Make Room for AR in Your Designer's Toolbox

Erich Doubek
Emmanuel College, United States

ABSTRACT   This paper will explore the various options open to design instructors looking to add AR into their course curriculum. Looking at the pros and cons of Artivive, Aero, and Blipper, the paper makes a case for design instructors to embrace, and introduce design students into the world of AR. The paper examines adopting AR tools the new ways designers need to think about how to create a deeper engagement with virtual content. The paper raises questions about accessibility, visibility, and the future of design with this new technology.

Keywords: augmented reality, communication design, animated posters, posters in motion, curriculum development, product design, new design horizons, designers toolbox

Augmented Reality (AR) has been part of our science fiction since the early 1900s. While it popped up in novels (Manning) and film (Minority Report) we saw AR as a great movie effect, but dreamily outside the realm of applicable technology. That was until Pokémon Go hit in 2016... 150,000+ Pikachu-related accidents later (Revell), and the world has woken up to AR's potential. Today AR is as commonplace as a Snapchat filter or even as an app showing you just how great a new couch will look in your home. While these are all useful AR applications, designers are just starting to see this technology's real potential within information and communication design. Designers need to be thoughtful and forward-leaning to move past the flash of AR and remember the true purpose of design: connection and communication.

A quick search into AR will send a designer down the rabbit hole of AR development firms, development kits, and applications. With 18+ billion dollars invested in AR technology in 2020, up 78% from the previous year (Houston), we are in the midst of some rapid advances. With smaller innovators such as Hoverlay,

CabinAR, ARTivive, A-Frame, and Big Guns like Apple, Google, and even Adobe, AR technology is now part of a designer's standard toolbox. But how do design instructors codify and integrate these new skills into their courses and students' portfolios?

The AR Basics

Before diving too deep into the AR offerings, it is important to clarify some super-fast basics, such as clear definitions of Augmented Reality vs. Virtual Reality, and the differing types of AR. This foundational understanding of the differences and definitions will help instructors better understand the pros and cons of the AR tools.

> **Virtual Reality (VR)** is an all-encompassing world you create in 3D. It takes a great deal of knowledge of 3D production and is accessed through a set of goggles and possibly handheld controllers you wear. The view is immersive, as the viewer is encompassed by and can engage in the designed reality.

> **Augmented Reality (AR)**, on the other hand, is a technology that layers digitally designed content on top of the real world and the viewer experiences the composite. AR can be easily produced with tools that designers are already familiar with, such as After Effects, Illustrator, and Photoshop. The users AR content can be viewed through a smartphone or tablet and become a shared experience between real people in a real space. It is the ease of production, ease of communal experience, and the ubiquity of the viewing device, the smartphone, that makes AR so powerful as a communication device.

Within AR there are a number of different types or modes of experiences that can be design for. Each have their own pros and cons, some of the tools discussed are very focused and only handle certain modes of AR, while others are more robust. Below are the most common ways of identifying AR modes or experiences.

[1] **Marker-based AR** identifies unique visual markers or aspects of an existing image or stamp. The AR app then uses the smart device's forward-facing camera to recognize the marker and superimpose the AR content onto the marker. Example: Animated Posters

[2] **Marker-less AR** doesn't need a visual marker. Instead, the AR app uses the forward-facing camera, GPS, and accelerometer to map out the physical surroundings and allows designer to layer a digital object onto the physical plane in front of their lens. Example: Any app that allows the user to view a couch in their room before ordering it.

[3] Location-Based AR uses GPS to allow certain content at certain locations. Example: An app that would overlay information about where user is while doing a walking tour of a city

[4] Superimposition AR uses the forward-facing camera to help identify an object and then either partially or completely replace that object with AR content. Example: Any app that when pointed at the colosseum in Rome would replace the damaged colosseum with an AR view of the colosseum in its most vibrant heyday.

[5] Projection Based AR is a bit of a different beast but deserves a mention. The visual is attained by projected light on a surface. There is no smartphone interaction. It is for lack of a better word, a hologram.

(Borkhatariya)

There are really three variables when choosing the AR solution that is right for a project. Looking back at the five modes of AR listed above, the modes only outline the interaction and the parameters of the experience. So, one can define the AR Mode as the first variable, but what the modes don't define is the second variable, the content. Within any of these modes of AR, the designer can apply static images, video, sound, interactive elements, etc. The content is up to the discretion of the designer and what the chosen AR platform can support. This makes the AR tool the third variable.

