

Chapter 12

Making digital art

Introduction

Making art that exists wholly in the digital world is a relatively new technique in the world of art as well as in education and it provides us with some interesting opportunities. Over the last ten years many of the tools available to explore this way of making art have become increasingly common in primary schools, including those that seemed unlikely to arrive in primary schools when they were first unveiled to the world. Using digital tools and techniques as part of the art curriculum can provide inspiring and inclusive opportunities for individual and collaborative making of art as well as being a way to use the devices that are available in schools, and increasingly in homes, in creative and active ways to make, rather than passive ways merely as consumers. Seeing themselves as inventors with technologies can be powerful and motivating for pupils.

There are many digital tools available to use in schools, some of which may be part of the commonly available equipment such as interactive whiteboards, tablets and laptops, but used for art making and others of which maybe more art specific. One important aspect of embedding making art with digital tools and devices into the curriculum is equipping pupils to be creative users and makers who use a range of tools and devices and in this, as in the other areas of art explored, experimenting and exploring is vital. In some ways in this area it could be easier as it is possible to make and remake, do and undo, saving outcomes as we go. There is less fear of “spoiling” and “wasting” and therefore more likelihood of risk taking and productive use of trial and error. In addition to this, digital tools give pupils access to a range of different ways of making art including manipulating and combining images, light and sound and exploring augmented and virtual reality – experiences they are increasingly familiar with in the context of entertainment.

Tools and materials

There is a list of suggested tools and resources to explore in Appendix 2 along with additional detail about some of the more specialist tools, equipment and resources used in working with digital devices and tools.

Devices

You are likely to have access to some or all of the following devices: PCs or laptops; tablets and other mobile devices; interactive whiteboards and / or large screens; fixed and / or mobile projectors; visualisers and combined or individual photocopier / printer / scanners. You might have other equipment that supports some of the above such as: tripods or stands; lightboxes; green screens; robots or other programmable toys; 360 cameras; styluses or pens to use on tablets and screens; drones and attachable lenses for mobile devices. All of these have the potential to be used to make digital art.

Software, apps and tools to use on PCs, laptops and tablets

Alongside the computers or tablets that you use in day to day teaching and learning, the software and apps that are available on these can be used to make art, along with those that are more specifically focused on art. The chart below summarises some of the main software and tools you might have available to use. You could use this as a checklist to begin to evaluate what is available to you.

	Notes
Camera (still and video)	Most mobile devices have a built-in camera that will take still images and video. This can be used to take series of photos or videos that can then be edited and manipulated to make digital art.

Photo editor	Along with the camera, devices will have editing tools to allow images to be cropped and resized, to manipulate the orientation, colour and light as well as draw onto (mark-up) and open in other tools to go further.
Photo collage maker	There are many free photo collage makers that can be used to combine and position images together to create new images. Options include creating grids, choosing positions (freestyle) and using premade templates. Having made a photo collage there are often tools that allow for the addition of frames, colour and patterned backgrounds, text and free drawing,
Slide presentation maker	Slide and sideshow makers such as Powerpoint (Windows), Keynote (IOS) and GoogleSlides all contain tools that can be used to make art. They can also be combined with other digital material such as photos and video, sound and music. It is also possible to make simple digital animations using the tools in slide makers.
Screenshot tool	It is possible to take a screenshot on most devices. This might be by using the 'snipping tool' on a PC or laptop or by using a shortcut on a tablet. Capturing what is on the screen in the moment can be useful when making art. Many apps and tools also allow for what is being created to be saved to photos or camera roll.
Screen recording tool	Being able to record what is happening on the screen can allow for the capture of change and movement. The addition of narration, sound or music can also be captured in this way allowing for the finished art to be multisensory. This might be part of the software or could be available within slide-making tools.

These tools are useful across the curriculum in day to day teaching and learning and creation of resources and can be used creatively singly and in combinations to make art as well as to capture

and share what pupils are making. In addition, there are tools and apps on devices as well as tools available online that are specifically focused on making art and it is useful to have access to some of these. They might also be used in the subjects of computing and design technology. You could annotate this chart with the specific names of the tools you have access to.

