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Students as innovators: a digital humanities and GLAM sector collaboration to produce new web-based content through student led projects

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Abstract

This paper will share the success of research-led teaching and GLAM sector collaborations developed as part of the Digital Humanities (DH) teaching program at the Australian National University. This collaborative project offered a shared solution to two distinct problems. For teaching in DH we found that students, while fascinated by the GLAM and DH crossover space, struggled to evaluate the challenges and affordances of digital resources developed for collection-based research and engagement when studied in the abstract. The students were unfamiliar with the pragmatics and realities involved in working with materials from the GLAM sector as they came from diverse academic backgrounds (computer science, linguistics, engineering). For our GLAM partners, project deadlines, organisational structures, and, most importantly, budgets constrained innovative work with digitised collections. The pilot program ran across two courses in DH, one with the National Museum of Australia that focused on development of web-based educational resources, and one with the British Library Labs where students could develop a project focused on any of the following: Research, Artistic, Community, and, Teaching/Learning. This pilot program has now become a permanent fixture of our teaching. It has offered a productive way for a small research centre to engage with a range of GLAM partners, and offered them the chance to see how to use collections in the digital space, from marketing to games to advanced research projects. Meanwhile, students in DH from diverse

backgrounds are shown the opportunities for future work pathways in GLAM, and exposed to not just the technical challenges of digital project development, but the social and institutional ones as well.

Students as innovators: a digital humanities and GLAM sector collaboration to produce new web-based content through student led projects

Digital humanities, although now a recognised methodology (or collection of methodologies) across much research, is still a new subject in formal teaching at most universities. Many successful courses are embedded within existing disciplines, but teaching it as a topic in and of itself requires a rethinking of the traditional humanities approaches to teaching. Digital methods and critical appraisal of digital projects and platforms cannot be productively taught in the abstract (Brier, 2012). Learning needs to be anchored to a problem that needs solving, ideally one with real-world application. At the Centre for Digital Humanities Research (CDHR), an interdisciplinary cluster within the Research School of Humanities and the Arts at the Australian National University (ANU), we have developed a successful approach to teaching digital humanities that is based around engagement with GLAM institutions. Instead of more traditional lecture/seminar classes and essay-based assessments, students engage in constructivist learning through individual or group projects (Bruner, 1961; Piaget, 2001; Nurmikko-Fuller and Hart, 2020). In our project courses they are tasked with building prototypes of digital resources that invite public engagement with the collections and ideas of a GLAM (galleries, libraries, archives and museums) sector partner. This successful approach engages with cultural institutions not simply as a resource or a topic of critical study (as is done in museum studies, history, art history, etc) but instead positions them as a public resource and a client. Over the past two years we have evaluated the potential for collaboration between students and GLAM with a range of institutions (a museum, archive and library). These collaborative teaching projects have offered academics, students and GLAM practitioners the opportunity to develop a range of approaches to experimental,

creative, and low-budget (but often high quality) to digital project development. Over the past two years most iterations of these courses have resulted in projects that have been picked up and highlighted by the institutions themselves.

The collaborative project courses offer a shared solution to two distinct problems. Our professional experience teaching in Digital Humanities (DH), demonstrated that students, while fascinated by the GLAM and DH crossover space, struggled to evaluate the challenges and affordances of digital resources developed for collection-based research and engagement when studied in the abstract. The students were unfamiliar with the realities involved in working with materials from the GLAM sector as they came from diverse academic backgrounds (computer science, linguistics, engineering). For our GLAM partners, project deadlines, organisational structures, and, most importantly, budgets constrained innovative work with digitised collections and digital projects (Minney, 2021). The following paper will explain the structure and implementation of these courses, the pedagogical approach, the key themes that have emerged, and look in detail at the types of projects that are most successful in this context. The students' projects, and their reflections on the process, offer useful lessons not just for collaborative teaching with GLAM, but for any organisation looking to implement creative, affordable, and accessible digital engagement.

