Recalibrating the Object Lesson: Implementing New Media Technologies as Teaching Tools for Object-Based Learning

[RECALIBRATE | re·cal·i·brate | *transitive verb* | to calibrate (something) again][1]

A recalibration of the object lesson is not a negation of 'traditional' methods of teaching about items and collections; rather, it is a digital repurposing of certain tools and methods, in order to bring about a rich, engaging and (inter)active experience that allows individuals to gain crucial information about objects – as well as contributing to an individuals' understanding and familiarity with digital technologies and new media.

Key Terms

Digital media
Referring to media that require digital technologies for the distribution of information.

Object-based learning (OBL)
A learning approach that centres a personal encounter with an object to produce knowledge.

Augmented Reality (AR)
An ephemeral media that layers virtual objects, sounds, videos and graphics onto physical space.

Virtual Reality (VR)
An immersive media that simulates different environments.

Mixed Reality (MR)
A multidimensional media that tethers virtual objects to physical space, combining elements of both AR and VR.

[1] Unknown, 'Recalibrate' *Merriam-Webster.com Dictionary*, Merriam-Webster <https://www.merriam-webster.com/dictionary/recalibrate/> [accessed 13 July 2020].

The initial idea to explore how digital technologies could be implemented for a *virtual* object lesson surfaced in response to the current academic climate. Though digital teaching is by no means a new concept, an immediate requirement initiated by the global pandemic for remote forms of learning prompts us to consider the ways in which we can facilitate this form of teaching without disadvantage, providing a learning experience that is equivalent to 'in-person' teaching. With the development of new media and technologies, digital learning is now being implemented across disciplines. Digital learning can now allow for multisensory, layered learning that not only imbues individuals with knowledge on a certain topic of field but encourages active participation with forms of virtual media and tools. I conceptualise that digital object lessons, for virtual interactions with teaching collections, would be primarily tailored towards students; particularly History of Art, Material Sciences, Archaeology and Anthropology students. However, due to the multidisciplinary nature of the digital medium, I feel that anyone with access to necessary platforms (i.e. a smartphone and internet connection) who are interested in engaging with object-based and digital learning would benefit from this approach to teaching. At present, new media such as Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) can be facilitated by a smartphone device. Due to the accessible and portable nature of smartphones, digital object lessons could potentially take place at any time, geographically anywhere, in a space of the individual's choosing. Further, smartphones are designed with elements of haptic feedback in-built that could be activated by new media platforms; enabling a multisensory experience (primarily audio, visuals and tactile) for individuals engaging with objects. Additionally, digital object lessons allow for different ways of accessing and experiencing collections; they enable individuals to discover the intricacies of digital collections, using digital media tools to create "new and complex materialities."[2]

In this report, I aim to:

- **Address the challenges that come with translating a physical object lesson into a digital one, as the knowledge acquired from these lessons comes from direct interaction with the items**
- **Question the notion of the 'digital surrogate' to posit whether 'virtual' objects are stand-ins for the physical—or whether they are a legitimate object in their own right**
- **Explore and expand upon the forms of knowledge that can be produced by a virtual object lesson**

[2] Geismar, Haidy, *Museum Object Lessons for the Digital Age* (London: Routledge, 2018), p. 27.

The Physical Object Lesson

"Object lessons are arguments about the world made through things."[3]

To place the object lesson within the binary of *traditional* and *new* creates a separation similar to that constructed between the *analogue* and the *digital*. In as much the same way as these two concepts can be thought of on a continuum (a notion that I will later revisit), we may think of the 'old' and 'new' object lessons in less black-and-white terms. Instead, we might say that the traditional object lesson is an in-person, *physical* object lesson. These lessons emphasise the physicality of teaching collections and encourage participants to pick up and observe objects firsthand. Often, an individual with specialist knowledge about the collection—a teacher, curator or perhaps conservationist—will tell individual/s particular information about the object, as well as using open-ended questions to prompt curiosity and discussion. They are educational, in that they inform individuals about certain objects, as well as encouraging analysis and individual interpretation of these items.