	Notes	Examples (add more)
On screen painting	Apps and tools that are focused on drawing or painting on the screen using a finger or stylus as a tool to create marks and lines.	Sketches Brushes TagTool
Video editing tools	Apps and tools that allow video to be edited and developed.	iMovie
Stop motion animation	Apps that support the creation of stop motion animation using a series of still images combined in a sequence to make a film. Many of these have additional useful tools such as a grid and / or onion skin to help position objects.	StopMotionStudio iMotion I can animate Animate It Lite Puppet EDU Draw and Talk series of photos in powerpoint
Green screen	Apps that use a photo / video taken against a green screen to allow for manipulation and combination of foreground images and backgrounds.	DoInk Greenscreen (IOS)
Sounds and sound recording	Apps that allow sounds, sound effects and music to be created, recorded and added to images and video making the finished art multisensory in nature.	Keezy Garageband Voice Recorder

Augmented reality (AR) and virtual reality (VR)	Apps and tools that allow us to create and interact with digital material in the physical world.	HP Reveal EyeJack CoSpaces ARMakr Reality Composer CoSpaces / Blocks Tiltbrush
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The apps and tools listed above are quite open in nature leaving the pupils the opportunity to create and manipulate the artistic content for themselves. In addition to these there are some specific apps and tools, including some available online, that have interesting but often limited or specific functions and can be used creatively, especially when combined with the tools listed above. Some of these will be explored as examples in the rest of this chapter.

Other useful resources

You will have seen from the list in Appendix 2 that there are other apps, tools and resources that can be harnessed in making digital art. Some of these might be used in science (microscopes, lenses and other viewers) and computing (robots and other programmable toys and coding apps such as Scratch). There also many physical resources that can be used alongside digital devices and tools as part of the making process. Those used in multisensory play activities with EYFS pupils such as lightboxes and other ways of playing with light such as torches, fairy lights, LEDs and glowsticks can be used to make art. You will have seen in previous chapters how physical materials and resources can be combined with digital ones to make art.

Alongside some of the resources explored above there will be supporting resources that make them easier for pupils to use. When using a mobile device, it is often helpful for children to have a stand or tripod to help keep the device steady and in the position needed. These can range from homemade using sturdy card, to expensive specialist equipment depending on the situation you are in. When animating or using greenscreen it is possible to buy backdrops and screens but also green card,

fabric or simply painting a wall green can be just as effective and user friendly. Searching online can allow you to see how teachers and other creative users of technology improvise and solve problems so it is not always vital to buy all the most expensive equipment. An example of this is these user-friendly and easy to make tablet stands to use when you are making stop motion animation.

Link <https://www.instructables.com/id/Cardboard-iPad-Stand/>

Subject knowledge

When you are planning to teach digital art making identifying the relevant visual elements can help you be clear about the learning that will take place. As with any aspect of art there will be subject specific vocabulary as well as words used with a specific meaning in this context. There are specialist techniques and processes in this area that you will need to know about, just as in any area of art making.

The chart below makes some suggestions in relation to each of the eight visual elements. When you are planning and teaching a unit of work that involves making digital art it is important to identify one or two visual elements that you will focus on with the children. It is likely that this will have been done at the long-term planning stage.

Line	Tone
Drawing with light (slow shutter apps)	Experimenting with the effect of light on surfaces (light / dark / fluorescent) Adjusting the tone of a colour in a painting app Adjusting the tone of a photo in colour and / or black and white in photo editing
Drawing on screen (drawing / painting apps)	
Screen recording of drawing on screen	
Programming an object or toy to move and draw	
Drawing GPS using running / walking / mapping apps	
Colour	Pattern
Experimenting with changing colours using drawing and painting tools on screen	Using tools and apps to manipulate images using pattern effects (photo manipulation apps)

Projecting colours onto surfaces to explore effects Deconstructing images and photos using colour sorters	Creating repeating patterns (time lapse app, gifs, stop motion animation, copy and paste)
Texture	Shape
Photographing and looking more closely at textures (magnification tools and apps)	Choosing shapes (photo manipulation apps) Changing shapes (cropping tools, shape apps) Layering shapes next to and over each other (copying, pasting, moving)
Space	Form
Placing and moving objects in space and changing their scale using green screen tools Placing and moving objects in augmented or virtual reality exploring scale and space. Creating installations and changing the environment	Manipulating size, orientation and scale of forms Creating and / or manipulating objects in virtual or augmented reality Manipulating 2d images into 3d (tinyplanet apps)

As you read the suggestions in the chart above you might have noticed that they have strong connections to the visual elements charts in the previous chapters. In some instances the use of digital tools can be a substitute or alternative or one of several tools used together. In this chapter the focus will be on additional and different ways of working that digital approaches provide will be explored.