From pilot to permanent delivery

These project courses were developed from a pilot program, which began with a discussion between staff at the CDHR and staff from the educational development team at the National Museum of Australia (NMA). The museum had received a generous grant to develop a digital classroom resource for use by primary and secondary students across Australia (launched in November 2020). The coordinating team of educational specialists, led by David Arnold (former NMA Deputy Director), approached our centre for advice about developing dynamic and engaging digital resources. At the same time we were investigating new options for teaching students enrolled in our *Digital Humanities and Public Culture: Projects and Engagement* course. We had identified a need for students to move away from just evaluating existing projects or engaging in short 2-3 week modules on various digital methods. Instead we wanted them to learn about the challenges and expertise required for project development by developing a project

themselves and seeing it through from concept to prototype. We proposed that our students could engage with the museum to develop projects for the digital classroom. This approach would build on successful Library Lab/GLAM lab approaches (Chambers et al, 2019) and GLAM community partnerships that use the co-creation approach (Baggeson and Johansen, 2019) but for a specifically educational context. Students would be given a basic set of guidelines: projects had to build on the overarching concept for the resource 'Defining Moments in Australian History', and their intended audience should be school students (ages 6-18) rather than a broader adult public. The museum staff agreed to dedicate time and resources to support students, including advice on developing material for educational purposes and expertise on engaging with sensitive topics suchs as Indigenous and LGBTIQ history.

This approach was presented as a win-win. The museum would be presented with several functioning proof-of-concept projects, which they could choose to take on for future development. The students would take on the risk of pioneering and out-of-the-box-thinking, a critical element of learning to work with digital methods, and be rewarded with an opportunity to engage with external partner institutions. They were able to focus on topics they are passionate about, which in turn encouraged them to build their digital competencies from a variety of levels from beginner to expert. Students responded well to the "real world" challenge and created a range of "blue sky" approaches to web-based content. Projects included a memory game revealing the history of a hydroelectric scheme developed by an engineering student, a machine learning collections interface, and an animation about the boomerang from two non-Indigenous students who worked closely with Indigenous curators to produce a short film that was culturally aware and intelligently aimed at very young children. The success of the first collaboration inspired the development of similar courses.

Course design and pedagogy

These project-based GLAM-sector collaborative courses have been running each semester since 2019. To date, these collaborations have been remarkably successful, the NMA collaboration was repeated in 2020 and 2021 is about to commence. In 2019 the second semester cohort worked with the British Library Labs, to complete a more scaffolded and supported version of the project-style

course. These students were able to access materials from one of the UK's legal deposit institutions but were also required to overcome the challenges of working remotely and across vastly different time zones. In 2020 this cohort worked with the National Film and Sound Archive of Australia (NFSA). Although this was a local institution, due to Covid-19 restrictions the course was run entirely online. The challenges of learning new software and pitching projects virtually was balanced by a renewed interest in the institutions in how to engage the broader public via digital projects during a time when most cultural institutions remained closed to the public.

A number of key themes that guide these collaborations have emerged over the past two years. Some were intentionally set in motion by us as lecturers based on past experience and current pedagogical research. Others have emerged organically as students, lecturers and GLAM staff engage and reflect on what has worked well. We believe the successes from these collaborative courses have the potential to inform teaching both in digital humanities and in museum studies, computer science and related disciplines. They also offer insights into processes, platforms, and project ideas that can work well in institutional contexts.

Course design

The two courses both require similar project outcomes, but with a slightly different structure. They fall into both of the bi-semester delivery (12 weeks) of the academic year. Both courses are run with mixed undergraduate and postgraduate cohorts. The pilot program was run with our advanced course (typically third year undergraduates and second year masters students), *Digital Humanities and Public Culture: Projects and Engagement*. The newly established model now requires students to first complete the *Introduction to Digital Humanities and Public Culture – Tools, Theories and Methods*. The Introductory course was designed based on observations about what students found most challenging in the pilot program: planning ahead, setting up productive group dynamics, scoping what was achievable in 12 weeks, and risk taking. This course has a greater degree of engagement with soft and transferable skills (they range from learning how to use Gantt charts to understanding the SCRUM method for agile project management). In the Advanced course students are expected to work with less direct supervision, and to set their own expectations in terms of the ambition and

completeness of the projects. Students in the Advanced course are not required to attend structured classes but to drop in to a weekly lab (a model borrowed from colleagues in computer science) to problem solve and discuss the project with lecturers and fellow students. The key themes that emerged from this process were: encouraging learning about digital methods through a combination of experimentation, risk taking and authentic activities; managing and supporting diversity both cultural and discipline expertise; and, digital humanities as a public culture discipline.

