

SO MANY REALITIES

Augmented reality as a library resource

WHAT IS AUGMENTED REALITY?

Augmented reality (AR) is a technology that enables a digital layer to be viewed against the backdrop of the real world, via the use of a viewing device. The effect is such that reality is *augmented*, and the viewer sees extra content in the world around them; content which doesn't exist in a tangible sense but which is nevertheless apparent. The virtual layer may in many cases be interacted with. The viewing device is usually a tablet, smartphone, purpose-built headset, special glasses or some other similar portable device. Often the digital layer is enacted when the viewing device is pointed at a target image. The application 'recognises' the image and triggers the appearance of a particular virtual layer that is associated with the individual target image. Various functionalities inherent in the viewing device may be used by the AR app in order to achieve the desired effect. For example, the GPS functionality of phones and tablets is utilised by the popular AR app '*Starwalk*' by Vito Technology in order to display a vision of the night time stars as they would appear in your location.

AUGMENTED REALITY IN EDUCATION

AR has been around for decades, with the very first examples emerging in the 1960s (Tsai, Shen & Fan, 2014). As an educational tool, however, it is still very much in its infancy (Wu, Lee, Chang, & Liang, 2013). The steadily rising number of published articles each year, concerning AR in education (Bacca, Baldiris, Fabregat, Graf, & Kinshuk, 2014), point to the need for more research into the associated educational uses, benefits, limitations and challenges (Bacca et al., 2014). Nevertheless, even at this early stage, numerous studies have already indicated that AR offers huge potential as an educational tool across multiple areas of teaching and learning for K - 12 (Antonioli, Blake, & Sparks, 2014; Bower, Howe, McCredie, Robinson, & Grover, 2014). Indeed, some authors speculate that AR may be the next big 'game changer' in education technology (Bower et al., 2014).

THE VALUE OF AUGMENTED REALITY IN EDUCATION

Some of the major teaching and learning benefits identified in the literature so far are (i) increased student motivation (Chang, Chang, Hou, Sung, Chao, & Lee, 2014; Di Serio, Ibáñez, & Kloos, 2013; Liu & Chu, 2010) (ii) increased levels of and more constructive collaboration (Billinghurst & Dunser, 2012), and (iii) facilitation of deeper understandings of content (Iordache, Pribeanu, & Balog, 2012; Radu, 2014). In particular, AR has proved useful for teaching topics that require students to mentally visualise difficult theoretical concepts or phenomenon, such as those found in disciplines like chemistry or physics (Iordache, Pribeanu, & Balog, 2012). When a tangible and manipulable representation either does not exist or cannot practically be brought into a classroom, AR may offer a solution. Even when a visual representation is available via desktop computers, AR is perhaps preferable because of its capacity to encourage natural face-to-face collaboration among students, as opposed to the segregation that is often caused by students working on individual computers (Billinghurst & Dunser, 2012). As Billinghurst and Dunster (2012) explained it "AR interfaces enhance the real world experience, unlike other computer interfaces that draw users away from the real world and onto the screen."

COMPARING AUGMENTED REALITY TO TRADITIONAL RESOURCES

Many published articles that examine AR as a teaching and learning resource, describe the potential and performance of AR by comparing it to the performance of other more traditional resources, used for the same learning objectives or tasks. Radu (2014) recently published a meta-analysis of 26 publications that compared the effectiveness of AR with non-AR resources in educational settings.

The major reoccurring observations were as follows:

<u>Positive impacts:</u>	<u>Negative impacts:</u>
<ul style="list-style-type: none">• Increased content understanding.• Better spatial structure learning.• Language associations.• Long-term memory retention.• Collaboration and motivation.	<ul style="list-style-type: none">• Attention tunnelling (less awareness of associated peripheral information).• Usability problems/issues with technology.• Problems effectively integrating AR into the classroom setting.• Varied results due to learner differences.

Librarians are sometimes approached for their opinion on which resource might be best for a particular learning task. Research examining the value of AR compared to non-AR resources may therefore be useful to librarians, but such comparisons can be problematic for several reasons. Firstly, librarians must remind teachers and students that AR is a medium unlike any that schools have used before, and it will take time to explore the best methods and contexts in which to use it. Furthermore, as AR technology becomes more sophisticated and easier to use, comparisons made today may not hold true tomorrow.

PRACTICAL APPLICATIONS OF AUGMENTED REALITY

The internet is littered with real life examples and case studies demonstrating effective and ineffective implementations of AR as a learning and teaching tool within a school setting. AR apps such as *Aurasma* and *Layar* have been used by hundreds of schools over the last few years, as a means of enabling students to create and add AR content to their projects. A common example is the informational poster: a student might, for instance, present a map of the world on cardboard, and attach AR content to each country by designating individual countries as target images. The AR content might be a one minute video of the student talking about the country, or it could be a slideshow of images, or a link to a google survey, a piece of music, or all of the above plus more. AR art, or "ARt" as it has been informally coined in the blogosphere, offers a unique range of options for art teachers to engage students with creative composition. History class can come alive, with students adding AR layers of artifacts or famous speeches to parts of a history timeline. Media studies teachers can demonstrate the future of advertising by asking students to explore and assess some of the thousands of examples of AR advertisements which exist today (for example: Blippar). An aerial map of the school may be used to create an AR tour of the school grounds, including video sweeps of building interiors, interviews with teachers, and geographic or even demographic facts about the school's surrounding suburbs and areas. Environmental science studies might incorporate AR into a field study project, by recording the sounds of local fauna and attaching them as AR layers for a physical project.

Whilst there are certainly limitations with the technology (Antonioli, Blake, & Sparks 2014; Pribeanu, 2014), the options for the practical application of AR in teaching and learning across K – 12, might be considered as limited only by the imagination.

