed
	No Classroom Management

SONY PLAYSTATION VR

A dedicated headset for Sony's PlayStation video games console. The PSVR headset provides a simple way for home users to experience high quality VR gaming.



ADVANTAGES	LIMITATIONS
Lower cost Relative to PC-Based Headsets	No Educational Content
Simple Setup & Configuration	Tethered by Wire to a Required PlayStation Console
High Quality Games Available	Requires Monitor or TV for Setup
	Closed Ecosystem & Content
	No Classroom Management

SAMSUNG GEAR VR

In collaboration with Oculus, Samsung GearVR combines a Samsung mobile phone with an active headset to deliver a high-quality VR experience. Access to Google Expeditions and some educational apps make it suitable for the classroom.



ADVANTAGES	LIMITATIONS
High Availability	Requires Mobile Device
Tether-free Operation	High Cost
	Overheating Devices Cause Lesson Disruption
	No Classroom Management

GOOGLE EXPEDITIONS

The Google Cardboard initiative uses mobile phones in special visors to provide an entry-level VR experience. Google are encouraging the use of Cardboard devices in schools through their Expeditions app, which provides panoramic pictures to support educational themes.



ADVANTAGES	LIMITATIONS
Low Equipment Cost	Requires Mobile Device
Tether-free Operation	Physical Setup Takes Time
Centralised Content Delivery for Expeditions	Overheating Devices Cause Lesson Disruption
	No Device Management

AVANTIS CLASSVR

ClassVR is the first fully dedicated end to end classroom VR & AR system. It comprises a standalone headset, a storage and charging unit, pre-installed 360 degree images and videos, a classroom management and control portal and the ability for schools to upload their own content.



ADVANTAGES	LIMITATIONS
Low Cost Standalone System	No Positional Tracking
Classroom Device & Content Management	
Curriculum Aligned Resources	
Ability to Create Own Content	
Supports VR & AR	

DEPLOYING AND MANAGING VR IN THE CLASSROOM

Typically, Virtual Reality systems have been designed for individual use, rather than in a shared or group environment. Obviously, the sheer nature of covering your eyes with a headset has massive implications for a classroom of children. So how would we set about deploying and managing 30 headsets to children in a classroom?

Understanding what classroom controls a system has, and how they are used in practice, is probably one of the most fundamental questions you should ask. If there is no centralised system for controlling and monitoring the devices, how will you successfully deliver a lesson?

Previously with deployments of computers, laptops or tablets, a 'Management System' of some description was typically implemented, to help control the devices and provision content or apps on them. There were also teacher based controls, to pause the devices, view or monitor student's screens, and to capture and send data or classwork back and forth. These management systems also facilitated security, such as lock down controls, asset tracking and device protection.

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Does this still apply to VR headsets? How do we control what content is displayed, or what content students can access from them, and how they would do that?

A significant part of your research should be to understand what controls the teacher will have in the classroom, and how they would use them to effectively deliver and manage a lesson using VR or AR technology.

CONNECTING TO YOUR SCHOOL RESOURCES

As VR is a relatively new technology, with different devices providing multiple ways to deliver content (via connected PCs, proprietary game platforms, mobile phones or standalone units), understanding how these will connect to your existing network, what ICT requirements they have, how much internet connectivity they need or how much bandwidth they use, are also important factors.

Take for example the Oculus Rift and HTC Vive. Both headsets require a dedicated PC. Is it practical (or affordable?) to also have 30 PCs to run these headsets? Is that feasible in today's classroom setting? Or does this require a roll-back to the days of a dedicated computer suite?

On the other hand, the likes of Samsung Gear VR and Google Expeditions require a mobile phone. It would be much easier to store and share 30 mobile phones and plastic headsets. However, what place do mobile phones have in the classroom, and how will they be managed and controlled? Is it practical for students to be putting expensive devices like this into the headsets? How likely are they to get damaged?

WHAT PLACE DO
MOBILE PHONES
HAVE IN THE
CLASSROOM, &
HOW WILL THEY
BE MANAGED AND
CONTROLLED?