Artists and makers in digital technology

There are many artists who use digital technology as part or all of their tools for making art. In chapter 4 you were introduced to some of these. Established artists whose names you may already know, such as Yayoi Kusama, Olafur Eliasson and David Hockney, who began working in other media have absorbed digital making into their repertoire as tools and approaches have become

available. One way in to children's making of digital art is to show them what an artist they have already encountered does with digital media. This reinforces the idea that digital tools can be used alongside physical materials as a way of being creative and expressing oneself. Other digital artists may be less familiar and this might affect your confidence in choosing them to share with your pupils. In some ways though this is a positive, as it allows you to make more exciting choices led by your personal and your school and pupils' interests, rather than relying on known "famous" artists. It also may lead you to expand both your own and the children's ideas of who an artist is and what they do and make connections to STEAM approaches. When you are making choices, it is worth considering whether the art and artists are doing something with digital media that could not be done any other way. Using and manipulating light to make art is one example of this.

Painting with light

You may have noticed the increasing prevalence of outdoor digital art projections and installations in towns and cities during the winter. Some of these are digital art projected onto large buildings sometimes to commemorate historical events such as those by Lux Muralis whose work is usually projected onto cathedrals. Others are more immersive and interactive pieces of art around a trail outdoors or in the streets, in woods or around the grounds of stately homes such as London Lumiere, Light Up Leicester and the annual interactive light festival at Compton Verney. All of these are created by artists using digital tools and some of them include opportunities for the viewer to take part and contribute or control the art.

Many digital artists make use of images projected onto a wall from a tablet. Often a feature of this art is that the viewer's interaction is a part of the art itself. For example, the CROSSROADS exhibition in Amsterdam featured a projected timeline controlled by visitors using an iPad, enabling them to explore connections between diverse museum objects. A group of designers in Seattle experimented with a simple iPad drawing app and a black background to project live murals drawn by themselves and their audience onto surrounding buildings as digital graffiti. At the Ars Electronica Festival 2018 in Austria the app Tagtool was used to project live art, animation and sound onto walls.

Some of these became immersive spaces for children to explore and others were the backdrop for dance performances.

Link <https://cemec-eu.net/cms/>

Link <http://www.seattledesignnerds.org/news/2016/11/4/lights-and-projection>

Link <https://www.oma.at/tagtool-convention-ars-electronica/>

Try for yourself

In this practical activity you will try out an app that allows you to paint and animate what you have painted and then project your image onto a surface.

You will need:

An ipad

The free app TagTool

Access to a digital projector, preferably mobile, but if not, use a fixed one.

What to do:

Watch the TagTool tutorial available here: <https://www.youtube.com/watch?v=hi-BjLz5-ul>

This shows you how to add and animate layers that combine to create a colourful, moving figure.

Either follow along and make what this artist, Josef Dorninger, makes or make something of your own following the steps. It could be applied to anything you would like to create: a bunch of flowers, fireworks, buildings, for example.

When you have finished try projecting it. If you have a small, mobile projector think creatively about where your projection could have most impact. Perhaps it could appear somewhere unexpected in school or outside in the grounds or it could be a digital addition to a part of the building or an existing piece of art. It could be timed to appear and disappear at random or with regularity.

You can experiment with this medium of projected live painting for yourself using a tablet connected to a small portable projector via AirPlay or using an AV adapter. It is particularly effective if when projected in a darkened space. There is a free version of the live painting and animation app

Tagtool mentioned above that has a simple paint tool for creating and animating coloured layers within an image using different sizes of brushes. The idea is that you paint and animate each layer as you go and then reorder the layers to bring objects forwards or backwards and group them. Each layer can be animated separately, and the animations recorded and projected. Other people can be invited to join in your Tagtool session and paint alongside you in multiplayer mode as long as they are all on the same wireless network.

Other apps worth considering for live painting are those that enable you to draw with neon colours on a black background such as Art of Glow, Glow Colouring or Forge of Neon, or that create colourful patterns and tessellations such as Amaziograph or Kaleidoscope Drawing Pad. These can create inspiring sensory spaces when projected onto the walls of a white tent or mosquito net and combined with music. You might also look at the app Mega Photo that has hundreds of photo effects and filters to choose from and can be used with imported drawings or photos. Effects such as mosaics, light tunnels or spinning globes can be combined into a video to be projected onto walls or white objects. Or you can project live interactions with the effects which move and distort as you tap, pinch or rotate them, perhaps in response to music.

There are many possibilities for creating a multimedia performance based on a combination of live painting, dance and music. ‘Wood Wide Web’ from the Czech company Tineola Theatre is based on the invisible life below a forest floor and would make an excellent provocation for a class project. This approach also relates back to the learning in action story discussed in chapter 4 based around creating multi-sensory environments.