The AR Landscape

On closer look, the AR tools available for integrating into an educational setting separate into two factions. This first set of tools require considerably more technical skill in terms of coding, production, and support. These tools would be better suited for standalone courses, courses that have room for larger projects with technological support, or existing coding courses. Whether you want to integrate AR into existing courses or want to build a stand-alone AR curriculum; A-Frame, Cabin AR, and ARToolKit are coding-reliant solutions offering AR and VR capabilities.

To be clear, more access to code can have its benefits but can also come with some challenges. For example, A-Frame has immense possibilities but needs a solid foundation of coding to configure and get up and running. Once set, it works off a marker-based AR system and can also support marker-less AR object placement. While a great solution, A-Frame's marker-based system relies on a rather rigid marker system for recognition. On the other hand, the object placement and VR capabilities mean that, if the instructor or institution can Ssupply the coding support, the instructor has a very robust technology that can be tweaked to meet any number of scenarios.

In contrast, tools such as Artivive, Aero, and Blipper have a more simplified process, with minimal setup, that can be more easily integrated into an existing curriculum with minimal support yet are also robust enough to be the backbone of a stand-alone AR course.

The first of these solutions, Adobe Aero, is a marker-less AR solution, that allows you to add your static, or animated content into real space. Included with your Adobe subscription, it uses a front-facing camera to map the surroundings and adds the digital object into the space at the marker's base location. While the ease of use is compelling, Aero's main function is to place a 3D object into the real world; that's what it does best. If the content doesn't align with that idea, a user will need to find another solution. That said, if the user has a layered digital file or 3D object or doesn't mind using a #D object from Aero's library, the application has a great deal of flexibility for end user. One of the best features is Aero's ability to code for triggers and actions. The software does not offer a ton of flexibility as of yet but the coding is very simple to execute.

While Aero has a lot to offer, Adobe has room to make the application more robust. Apple TV's show *For All Mankind* offers an excellent example of what is capable with this kind Marker-less AR technology. Offered free, as an added bonus content and made with Apple's ARkit, this experience allows the user to choose a space suits or rockets from history, place that object in virtual 3D space, and interact with the model. Apple has been able to blend their 3D models with triggers that reveal informational text about the objects with corresponding animations showing their functionality. Marker-less AR is currently best known for interactions like Pokémon Go or any of the apps that help users preview furniture in their home. This gorgeous new work from Apple is a sign of what's to come.

The next AR solution is Blippar, an AR development platform that supports both Marker-based and Marker-less AR interactions. Its educational subscription is reasonably priced. While still a codeless solution, Blippar has all of the 3D object interaction capacity that is seen in Aero, but it doesn't stop there. Blippar also supports Marker-based interactions, so it has the capacity to recognize specific imagery and trigger interactive elements. For comparison, A-Frame also supports Marker-based AR, but A-Frame's markers need to be high contrast logo-like forms and the designer still has to be able to handle a fair bit of code. Blippar offers full-color imagery as their markers, making the viewing and AR integration seamless for the viewer with no coding for the designer. With an impressive gallery of clients and interactions, it is easy to see how Blippar's Marker-less and Marker-based solutions could easily be integrated into print and motion curriculum.

The last of the AR solutions is Artivive, a Marker-based AR solution. Like Blippar, Artivive has the capacity to recognize specific imagery and superimpose audio, static imagery, or video onto the marker image in real space. This type of experience-driven interaction has been championed by artists looking to bring motion design into the gallery experience but has also found its way into print and even package design. Most infamously, 19 Crimes has used this kind of Marker-based AR to bring their wine bottle labels to life, with each criminal telling their own tale. Most recently adding Snoop Dogg's, Snoop Cali Rose to their list of offenders.

