

4 AR tools to build executive function and engagement

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Imagine your classroom filled with purposeful, motivated, strategic, goal-directed learners. What would students be able to do? What would your classroom look like? What could your learners accomplish? Envision your students showing initiative by quickly beginning assigned tasks, knowing what to do (or how to get help) and demonstrating effort. See them working collaboratively with peers on challenging tasks. Picture them understanding themselves as self-motivated learners, able to monitor their comprehension and persisting even when a task is challenging.

One way to create this type of learning environment is with the **Universal Design for Learning** (<http://www.cast.org/our-work/about-udl.html#.Va69tMZVhHw>) (UDL) framework, which aims to develop expert learners. In addition to removing barriers and making learning accessible to the widest varied of learners possible, UDL addresses many of the metacognitive and self-efficacy skills associated with becoming an expert learner, including:

Executive functions. These cognitive processes include initiation, goal setting, attention, planning and organization.

Comprehension skills. This skillset encompasses knowledge construction, making connections, developing strategies and monitoring understanding.

Engagement principles. These soft skills include coping, focus, resilience, effort, persistence, self-assessment and reflection.

Goal of UDL: Expert Learners



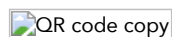
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We all know that technology can engage learners. But if you want to extend your classroom in ways that truly enhance learning, you need to choose and use tech in ways that support and optimize every student's learning experience. When used with intent, the same tools and apps you use in your classroom can also support UDL principles, and help you create the classroom imagined above.

Three technologies that can "augment" the physical world of the classroom with digital content are QR codes, augmented reality and beacons, all of which are uniquely suited to recruit learner interest and build engagement. Perhaps more important, you can use these technologies to foster the self-regulatory and self-efficacy skills that are so important for all learners.

QR codes

You've most likely seen, used or even created your own quick response (QR) codes. These 2D codes are now common in print materials, such as magazines and posters. They are also used to enhance real-life learning experiences, such as museum visits, walking tours and conferences, as they allow users to make connections between the physical world and the online world. When you scan a QR code with a mobile device enabled with a code-reading app, it points to a website, text, picture or video that provides additional information. For example, scanning the QR code below with a QR reader app such as **i-Nigma** (<http://www.i-nigma.com/Download-i-nigmaReader.html>) will point you to a video from CommonCraft, which explains what QR codes are and how they work.



When you use them strategically, QR codes are an effective way to support engagement and promote self-regulation. Here are three ways you can use these codes in your classroom:

Start the day right. Post a QR code at the classroom entrance that takes students to the class website, where they can find an overview of the day's activities.

Bolster their skill development. Post QR codes at learning centers around the room that link to short videos, images, checklists, rubrics or websites that will help students develop self-regulatory, organization and/or reflective skills. For example, the QR code might link to an image of a checklist of behaviors for collaborative group work, a video explaining how to create an exit ticket to reflect on learning or go to a website with graphic organizers to help plan and organize research.

Give them choices. Post QR codes with calming images or music for students who need to take a break or links to resources that extend learning for those who want to explore a topic in depth. When you introduce the QR codes to the students, use a think-aloud process to model the purpose of the resources they'll find. Remind them that the goal of using the QR codes is to support their growing intrinsic ability to monitor their own learning.

AR apps

Augmented reality (AR) is a technology that acts like a digital overlay on the real world. AR has two "layers": the image, object or place that acts as a trigger when scanned by a device with the appropriate app, and digital content superimposed over the existing reality on the device's screen. Once triggered, the digital content becomes visible to create a dynamic and often interactive experience for the viewer.

AR shares a few commonalities with QR codes, but there are some important differences. Unlike QR codes, AR doesn't require you to scan a code. AR apps use pattern recognition to determine if the image you are scanning matches the stored image (the trigger). While the trigger can be an actual object or place, usually it is a printed image. This helps ensure the AR app will identify the trigger correctly. As with QR codes, when there is a match, the AR app brings up a video, 3D object or other digital resource. Unlike QR codes, more than one layer can be associated with the same trigger.

There are two types of AR apps: those for experience and for creation. Experience AR apps, such as **Star Walk**, (<https://www.youtube.com/watch?v=fLqorTN0Gzs>) are designed to provide the user with an AR experience within a specific content or context. Creation AR apps, such as **BlippAR** (<https://blippar.com/en/education>) and **Aurasma** (<http://www.aurasma.com/>), allow users to create their own AR experiences. To get a better understanding of AR, we recommend you download the BlippAR app on iTunes (<https://itunes.apple.com/ca/app/blippar/id410604563?mt=8>) or Google Play (<https://play.google.com/store/apps/details?id=com.blippar.ar.android&hl=en>) and then scan the magazine cover below to see it come to life.

