Humanitarian Leadership Academy

QR codes and Augmented Reality for capacity strengthening initiatives for health providers treating children with paediatric blast injuries

Digital Learning Lab Case Study

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Digital Learning Lab Case Study #AR01

As part of a new series in 2024, our Digital Learning Lab will be regularly publishing case studies of how new technology and approaches are helping to transform the humanitarian and development sectors. Our easy to read guides will show you how you can start to solve real-world problems.

The Problem/Learning need

Children injured in conflict pose specific problems for those trying to treat them. Paediatricians are often not trained in the specific management of conflict trauma, such as blast injuries. First responders, emergency physicians and surgeons may be experienced at managing this type of trauma in adults but often do not know the specific adjustments needed to treat children safely and effectively, leading to excess paediatric mortality and disability.

UK-based experts have developed resources and face to face trainings but they are often impossible to deliver in areas of greatest need, due to security concerns and the fact that the already stretched health sector is working continuously to meet the population's needs resulting from the conflict. For example, the newly released Paediatric Blast Injury Field Manual, which was used as the content for this case study, is a comprehensive multi-lingual document totalling 176 pages.

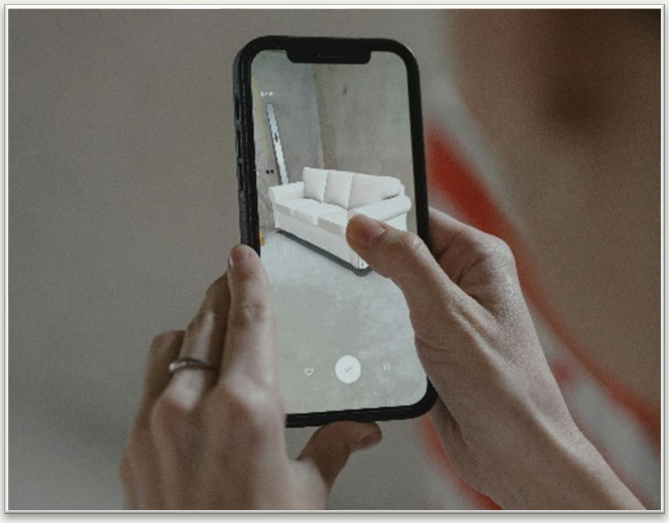
What is a QR code and AR?

Quick Response (QR) codes, are two-dimensional barcodes that can store a variety of data types including text, URLs, and other information. QR codes have since become widely used for various applications due to their quick readability and large storage capacity.

They are created using a variety of online tools and software applications by entering the desired location (like a website). In this case study we used

Adobe Express QR Code generator. Activation is simple by scanning them using modern smartphones. Most have in-built QR code readers or can be opened via the camera app.

Augmented Reality (AR) is a technology that overlays digital information, such as images, videos, or 3D models, onto the real-world environment in real-time, typically through devices like smartphones, tablets, or AR glasses.



By blending virtual elements with the physical world, AR enhances the user's perception and interaction with their surroundings, creating an immersive experience.

This technology is used in various applications, including gaming, education, retail, and navigation, allowing users to visualise and interact with digital content as if it were part of their actual environment.

How can QR/AR be the solution?

Scanning QR codes can launch AR experiences, helping providers access valuable learning resources in real time. This could support local trainers in delivering scenario-based training with low-fidelity mannequins, enhancing the authenticity and range of learning experiences easily and cheaply. For example the AR overlay might show other people in the room (surgeons, nursing staff, parents) to test a learner's situational awareness and their ability to adapt to a changing medical situation. With adaption, the solution could also be used to remotely train facilitators to run face-to-face simulation.

What did we do?

