

STRAND			Knowledge and understanding				Processes and production skills																								
			Digital Systems		Representation of data		Collecting, managing and analysing data				Creating Digital Solutions by:																				
											Investigating and defining		Generating and designing			Producing and implementing		Evaluating		Collaborating and managing											
Content Description			Investigate the role of hardware and software in managing, controlling and securing the movement of and access to data in networked digital systems (ACTDIK034)		Analyse simple compression of data and how content data are separated from presentation (ACTDIK035)		Develop techniques for acquiring, storing and validating quantitative and qualitative data from a range of sources, considering privacy and security requirements (ACTDIP036)				Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)				Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)		Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)			Design algorithms represented diagrammatically and in structured English and validate algorithms and programs through tracing and test cases (ACTDIP040)		Implement modular programs, applying selected algorithms and data structures including using an object-oriented programming language (ACTDIP041)		Evaluate critically how student solutions and existing information systems and policies, take account of future risks and sustainability and provide opportunities for innovation and enterprise (ACTDIP042)		Create interactive solutions for sharing ideas and information online, taking into account social contexts and legal responsibilities (ACTDIP043)		Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)			
Sequence of Lessons / Unit	Approx. time req'd	Year	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #							
Managing a group project: Augmented Reality	20	9	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>	4	<input checked="" type="checkbox"/>	5	<input type="checkbox"/>		<input checked="" type="checkbox"/>	6	<input checked="" type="checkbox"/>	9	<input checked="" type="checkbox"/>	3	<input checked="" type="checkbox"/>	3							

Years 7 and 8 Achievement Standard	Years 9 and 10 Achievement Standard
<p>By the end of Year 8</p> <ul style="list-style-type: none"> <li>Students distinguish between different types of networks and defined purposes. (1)</li> <li>They explain how text, image and audio data can be represented, secured and presented in digital systems. (2)</li> <li>Students plan and manage digital projects to create interactive information. (3)</li> <li>They define and decompose problems in terms of functional requirements and constraints. (4)</li> <li>Students design user experiences and algorithms incorporating branching and iterations, and test, modify and implement digital solutions. (5)</li> <li>They evaluate information systems and their solutions in terms of meeting needs, innovation and sustainability. (6)</li> <li>They analyse and evaluate data from a range of sources to model and create solutions. (7)</li> <li>They use appropriate protocols when communicating and collaborating online. (8)</li> </ul>	<p>By the end of Year 10</p> <ol style="list-style-type: none"> <li>Students explain the control and management of networked digital systems and the security implications of the interaction between hardware, software and users.</li> <li>They explain simple data compression, and why content data are separated from presentation.</li> <li>Students plan and manage digital projects using an iterative approach.</li> <li>They define and decompose complex problems in terms of functional and non-functional requirements.</li> <li>Students design and evaluate user experiences and algorithms.</li> <li>They design and implement modular programs, including an object-oriented program, using algorithms and data structures involving modular functions that reflect the relationships of real-world data and data entities.</li> <li>They take account of privacy and security requirements when selecting and validating data.</li> <li>Students test and predict results and implement digital solutions.</li> <li>They evaluate information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise.</li> <li>They share and collaborate online, establishing protocols for the use, transmission and maintenance of data and projects.</li> </ol>

**Managing a group project: Augmented Reality**

There is a movement away from the containment of information in a device, smartphones or tablets, moving to information everywhere, information around us, displayed on the world and interacting with it in a different way. Augmented Reality (AR) is a technology that enables us to do just that. The origin of the word augmented is augment, which means to add or enhance something. In the case of Augmented Reality (AR), graphics, sounds, and touch feedback are added into our natural world to create an enhanced user experience. Augmented Reality uses your existing natural environment and overlays virtual information on top of it. Developing project management skills, collaborating with others and undertaking a specific role are all aspects of learning that students can demonstrate and develop during their planning, implementation and monitoring an AR project.