AUGMENTED REALITY AS A LIBRARY RESOURCE

If school librarians are to take a leadership role in the emergence of AR in schools, then the definition of “library resource” must be expanded to include AR. Librarians have been expanding the definition of “library resource” for decades, and it is perhaps inevitable that as the technological landscape continues to change, so too will library resources and services.

When AR is treated as a library resource, it is possible to subject it to the scrutiny of the library’s Collection Development Policy and the Service Delivery Model. Even if your library does not possess or operate in close accordance with these age-old library management documents, the bottom line is, that a school librarian will ask the crucial question: *“for whom and to what end would this resource be of benefit”*; quite simply, does it fail or succeed to meet the relevant selection criteria. Viewing AR in this way may make it easier for school librarians to assess the worth of particular AR applications, rather than tackling the question of whether the AR medium has a place in libraries or not.

It may be beneficial to create a set of guidelines through which AR resources can be assessed, on a case by case basis. Some factors to consider are: the curriculum, compliance with educational benchmarks, the pedagogical aims of the school, the interests and needs of the student demographic that is particular to the individual school, and of course the library’s own vision statement or strategic plan. A brief template may be fashioned and used a guide for deciding whether or not to acquire a particular AR app. Such a template also provides an informative description of individual AR applications, for teachers to consult. An example of such a template is shown below:

Name of AR app (Title):	Anatomy 4D
Creator:	DAQRI
Cost:	Free
Description/use case:	<p>Target image of a human body must be printed.</p> <p>The app enables all major systems and associated organs of the human body to be viewed together or in isolation. Differences between male and female are available for each system. Areas may be zoomed in on.</p>
Specific relevance to The Australian Curriculum:	<p><u>Health and Physical Education / Year 10 / Movement and physical activity</u></p> <p><u>Science / Year 9 / Science Understanding / Biological sciences / ACSSU175</u></p>
Access:	<p>Multiple A3 print-outs have been laminated and catalogued as a class set for teachers to borrow.</p> <p>IT have made the DAQRI app available via the school's software suite, but the app is freely downloadable from Apple and Googleplay stores, by searching for Anatomy4D.</p> <p><u>Students must use their own tablet devices to view the AR.</u></p>
Specific relevance to: <ul style="list-style-type: none"> • Collection Development Policy • Library Vision Statement • Service Delivery Model; 	<p>Encourage students and teachers to explore and interact with the latest relevant emerging educational technologies.</p> <p>Provide resources that are both informative and engaging.</p> <p>Inspire learning through the provision of information in novel and creative ways or formats.</p> <p>Assist teachers in their practice by providing relevant and interesting resources for use in classes.</p>
Comments:	<p>This app is also used to view the Human Heart AR target image (also by DAQRI). See details for the Human Heart app here.</p> <p>Very direct light reflections on the laminated page can obscure the image and cause occasional interruptions to the AR.</p>

Having this information visible in OPAC search results, along-side traditional resources, will enhance the visibility of AR as a legitimate library resource. If an AR app is catalogued, then the information in this template may be assimilated into a MARC record, by adding extra fields, subject headings or metadata (depending on the functionality of your ILS). The template in its original form might even be made available as a downloadable PDF, via a link in the record.

HOW TO BRING AUGMENTED REALITY INTO THE LIBRARY

Green, Lea and McNair (2014) wrote in their article about AR in school libraries, that the key to successful implementation of AR into a school library rests on four tasks: "create, curate, locate and gamify". This may serve as a useful guide when brainstorming for ideas regarding how to bring AR into the school library. Some possibilities are:

- AR displays (perhaps run by the library tech club).
- Class sets of AR targets (such as Anatomy 4D by DAQRI). It is a good idea to place a QR tag on the back of the page, leading users to the app download site.
- Tech clubs – get the students involved with creating and promoting AR.
- PD sessions for teachers, focusing on AR apps specific learning areas.
- Careful implementation of instructional design into platforms promoting AR (e.g. linked off the OPAC or embedded in the student portal)
- Events which employ the use of AR, such as AR treasure hunts or a Christmas lunchtime library session on how to make an AR greeting card.
- Makerspaces – AR belongs here.
- AR posters that can be placed around the school.

WHY GET ON BOARD?

Librarians should perhaps be alarmed that in the literature concerning AR so far, the field of library and information science has not been a prominent part of the conversation (Zak, 2014). This is concerning for many reasons, but perhaps one of the biggest is that without the holistic approach that libraries take towards resources, AR as a medium will be defined by the discipline-specific contexts in which it currently appears; which right now means that it will be perceived through understandings belonging to the domains of IT, advertising, psychology and philosophy (Zak, 2014). There is little room for access and equity when a medium is understood to be pigeonholed in this way. Outside the umbrella of the library institution, the patron will not exist as a type of user. Instead, as Zak (2014) suggests, discipline specific research will designate the AR user as "a *subject* or *wearer*". These treatments of the information seeker are not holistic and do not allow for cross discipline or non-discipline specific explorations of the medium. At this point in time, as the interest in AR increases exponentially, the voice of the library patron is missing (Zak, 2014), and for school librarians this translates as the voice of students and teachers. Our patrons are our primary concern

of course, and it is therefore up to us to bring AR into the school library domain, so that it may be accessed easily and fairly by anyone. Furthermore, AR resources may be collected, promoted and described by librarians according to the multitude of intellectual and emotional information needs that exist within a school. If the job of bringing AR into the school is left to teachers, they will naturally pick out what is useful for their own class or subjects. The students of less informed, less proactive or less tech-savvy teachers will simply miss out. The school librarian is the one person who is perfectly placed to ensure this does not happen.

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