Though, we may be inclined to think of digital object lessons as no less 'physical' than these in-person lessons; all virtual lessons require a tangible device, such as a smartphone, and an embodied relationship. Though interactions with 3D objects are mediated through a screen, there remains a physical component to this otherwise ephemeral teaching method.

<u>What forms of knowledge do digital object lessons produce?</u>

I identify that traditional and digital object lessons necessitate four forms of knowledge production: haptic (knowledge through touch), visual (knowledge through sight), contextual (knowledge about the object) and reciprocal (knowledge through creative response).

	Traditional Object Lesson	Digital Object Lesson
Haptic	• Physical engagement with the object • Being able to feel the weight and texture of the object; becoming a part of the object's history	• Simulated physicality through digital means i.e. haptic feedback on a phone (the phone may vibrate and/or make a noise when an object is selected and manipulated)

[3] Haidy Geismar, *Museum Object Lessons for the Digital Age*, XV

Visual	• Being able to perceive the object first-hand, thus seeing the 'real' colours and textures of the object	• Prioritised form of interaction with the object, as it cannot be 'felt' • Able to 'zoom' in and out of the object with precision
Contextual	• Usually gain information about the object orally • Information is relayed by someone with specialist knowledge about the object • Could also gain contextual information through supplementary text, i.e. labels	• Usually gain information about the object in written form • Accessible features could be implemented digitally, i.e. speech-to-text or short videos containing specific information on the object
Reciprocal	• Traditional object lessons allow for active participation and response, such as writings on and drawings of the objects in the collection	• Digital object lessons necessitate creative responses, such as creating individualised digital collections, apps and/or websites around the objects

Furthermore, digital object lessons produce a *layered* form of learning. A traditional object lesson allows for the acquisition of knowledge through engagement with objects; from active observation, to physical handling, to learning about the name and cultural relevance of the object. A digital object lesson can facilitate this form of knowledge, as well as allowing for individuals to gain crucial digital learning skills through interactions with new media technologies. One of the technologies I identify as having great potential to enrich digital object lessons is Augmented Reality, which "can be used for visual and highly interactive types of learning, which enrich the real world with an overlapping of digital data and the simulation of dynamic processes."[4] An object lesson that uses Augmented Reality, therefore, allows individuals to understand the object studied as well as making them acquainted with the user mechanisms of AR. Moreover, I find that there is an overarching notion of the digital "as a process rather than a fixed materiality"'[5] – so that we can rethink the object lesson as focused on the *end product* and more on the *process,* to facilitate learning as a process of unfolding.

[4] Macauda, Anita, Chiara Panciroli and Veronica Russo, 'Educating about Art by Augmented Reality: New Didactic Mediation Perspectives at School and in Museums', *Proceedings*, 1 (2017), 1-11 (p. 3).
[5] Geismar, Haidy, 'Defining the Digital', *Museum Anthropology Review*, 7 (2013), 254-263 (p. 259).

Forms of interface: Hypermediacy and Transparency

"Hypermedia and transparent media are opposite manifestations of the same desire: the desire to get past the limits of representation to achieve the real."[6]

In imagining how the digital object cabinet could function, one of its features which may prevent it from being used as a suitable alternative to a physical cabinet is its lack of tangibility or 'realness'. This above quote prompts the question: *to achieve the real, should digital media attempt to disguise themselves as a medium, or should they make the individual aware of their virtual nature?* I posit that *both* hypermedia and transparent media achieve their aim. A transparent interface effectively 'erases itself' so that the user may feel as though they are having an 'immediate relationship to the contents of the medium'.[7] Conversely, hypermediacy visually acknowledges 'multiple acts of representation'; thus, a degree of opacity is achieved, and the user trusts the media acts as representation of the real. [8] What can be considered 'real' is, of course, subjective and dependent to an extent on the perspective of the individual engaging in these media. Thinking back to the digital object cabinet and the lessons that can be initiated by it, I believe that a degree of *both* hypermedia and transparency are necessary to achieve the desired phenomenological effect. Information on the items should be abundant and readily available, with clear signage of how to operate and interact with the platform. Additionally, features that attempt to achieve transparency, or a meshing between physical and digital realms, such as virtual reality, should be incorporated in order for the user to experience the object in 'real' time and space.