Digital Humanities Pedagogy – experimentation, risk taking and authentic activities

As outlined by Nurmikko-Fuller and Hart in 2020, the traditional individual essay that has dominated assessment models in the humanities faces challenges in the digital age. Following the arguments of Biggs (2011) we have looked for opportunities to align our learning objectives to the types of skills and experiences we want our students to gain. In digital humanities these skills include project scoping and planning, writing technical reports, communicating complex ideas and technical specifications to a mixed audience, and learning *how* to evaluate what digital tools are needed and then make time to upskill. DH also increasingly values experimentation, play and risk-taking as key skills (Tracy and Massa Hoiem, 2018). As well as a final project, students produce a critical exegesis for each project, reporting on aspects such as the digital methodology, their design decisions, target audience, and project timeline. The other key assessments are live pitches and demonstrations of the project to the GLAM partners. By engaging in the entire workflow of imagining, scoping, planning, pitching, developing, reporting, and presenting their digital projects, students gained a mastery of the processes of digital projects. This, in turn, enables them to accurately and effectively evaluate the digital projects of others, taking into consideration the practical effects of institutional policies, access rights, the limitations of time, budget, and existing skills.

Authentic activities

The project-based pedagogy of the CDHR is supported by the 10 steps of authentic activities (Table 1) as defined by Reeves et al (2002, p.564):

Table 1: Authentic Activities

	As defined by Reeves, et al (2002)	Achieved in our project-based learning by
1	Have real-world relevance	GLAM-sector collaborations
2	Ill-defined, requiring students to define the tasks and sub-tasks needed to complete the activity	Students imagine, pitch, and develop their own ideas for prototype digital projects
3	Comprise complex tasks to be investigated by students over a sustained period of time	Students spend between 6 to 12 weeks working on a single project
4	Provide the opportunity for students to examine the task from different perspectives, using a variety of resources	Rules for diverse group formation; GLAM-sector collaboration; connecting collections from various institutions
5	Provide the opportunity to collaborate	Within the group on a personal level; with the GLAM-sector partner at the institutional level
6	Provide the opportunity to reflect	Students write project exegeses
7	Can be integrated and applied across different subject area and lead beyond domain-specific outcomes	Rules for diverse group formation; some projects are chosen for further development
8	Are seamlessly integrated with assessment	The rubric has been custom-designed for the evaluation of these diverse projects
9	Create polished products available in their own right rather than as preparation for something else	Many projects are available online as functioning prototypes or even minimum viable products
10	Allow competing solutions and diversity of outcome	Students can choose to approach the same material; diversity of projects is illustrated by the six-part taxonomy

Managing and supporting diversity

Digital humanities research and digital project development in industry are both inherently collaborative (Needham and Croft Haas, 2019). As such we require students to work in groups and to support each other as a cohort. The students on both courses come from diverse disciplines, including linguistics, museum studies, art and design, computer science, law, and engineering. The student demographics are also culturally and linguistically diverse, typically up to half our cohort are international students from a non-English speaking background. In the past we have observed that when students are asked to form groups they tend to want to work with students from the same discipline and the same linguistic or cultural background, a practice we have termed "self-siloing". From 2019 in our *Introductory* course students have been asked to self-organise into groups that meet three basic criteria:

1. the group must comprise of students from more than one degree program;
2. each member of the group could not have the same first language, or be monolingual in the same language; and
3. not all group members could identify as being of the same gender.

Despite a degree of apprehension from students, we have observed that the best projects have come from the most diverse groups. In 2020 when students reflected on the group dynamics many reported that they were pleased to discover their groups had very different skills and backgrounds as it allowed for the projects to be more ambitious, more culturally aware, and more sophisticated in terms of design and content. Students in these groups also often create culturally diverse projects, they might include information in more than one language and are more likely to consider Indigenous and non-Western perspectives.

Digital humanities as a public culture discipline

The digital humanities teaching program at the ANU is firmly grounded in the idea that students gain value from being supported to think about public culture and the relevance of what they are learning to broader society (Decker, 2016). Students at masters level earn a degree in Digital Humanities and Public Culture. Assessments in all courses taught by the CDHR require students to practice effective communication by giving Pecha Kucha style talks and to present

research outcomes in non-traditional formats (podcasts, videos, blogs). A key characteristic of digital platforms and modes of communication is obviously the broad public reach (compared to academic articles), yet in the humanities students are still often not taught to think about how the work they do can (or should) engage a broader audience beyond the academy (Jay, 2010). By asking students to think about an audience *beyond* the academic who marks their work (both the museum as client and the audience for the project) we have found that students take greater ownership of their own work and see themselves as co-participants in their education, rather than just passive receivers of information. Engagement with GLAM partners is ideal for fostering this. Most cultural institutions have a remit to engage with the broader community and to support education so staff are open and welcoming of students as collaborators. Students in turn are able to build professional bridges with staff at various national institutions and understand what roles might exist for them as future employees. Several Masters research have revisited GLAM partners and projects for further research. This approach also builds on the emerging library lab/GLAM labs movement (Chambers, 2019, Chamber et al, 2019). Our model allows the lab to be supported by university academics and resources and then openly engage with a range of local and international GLAM partners, rather than the lab being based within a specific cultural institution. It also takes collaborative approaches that are successful in museum studies and opens them up to more students (Resch and Greupner, 2020).