A new category of emerging devices, known as 'standalone', are now available. These are a hybrid solution, with fully integrated electronics, CPUs, Wi-Fi display screens and batteries, allowing the device to work as a complete system itself. There is no requirement to add a mobile phone, and no need for a connected PC. Systems like ClassVR provide a standalone headset, at an affordable price, and are an ideal solution to classroom portability and use by students.

With very different technology requirements, the selection of a VR system should be carefully considered. Decide how they are going to be used, in what setting and location, by students of what age, and for how long. Again, having clarity on the use will enable you to select the best system for your needs.

DELIVERING ENGAGING LESSONS ACROSS THE CURRICULUM

Devices and management systems are only a part of the equation. What will likely lead most of the decision is how they will be used to learn, and how they will fit into curriculum lessons. The initial thoughts here often go to 'What content do you have available, and how does that fit with my curriculum?'. While that would typically be a great question to ask, with Virtual Reality it may not be the best one...

We have already seen that the fundamental educational benefit for the use of VR comes in the form of immersion and engagement, from which students derive a better understanding and greater knowledge retention.

SYSTEMS LIKE CLASSVR PROVIDE A STANDALONE HEADSET, AT AN AFFORDABLE PRICE, AND ARE AN IDEAL SOLUTION TO CLASSROOM PORTABILITY AND USE BY STUDENTS.

So a good question to ask for VR might be 'How can I use VR in my lessons to increase engagement and improve student outcomes?'

Virtual Reality allows us to provide unique experiences for students, such as environments, locations or objects in ways that they may never experience in life. So should the focus of the use of VR be more around applying these engaging experiences to help drive increases in fundamental skills such as literacy? Take the following excerpt from a real world case study on 10-11 year old students...

"From the very first lesson, we found that it really helped the children with using descriptive and emotive language – they found it much easier to use a diverse range of adventurous vocabulary when setting a scene in their stories, once they can understand what a particular place actually feels like to them.

The short descriptive text exercise initially uses word banks and a shark photograph as a stimulus. Whilst the child selects vocabulary in keeping with their expected age, they are not writing emotively. They cannot relate to the situation as they've never experienced it first-hand. Immediately after using the virtual reality headsets, we see an impact in the child's writing. They now 'swim nervously' instead of 'happily' and the entire encounter with the shark is far more 'up close and personal' due to their freshly gained experience."

**EXCERPT FROM 'USING VIRTUAL REALITY AS A
STIMULUS TO STORY WRITING IN PRIMARY SCHOOL'**

Barry Island Primary School, Vale of Glamorgan (Wales, UK)

Although the Virtual Reality shark experience 360 degree video is not directly a 'curriculum' resource, it is clear that the experience the students have in Virtual Reality helps dramatically improve their creative writing and literacy skills. It is also an immediate improvement, with teachers seeing an instant impact on outcomes.

Now consider what a trip to Mars could yield for science or maths, or a trip to an ancient Egyptian tomb for history or geography, and we start to see how these experiences can be mapped to educational ideas and lesson plans, to support and extend learning aligned to any curriculum. For example, take the following excerpt from the United Kingdom's Geography National Curriculum for Year 7 (age 11-12), focussing on biomes:

STUDENTS SHOULD BE TAUGHT:

To extend their locational knowledge and deepen their spatial awareness of the world's countries using maps of the world to focus on Africa, Russia, Asia (including China and India), and the Middle East, focusing on their environmental regions, including polar and hot deserts, key physical and human characteristics, countries and major cities

USING VR AND A RANGE OF LOCATIONAL 360 IMAGES SUCH AS THE GOBI, SAHARA, SCOTTSDALE, UTAH OR MOROCCO, LESSON IDEAS COULD INCLUDE:

Discuss what students think of when they hear the word 'desert'. Share ideas on what they are expecting to see during their trip to the 'desert'.

While they experience these locations in VR, draw their attention to the differences and the plants. Ask questions such as – how do plants usually photosynthesise? How are some of these plants adapted to suit this climate? What are the key features of a desert?

Building educational resources from 360 images and videos can provide an entire cross curricular resource bank to drive engagement across all subject areas. Aligning these experiences to areas of the curriculum and presenting lesson ideas on how they can be used to teach a subject is a great way to start with Virtual Reality in the classroom, and will provide impactful and instant improvements in students' engagement.

