Augmented reality: a new vision for Special Collections

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Students in Manchester are benefiting from a pioneering new way of handling rare books and accessing special collection materials. Mimas and the University of Manchester have been piloting the use of augmented reality with the aim of developing a methodology to be used by others. **John Hodgson**, **Jo Lambert** and **Matt Ramirez**, members of the multidisciplinary team behind the initiative, explain how the Scarlet project works.

THE Jisc-funded Scarlet project (Special Collections using Augmented Reality to enhance Learning and Teaching) is pioneering use of Augmented Reality (AR) to enhance students' use of special collections materials in libraries. Using materials from the University of Manchester's John Rylands Library, AR enables students to experience the magic of original materials, whilst 'surrounding' the object with digitised content: images, texts and online learning resources. Learning and teaching is placed at the heart of this innovative project, ensuring that the focus remains on the student experience and not the technology. Key to Scarlet development is a methodology that can be easily replicated within other contexts. This will benefit other special collections libraries, archives and museums by enabling librarians, archivists and curators to develop AR applications for visitors. This article will outline how Scarlet can be extended to other contexts and highlight implications for the sector.

John Rylands Library

The University of Manchester's John Rylands Library (JRUL), a spectacular neo-Gothic building in the heart of the city, houses one of the world's great collections of rare books, manuscripts and archives. They span five millennia and six continents, and are written on virtually every medium that has been used for human communication, from clay tablets to emails.

Members of staff in the library's Special Collections Division have a long tradition of working with academic colleagues at the University of Manchester to make collections accessible to students – from freshers to taught-course postgraduates and research students. We do this in several ways: giving presentations to groups of students on campus; taking part in seminars; offering first-visit support to individual students; and delivering what we term 'close-up sessions'. A close-up session typically involves a curator and an academic selecting up to a dozen items to show to a group of students. The items are generally set out on tables and everyone gathers round for a discussion. It is a real thrill for students to see Special Collections materials up close, and in some circumstances to handle the items themselves. The material might be papyri from Greco-Roman Egypt; medieval manuscripts; early printed books; 18th-century diaries and letters; or modern literary archives: the scope of our Special Collections is vast.

From the library's point of view, it is really rewarding and enlightening to work alongside enthusiastic teachers such as Drs Guyda Armstrong (Italian), Roberta Mazza (Classics) and Jerome de Groot (English and American Studies). The ideal scenario is a close partnership between the academic and the curator. Curators know the collections well, and we can discuss with students the materiality of texts, technical aspects of books and manuscripts, the context in which texts and images were produced, and the afterlife of the objects – the often circuitous routes by which they have ended up in JRUL. Academics bring to the table their incredible subject knowledge and their pedagogical expertise. Sparks can fly, especially when students challenge what they are being told and lively debate ensues!

Digitisation – a suitable alternative

Digitisation is often a suitable alternative to direct contact with Special Collections material, and it offers enormous scope for broadening access. JRUL has an ambitious digitisation programme, managed by our Centre for Heritage Imaging and Collection Care (Chicc: http://chiccmanchester.wordpress.com), and tutors can apply to have complete books and manuscripts digitised for use in teaching. However, it is essential that students also experience original materials during their studies: in order to confront the materiality of objects; to be inspired; and to prepare them for solo research. Many tutors recognise


CANTO PRIMO DELLA PRIMA CANTICA O VERO COMEDIA DEL DIVINO POETA FIORENTINO DANTHE ALEGHIERI : CAPITOLO PRIMO :

DEL MEZO DEL CAMINO DI NOSTRA VITA
Mi ritrouai peruna selua obscura
che la diricta uia era smarrita
Et quanto adire quale era e/ cosa dura
esta selua seluaggia et aspra et forte
che nel pensier rinuoua lapaura
Tanto era amara che pocho e piu morte
ma per tractar del ben chio ui trouai
diro dellaltre cose chio uho scorte
I non so ben ridire chomio uentrai
tantera pien disonno insu quel puncto
che lauerace uia abbandonai
Ma poi chio fui appie dun colle giunto
la oue terminaua quella ualle
che mhauea dipaur elcor compuncto
Guardai inalto et uidi lesue spalle
coperte gia deraggi delpianeta
che mena dricto altrui per ogni calle
Allhor fu lapaura un pocho queta
che nellago del chuor mera durata
lanocte chio passai con tanta pieta

A page from the 1481 Florence edition of *The Divine Comedy*. Reproduced courtesy of the University Librarian and Director, John Rylands University Library, University of Manchester.

that exposing their students to original Special Collections material, even on a limited basis, can spark their enthusiasm for, and engagement with, wider classroom-based and remotely-taught courses. However, students are constrained by the fragility and unfamiliar formats of the material. It isn't easy for them to study an object in a seminar context, where several students are examining the same object. Student feedback shows that while they are inspired by the objects they encounter, they are often frustrated by the traditional pedagogical experience. In addition, Special Collections are often seen as fusty, old-fashioned and hidebound by arcane rules.