Link <http://www.drawinginmotion.com/>

Teaching and learning

Using digital approaches to make art will include the same learning opportunities as if physical materials were being used. A combination of opportunities to explore and experiment with new devices and tools along with teaching specific ways to use them will be important if children are to learn and be creative. Using the readily available devices and tools to create art along with using

more specifically art and digital technology focused ones can enrich the range of experiences offered in the art curriculum. If you are just beginning to incorporate digital approaches into the art curriculum using the devices, apps and tools that you have to hand is a good starting point.

Starting with a mobile device:

Learning in action

A group of undergraduate students are exploring how to use mobile devices to explore and make art. They work in pairs and each have a tablet or phone and access to the free app PicCollage. They are given an art word to explore at random through a lucky dip. These words are based within the vocabulary of the visual elements. They are asked to move around their immediate environment to take a set of photos that visually exemplify their word. They have access to a building and some outdoor space. They are asked to take about 20 photos and when they have done this they stop and return to the classroom. At this point they are asked to evaluate their set of photos by considering the following questions:

- Is it clear in each image what your chosen word is? If not, take a few more that really feature an aspect of the word and / or edit the photos to have taken to make that the main feature.
- Do you have a range of examples of your chosen word (eg a range of shades of red, thin to thick lines, different curves or patterns)? If not, take a few more that add some variety to the collection.

When they are happy that they have captured a coherent and representative set of images the students move to the collage making tool. They are asked make a 4 x 4 grid of images and add the photos they feel best represent the range of the chosen word. They are asked to evaluate how this looks in the grid. At this point they can choose to move the photos around to make a pleasing array. They can also choose whether to have a coloured frame around the photos or shrink this away so that all the photos appear next to each other with no gaps.

When they are satisfied with the photo collage they are asked to save it to the camera roll, delete all the other photos used to make it and then air drop or email it to their tutor. The photo collages are shared as a slide sequence and the group asked to supply the word each suggest and they discuss the challenges of representing the words visually and how focusing on the word supports understanding of the nuances of it in the context of the subject.

Questions to consider:

Taking photos: It is easy to assume that everyone knows how to take a photo. We are surrounded by people with devices that take photos and the sheer amount of taking, sharing and discarding of photos can lead us away from thinking about determined purpose and composition. In this activity the group were asked to take photos for a specific purpose (to visually exemplify a word) and demonstrating this can support making more effective choices. Perhaps taking some images that model what you are looking for and some that do not and sharing this set with the class for them to evaluate and give advice about is a productive way in. Another way in is to share some examples – look for the work of Liz Atkin, Phil Barnett and Jane Hewitt for examples of collecting groups of images in photo collages, Showing how to use the view finder, zooming in and focusing is also useful, as well as cropping photos after they have been taken, to retain the chosen part of the photo and eliminate the irrelevant.

Evaluating and developing: You will have noticed that threaded through the activity were stopping points where the students were asked to evaluate the set of photos against the purpose of the activity. It is all too easy to take many, many photos and lose sight of the purpose and focus. Building in these evaluative steps is important to allow children to act as artists, selecting and discarding visual material. You can set a rule or convention that only 20 photos can be taken and after that for each extra photo added one must be deleted. This again will build in a sense of discrimination and judgement.

Composition: Having collected the raw material for making (the photos), the way that this material is used allows us to be creative. In the activity students were asked to choose a grid and working within this constriction allowed freedom to place the photos. More freedom can be built in by choosing the 'freestyle' option where photos can be moved around freely. Again, evaluation is important here, trying out different placements until the one that the maker is happy with is essential in the creative process.

Sharing the art: If every child in the class completes an activity like this you will have 30 photo collages to share. These could be added one to each slide in a slide sequence and projected in a carousel of images in the classroom, assembly or on the school website. They could be put back into PicCollage and made into one large final image, like a digital quilt and then shared through projection. When making digital art it is important for the creators to see it complete and shared in its digital form as the quality of the colours and light is much more evident to the viewer in this form than if it were to be printed out. Seeing your art shared like this is a powerful moment for the artist.

Planning for learning: In the activity above students were asked to focus on a key word chosen at random from the visual elements but of course there are some many focuses that could be chosen depending on the learning you are planning for. You might take a specific visual element (colour, line, tone, texture, pattern, shape, space, form) and develop words from the one you have chosen in order to explore it more fully. You might choose from natural or manmade environments or seek to explore abstracts by using close ups, using the magnifier tool or using attachable lenses if you have them. This could be a starter activity to activate observation and understanding before developing it in another direction or it might be a full project in itself.

Organisation and practicalities: You might be fortunate enough to have a mobile device for each pupil, or it might be necessary to work in pairs, either to make a shared product or work individually by pairing this activity with another one. Sharing devices and tools will often be a feature of working with technology and this can be harnessed as a strength, developing

collaboration and giving children access to a larger pool of ideas. Some artists do work in pairs and groups collaborating to make a shared end product so this approach should not be seen as a deficit model.