Case Study Examples

In each iteration, a typology of digital prototypes has emerged. These seem to be influenced by several factors, current trends and positioning of various technologies along the curve of the Hype Cycle (the fascination with VR, AR and XR), institutional expectations, ease of use of existing tools, and (in the case of later iterations of the courses) existing examples.

Five distinct type of project have appeared consistently:

1. Serious Games and Games with a Purpose;
2. Digital Maps, produced using tools such as ArcGIS;
3. Interactive timelines produced using web apps like Knight Lab Tools;

4. XR applications ranging from fully-fledged virtual reality (VR) environments to augmented reality (AR) apps for mobile devices such as smartphones and tablets, and,
5. Digital Media (podcasts, vlogs, animations, videos).

Case Study 1: Games

Several different types of games (Figure 1) were developed by the students throughout the courses. The interest in games was generally driven by the students themselves who believed that playful and entertaining approaches to museum collections would be more engaging for children and adults alike (this is supported by recent research, eg Nunes, et al, 2016). The approaches and techniques were varied. Typically students chose well-known games and reimagined them using GLAM collections. The 2019 *Snowy Hydro Who's Who* used the model of a traditional memory card game to explore the stories of people involved in the Snowy Mountains Hydro-Electric Scheme. This project was developed by an engineering student using Adobe Illustrator and the coding was developed and implemented using GitHub, but the student also engaged in archival research at the National Archives of Australia to ensure the game was based on actual history and revealed new stories. The card game (*Librorum*) aimed to open up the collections of the British Library to an international audience and produce a product that could be developed into a commercial product (sold, for example, in the giftshop). It was inspired by the game *Saboteur*, and the students invested their time in graphic design using Adobe Illustrator and the creation of online resources that could be accessed using QR codes within the game.

Choose your own adventure games appear to be experiencing a popular resurgence. Several groups have developed these both as fun entertainment as in the *Fantastic Bestiaries*, which engages the player in a Medieval fantasy narrative to capture mystical, mythological, and exotic animals) based on the collections of the BL. In 2020 two students used this format to engage users with historical exploration, one looking at the colonial explorer Matthew Flinders using material from the NMA (and offering an intriguing opportunity to rewrite history) and another, *Home of the Blizzard*, took the player on an adventure to the South Pole, based on the collections from the NFSA. Most of these games embraced a lo-fi, nostalgic aesthetic of 1990s era games and web design. These games offered

students the opportunity to work across accessible software such as Adobe Animate, Photoshop, Illustrator, and Audition and Audacity and to engage in more challenging coding by working directly with HTML, CSS, and JavaScript. Students also made use of existing game building web tools, like the QUEST gaming tool.
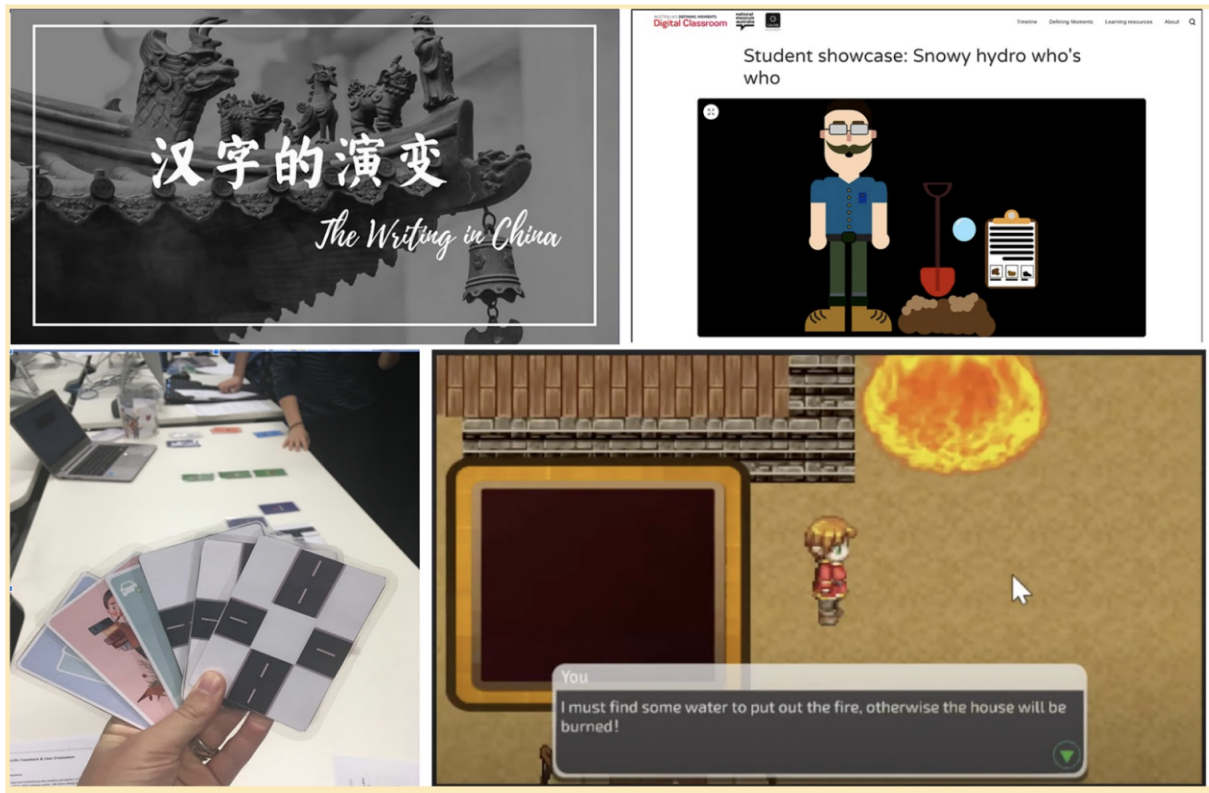