<u>Digital Media and Analogue Technologies</u>

When conceptualising how digital object lessons would operate, I found that there was a tendency to consider the digital as a substitute, or lesser version, of the in-person object lesson. I found that this was reinforced by a binary mode of theorising the digital and the analogue, as two distinct, separate, and opposing mediums. However, through my research I found that there was a strong case for considering these media as being on a 'continuum', rather than irreconcilable entities.[9] To reinforce this notion, we may consider how digital and analogue mediums have shared aspects. For example, the implementation of virtual reality and haptic touch screens mirrors the 'reality effects' of analogue modes of teaching object lessons, such as crafting models and dioramas. [10] Indeed, the digital itself can be regarded not as some intangible, intelligible thing, but rather as an 'artefact' in its own right which can produce knowledge and

[6] Bolter, Jay David, and Richard Grusin, *Remediation: Understanding New Media*, p. 53.
[7] Ibid, p. 23-24.
[8] Ibid, p. 33-34.
[9] Haidy Geismar *Museum Object Lessons for the Digital Age*, p. XVIII.
[10] Ibid, p. XVII.

material in 'profound' ways.[11] The similarities between the digital and the analogue ensures that a digital mode of learning about museum objects is not a disorienting experience; rather, the in-person object lesson can be simulated digitally, supplemented by additional features that are unique to digital realms.

Here, I draw upon the idea that digital imagery are not replicas of the physical, but rather objects in their own right. Geismar's proposition that three dimensional digital objects facilitate the creation of a distinct 'second order mimesis' informs my understanding of digital objects as a simulacrum: a copy with no original.[12] Though digital imagery and objects can indeed be seen as an index of physical items; I argue that they as well may be seen as original objects in their own right. Digital objects do not appear out of thin air; they are meticulously crafted and curated using a variety of technologies and skills. They exist as the cumulation of collaborative, creative labour. This is evidenced by Geismar's experimentation with converting digital images to soundscapes, employing gaming software to create topographical representations—landscapes that could be 'flown over' by the viewer.[13] From her observations and participation in the creative process, Geismar concluded that digital technologies did not simply form 'digital surrogates'—stand-ins for the real—but instead aided the expansion of 'the status of the artefact.'[14]

Digital surrogacy

"In browsing, surrogates provide an important alternative to primary objects…[they] allow users to assess the need for further processing of other surrogates and the primary object."[15]

A surrogate can be defined as 'one that serves as a substitute.'[16] The very nature of *surrogacy* is associated with copy-making, which may have negative connotations. A *copy* is often considered as something inauthentic, either less valued than the original or serving to add value to the *original*; in either case, it is not considered valid on its own. When thinking about digital surrogates, we may question whether these are virtual replicas of physical things—or whether they are objects in their own right. As Geismar has found, digital objects can both be considered 'repositories of information about the form and structure of objects *and* as visual representations of collections.'[17] Digital objects contain information about items that differs from the physical

[11] Geismar, Haidy, *Museum Object Lessons for the Digital Age* (London: Routledge, 2018), p. 113.
[12] Geismar, Haidy, 'Post-Photographic Presences, or How to Wear a Digital Cloak', *Photographies*, 8 (2015), 305-321 (p. 310).
[13] Geismar, Haidy, 'Post-Photographic Presences, or How to Wear a Digital Cloak', *Photographies*, 8 (2015), 305-321 (p. 316).
[14] Ibid, p. 318.
[15] Previews and overviews, Stephan Greene, p. 381.
[16] Unknown, 'Surrogate' *Merriam-Webster.com Dictionary*, Merriam-Webster <https://www.merriam-webster.com/dictionary/recalibrate/> [accessed 13 July 2020].
[17] Geismar, Object Lessons, p.97.

object, as they are never *exact* copies; often, they are 'crafted almost entirely from within a computer.'[18]