In this example a commonly used app on a mobile device is used to create a digital artefact that can be shared or used as the basis for further digital or physical making. There are other opportunities to use the software or apps available on devices to create images both static and moving. Making digital animations on the screen is accessible through most mobile devices and laptops / PCs. When making digital art the artist can make and save many versions of their work, later making choices about what to keep and what to discard. This aspect of making art can be attractive to the child who fears to “spoil” their work. A change could be positive or negative and if it is unwanted it can be undone or deleted.

Try for yourself

Changing images with apps.

In this practical activity you will try out some apps that can be used to change images. The purpose is to get a sense of what is possible in terms of manipulating images to make new art.

You will need:

A tablet or laptop / PC

The apps listed below (all, or some of these and some that you have used and like).

The pro forma below

What to do:

Choose one image from your camera roll.

Choose five of the apps either from the list below or some from the list and some of your own.

Use the image that you have chosen and manipulate it in each of your chosen apps to explore the tools available.

Make some notes about what each of your chosen apps can do. Some will have features in common and a few that are distinct to the app.

App or tool (IOS)		Function	Your notes
Be Funky	IOS GooglePla yOnline tool	A free photo manipulation app that applies edits, effects and frames to a photo. Each of these can be changed in intensity using a slider.	
Color ViewFinder	IOS (Colrd online tool)	A free app that takes a photo and analyses the colour then produces a colour palette of the key colours in different formats.	
Cut Paste Photos	IOS GooglePla y	A free app that allows parts of photos to be cut out, manipulated and effects added, including animated effects.	
Distressed FX	IOS	A free app that applies a very wide range of effects to a photo. Each effect can be changed using sliders to make them lighter / darker or more / less coloured.	
Fragment	IOS GooglePla y	An app that allows photos to be manipulated in a variety of ways at random or purposefully moving towards abstraction.	
Kaleidacalm	IOS Android	A free app that applies various kaleidoscope effects to a photo or	

		what can be seen through the viewfinder. This can be further changed by the user.	
Pixel Wakker	IOS	A free app that changes a photo into pixels and allows the user to change the size and saturation of the images.	
Rollworld TinyPlanet	IOS GooglePlay	A free app that allows the photo to be “rolled up” in a variety of ways. If the photo is a landscape this can create a	
Snapseed	IOS GooglePlay	A free app that add a wide range of effects to a photo in combinations and gradations.	
StoryZ	IOS GooglePlay	A free app that allows the addition of some motion effects to a photo. When carefully planned this can add an element of animation and be useful for GIF making.	

Note: some of these free apps also contain opportunities to have a paid for component but this is not necessary for most activities.

As a teacher or supporter of learning it is important that you know the possibilities of the tools available in any app, tool or site that you plan for children to use. Planning for them to freely explore to see what they can do and then share what they’ve found is a good way in. The approach of changing the same image over and over again can be useful here, as can stopping to remember how various effects were created and demonstrate them. This can be captured by the child using screen recording perhaps challenging them to make a one-minute demo video of their favourite tool and effect. After this free exploration the user is much more likely to be able to work purposefully to create a piece of art.

Ways forward with using apps like this are for the user to work individually to manipulate their image and save it in a number of incarnations and then present these as a photo collage, showing the variations. Working more collaboratively students can swap photos using air drop and work on each other's images in a "pass the photo" activity. The images created could be used in further digital making such as backgrounds and projections or used in combination with physical making of art.

Making interactive digital art

Both mobile devices and laptops / PCs have apps or tools that support making images on the screen. A painting or drawing app or tool can be used to make an image using many choices as explored earlier in this chapter. A next step can be creating an image that moves through digital animation. This can be saved as an animated GIF and shared in several ways as well as taken into augmented reality, as we will see later in this chapter. The chart below outlines two options for learning how to do this using the most commonly available tools.

Device	App or tool	
iPad or MacBook (IOS)	Keynote	<p>It is possible to use the shapes and objects available in Keynote along with your own drawing onscreen to construct and animate digitally. When the digitally animation is complete it can be saved as a GIF or a video.</p> <p>Useful starting points for learning to do this are Apple Teacher Keynote for iPad Starter Guide available free from the iBook store. Educator Simon Pile's iBooks Animating Keynote and Doodle-a-Day are both user friendly introductions to creating digital animation on the iPad with many starting points that you can take further.</p>
Laptop (Windows)	Microsoft Powerpoint and	<p>In Powerpoint there are many shapes and objects that can be found in 'Insert' that can be used along with your own drawings made in 'Draw'. In the 'Animations' menu movement can be added, ordered</p>