Special Collections in the age of the app

Scarlet is addressing these issues directly, bringing Special Collections into the age of the app. Augmented Reality enables students to experience the best of both worlds: to enjoy the sensory delights of seeing and handling original materials, while enhancing the learning experience by 'surrounding' the object with digital images, online learning resources and information on the items before them and on related objects held in the library and elsewhere. AR will make the sessions more interactive, moving towards an enquiry-based learning model, where we set students real questions

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to solve, through a combination of close study of the original material and by downloading metadata, images and secondary reading, to help them interrogate and interpret the material. One of the benefits of the project is that it will make it more feasible to host 'taster' sessions for first and second years, enabling them to engage with Special Collections materials without requiring extensive handling of the original books and manuscripts, and thus addressing conservation issues about the over-exposure of fragile objects.

AR technology considerations

At the project outset, technical architecture and choice of software was considered integral to its level of success. As the project would not be developing any technical code or services, building on existing frameworks available as open source (e.g. AR browsers), it was imperative that the delivery solution would be intuitive, structurally sound and technically viable. Due to the environmental constraints of the technology being used inside JRUL, the traditional format of augmented delivery – POI's (Points of Interest) mapped to GPS co-ordinates – was problematic. Mobile devices would struggle to detect accurate location-based data with their inbuilt GPS, or in some cases would not work at all due to compass interference. At the time, Junaio was the only AR browser to harness optical tracking functionality, linking 3D models, videos and information to images in the form of 'GLUE'-based channels. This coupled with an open API and compatibility with Android, iOS and Nokia devices would prove decisive in the final reckoning. Subsequently, other AR browsers such as Aurasma and Layar have launched similar functionality, but in Junaio the technology is far more mature, having been available to the developer community for more than a year.

A relatively new technology such as Augmented Reality offers significant challenges, namely a lack of ratified standards for developers to adhere to. But, although most AR vendors are working on proprietary platforms, they share similar traits; the majority use XML documents to hold the POI (or GLUE object) information with most nodes being universal (i.e. Longitude, Latitude, Name, Description, 3D model, Multimedia etc.). By the end of the project, an application of base level standards should be ubiquitous across most AR browsers enabling the outputs to be interoperable regardless of delivery platform.

Benefits of using AR

Scarlet, while embracing the potential of AR, hopes to concentrate on delivering the benefits to student learning without being a flag bearer for the technology. The main benefit is that users can see and touch real manuscripts/editions with access to guided support, allowing users to work at their own pace. Being able to interact with a core medieval text while referencing supplemental materials (via visual triggers) can spark enthusiasm, confronting the materiality of objects, and preparing them for solo research. This promotion of 'active' teaching encourages critical response and the adoption of new perspectives and positions. This is in opposition to traditional didactic methods that are predominantly teacher-led.

When learners become actively involved in an experience, they will remember and retain the majority of the information presented to them. AR can harness both asynchronous (emailing tutor questions) and synchronous (discussion with peers) e-learning methods. Abstract concepts or ideas that might otherwise

Dr Guyda Armstrong shows her students one of the 15 rare editions of Dante's *The Divine Comedy* housed in Special Collections at the John Rylands Library.

be difficult for students to comprehend can be presented through an enhanced learning environment offering access to source historical artifacts and online research in situ. The learning curve for new users engaging with mobile AR through browsers is relatively quick, enabling the learning/pedagogy to be the driver, not the technology.

AR toolkit and implications for the wider community

The core issue that Scarlet addresses, enhancing access to Special Collections material, has implications for libraries and archives around the world. Sharing knowledge and experience to benefit the community is a key driver and this will be delivered through various mechanisms. The Scarlet blog (http://teamscarlet.wordpress.com/) captures our journey and provides an engaging record of the development process from the diverse perspectives of librarians, academics and learning technologists. Using the blog we aim to develop a structured online toolkit that can be used by the community to develop similar applications. The toolkit will include course content templates for AR, technical specifications, guidelines, an overview of the technical and pedagogical processes and an online workbook disseminating lessons learnt and advocating the benefits of AR for teaching and learning within Special Collections.

The JRUL and other Special Collections libraries and archives will be able to use the Scarlet toolkit to develop AR applications for visitors, enhancing their understanding and enjoyment of objects. Librarians, archivists and curators will be enabled to develop AR applications, both within their own institutions and as part of collaborative projects. The toolkit, available this summer, will enable information professionals to engage with their users in new ways, and to demonstrate the relevance and value of the wonderful collections in their care.

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Summary

Scarlet is unique in that it has a multi-disciplinary team working to achieve aims with a focus on student learning, an iterative development cycle that places the user (student) in the centre in terms of project design evaluation and review. While other implementations of AR have stopped short of engaging with the pedagogic agenda, Scarlet aims to utilise the diverse academic expertise to integrate these methods into the finished outputs. As Scarlet progresses, we expect that lessons learned from development can be successfully applied to the wider library and information community.

Glossary

AR – Augmented Reality, in this case referring to objects from the Special Collections which have been 'surrounded' with related digitised content: images, texts and online learning resources.

GLUE – describes junaio's ability to recognize and enhance images and pictures with virtual content without the need to use special markers.

JRUL – The John Rylands University Library

Open Api – in this case refers to sets of technologies allowing websites to interact with each other

POI – Points of Interest, an entity (marker) at a physical location about which information is available

Scarlet – Special Collections using Augmented Reality to enhance Learning and Teaching.