Figure 1: Examples of Games

Case Study 2: Digital Maps

Each iteration of the courses has seen a number of students engage with two different approaches to digital mapping. Most students, and GLAM colleagues, will nominate maps as something they personally find engaging and a meaningful way to communicate ideas about history and collections through a dynamic, visual interface. Digital maps also allow students to work at different levels of expertise in terms of software and technical skills. On the one hand, they can use sophisticated GIS programs such as QGIS or ArcGIS, or, they can use "off-the-shelf" type web mapping tools like the StoryMaps from KnightLab tools. The projects developed by students who used GIS programs were diverse. In 2019 one student created an animated map of invasive species in Australia, this was a digital update of a physical museum installation at the NMA that was due to be decommissioned that year. The student painstakingly remapped the data from the museum installation (as no records existed of the origins of the data used for the museum display) and

developed a digital version. For the BL collaboration one group created a virtual pub crawl map of *Ye Olde Pubs of London* (built using JavaScript and HTML, pulling from the content of the BL's collections. In 2020, the NFSA collections were used to create two interactive maps using ArcGIS, one to display the locations of landscape paintings on glass slides by Walter Scott Griffiths using ArcGIS (*Mapping Canberra*).

Figure 2: Digital Maps

Case Study 3: Interactive timelines, simple tools and content richness

The interdisciplinary nature of the student cohort meant that from the onset, the assessment criteria for these digital projects could not be justifiably set at creating projects of an identical level. Some students had prior knowledge, skills, and expertise in digital and computational methods whilst others did not. For students with less expertise and confidence in using software or coding we often suggest the KnightLab suite of web-based apps. These tools have a low bar to entry, requiring skills that most students already have (typing in details, copy-pasting in URIs, using point-and-click interfaces). Students are asked to justify their approach as they might for a real world project proposal. So a student who wishes to put time into learning a complex program like QGIS or coding a website from scratch might argue that it will allow greater customisation and sophistication of the final