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To create the examples below, we used BlippAR's online tool, **BlippBuilder** (<https://blippar.com/en/builder>), which requires a **free educator account** (<https://blippar.com/en/contact-us>). BlippBuilder lets you create more sophisticated interactive images with several layers, interactions, animations and/or sequences that can be timed or touched to open separately.

Posters

One way to support engagement and the development of executive functions is with a "hot spot" poster. Working in BlippBuilder with a trigger image like the one to the right, you can add a set of hot spots. You can layer these transparent objects over each icon and program them to open at a certain time or when students scan the image and touch the icons, triggering a video, website or image to open. Use the BlippAR app to scan the images below to see how it works.



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You could use this approach to teach:

- General classroom skills, such as organization, planning, routines, timetables and collaboration.
- Procedural skills, including processes, steps, frameworks, equipment handling, and the use of online tools and apps.
- Executive functions, such as organization, attention, initiation, flexibility, emotional regulation, self-awareness, planning and working memory.

To support comprehension and metacognitive skills, images related to classroom topics, or posters related to a process could serve as the trigger image. Again working in BlippAR Studio, you can add a variety of resources, tools and supports to give students choices in how they learn. To see an example, use the BlippAR app to scan the **writing process poster image** (<https://www.flickr.com/photos/vblibrary/6124465878>) below.