	www.giphy.com	and timed resulting in a digital animation that can be saved as a GIF or a video. A useful short video tutorial is available here Link
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Although children pick up how to make and animate images quickly when using an iPad similar options are available on a laptop / PC and ultimately the finished outcome can be the same: an animated GIF that can be shared on screen, inserted into a slide sequence, added to the school website and shared on social media or a short video that can be used in a similar way. In addition it can be triggered in augmented reality by a marker or QR code, appearing as the Google AR animals explored in chapter 4 appeared as if in our own environment. As when making a painting or drawing, choices about colour, shape, line, tone and pattern will play a part in the creation, with the addition of how part of the image can appear and disappear at different times and move into and out of place. When working with a class if each child makes a small animation around a theme and they are combined together in sequences and groups this can result in an impressive result that includes both individual elements and shared outcome. They can be displayed on a Padlet where they will play simultaneously in a grid layout.

Another tool that can be readily used in the classroom to learn about and make art is the green screen. This is another example of technology that seemed light years away from day to day use in a primary classroom several years ago, but now provides great opportunities to place ourselves or our creations digitally in a range of real and imagined situations. Works of art can be chosen and interacted with, placing the child in front of to give a guided tour or to become part of the scenery – choosing paintings of groups or crowds of people can work well here. The art that pupils make can be placed in a variety of locations including as backdrops to interaction or new locations as in the sculpture based example discussed in chapter?. When using the green screen the images or videos that are combined can be photographs and video taken by you or the child; found online or created through

using other physical and digital materials. Earlier in this chapter the idea of using materials readily to hand with the green screen app was referred to. Here is an example of my green screen collection.

[Insert image C12 fig 1 and 2 here]

Recently making digital environments using images and emojis found online in combination with photographs and scenes with live links has popped up as a tool for teaching. These “bitmoji classrooms” are constructed in Google Slides or Powerpoint by teachers to use in remote learning situations. Children can click on items within the larger image to be taken to activities and websites. There is great potential for using this approach to create their own imaginative scenes and environments in the context of art.

Link <https://mypad.northampton.ac.uk/fdlt2012/>

Exploring and making augmented reality in art

When working digitally there are also opportunities to use more ambitious approaches. This includes exploring augmented and virtual reality. Over the last few years augmented and virtual reality in game-playing at home, entertainment and in museums and galleries has developed enormously. Augmented reality can be defined as when we interact with digital objects in the real world using a digital device. Examples of this are the recent Google AR objects that can be viewed with mobile devices; the Merge cube; the HP Reveal app (formerly Aurasma) and the EyeJack app; Pokemon Go!; Google Street View and other Google AR explorers. Virtual reality is a much more immersive experience and includes using a headset and controls to feel as if we are immersed within the digital environment and able to interact to control and create within it. Examples of this are Google VR; TiltBrush and CoSpaces.

Augmented reality provides new ways for audiences to interact with artworks. For example, the Take Festival in Vienna used AR to bring together fashion and art, as the audience interacted with the physical art using the app Artivive on their mobile phones:

Link <https://www.youtube.com/watch?v=Mb3OfHnFjqE>

In this video a number of artists talk about building interactive environments that take people away from their everyday realities and explore our relationship with physical space by bringing experiences out of the screen through animation and sound:

Link <https://www.youtube.com/watch?v=F9-PMm6YdUU>).

Audiences can use their phones to unlock the physical artwork and interact with its digital layer:

Link <https://www.youtube.com/watch?v=mdvVDXpZxqo>).

Augmented reality experiences are triggered by something in the real world. You have probably used QR codes along with a mobile device. When you hold your phone or tablet over the QR code the QR code reader app causes a website to open or a video to play. You can download a QR code maker to make your own QQR codes attached to whatever material you would like to connect the viewer to. Some AR apps use symbols or images as the trigger for the action in your device. These include HP Reveal and EyeJack. Other ways of triggering AR are through markers or GPS tags. When we are using AR technology in art we need to have a digital product to link to the trigger. This could be a photo or video of a piece of real or digital art, an animated gif or a link to any of these online. The connection between the trigger, whether it is obvious, through a QR code or hidden, through the embedding of the trigger into a picture or text can also be a creative opportunity.

Try for yourself – using augmented reality in art making

In this practical activity you will try out an app that allows you to connect a digital animation to a trigger in the real world – a symbol or picture on paper for example.

You will need:

A laptop / PC and access to the website EyeJack Creator

Link <http://creator.eyejackapp.com/>

An animated GIF (make one using the tools outlined earlier or download one from the internet taking care to choose one that is available to use freely through commercial commons)

A trigger image: a picture or symbol either made by you or in a book.