Adding Artivive into a program's curriculum is simple. Artivive offers a free account with five projects to anyone with an EDU email, so student on-barding is simple and straightforward. The process of making the AR elements itself is quite manageable. Students can create a motion design work as they normally would. Just keep in mind the motion work will be triggered by a static image, so the image and the content need to be of the same aspect ratio and orientation. If students are thoughtful about the first frame of their animation and bake some poster design fundamentals into its layout, the first frame of the animation can easily serve as the Marker image that triggers the animation. The Artivive interface has a recognition rating system to rank how unique and recognizable an marker image is on a scale of 1-5. This helps the student optimize the marker image for a faster connection to the AR content. As stated earlier, the AR content can be audio, static imagery, or motion design elements. Artivive even offers a 3D option allowing the designer to deliver multiple layers of content at differing depths or distances.

AR in Curriculum

I introduced AR and demoed Artivive in my Graphic Design Sr. Thesis course as an emerging technology. It struck a chord with one senior whose current thesis was centered around a collection of portraits of empowered women. While the digital illustrations were strong, the connection to who these women were and their impact was still missing. With Artivive, my student was able to weave the audio files of Alicia Keys (Figure 01), Sandra Cisneros (Figure 02), Maya Angelou (Figure 03), as well as others, into her series. This unified experience of viewing these expressive portraits while hearing the voices of the women was a powerful moment and a transformative agent for the piece.

The AR experience was powerful but what was unexpected was that the gallery viewing experience also changed. Instead of having large bulky monitors playing on loop, the work was delicately hung. As the viewers discovered the expanded possibilities of the piece, one could see them start to engage their smart phones. As soon as the first few viewers started to engage with the posters, other viewers took notice and began to take part.
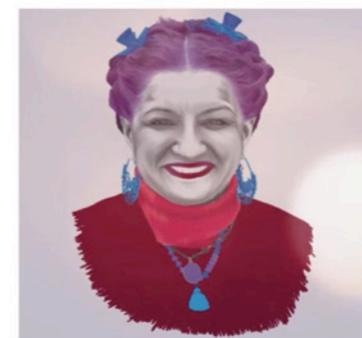
Figure 01

Figure 02

Figure 03

Figure 1: Berardinelli, Sophia. *Alicia Keys*, 2019.
Figure 2: Berardinelli, Sophia. *Sandra Cisneros*, 2019.
Figure 3: Berardinelli, Sophia. *Maya Angelou*, 2019.

Seeing the potential of this first project inspired me to integrate AR into my design courses for two reasons. The first is that the integration of AR in this way doesn't change or impede the process of making the work. The second is the ease of sharing the work. I can now simply hang posters on walls and any passer-by can see a full motion experience simply by engaging a smart device.

In the fall of 2020, I introduced Artivive into my motion design class as a single open project. There only parameters were to
· explore Artivive's AR technology.
· create work that seamlessly transitions from the marker image to the animation.
· create a marker image that draws the viewer in and offers some kind of experience.

The work ran from the fun to the informative, while the best of the work fell into the realms of informational and promotional. Two of the following three student pieces are from that assignment. The third piece was made by a student from that class for our end of year show.
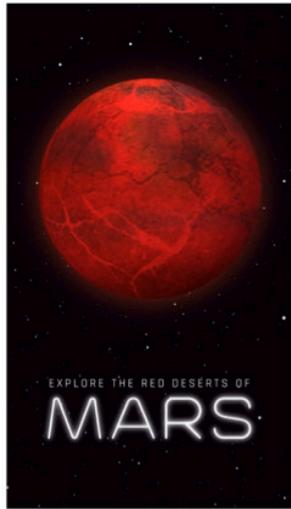
Figure 04

Figure 05

Figure 06

Figure 4: Goggin, Emily. *Mars*, 2020.

Figure 5: Ortiz, Wilfford. *Boston Film Festival*, 2020.

Figure 6: Doran, Ryan. *Art Exhibition*, 2021.

Mars (Figure 04)

This piece has a striking opening marker image, its transition into the animation is relatively seamless, and the secondary information offers a surprise. The added small animations to the spaceman help bring the visual experience together as the AR element provided the details of the message.

Boston Film Festival (Figure 05)

The opening marker image is eye catching and the AR experience with moving camera, sound, and lighting effects builds a great connection and nostalgia to the early days of cinema and film. A great visceral experience but a bonus beyond the communication of the message.