Flow of activities				
Short text	<b>Explore AR and VR</b> Explore differences between AR and VR explain some practical uses of both AR and VR.	<b>Plan an AR experience</b> Plan a group project that uses an AR platform to create an AR experience in response to a problem.	<b>Manage the AR project implementation</b> Use project management methodology to define, design, implement and monitor development of the AR project.	<b>Evaluate the AR project</b> Evaluate the end product as well as the development process.
Questions to guide exploration	<i>What is augmented reality (AR) and how is it used in everyday life?</i>	<i>How will your group approach the solving of a problem that uses an AR experience as part of its digital solution? – What role will each group member play? What will the solution be?</i>	<i>How will your group manage the creation of the AR solution?</i>	<i>Was the solution successful and does it work as intended? How well did the group perform in completing the project?</i>
AC Alignment	Evaluating (ACTDIP042)	Investigating and defining (ACTDIP038)  Collaborating and managing (ACTDIP043 and ACTDIP044)	Collaborating and managing (ACTDIP043 and ACTDIP044) Investigating and defining (ACTDIP038) Generating and designing (ACTDIP040) Producing and implementing (ACTDIP041)	Evaluating (ACTDIP042)  Collaborating and managing (ACTDIP043 and ACTDIP044)
What's this about?	<p>AR and VR might sound similar but they are quite different. VR essentially places the user in another world through the use of VR goggles such as Oculus Rift, Google Cardboard or Samsung Gear VR. VR goggles block out your world and replace it with a virtual world which is immersive and heightens your senses as you experience this virtual environment.</p> <p>AR adds something to your current reality. AR mixes the physical and the digital worlds together in new ways. It is envisaged that with expected technical advancements and broader social acceptance new opportunities for use of AR will be created.</p> <p>There are three key drivers of AR use, these include:</p> <ol style="list-style-type: none"> <li>1. The ability to display information</li> <li>2. The ability to add digital objects</li> <li>3. The ability to enhance existing objects</li> </ol> <p>Smartphones and tablets as hand-held devices can be isolating. AR can provide new dimensions to their use.</p>	<p>There are several AR development platforms that can be used to explore the development of AR applications. Four notable platforms for building AR are <a href="#">HP Reveal</a> (formerly <a href="#">Aurasma</a>), <a href="#">Metaverse</a>, <a href="#">Unity</a> and <a href="#">ARKit</a>. HP Reveal and Metaverse are a user-friendly platform to use as a first experience. Unity and ARKit are more high-end platforms.</p> <p>In planning a collaborate project that involves defining, designing and implementing a digital solution such as one that involves AR, people with different skill sets often are brought together to contribute to the project at various stages. The successful outcome of these types of projects is highly dependent on the effective management of the project and resources, and the way in which team members collaborate and execute their specific roles.</p> <p>Developing project management skills, collaborating with others and undertaking a specific role are all aspects of learning that students can demonstrate and develop during this project.</p>	<p><b>Approaches to undertaking a project</b></p> <p><i>Waterfall method:</i> Each process in the problem-solving methodology is completed before the next process begins.</p> <p><i>Agile method:</i> The Agile method doesn't require you to adhere to the strict order of each process. Rather phases can be revisited and small components of the larger project can be undertaken more frequently allowing for ongoing changes and testing.</p>	<p><b>Product Evaluation</b>                      The primary focus of product evaluation is to make sure the product does what it is intended to do.</p> <p><b>Student Performance Evaluation</b>                      Typically, teachers are required to report on student performance. Digital Technology work is often project based and a variety of pieces of evidence are needed to assess student performance.</p>