interface. A student who uses an off-the-shelf tool might argue that they want to use their time to do in-depth research and create richer content. This was the case for an LGBTIQ timeline developed for the 2019 NMA project (and included in the final NMA site). The student developed the timeline as a learning resource for Year 10 students (16-17 year old), the timeline was simple to use but linked outwards to a range of resources, archives and even government legislation. The design was intended to act as a bridge leading students from an easy-to-use online explainer toward primary and archival resources for research. Knight Lab tools were also incorporated into a more complex project depicting the history of fashion as recorded by the NFSA (*Sociology of Women's Fashion: A Digital Timeline*) in 2020. As with the maps, these classic modes of displaying data and content, which have been a common part of museological display for a long time (Lubar, 2013), remain popular in new digital formats.
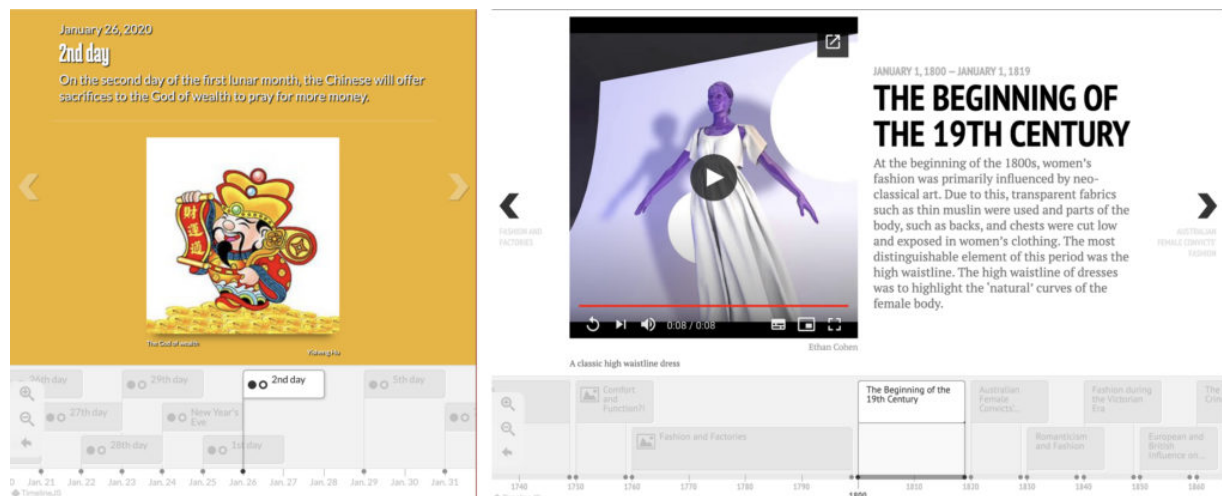

Figure 3: Knight Lab tools

Case Study 4: XR Applications for Mobile Devices

Unsurprisingly given that both VR and AR (henceforth XR) have arguably yet to fully reach the Peak of Inflated Expectations of the Hype Cycle, many student groups took on the challenge of engaging with these technologies (Figure 4). These include a 2019 VR reconstruction of a Russian concert hall (*VR2*). The VR experience was built using Autodesk Maya and Unreal Engine 4. The music was produced using midi data, with each note individually entered into Logic Pro X, and finally played through Addictive Keys Studio Grand virtual instrument.

Another group produced a location-based AR game (*ActionBound*) inspired by *PokemonGo!*, using GPS for geo-locating (and geo-caching); they also created QR

codes, and mapped locations using Open Street Map. In 2020, a team produced an Instagram filter (*Spirit Selfies*) that superimposes a ghostly apparition to a photograph. The team used a range of tools including Spark AR Online, Videezy, and Adobe After Effects. The filter and a video demoing it in action are available online. The *Sociology of Women's Fashion: A Digital Timeline* project from 2020 also incorporated animated 3D models of examples of fashionable outfits (see example in Figure 3 above). A student in 2020 Advanced course created an ambitious AR app designed to extend the engagement of users within the gallery space. The project, called *LENS*, allowed users to enrich their experience of museum objects within the gallery space itself using their own BYO mobile device. This included offering plain text transcriptions of nineteenth-century handwritten journals and the ability to zoom in on maps. The conceptualisation of this project was also based on research by the student that found that younger visitors preferred some kind of digital interactivity rather than passive observation (Moscardo, 2010).
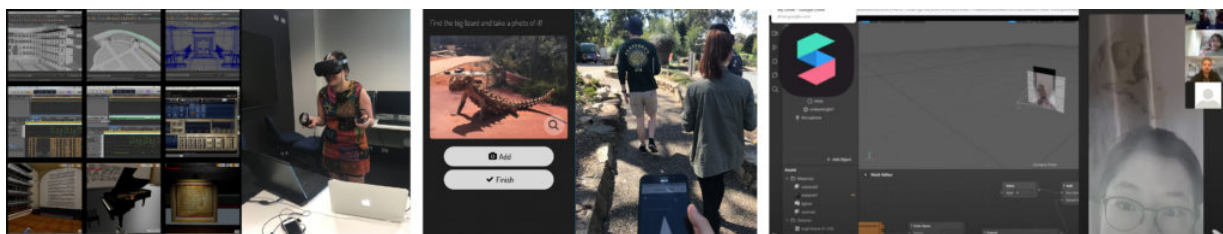