FLEXIBILITY WITH SELF CREATED CONTENT

Inevitably with curriculum content it is always a challenge to create resources that cover an entire syllabus. We often hear the question 'have you got anything for cell division?' or 'how can I teach photosynthesis with it?'. Teachers typically have their favourite websites or existing resources that cover specific areas of the curriculum, which they are familiar and comfortable with, so how could VR be used to enhance and contribute to these resources, rather than replace them?

Allowing teachers to be creative with VR resources holds the potential for a far better use of the technology, rather than prescriptive, inflexible content. Creating VR content is now possible, and quite easy, thus focusing on students creativity and self-created content can drive engagement and the thirst for knowledge even further.

Take for example a simple 360 degree camera. With this teachers and students can easily create images and videos for VR. Imagine a class field trip to a landmark, or museum. Now have those students capture 360 images of themselves stood at that landmark, or with a object of significance, then share their field trip and experience with their peers when they return to school by delivering it in Virtual Reality.

INTERACTION,
INCLUSION,
MOTIVATION AND
ENGAGEMENT
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WITHOUT THE
NEED FOR
ANY SPECIFIC
CURRICULUM
CONTENT

Now we can start to see how interaction, inclusion, motivation and engagement can be driven without the need for any specific curriculum content.

Taking this concept further, the creation of virtual worlds and resources can be achieved through innovative VR creation applications and websites. Student can use simple tools to build and create virtual worlds, then explore them through Virtual Reality headsets. Not only do students learn coding, they learn many science and maths topics, can better understand spatial awareness, learn construction and material properties, environmental considerations, and socio-economic awareness.

Looking beyond pre-configured curriculum resources, and understanding how to use this technology creatively, can unlock far more potential with students than traditional content. A good example of this is Minecraft, used to drive engagement and creativity with students, and the continued gamification of educational content to provide a more engaging and creative approach to learning.

PROVISIONING TRAINING AND PROFESSIONAL DEVELOPMENT

As with all educational technology, the correct provision of educational support resources, including training, development, technical and teacher support is a critical component to ensuring positive adoption, and the path to a successful implementation. Underestimating the requirements for training and support, however easy to use the technology is, will undoubtedly be the worst mistake you can make, even more so than the wrong choice in systems.

Implementing any new technology in the classroom means teachers and students need help and support to familiarise themselves with it, and to understand how best to utilise it during lessons. Initial training sessions are useful; however, often they fail to provide sufficient supporting material to allow continued self-help. Some initial sessions cover too much detail, trying to cram in as much as possible in a limited period, due to budget constraints or busy diaries.

Focusing on a few of the key features of a product, and how to get 'quick wins' by using just some of these is often a good way to start.

Augmenting initial training with regular 'top-up' sessions will help to ensure teachers become more comfortable with the technology over time. Investment in continued CPD, and the provision of sufficient supporting resources, such as training videos and documents, will help boost the confidence levels of teachers and allow them to consider more advanced use of technology.

FOCUSING ON A FEW OF THE KEY FEATURES OF A PRODUCT, AND HOW TO GET 'QUICK WINS' BY USING JUST SOME OF THESE IS OFTEN A GOOD WAY TO START.

Work with your technology providers, and map out a training and implementation plan to help focus on delivering a simple yet effective launch of the project, with the aim of winning support from teachers and a positive impact in the classroom. Look at how well they support the technology; do they provide assistance by email and phone? How can they help you if you have questions or need guidance? How good are their supporting materials? All of these questions should be asked when selecting the technology to implement.

As teacher confidence grows, support them with ongoing training and look at more advanced features of the system or ways to further utilise the technology. Are there certified courses teachers can attend online? Can they earn credits through CPD? What additional training and support can be provided over time?

If sufficient thought is given to a thorough and well planned training program, then adoption should be smooth and benefits will be seen. However, make sure you understand training is an ongoing requirement, not just during the implementation.