Reconfiguring the object lesson

A digital object lesson can be seen as a reconfiguration of the traditional, or analogue, object lesson. Through the implementation of digital technologies, we may 'open up the received history of object lessons in museums', thereby directly challenging our expectations of the relationships between 'material form and knowledge, objects and information, meaning and matter.'[19] Digital objects may allow us to access different interpretations of certain artefacts, recontextualising them in a virtual 3D space that grants us new interactions with the objects. Here, I reference Andre Malraux's theory of the *Musee imaginaire*; a collection 'beyond walls' that would explore how 'reproductions' could be organised in order to produce 'new global connections and forms of art historical knowledge' for individuals.[20] Though theorised in the 1950's, it could be argued that this idea parallels—or indeed foreshadows—methods of digitisation. Indeed, the organisation of certain 'reproductions' of artefacts is evocative of modern methods of standardisation used by digital museum catalogues.[21] I find that this links back to the idea of rethinking the digital and the analogue on a *continuum*, rather than a binary, thereby abolishing the old/new dichotomy that inhibits, rather than enriches, our experiences of objects.

To further expand on my prior point about digital objects allowing for new interactions with objects, I reference Geismar's example of a cloak, too realistically fragile to be held in any way, that could be digitally felt, flipped, and surveyed through processes that allowed for a more 'corporeal' contact with the item 'than was permissible with the original artefact.'[22] The translative process from original object to digital artefact presents us with an array of intriguing questions and possibilities: is there a hierarchy between original items, and their copies? Should digital objects be seen as copies, or are they objects in their own right? What defines the 'real'? I find that these issues are evocative of the long debates—continued to this day—surrounding matters of authenticity, recontextualised in the digital age. Our approach to these questions is more important than their actual answers if they can be answered at all. Indeed, I find it extremely useful to continue to ruminate on the model of the digital and the analogue on a continuum; not as oppositional entities, but as separate realms of creation that 'influence and affect each other.'[23] Moreover, the process of transforming the analogue into the digital is a

[18] Ibid, p.99.
[19] Geismar, Haidy, *Museum Object Lessons for the Digital Age*, p.10.
[20] Ibid, p. 52.
[21] Ibid.
[22] Geismar, Post-Photographic Presence, p. 309.
[23] Geismar, Defining the Digital, p. 255.

highly creative process, and one I believe can be extended from the translation of artefacts to the reconfiguration of the object lesson.

I do not suppose that there is one set way to go about creating an effective and engaging digital object lesson. Through my research, I have instead found that the most successful digital collections operated on an *artefact first* approach; the initial understanding and contextualisation of the objects better allowed for sensical organisation and interactions that enhance an understanding of the artefacts collated (such as the virtual collaborative project between Google and the British Museum, *The Museum of the World [24]).* I agree with Hess that digital technologies, by permitting innovative explorations of museum collections, can 'transform the very nature of the museum experience'; both for the visitors of these institutions as well as those who curate and work with the artefacts.[25] For example, three-dimensional imagery in tandem with an accurate recording of the details and colour of objects can allow for 'validated data sets' that may enable a closer study of objects, including how they were made, any abrasions on their surface, and additional details that may be near undetectable to the human eye.[26]

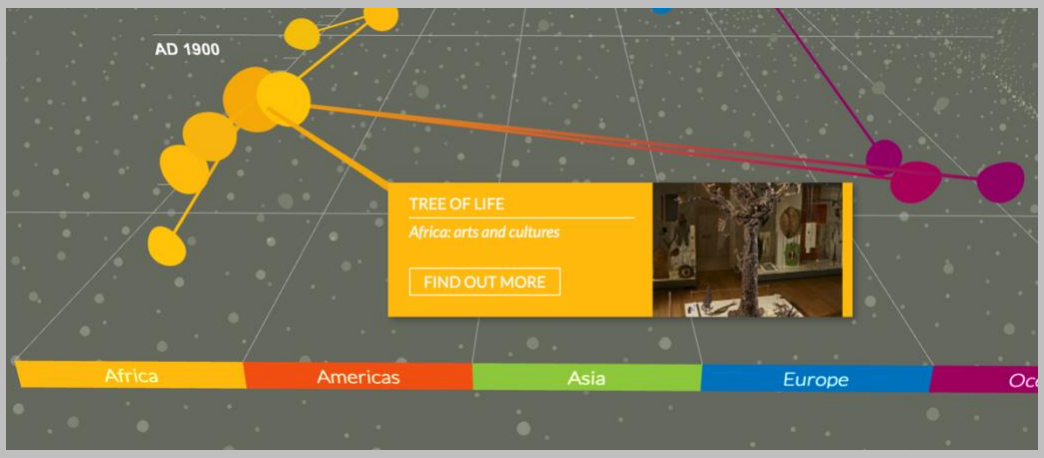
Case Study: The Museum of the World

The Museum of the World is a project created through the collaboration between the British Museum and Google Cultural Institute.