A mobile device with the EyeJack app (free) loaded on it.

What to do:

Begin by selecting the artwork that will trigger your animation.

Upload this to EyeJack Creator desktop app on your computer. The app then takes you through a short sequence of steps to add either a sequence of PNG images, a gif, an animation or a film to your trigger image. GIFs and PNG sequences have the advantage that they can have transparent backgrounds. You can then add sound.

When you select 'create', EyeJack Creator generates a QR Code for the viewer to scan within the EyeJack app on their phone. Once they have done this, they can hold their phone up to the trigger image on a screen or to the actual artwork on a wall, and the animated layer will spring up and play on their device.

The trigger and the animated overlay can be created digitally using apps and tools such as Sketches, Brushes, Keynote, Powerpoint, iMotion, or iMovie.

Here is a tutorial on how to make your own GIFs with transparent backgrounds in Keynote: Link <https://www.youtube.com/watch?v=diXG192U8G8>).

Using augmented reality tools to connect digital art with the real world can be magical for children to see, so the opportunity for them to create the magic is a motivating experience. It can be shared with other children in school and with parents allowing the children, as the artists, to see how the viewer reacts to their art, another important aspect of being an artist. For more ideas about using this approach in art explore teacher Tricia Fuglestad's blog.

Link <https://drydenart.weebly.com/fugleblog/book-covers-that-come-to-life-with-ar>

To use augmented reality in a slightly different way, the app ARMakr enables a part of the room or a flat surface to become the space in which to create a scene. Images can be made or chosen from a library of images to overlay onto a set of 2D or 3D objects within the real-life setting, adding layers and depth. For this to work images must have a transparent background, however the tools within the app can enable this. Scenes can be populated with children's physical drawings or digital

drawings created within the app, or images can be imported from the app library or the internet. Once they have been arranged, the images pop up in 3D as the viewer holds their phone over the designated space. The screen record option on an iPad or phone can be used to create a short, narrated video, or an iPad can be set up on a tripod and so that the viewer can walk into your scene so that you have a film of yourself interacting with it.

In addition to the tools and apps mentioned so far, there is a growing number of simple to use AR apps for mobile devices, many of which can stimulate artistic creativity. One of these is Reality Composer. Children can also experiment with 360 stills or video as creative mediums for making their own images and films. We have seen that the ability to paint and sculpt in 360, to collaborate on live paintings, and to use augmented reality in combination with art all add new dimensions to digital art.

Connecting to other types of art

Opportunities to use digital tools as part of the making process when using other media have been explored in previous chapters. When making art that is wholly digital it is possible to connect to each process or technique and explore it in a digital form. This is not to suggest that it should or could replace the physical process but it could further develop the scope and creative opportunities available. The chart below outlines some physical / digital art connections to explore when you are deciding where to include a wholly digital outcome in the art curriculum.

	Physical (see earlier chapters)	Digital
Drawing	With tools such pencils and pens on surfaces such as paper and card.	<p>Programming a robot or toy to move the drawing implement.</p> <p>Recording using GPS as the artist walks their drawing onto the virtual world of digital maps.</p>

		<p>Using a stylus or one's finger on the screen of a device.</p> <p>Drawing with light recorded with a slow shutter app.</p>
Painting	With tools such as paintbrushes on surfaces such as paper	<p>Using a virtual reality painting tool such as Tiltbrush to paint in space.</p> <p>Painting with UV paint that can only be revealed to the viewer by a black light torch.</p> <p>Using a stylus or one's finger on the screen of a device.</p> <p>Creating an animated GIF or short video.</p>
Printmaking	With objects and constructed tiles onto paper.	Creating a digital stamp or sticker to copy and paste
Collage / textiles	Choosing items to arrange and / or attach to surfaces.	<p>Collecting items by photographing or scanning them and arranging them on the screen.</p> <p>Sewing with conductive thread into fabrics</p> <p>Adding programmeable LED lights to textiles</p>
3d art sculpture / installation		<p>Using a virtual reality painting tool such as Tiltbrush to " " in three-dimensional space.</p> <p>Creating digital sculptures viewed through EyeJack or HP Reveal.</p> <p>Creating stop motion animations.</p>

		Creating multi-sensory environments using a combination of digital tools and approaches
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Often the tools of AR and VR require images, videos and objects to be made in order to be used in the digital environment which leads to string connections back to art making using physical resources as well as combining a number of digital approaches. It is this mixed approach that can trigger new ideas and creativity often when collaborating with others to make art. As cybernetics and AI increasingly transform our world, it becomes imperative that artists understand the intersections between technologies and the arts, and that digital art becomes embedded in their studies alongside analogue art. Whether an artwork is made with paint or code, it could be argued that the critical thinking that lends it substance and makes it meaningful stays the same regardless of the tool.