KNOWING WHEN YOU'VE SUCCEEDED

Unless you can understand why you are implementing VR, what outcomes you expect, and how to measure them, then you might as well not bother. The single most important factor to consider is what is the primary educational benefit or outcome you expect. If you don't know what you want to achieve, how can you know if you've achieved it?

This may sound simple, but many times projects and technology are implemented without this primary consideration, and thus we end up with 'technology for technology's sake'. Take that iPad that was issued to the teacher. What was the expected outcome based on spending that money? Easier access to network based resources? A simpler way to access email? A general research tool? Whatever the reason, did you measure the outcome? Did things improve? Was it worth the spend?

Knowing when you've succeeded requires clear goals, and a way to measure them. Defining and understanding these goals should allow simple analysis to establish success or failure, and will provide that all important Return On Investment.

Investing in educational technology means investing in student development. Measuring this can be difficult, but some clearly defined goals, even subtle ones such as better engagement in class or a noticeable change in motivation, can be highly valuable and ultimately will yield results for improved student outcomes over time.

A black and white photograph of Albert Einstein, showing him from the chest up. He is wearing a patterned suit jacket, a white shirt, and a dark tie. He has his characteristic wild, curly hair and a mustache. He is looking slightly to the right of the camera with a thoughtful expression. His right hand is resting on a surface, possibly a desk or table, which is partially visible at the bottom left. The background is a plain, light-colored wall.

SUMMARY

"THE ONLY SOURCE OF KNOWLEDGE IS EXPERIENCE"

~ ALBERT EINSTEIN ~

VIRTUAL REALITY PRESENTS AN UNPARALLELED OPPORTUNITY TO RAISE ENGAGEMENT AND INCREASE KNOWLEDGE RETENTION FOR STUDENTS OF ALL AGES, THROUGH PERSONAL EXPERIENCE.

Properly implemented, Virtual Reality can be an incredible learning tool to help guide students through complex topics, empathise and understand emotion, and give them a view of the amazing world in which we live, unlocking creativity and imagination that helps create a foundation for success.

VR truly is a ground-breaking technology, with so many ways to help augment traditional teaching methodologies and make a fundamental impact on how students learn and retain knowledge.

However, make no mistake, this technology is in its infancy, and it will grow and change rapidly. Understanding how Virtual Reality and Augmented Reality can fit into a traditional classroom environment should be of fundamental concern. A well conceived and properly executed plan, with the right technology, could deliver incredible results. A poorly thought through strategy and project implementation will almost certainly fail.