Screenshot of the entry page to *The Museum of the World*

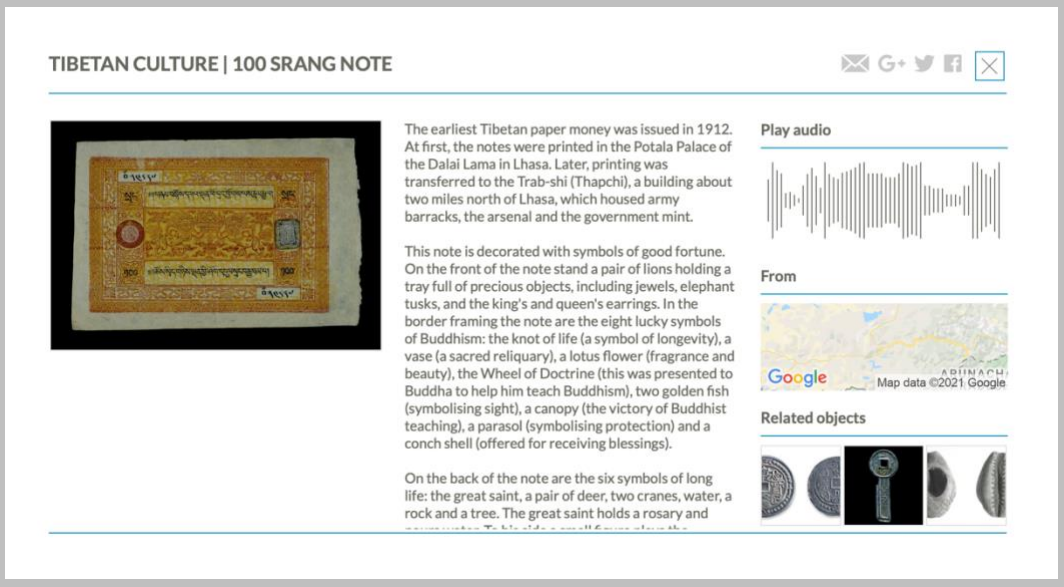
[24] https://britishmuseum.withgoogle.com
[25] Mona Hess, Well Connected to Your Digital Object?, p. 194.
[26] Ibid.

This project is highly interactive and multisensory. Users can either hone-in on objects by their date, from one of the themes on the right-hand side of the screen, or at 'random'; by clicking one of the gently moving colourful orbs that signify a museum acquisition. Once a user clicks on the item of choice, a web appears showing the links between the object and those of the same theme (in a coloured thread the same as the orb), as well as those of different times and themes (in a soft gradient, leading into the colour of the adjacent theme).



By choosing the 'Tree of Life' acquisition, the user can see links between the object and other acquisitions from Africa, as well as close links to artefacts from Oceania

When the user chooses to learn more about the item, a page pops up with a high-definition image of the object, its history, and other relevant information such as snippets of audio and/or geographical location.



Tibetan *100 Srang Note* information page

This form of digital acquisition interactivity is best suited to a larger collection, from around the world and spanning centuries. Though I find 3D rendering of objects, that can be turned and resized as the user wishes, an effective means of object interaction, I understand that implementing this software for a project such as this would be very extensive and resource intensive. As it is, opening this webpage on a new computer with access to high internet speeds causes issues; the high quality of the page and the many forms of interactivity are quite draining for even newer digital devices. Yet, I see how this project could allow for a form of digital object lesson, either remote or in-person. Over video call, or perhaps in the Museum itself, students could open the webpages individually, following a prescribed route as directed by their teacher—who, in turn, may ask the students to participate in their own form of exploration of the acquisitions, discovering the ways in which the objects link together and sharing their findings with their peers. Though I do not touch upon this topic in this research, I find it necessary to comment on how this project *could* be seen as an attempt by the British Museum to solve the 'issue' of repatriation; by making these objects free to access remotely, from anywhere in the world, perhaps there is some motivation towards digital accessibility as a form of borderless acquisition—or, even, an alternative to traditional means of 'acquisition' itself, a form of negation of the term. This thinking raises many issues and challenging conversations that should be approached with compassion, listening to and taking into consideration the requests of those from the countries that these items derive from—often having been forcibly taken from their place of origin.