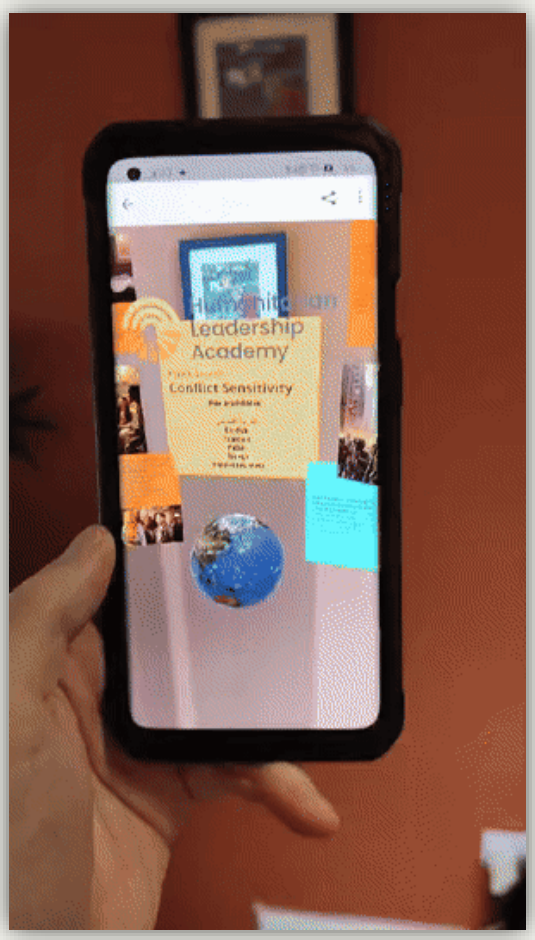
To test basic QR code functionality we linked to the Paediatric Blast Injury Field Manual (PBIFM online page-per-age card). The QR code was linked to the tool, which confirmed that non AR integration still had practical applications to meet the learning need as it was possible to access the tool quickly via a smartphone. With this foundation in place, we could test adding the AR experience. In the development of a working prototype, we authored the following AR solutions:

The **first** was an AR experience of an unrelated learning resource around Conflict Sensitivity. This example included **no interactivity**. This allows the user to rapidly pull pre-curated information up that is relevant to the context.

The **second** AR experience used PBIFM dosage information and **included interactive** button elements to trigger different views of dosage information. The intended effect was to create dosage cards overlayed on to a physical wall that could be changed by age. This allows the user to view more information on a wall in front of them with the

ability to quickly toggle between different documents in the form of posters. The user can zoom in and out on tables and charts by simply moving closer to the wall allowing quick access to dosage information.

AR elements were designed used Aero (a free app from Adobe) and used layered PNG image files to create spatially aware elements. Scanning a QR code then prompted the load screen. A phone screen recording is available here (Screencast Demo) or can be launched via the QR code opposite. The image below shows the Conflict Sensitivity AR experience in action.



How did we test it?

We shared the AR experiences with Subject Matter Experts (SMEs) who contributed to the PBIF manual and other learning design experts who accessed the experiences using various Android and Apple devices and provided feedback.

What went well?

The first QR code link to a website location was quick and successful. As a solution to signpost to content, this could be an easy solution in many different scenarios. QR codes are quick to print and affix to any tangible object (mannequin, medical device, manual,

emergency supplies etc.) and therefore to disseminate context specific information rapidly.

The benefits of AR made the experience feel more immersive and could be shared with other people in the room. In the interactive scenario, the learner was free to access the information most crucial to them or could “trigger” new content by being in close proximity to a region we defined. Approaching close to the globe for example, triggers the language available panel to activate.

We found authoring these initial AR experiences was relatively short (1-2 days). After some user testing, most versions of the AR experience performed as expected. Testers using recent iOS devices reported a much quicker experience.

What could be improved?

Our AR experience had a prohibitively long load time, despite being a small file (44mb) and took approximately 3 minutes in some cases. Therefore, final development would likely need an alternative AR tool for faster load times and offline access. In a conflict-affected setting an offline version will be essential for practical functionality. It was not determined if this was software or design based, although it should be noted that Aero is still in Beta as a desktop application. Additionally, for specific age related dosage functionality identified by the target audience, the AR solution wasn’t practical for simulations or real life. One user also reported a feeling of motion sickness when trying to view it.

“This case study demonstrated the importance of lightweight AR experiences that are accessible offline.”

The next steps would involve using a faster AR tool to design a more complex simulation with a QR coded mannequin as the launch trigger. This could be used to build out a model to test a basic simulation such as a single injury or family member interaction in an authentic blast injury environment. A second project will also explore alternatives to develop an appropriate solution for the age related dosage functionality via a smartphone app.

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Key contact

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Related case study code: *#QR01, #APP01*