<p>The focus of the learning (in simple terms)</p>	<p>Ask students to work in pairs to create a short presentation on the differences and similarities of AR and VR. The presentation should include relevant examples of existing uses of AR and VR technologies. Students could include a section on some of the potential social benefits of AR.</p> <p>There are texts with complimentary AR experiences created by book publishers, as well as AR apps and games all available for smartphones and tablets – iOS and Android-based devices. Provide some examples of some texts, apps or games suitable for your particular platform. Ask students to evaluate one of them and report your findings to the class. What is the AR experience? Rate the success of the experience and in what ways AR enhances the experience.</p> <p>QR (Quick Response) codes have been around for some time. When a QR code is scanned, specific information is made available to the user. Students respond to the question: In what ways are QR codes and AR similar?</p> <p>Discuss the use and potential benefits of AR in sport broadcasts, for example:</p> <ul style="list-style-type: none"> <li>on-field advertisements are often not on the field but added to the broadcast digitally</li> <li>off-side lines in soccer broadcasts, down lines in American football are added digitally.</li> <li>track and field broadcasts distance lines are added digitally in long jump and throwing events such as discus and javelin.</li> </ul>	<p>HP Reveal is an appropriate platform for students to begin their exploration of creating AR experiences.</p> <p>Once HP Reveal has been installed on smartphones or tablets, the tutorials can be used to understand how to create AR using HP Reveal. Alternatively, another platform may be provided which has relevant tutorials and is comparable to students' skill level.</p> <p>Ideas for an AR activity that adds additional elements to the user's experience include:</p> <ul style="list-style-type: none"> <li>assisting another student to understand a mathematics or science concept</li> <li>enhancing the experience of school visitors to view student exhibitions for example artworks or designs</li> <li>providing promotional information for visitors to the reception area at the school</li> <li>providing overlay information for a recent geography field trip.</li> </ul> <p>Each team can create a project plan for one or more AR ideas.</p> <p>Discuss suitable ways the team can be structured. Suggested team roles could include:</p> <table border="1"> <thead> <tr> <th>Role</th> <th>Responsibilities</th> </tr> </thead> <tbody> <tr> <td>Technical Helper</td> <td>Assist teacher and students install app on devices – Phones (iOS, Android) tablets (iOS, Android), computers (Windows, Mac)</td> </tr> <tr> <td>Content Manager</td> <td>Track content development Lead content choice discussions</td> </tr> <tr> <td>Content creators</td> <td>Activities could include: Create video clips Create PowerPoint content and export to video Take photographs Create posters</td> </tr> <tr> <td>Graphic designer</td> <td>Design splash screens, trigger cards</td> </tr> <tr> <td>Test case manager</td> <td>Generate test cases to ensure that the products work as expected across platforms and devices</td> </tr> </tbody> </table>	Role	Responsibilities	Technical Helper	Assist teacher and students install app on devices – Phones (iOS, Android) tablets (iOS, Android), computers (Windows, Mac)	Content Manager	Track content development Lead content choice discussions	Content creators	Activities could include: Create video clips Create PowerPoint content and export to video Take photographs Create posters	Graphic designer	Design splash screens, trigger cards	Test case manager	Generate test cases to ensure that the products work as expected across platforms and devices	<p><b>Generally, AR platforms operate on some sort of trigger to generate an overlay or Aura.</b></p> <p><b>The Trigger</b> As an example HP Reveal requires a trigger which may be a photo, a poster, an object.</p> <p><b>The Overlay (Aura)</b> When using HP Reveal it uses the term 'aura' for an overlay. When the trigger has been registered, an aura is associated with the trigger. When the user points the camera at the trigger, the aura is displayed.</p> <p>As a first lesson students could be challenged to create a one-step AR experience just to get familiar with the process. They can then undertake a more complex group project.</p> <p><b>Using HP Reveal studio</b> Simple one-step AR activities can be created using the app on a smartphone or tablet. The <a href="#">HP Reveal Studio</a> provides the option to add additional overlay actions to a trigger to create a sequence of actions.