Figure 4: XR projects

Case Study 5: Digital Media Engagement

A podcast series about Jackson Pollock's *Blue Poles*, and an animation about the boomerang were incorporated into the *Defining Moments Digital Classroom*. In 2020, several groups opted to create projects that fall into this category. These include *Building the Bridge*, a video and an associated podcast about the construction of the Sydney Harbour Bridge. The popularity and success of these projects reflects the public culture emphasis in our teaching, students at undergraduate and postgraduate levels are asked to make videos and podcasts as part of general assessment. Because the concept of these projects is straightforward and reflect existing popular modes of engagement, we ask these students to demonstrate an understanding of the genre and display highly-polished skills in editing, recording, and presentation. These projects benefit from the interdisciplinary model of teaching DH at the ANU where students are able to

engage in courses from other disciplines on **creative coding**, animation, recording, and video editing and then implement these in a professional project.
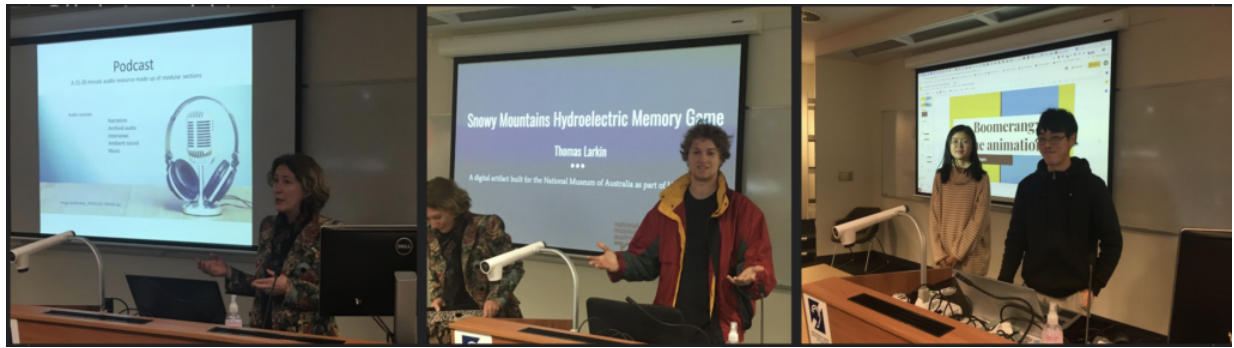

Figure 5: Podcasts and Animation

Project success and evaluation

With such diversity of the project types, GLAM-sector partners, and student backgrounds, the process of fair and egalitarian grading is a challenging process. We had to balance the typical parameters of academic success with those of our colleagues in cultural institutions. The nature of the mixed cohort means that technical skills alone can not be rewarded in the planning, implementation, and presentation of the designed prototype projects, as not all students start from an equal base of knowledge. We also did not want to discourage students from tackling challenging software and digital methods and to "play it safe" by using only methods they were already familiar with. There was a deliberate and clearly articulated desire to see students up-skilling no matter what level their existing skills, and second, to reward student endeavour on the two axis of ambition and completeness of the project (Figure 6).

The grading system actively rewards students for engaging with tools and technologies that are new to them. Projects that show exceptional success in public engagement, creativity, and originality were also awarded points within the matrix.

Very ambitious Not complete (60s)	Very ambitious Quite complete (70s)	Very ambitious Complete (80s)
Quite ambitious Not complete (50s)	Quite ambitious Quite complete (60s)	Quite ambitious Complete (70s)
Not ambitious Not complete (40s)	Not ambitious Quite complete (50s)	Not ambitious Complete (60s)

Ambition (vertical axis) — Completeness (horizontal axis)

Figure 6: Evaluative matrix

Typically we agreed about the excellence of the top 10% of projects, but often we found that what we valued as educators did not exactly align with what was useful or engaging for GLAM. For us as DH researchers some projects that critically interrogated the nature of digital collections were fascinating, but for colleagues engaged in developing education materials for schools these projects were less relevant. In other situations we, as experts in digital methodology, might judge a project to be technically not very ambitious, but when these were backed up with rich content they were often amongst the most popular with the collaborating institution. The simplicity of the tools and interface meant they would have broad appeal and were easier to implement. These differences of opinion have now become a valuable aspect of the course itself, and students are made aware of the fact that opinions can differ depending on context. Where we might reward a student for taking on a difficult coding project, a GLAM institution can point out that they need a more polished prototype to move forward. This becomes a useful learning moment for the cohort. Projects built with free open source software, such as maps and timelines, have demonstrated to colleagues working on public engagement that not all digital projects require expensive, bespoke solutions.