2021 Art Exhibition (Figure 06)

In this piece the designer explored Artivive's ability to extrude a flat image by breaking apart its layers to add greater depth and space, allowing the viewer to exist in the spaces between the layers. While this work is only engaging this ability on the aesthetic level, this ability to peer in-between the layers of a piece has great possibilities.

Looking Forward

The Beta run of this assignment, offered excellent outcomes, as well as a couple of questions. In the work shown, we can see the same struggles I outlined at the beginning of this paper. We see the potential of the technology but have yet to fully realize it in the final experience. AR is not poster design, nor is it strictly motion. A poster, in its two-dimensional, static format, has only one chance to give the viewers all the needed information. However, with AR, the designer now has ability to give more than that first page. This changes the ideas about the role of the marker image and that first encounter. What should that first view tell us? What is enough to capture a viewer and what information makes sense to edit out of the marker image and embed into the deeper AR experience?

With AR's ability to provide layers of information, it is worth exploring beyond poster/motion design into some level of AR in package design and data visualization courses. How can AR address the problems of instructions or visualizing complex data in static posters or magazine experiences? What distinct challenges does AR pose for design thinking and planning? How do we create an xperience where the engagement to the AR content is seamless? When should the AR be the message or just the extra experience?

As I begin to expand Artivive into my curriculum, questions remain. Currently, Artivive can support audio, static, and motion elements, but its lack of interaction is something of note. Artivive's ease of use and free price point are huge assets, but as research continues, Blippar is becoming more interesting for its interactive capacity.

As AR expands and more designers engage with AR's possibilities, it brings about questions regarding what this means for our public and private spaces? If instructors assign public street art assignments in line with the work of Timothy Goodman or Banksy, does the fact that the work is virtual dilute the power of the message? When graffiti isn't permanent, what is it? In this vein, activist, Dustin Lein, recently covered up confederate statues through projections, choosing instead to show African American victims of violence. This use of Projection Based AR was powerful because the viewer couldn't not see it. However, not all AR falls into this format, leaving questions about access, visibility, and ultimately its power to reach those who aren't looking.

While the use of something "so ubiquitous" as a smartphone as the key to the messaging is tantalizing, designers cannot ignore the glaring fact that only 48% of the world's population has a smartphone (Turner). With all of the interest in AR, designers are flooded with possibilities of what platforms to use and what to say with AR, but right now there are too many keys to too many castles. A user

can have as many as four separate AR apps on their phone each only working with certain content. How does the user know there even is a castle to unlock? Unlike screens AR is so passive. There is no looping audio or proximity sensor to trigger the interaction. The designer is reliant on the power of the poster to draw the viewer in and be enticed to take the plunge into AR. Even within this paper I have markers instructing viewers on how to partake in the experience. That is far from seamless.

This will all be solved in time. There was a point when users needed an app to read a QR code and now its functionality is embedded into the smartphone's camera. Maybe it's just a matter of time until users have access to this walled garden, as long as they know where to look.

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Appendix

19 Crimes
https://www.19crimes.com/
Adobe Aero
https://www.adobe.com/products/aero.html
A-Frame
https://aframe.io/
ARToolKit
http://www.hitl.washington.edu/artoolkit/news/index.php
Artivive
https://artivive.com/
ARkit
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Cabin AR
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HBO For All Mankind Bonus Content
https://tv.apple.com/us/show/for-all-mankind/umc.cmc.6wsi780sz5tdbqcf11k76mkp7?itscg=MC_20000&itsct=atvp_brand_omd&mttn3pid=Google%20AdWords&mttnagencyid=a5e&mttnc=US&mttnsiteid=143238&mttnsubad=OUS2019805_1-499372547958-c&mttnsubkw=79970523513__4AahnpV4_&mttnsubplmnt=

AUTHOR BIOGRAPHY

Erich Doubek is a designer, artist, and educator. As an Associate Professor of Art and Design at Emmanuel College for over a decade, his courses run the gambit from Poster Design, Data Visualization, Motion, Interactive and everything in between. He regularly works across disciplines to bring together the fields of communication, computer science and design. He has been a guess critic at Yale's School of Art and Design, UMass Dartmouth and MassArt. His most recent design education explorations have been focused on motion design and how augmented reality will play a role in the future of communication design. His personal work with a focus in illustration has been exhibited in The Bakaler & Paine Galleries and Gallery 263.