Connecting across the curriculum

There is scope to connect making digital art to learning in other curriculum areas especially when seeking to make meaningful cross curricular links. It may be that the technology itself provides a connection. An example of this is in geography where children will be exploring map and mapping. Looking at the world from above using GoogleMaps allows children a new view of landscapes and zooming into the world using GoogleEarth and Streetview allows them to explore distant locations. In the recent pandemic. At time when many were confined to one location, artist used these tools to explore and respond to the environment making virtual sketches of the places they explored. In the example below GPS is used to create art on the landscape that exists only in the digital world.

LEARNING IN ACTION

A group of teachers from four countries are exploring ideas for using digital technology when working outdoors. They experiment with using a walking app (MapMyWalk) to record their own movements, drawing virtually on the landscape as if they themselves are the drawing instrument. After learning how to use the app by making simple patterns they found that there were some useful teaching tips in

terms of stopping and starting recording, planning ahead, getting a sense of scale and collaborating together.

[Insert image C12 3 here]

Sophisticated examples of this kind of art made by runners and cyclists can be found online. There is a more detailed outline of this example with supporting resources on the chapter padlet.

The wholly digital nature of the outcome of the art making explore above, along with the collaborative nature of it, is made possible because of GPS and mobile devices. It provides another perspective on drawing as well as having potential for connecting to learning in geography as well as art.

As has been explored in Chapter 4 there are strong connections to the computing curriculum when coding and designing generative art as well as when using augmented reality with art. Including art, or more widely, the arts, in the science, technology, engineering and mathematics (STEM) approach, developing it into STEAM instead, can bring together these areas of the curriculum.

Find out more

Explore the international project Digital Learning Across Boundaries (DLAB) project STEM to STEAM. These materials share ideas and resources based around using the arts and digital technology with STEM subjects in an international collaboration.

Link <http://dlaberasmus.eu/courses/stem-steam-online-course/>

Conclusion

In this chapter some of the newest ways of creating art have been explored. Your opportunities to work in this way yourself and with children will depend on your working context but most devices commonly used in school can give you access to some of the ideas explored in this chapter as well as ways in to connecting the newest area of the curriculum: computing. Starting out by using what is available to you creatively and building on this over time as you seek out resources, ideas and people who can help and inspire you is a good way forward. You might well find that the children you work with have expertise and enthusiasm that you can draw upon when using technologies creatively. Incorporating making art with digital tools along side the media processes we have always used in schools can enrich what we offer to children and give them the inspiring art curriculum they deserve.

Next steps

Check the creative potential of the devices you own and use. Make sure that you know which apps and tools lend themselves to creative making and have a go at using them with thought to how they could fit into your teaching.

Look out for opportunities to experience and create with augmented and virtual reality.

References

- Caldwell, H., Edwards, J. and Grantham, S. (2019) The arts in STEM: STEAM. In: Caldwell, H. and Pope, S. Eds. *STEM in the primary curriculum*. London: Learning Matters. Pp. 153-168.
- Cullen, J. And Evans, S. (2007) The friendship project – digital art meets PSGCE. *START*. No 25. Pp 26 – 27.
- Heaton R. and Edwards, J. (2017) Art. In: Caldwell, H. and Cullingford-Agnew, S. *Technology for SEND in primary schools*. London: Learning matters.
- Edwards, J. (2017) Crossing boundaries through digital learning. *AD*. **Issue 20**. Pp16-17.

Edwards, J. (2014) Inspired by Digital. *AD the NSEAD magazine*. **Issue 11**. Pp 24-25.

Matthews, J. And Seow, P. (2007) *Electronic Paint: understanding children's representation through their interactions with digital paint*. In: Herne, S., Cox, S. and Watts, R. (2009) *Readings in Primary Art Education*. London: Intellect Books. Pp269-286.

Liu, D., 2017. *Virtual, Augmented, and Mixed Realities in Education*, Springer Singapore.

Further reading

Sakr, M., Connelly, V. and Wild, M. (2018) Imitative or Iconoclastic? How Young Children use Ready-Made Images in Digital Art. *International Journal of Art & Design Education*. **Volume 37**, number 1, pp.41–52.

Wang, T.W. (2018) Empowering Art Teaching and Learning With iPads. *Art Education*. **Volume 71**, number 3, pp.51-55

Chapter padlet

<https://padlet.com/Jeanne/Chapter12>