Project feedback

Student success or failure in the course was not based upon impressing the GLAM institution, however, students are expected to demonstrate engagement with the feedback and expectations of the various institutions. The feedback structure set in place for the pilot program has remained much the same. Students present a project pitch around Week 4 to a panel of experts from the ANU and the collaborating institution. This is a supportive and constructive session. Students are encouraged to treat it as a professional presentation and really "sell" their idea. It offers a chance for experts from different areas to suggest potential methods and software and also to highlight possible resources in the collection or cultural sensitivities to account for, this is particularly important for students looking at Indigenous topics. The students who developed the animation about the boomerang contacted a curator with their storyboard and then illustrations to ensure it was culturally sensitive. Each course concludes with a Digital Humanities Expo event where students set up their working prototypes and then demo them to an audience of ANU staff, students, and staff from the relevant institution (usually including curators, developers, digital marketing, and public engagement experts). As part of these events, visitors are asked to test out projects of their choosing, and to give feedback. The feedback is typically positive and supportive, with staff taking time to talk through projects. David Arnold who led the NMA team in 2019 said "We were pretty blown away by the efforts of the students and the way they undertook their projects so seriously and did their level best to make resources interesting for kids" (Ho, 2020). BL representative Mahendra Mahey in 2019 recognising the value of ambition "I really liked the ambition of the project… there is great potential to develop this app" (for *ActionBound*); as well as rewarding the courage students showed in embracing new ideas "The idea of the game is really innovative!" (for *Fantastic Bestiary*). These different forms of positive feedback illustrate that in both students and GLAM sectors teams have benefited from seeing a range of highly-developed, interesting and engaging digital prototypes which can be developed further into useable and publishable online resources.

Five projects from the pilot course were chosen by the NMA to include in the "Defining Moments Digital Classroom", and are incorporated into a "student showcase" on the site, intended to support teachers and also to encourage school students to try to develop their own projects. The students responsible for developing the prototypes were all awarded a $1,000 stipend, and continued to

work with museum professionals to further develop their digital projects. The collaborative project course run with the British Library in 2019 won the British Library Labs Competition's Education Category in 2020 (Nurmikko-Fuller, 2020). Following the pilot, NMA lead David Arnold stated that "It's a great example of partnerships – where partnerships are productive and serve the interests of all parties involved. They can take a life of their own on, and this one did. I think it became more interesting and productive than any of us thought it would at the start." This opinion was shared by the students themselves, Thomas Larkin, a final year engineering student (who built the Snowy Hydro game and the Fantastic Bestiaries) reported that "It has been an excellent experience for me to be working alongside the museum in the months after coursework completed and working as a bit of a freelance web developer/designer. I think it is fantastic for students like me to be engaging with national institutions because the outcomes of a project such as this are mutually beneficial."

Figure 7: User Evaluations

Conclusion

Collaborative, collections-based, and project-led learning presents unique opportunities for students at both the undergraduate and postgraduate levels to engage with cultural heritage collections. What began as a pilot program has now become a permanent fixture of our teaching. It has offered a productive way for a small research centre to engage with a range of GLAM partners, and offered them

the chance to see how to use collections in the digital space, from marketing to games to advanced research projects. Students enrolled in Digital Humanities courses from diverse cultural and disciplinary backgrounds are introduced to GLAM institutions as partners. For some students they are able to see the opportunities for future work pathways in GLAM, but for others it demonstrates that these institutions and their collections are open for engagement. A straw poll regularly taken at the beginning of our Advanced Projects course typically reveals that fewer than 50% of students have set foot in the National Museum (situated only 10 minutes walk from campus), and even fewer have ever looked at a digital collections website. The reasons for these vary. Some students are new to Canberra so have not had the opportunity to visit in person, but others report not being sure if it was of interest, or assuming it was more for tourists. This resonates with various research findings on the barriers for museum visitation, especially by younger adults (Kay, Wong & Polonsky, 2009). This approach to collaboration therefore also opens up new audiences and new modes of engagement with students beyond the usual museum studies and curatorial studies cohorts. These courses deliberately build on the new interest in co-creation, lab-driven work that is driving digital humanities projects in both academic research and GLAM. This particular version has a focus on students as drivers of creation. The approaches taken by the students illustrate possibilities for rapid, low budget project development in non-educational contexts. The course design works well with an interdisciplinary Digital Humanities cohort, but could be adapted to suit discipline-specific courses in art history, museum studies, archaeology, social history, and others.

Acknowledgements

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