Remediation

Jay Bolter and Richard Grusin define remediation as the 'mediation of mediation.'[27] Remediation—in the context of media studies—is the process of one media transforming another; often referring to newer media transmuting an older media, though this does not necessarily have to be the case. Remediation occurs when any medium is interpreted or changed by another medium, which is inherent to all media, even in how speech can be said to translate writing to the spoken word.[28] Remediation is applicable to the process which is required to create the digital object lesson; a remediation of the analogue lesson into one that harnesses new technologies. Indeed, remediation is a term that is non-static and amorphous, having different forms as outlined by Bolter and Grusin. The two forms of remediation that are relevant to my research are remediation as 'the inseparability of mediation and reality', and 'remediation as reform' (by which I understand as both the reformation of media, as well as our perceptions or reality).[29] To expand upon a prior idea raised of how new technologies can recontextualise arguments surrounding authenticity and originality, I find that we can see that forms of mediations, including and especially remediation, produces a 'real' object, not just because it 'copies' from an original source, but because mediation—as I have mentioned, an inherently creative process—exists as a 'hybrid' in itself, and can be considered as 'physical' as tangible objects.[30] Moreover, the transformative process of mediation of one media into another allows

[27] Jay David Bolter and Richard Grusin, Remediation: Understanding New Media, p. 5-6.
[28] Ibid, quoting Marshall McLuhan (Understanding Media, 1964), p. 45.
[29] Ibid, p. 55-56.
[30] Geismar, Object Lessons, p. 46.

for new perspectives in discourses in media and museum studies. Geismar states that this process may raise both 'opportunities, and challenges' to the 'conventional' conversations surrounding possession and location of certain collections.[31] To approach and perhaps attempt to resolve these issues, we will have to question our perception of the locality of digitisation: is the Internet a nationless place? Are concerns such as repatriation still an issue for online spaces? These questions are particularly important when working with collections that have important cultural significance. It is difficult to say what the answer is, and whether there is one set resolution to these issues; what I find most important, however, is placing emphasis on the inclusion of many different voices and perspectives, particularly those with significant knowledge and ties with certain artefacts, to ensure the best solution to these quandaries. Thus, remediation holds significance not just in how physical objects are transformed into digital ones, but in how contexts can be shifted and rethought in digital spaces. This is imperative for the object lesson, as much of the learning that happens through object interactions are underlined by the historical and cultural context of the items.

Further, we may consider the role that remediation plays in the user experience of these online collections, and the lessons that can be initiated via these digital assemblages. We should consider how digital mediums may employ either (or, in some instances, a blend of the two) immediacy and hypermediacy. Immediacy refers to the idea that, for optimal user experience, a medium should 'disappear'; that media devices should not obstruct an individual's interactions with the online content. Bolter and Grusin state that the 'logic' of immediacy finds that the vanishing of medium allows for an uninhibited 'presence of the thing represented'.[32] Immediacy is found in immersive mediums, such as virtual reality (yet this effect is diminished somewhat by the large and heavy headsets required for virtual reality—an issue that, when solved, will allow for a better immersive experience for the user).[33] Virtual reality temporarily exchanges our physical world for an alternative visual space, and could be a useful tool for object lessons as we may simulate the conditions needed for object-based learning. For instance, virtual reality can allow us to access a space removed from the 'everyday' that has its own set of ritualistic conditions similar to those found in conventional collection spaces: such as wearing gloves before touching or picking up the items, learning within a quiet and contemplative environment, handling the objects with care and consideration, and other applicable object protocols. Yet, we may also make use of remediation's inverse: hypermediacy. Hypermediacy as defined by Bolter and Grusin is 'a style of visual representation whose goal is to remind the viewer of the medium.'[34] In direct contrast and contestation of immediacy, hypermediacy ensures that the user is aware that what they are experiencing is markedly different from interactions with the physical world, which in turn may allow the user to better garner a sense of shift in 'reality'—not necessarily seeing the digital space as lesser than the tangible world, but acknowledging the differences between the two in order to understand that different forms of knowledge can be produced in this space removed from the everyday. In the digital object lesson, I propose that a blend or continual shift between these two modes can allow the participating individual to feel as if they are learning in a different space, in order to acclimatise to a new form of object learning, whilst maintaining an awareness of the differences between the digital objects and their original