</p> <p><b>AR solution</b> Once each group of students has selected the focus for their AR solution, they need to define the problem in terms of its data, functional and non-functional requirements and design how the solution will operate. Using their selected platform, they can implement their solution.</p> <p><b>Define, design and implement their AR solution</b></p> <ul style="list-style-type: none"> <li>What is the problem?</li> <li>How will AR be used in the digital solution?</li> <li>Generate at least 3 designs. Decide on a final design and create a design plan.</li> <li>What information, data or other assets are required?</li> <li>What are the functional and non-functional requirements?</li> <li>What are the social considerations?</li> <li>What platform are you using to implement the solution?</li> </ul> <p><b>Project plan</b> Complete a checklist that helps with planning, carrying out and monitoring the project.</p> <ul style="list-style-type: none"> <li>Design plan</li> <li>Team structure and roles</li> <li>Timelines</li> <li>Resources required</li> <li>Feedback and review</li> </ul>	<p><b>Solution Evaluation</b> Does the final solution do what was set out in the solution design?</p> <p><b>Student Performance Evaluation</b> How can you plan to evaluate student work throughout the project development process?</p> <p><b>Student-guided rubrics</b> represent a meaningful assessment exercise designed to engage students not in the content that they are learning, but also the motivations behind why they are learning it. Students may, as a class, list characteristics of what would make a good project and a project plan. For example, when considering their digital technologies project, they might consider what would make a good presentation of a requirements specification. For the project plan, how can the individual tasks and the allocated time for each, be best shown? How can you tell if the project is on schedule?</p> <p>While <b>peer review</b> is often fun and engaging, peer review can also present problems in that students need to be guided as to how best use the process as a learning opportunity. In an example of formative assessment, students could be asked to test each other's AR creations and provide feedback to their peers, including the top three best features of the apps, as well as the top three issues.</p> <p><b>Think Aloud</b> is a learning and assessment strategy designed to assist students to articulate their thought processes, and to help foster a supportive environment for learning.</p>
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<p>Supporting resources and tools and purpose/ context for use.</p>	<p><a href="#">Augmented Reality</a> The Ultimate Guide to Augmented Reality (AR) Technology</p>	<p><b>Easy-to-use platforms</b></p> <p><b>HP Reveal</b> Formerly known as <a href="#">Aurasma</a>, HP Reveal is available for Android and iOS phones and tablets. Almost everything</p>	<p>HP Reveal in Education (formerly Aurasma) <a href="#">Art Department</a></p> <p><a href="#">Aurasma for Shakespeare (Augmented Reality and R+J Act 3 Sc 5)</a></p>	<p><a href="#">Evaluation &amp; Assessment - Part 1</a> An overview of assessment ideas and methods for computational thinking.</p> <p><a href="#">Evaluation &amp; Assessment Part 2</a></p>												

	<p><a href="#">8 Examples of Augmented Reality Apps and their Successful Uses</a> This blog provides an opinion about useful AR apps.</p> <p><a href="#">Augmented Reality 101: Top AR use-cases</a> Explore how augmented reality is being used in our world today.</p> <p><a href="#">Augmented Reality</a> Augmented reality superimposes digital information or images onto the physical world to enhance the way we view our surroundings.</p> <p><a href="#">Evolution of AR in Pokémon Go</a> Phil Keslin (CTO, Niantic and creator of Pokemon Go) discusses the evolution of Pokémon Go and how it transformed into a phenomenon. The social benefits are discussed towards the end of the video.</p> <p><a href="#">AR in ACTION</a> AR in ACTION Leadership Summit convening some of the top minds in Augmented Reality to accelerate conversation and collaboration amongst industry innovators, thought leaders, investors. (Conference website is <a href="http://arinaction.org/">http://arinaction.org/</a> )</p> <p>Some suggested apps to explore.</p> <table border="1"> <thead> <tr> <th>App name</th> <th>Function</th> <th>URL:</th> </tr> </thead> <tbody> <tr> <td>CluckAR</td> <td>Scans egg Carton labels to determine if the eggs are Free Range, Cages or Barn</td> <td><a href="#">CluckAR website</a> (with link to App store and Google Play) <a href="#">App Store</a> <a href="#">Google Play</a></td> </tr> <tr> <td>Google Translate</td> <td>Real-time translator for different languages by using the camera in the Google Translate app.