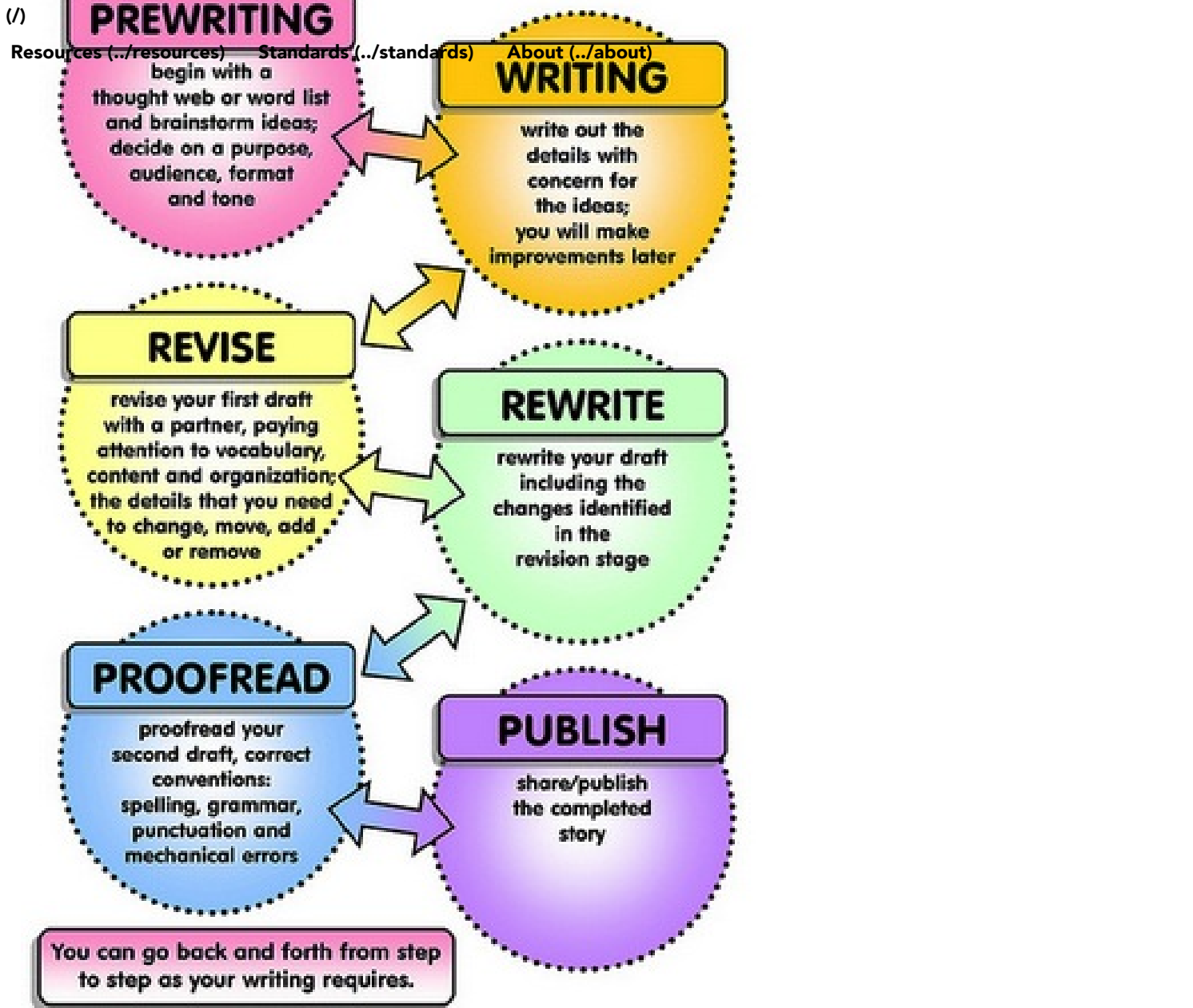


Image: The Writing Process (<https://www.flickr.com/photos/vblibrary/6124465878>) by Enokson, licensed under Creative Commons

As you add overlays to the trigger image, consider what skills students would need to successfully complete the task at hand and build their metacognitive skills. You could provide a link to a video for background information, to a mapping tool such as **cmaps** (<http://cmapp.ihmc.us/>) to explore important connections and key concepts, or to a planning tool such as **Trello** (<https://trello.com/>) that they could use to develop a plan for a project that demonstrates understanding. You might want to link to exemplars or online tools that will support, enhance or extend their learning. Or you could link to various Google Docs where you embed exemplars, rubrics, checklists, graphic organizers and exit tickets that students could refer to, save or complete in collaboration with others.

Consider asking older students to create their own AR poster prompts and resources related to skills they will need to succeed in your class. Students could even create video examples modeling what persistence, grit, self-regulation and other positive characteristics look like. When finished, each student can then teach the skill to the class before posting the AR image.

iBeacons

Beacon technology, such as **iBeacon** (<https://en.wikipedia.org/wiki/iBeacon>), shares some similarities with QR codes and AR, as it is a way to call up digital content from a specific spot in the physical world. However, unlike QR codes and AR, you do not have to point your device at a code or use a trigger image to call up content with iBeacon. Your device will automatically sync when it is near a beacon, a small device that emits a low-power Bluetooth signal, if you have an iBeacon-enabled app. The beacon then automatically launches digital content, such as a video, audio file or webpage.

Many of the same activities you could design with QR codes and AR can be adapted to work as beacon-enabled activities. The only thing that would change is how the learners trigger the content.

Beacon technology is well suited for client-based activities (https://www.iste.org/iste-explore/featured-article/bring-the-learning-to-your-students-with-iBeacons) as you can set up the app to trigger instructions for each center, exemplars of what the finished work will look like and/or prompts for the reflection when the center's activity has been completed.

Scavenger hunts are another application that is well suited for beacons. You can set up each beacon to provide a different clue, such as a problem to be solved or a prompt to promote reflection, to help learners develop their skills in a fun and engaging way that gets them out of their seats and moving.

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Museums have led the trend of using beacons for educational tours. A great example is the **Reubens House in Antwerp** (<https://vimeo.com/84760383>), which uses iBeacons to give visitors additional information as they approach each exhibit and launch interactive activities that promote a deeper engagement with the content.

Here are a few more applications for beacons in the classroom:

Classroom instructions and other supports. As learners come into the classroom, a beacon can notify them of the activity they are about to engage in, any materials they need and the goal for that day. Learners can work independently while the teacher answers questions and provides support.

Supports for project-based learning. As learners move around the school to complete the steps for their projects, beacons can alert students about their progress, offer discussion or reflection prompts, and provide a rubric or checklist to help them self-assess.

Location-based reminders. For example, as learners leave the classroom, a beacon over the classroom entrance could remind them about homework and offer tips for completing it.

The **Locly** (<https://locly.com/education/>) app allows you to use an iPad or other iOS device that supports the app as a beacon transmitter so you can try out the technology before you invest in devices. The app also includes a feature for building a beacon-based scavenger hunt.

These technologies represent a continuum in the development of augmented reality, from QR codes to AR and finally to iBeacons. However, there is nothing to keep you from using two or all three in combination. To see what we mean, watch the video below of a museum walk that uses all three technologies.

World's first beacon based Augmented Reality Museum A..  



Want to learn more about UDL and how to use classroom technologies to support all learners? **Join ISTE's Inclusive Learning Network** (<http://connect.iste.org/connect/communities/viewcommunities/groupdetails/?CommunityKey=1d23944a-c111-483f-b157-d06d0c7a6d28>) for free year-round professional development and collaboration.

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Everyone loves apps. The key for educators, however, is to find budget-friendly apps that go beyond the cool factor to enhance learning. Here are a few of our expert members' top suggestions for new apps to try in your classroom this year.

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