[31] Geismar, p. 112.
[32] Bolter and Grusin, p. 5-6.
[33] Ibid, p. 21-22.
[34] Ibid, p. 272.

counterparts. This should be strategically implemented as to not prioritise one form over the other, instead showcasing that these different iterations, both 'real' in their own way, can provide different forms of helpful information to further our understanding about the items and their contexts: cultural, historical, political, and more.

When virtuality does not improve accessibility: The digital divide

Before I assess the value of digitising collections with which to teach object-based lessons, I find it important to address the inaccessibility that solely online-based learning emphasises. Whilst I do not propose that the digitisation process should replace in-person collections and lessons—instead, it should be seen as a supplement, a different way of interacting with and learning about a collection—I understand that some individuals do not have access to a smartphone, tablet, computer, or stable internet connection, thus cannot access virtual collections and lessons. Whether it be age, socioeconomic status, living in a rural area with low internet speeds, or other contributing factors, individuals who cannot access this form of collection and learning should be considered—there must be an alternative form of access for teaching collections to be *truly* accessible. The digital divide is not the socio-political issue of division between individuals who do and do not have access to digital devices, but encompasses a separation between new technologies—with frequent updates and optimal running speeds—and older technologies—which often do not support the software and applications necessary to facilitate new media such as VR and AR.[35]

School and public library schemes that offer laptop or tablet borrowing help to bring the wealth of information that can be found on the Internet to those who do not have these devices; however, technologies such as VR and AR are optimal on mobile phone devices, and there does not seem to be a similar scheme for borrowing smartphones. The few enterprises that *do* allow for this form of loaning seem to only allow for costly fixed-term contracts of twelve or twenty-four months, which is not suited to those on low incomes, or even those who are unaccustomed to these technologies, such as an older demographic, and would not wish to have a smartphone of their own. Though I identify that the implementation of proper phone borrowing schemes that may be fixed to a certain space, such as a library, community space, or gallery, would allow access to VR and AR—and, as consequence, digital collections—I again emphasise that analogue collections and lessons should not be replaced by a virtual counterpart. Perhaps those who do not have technological and/or Internet access may benefit from a hybrid learning model—by accessing the collection in-person, when available, and being granted access to a phone or tablet (which VR and AR *does* work on, though some of the immersion is dispelled by the large size of the device). There should be software implemented that recognises the objects in the collection as the student scans it with their phone/tablet device, activating a 3D model of the object to appear that can be manipulated in such a way that the physical object cannot. Information can appear as the student interacts with the artefact. If we encourage this form of hybridity for those who would otherwise not be able to benefit from virtual learning, it may

[35] Sharon S. Kleinman, 'Understanding the Digital Divide: Implications for College Teaching', *Transformations: The Journal of Inclusive Scholarship and Pedagogy*, 12 (2001), 51-67 (p. 52).

allow the individual to experience greater comfort and knowledge about these technologies. They may seek out other ways of accessing devices and become more proficient at Internet and computer-based skills. The greatest benefit of increasing access to digital collections is the experience of student-centred learning; where the student adopts the role of learner/teacher, enabled by the digital device, and the traditional role of teacher is shifted to a guidance or 'facilitator' role.[36] In this way, more individuals can experience a new way of active participation and agency in a hybrid classroom setting.