KEEP IN MIND THESE IMPORTANT ASPECTS



UNDERSTAND WHY YOU WANT TO IMPLEMENT VR/AR IN YOUR SCHOOL



SET YOUR GOALS, DEFINE YOUR SUCCESS CRITERIA AND KNOW HOW TO MEASURE THEM



RESEARCH YOUR OPTIONS, LOOK AT THE OPTIONS AVAILABLE TODAY AND SEEK ADVICE FROM YOUR TECHNOLOGY SUPPLIERS



PLAN YOUR IMPLEMENTATION AND UNDERSTAND THE REQUIREMENTS OF THE TECHNOLOGY AND YOUR INFRASTRUCTURE



CONSIDER HOW YOUR TEACHERS WILL MANAGE AND USE THE TECHNOLOGY WITHIN THE CLASSROOM



UNDERSTAND HOW YOU WILL USE VR TO SUPPLEMENT YOUR CURRICULUM TEACHING



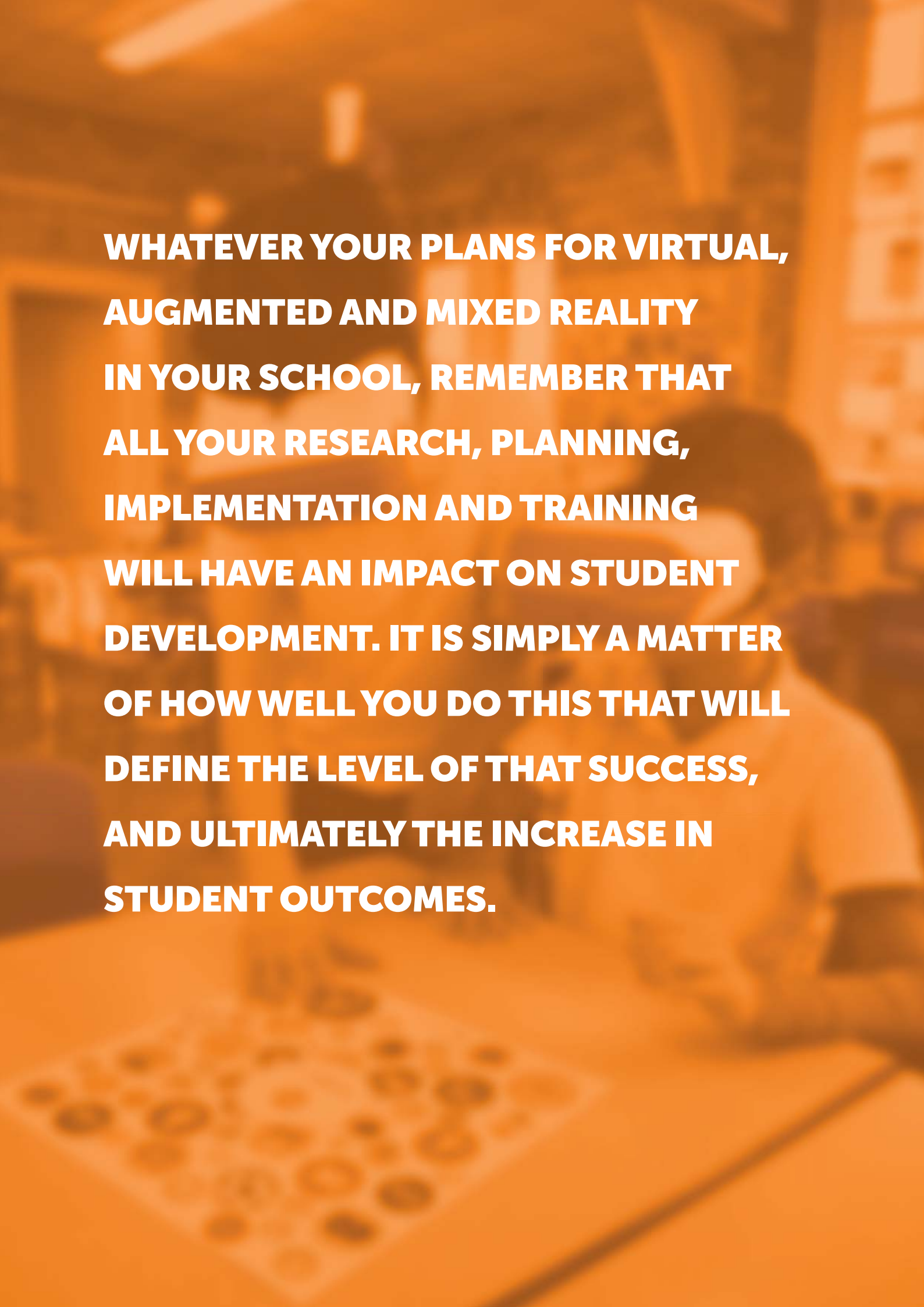
RUN PILOT TRIALS TO TEST OUT THE TECHNOLOGY AND SEE WHAT FEEDBACK YOUR TEACHERS AND STUDENTS PROVIDE



ENSURE YOU HAVE PROVISIONED SUFFICIENT TRAINING AND ONGOING SUPPORT



REVIEW YOUR PROJECT WITH A VIEW TO UNDERSTANDING IF YOUR GOALS WERE MET



**WHATEVER YOUR PLANS FOR VIRTUAL,
AUGMENTED AND MIXED REALITY
IN YOUR SCHOOL, REMEMBER THAT
ALL YOUR RESEARCH, PLANNING,
IMPLEMENTATION AND TRAINING
WILL HAVE AN IMPACT ON STUDENT
DEVELOPMENT. IT IS SIMPLY A MATTER
OF HOW WELL YOU DO THIS THAT WILL
DEFINE THE LEVEL OF THAT SUCCESS,
AND ULTIMATELY THE INCREASE IN
STUDENT OUTCOMES.**