</td> <td><a href="#">Google Translate website</a> <a href="#">App Store</a> <a href="#">Google Play</a></td> </tr> <tr> <td>Sky View Lite (Free)</td> <td>Point the phone at the sky and get the names of the items in the sky and access additional information</td> <td><a href="#">Sky View Lite App summary</a> (with link to App store) <a href="#">App Store</a> <a href="#">Google Play</a></td> </tr> <tr> <td>iClass Shapes</td> <td>Point the phone at the net of a shape and view the augmented 3D shape on screen. 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The latest version requires XCode 9.3 and iOS 11.3 to be installed.</p> <p><a href="#">How MIT Builds Cities Using Lego and Augmented Reality   Science of Teams</a> The MIT Media Lab is using innovation to boil efficient teamwork down to a science.</p>	<p><a href="#">Aurasma In the Music Room</a></p> <p><a href="#">Teaching with Aurasma</a> A helpful teaching tool on how to integrate Aurasma into the classroom.</p> <p><a href="#">HP Reveal Augmented Reality Example</a> Here are some projects using Augmented Reality and the HP Reveal app.</p> <p><a href="#">Aurasma Demo for Teachers</a></p> <p><b>HP Reveal tutorials (formerly Aurasma)</b> <a href="#">Make your Own Augmented Reality - with PowerPoint and Aurasma (Now Called HP Reveal)</a> Make your own Augmented Reality presentations with PowerPoint and a cool free app called HP Reveal (previously known as Aurasma).</p> <p><a href="#">Teachers: How to use HP Reveal app</a> A tutorial to help teachers getting started with the HP Reveal app.</p> <p><a href="#">Aurasma Step by Step</a> A step by step guide to creating Augmented Reality using the Aurasma app.</p> <p><a href="#">Aurasma Studio Tutorial: How to Create a Sequence Aura</a> Use various sequences to create more interactive auras for your classroom!</p>	<p>In this second video, we look further at how rubrics can be used to support understanding of the problem-solving process, and discuss ideas for students might engage with decomposition and abstraction.</p> <p><a href="#">Grading rubric for group project</a> An example rubric for a group project from Carnegie Mellon University.</p>
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Assessment	<p>A visual presentation of the differences between AR and VR. The presentation should include the benefits of AR and VR to individuals, groups and businesses.</p> <p><b>Achievement standard</b> They evaluate information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise.</p>	<p>Develop a plan to design an AR solution that includes requirements, target audience, user benefits and development timelines.</p> <p><b>Achievement standard</b> Students plan and manage digital projects using an iterative approach.</p> <p>They define and decompose complex problems in terms of functional and non-functional requirements.</p>	<p>Present completed AR solutions to the groups and the target audience.</p> <p>Present the project plan showing any changes that resulting from monitoring the project.</p> <p><b>Achievement standard</b> Students plan and manage digital projects using an iterative approach Students test and predict results and implement digital solutions.</p>	<p>Completed product evaluation rubric.</p> <p><b>Achievement standard</b> They evaluate information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise.</p>

We are learning about our digital footprint, potential dangers of online and copyright to protect our work and the rights of others.				
SOLO LEVEL	One	Many	Relate	Extend
SOLO VERB	<i>Identify &amp; Define</i>	<i>Combine &amp; Perform Serial Skills</i>	<i>Apply Integrate</i>	<i>Create &amp; Evaluate</i>
Success Criteria	<p>I can identify an Augmented Reality (AR) feature.</p> <p>I can explain the difference between Augmented Reality (AR) and Virtual Reality (VR).</p>	<p>I can describe potential benefits of AR for individuals or groups of people.</p> <p>I can install and use apps onto a smartphone/tablet.</p>	<p>I can consider user scenarios and design an AR activity that would add benefit for the user.</p>	<p>I can evaluate a AR environment describe its usefulness</p> <p>I can create an AR activity that provides an enhancement to the reality for the end user.</p>
Digital Technologies Way Of Thinking	Systems thinking	Systems thinking	Computational thinking	Design thinking