Efficient virtual object-based learning

In conclusion, the creation and implementation of digital object lessons must be informed by a thorough assessment of how media can complement the requirements of specific items and catalogues. The efficiency of three-dimensional digitization process, for example, is dependent on the materiality of objects; Hess states that surfaces that are not very reflective, such as terracotta, may be scanned effectively; however shinier, or very dark, surfaces are much more difficult to process.[37] Moreover, the instability and inherent vice of digital software means that digital catalogues and items must be upkept, to prevent errors which would make these items inaccessible.[38] Issues that affect even the most streamlined and efficient software and hardware today, such as low frame rates, lag and a dependability on high internet speeds may impact the effectiveness of digital catalogues, and ultimately digital object lessons themselves. I believe, therefore, it may be of use to include the process of digitisation in object lessons, as it is a dimension of learning about the objects in a technology mediated way. There is a distinct benefit of digital collections in how, unlike physical museum or collection spaces, the 'final' product—the media in front of the individual—is not the main focus, as the *process* of digitisation for collections emphasises the process of creation and curation. Therefore, either it may be encouraged and directed that those who wish to learn from and about these items partake in the digitisation process itself *or* include 'behind the scenes' footage of the process of creating and curating the digital objects within the object lessons. I find that these two strategies may allow a development of the traditional object lesson, allowing the digital object lesson to be a way of learning in its own right, and not a technological mimicry of what already exists.

[36] Linda Pomerantz, 'Bridging the Digital Divide: Reflections on "Teaching and Learning in the Digital Age)', *The History Teacher*, 34 (2001), 509-522 (p. 519).
[37] Ian Brown Mona Hess, Sally MacDonald, Francesca Simon Millar, Stuart Robson and Graeme Were, 'Well Connected to Your Digital Object? E-Curator: A Web-based e-Science Platform for Museum Artefacts', *Literary and Linguistic Computing*, 26 (2011), 193-215 (p. 195).
[38] Haidy Geismar, Defining the Digital, p. 255.

Bibliography

Geismar, Haidy, 'Post-Photographic Presences, or How to Wear a Digital Cloak', *Photographies*, 8 (2015), 305-321.

— —, *Museum Object Lessons for the Digital Age* (London: Routledge, 2018).

Bolter, Jay David, and Richard Grusin, *Remediation: Understanding New Media* (Massachusetts: MIT Press, 2000).

— —, 'Defining the Digital', *Museum Anthropology Review*, 7 (2013), 254-263.

Brown, Ian, Mona Hess, Sally MacDonald, Francesca Simon Millar, Stuart Robson and Graeme Were, 'Well Connected to Your Digital Object? E-Curator: A Web-based e-Science Platform for Museum Artefacts', *Literary and Linguistic Computing*, 26 (2011), 193-215.

Dovey, Jon, Seth Giddings, Iain Grant, Kieran Kelly, Martin Lister, *New Media: A Critical Introduction* (London: Routledge, 2009).

Greene, Stephan, Gary Marchionini, Catherine Plaisant and Ben Schneiderman, 'Previews and Overviews in Digital Libraries: Designing Surrogates to Support Visual Information Seeking', *Journal of the American Society for Information Science,* 51 (2000), 380-393.

Kleinman, Sharon S., 'Understanding The Digital Divide: Implications for College Teaching', *Transformations: The Journal of Inclusive Scholarship and Pedagogy*, 12 (2001), 51-67 (p. 52).

Macauda, Anita, Chiara Panciroli and Veronica Russo, 'Educating about Art by Augmented Reality: New Didactic Mediation Perspectives at School and in Museums', *Proceedings*, 1 (2017), 1-11.

Pomerantz, Linda, 'Bridging the Digital Divide: Reflections on "Teaching and Learning in the Digital Age)', *The History Teacher*, 34 (2001), 509-522 (p. 519).

Unknown, 'Recalibrate' *Merriam-Webster.com Dictionary*, Merriam-Webster <https://www.merriam-webster.com/dictionary/recalibrate/> [accessed 13 July 2020].

Unknown, 'Surrogate' *Merriam-Webster.com Dictionary*, Merriam-Webster <https://www.merriam-webster.com/dictionary/recalibrate/> [accessed 13 July 2020].