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Cover image:
Judy Chicago
Birth Trinity: Quilt 1, 1983
Reverse applique and quilting
47.75 x 128 in. (121.29 x 325.12 cm)
Reverse applique and quilting by Barbara Velazquez, Ann Raschke, and Jacquelyn Moore Alexander
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Collection of the University of Houston-Clear Lake.

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The University Museums and Collections Journal (UMACJ) is a peer-reviewed, open call, on-line journal for the International Committee for University Museums and Collections (UMAC), a Committee of the International Council of Museums (ICOM).

If you would like information about upcoming thematic issues, or would like to propose a topic for possible consideration prior to submission, please contact the editorial office via umacjeditor@gmail.com

UMACJ Editorial Board 2022 – 2023

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EDITORIAL: RESONANCE

Andrew Simpson

UMAC was formed 22 years ago as an International Committee of ICOM. We are one of 32 International Committees that are important parts of ICOM's structure. International committees get set up for all sorts of reasons. They are defined by the different reasons for their establishment. It could be what they collect, what sort of museum they are, or because of a focus on a particular museum process such as conservation or museum training. International committees are a response to an identified need within the ICOM membership and broader museum community.

We were established because our defining feature was the institutional context, being part of the higher education sector. We are a relatively young committee but we have an organisational pedigree that goes back to antiquity. Many UMAC members believe that material collections when used creatively, or in fact when used at all, can greatly enhance the business of higher education. We are important to higher education because museums and collections are gateways to inter-disciplinarity and multiple epistemologies. If a university doesn't have material collections and/or museums, it's probably more in the business of transmitting knowledge rather than generating knowledge.

At a time when the world faces many challenges, here's a basic proposition; society desperately needs a new relationship with knowledge. University museums and collections are structures that breach the boundary between the academy and civil society, so we are the obvious brokers of that relationship. The new Board of UMAC has resolved to formulate a defining statement about what we are as a professional collective and what values we bring to higher education.

One of the reasons we were originally established back at the start of the millennium, in a period sometimes referred to as a 'crisis' in university museums was a perception that some university leaders didn't realise the potential value of museums and collections to their organisational business. At the time there were questions of relevance and purpose and many material collections were being abandoned by their academic custodians as pedagogies and research practices changed dramatically. There was also a feeling in many quarters that those working with and in university museums and collections were marginalised from the mainstream of the museum profession. In the time since our establishment as an International Committee of ICOM we have convinced some of our value, but the recent pandemic-related chaos in higher education has shown there are still many more who need convincing.

Furthermore, we are in a critical time period where both museums and universities, as knowledge-based organisations, are changing from being independent points of cultural and scientific authority to being part of a network of cultural and scientific agency.

UMAC as an organisation will build on our successful projects on ethics (SCHOLTEN et al. 2021) and pedagogy (KWAN 2021, SIMPSON 2021) and look at instigating new projects with new partners. This project work has already been, and will further be reflected in the pages of our journal. After one thematic issue on pedagogy (volume 13, number 2) there are two future issues on this subject currently being developed. We are also well into reviewing submissions for our repatriation and restitution issue that will be released later this year. As a membership group, our achievements are derived from membership participation and activity including what appears in the pages of this journal.

This issue of the journal is non-thematic, it consists of open call articles submitted and reviewed that lie outside of any of the thematic frames of UMAC's project work. But the articles in this volume are aligned as a coherent set of writings through the same institutional context that defines us international committee of ICOM. More specifically, the concept of resonance can be seen in the articles in this journal edition, whether the subject is specific objects, processes or sector wide views.

Beth Merfish analyses the resonance between the 'Birth Trinity' quilt by pioneering, paradigm-shifting Feminist artist and writer Judy Chicago and its home institution, the University of Houston Clear Lake. The changing value of the object in a higher education setting is considered; it is noted that it has lost its original resonance and the need for new contexts to develop new meanings. The paper

by Biedermann also takes a single object as a point of reflection; in this case the Ruby Red Laser at the University of Graz is the subject of a museological analysis of academic research and knowledge transfer. It is an expansion of museological concepts that indicate the general level of under-theorisation of museology in the academy where the object resonates within this specific institutional setting.

These two are followed by three papers that reflect the concept of resonance in ways other than the relationship between object and institution. The paper by Verschelde et al., developed from a workshop at the UMAC-Universeum conference in 2021 (VERSCHELDE et al. 2021). It covers a unique response to some of the consequences of the COVID-19 pandemic in the form of a specifically focused education program. It can be argued that this is an example of the social contract of the university resonating through a university museum public engagement program. Thogersen and Guerry offer another view of how work in university museums has been impacted by COVID, again it is from a university, like Ghent, with a centralised museum service. They provide a solid case study by discussing how they reframed their popular object-based learning program at the Chau Chak Wing Museum. The paper by Johnson & Ladkin represents another form of institutional resonance. They provide an outline of the pedagogy of immersion with the Texas Tech University's Heritage and Museum Sciences program, exhibiting the resonance between a university study program and professional practice in the cultural sector.

The final two papers go beyond the individual institution. Terakado investigates the history of plaster cast collections in Japan's higher education sector and argues that this specific form of material collection requires reconsideration and recontextualisation. In other words it's an example of developing a new resonance between a collection type and the sector. Finally, the paper by Alabada and Granato takes a sector-wide view of scientifically oriented museums and collections in the vastness of the higher education sector of Brazil in an effort to establish some sense of ground truth regarding what is out there. In this case the nature of the challenges faced by the sector during the pandemic (SIMPSON & LOURENCO 2020, ECONOMOU et al.) has impacted not only the research data, but the methods used for capturing it. Here the resonance is between certain types of material collections and a sector under pressure from significant challenges. This study enhances earlier ones on the impact of the pandemic on university museum work (CIOPPI et al. 2020) by providing significantly more granularity.

In summary, this issue of the University Museums and Collections Journal covers a variety of contemporary issues in the museology of higher education.

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After the Party Ends: Judy Chicago's Birth Trinity and the University of Houston Clear Lake

Beth Matusoff Merfish

Abstract

This article is concerned with the dialogue between Judy Chicago's quilt, Birth Trinity, and its home, the University of Houston Clear Lake. Due to the very particular problem to which the quilt responded, it has lost its original meaning and must now be invested with new meanings if it is to remain relevant within the university setting, particularly that of a state university in Texas. An examination of the history and goals of the larger project to which the quilt belongs demonstrates the need to consider new contexts for the project in order for it to continue to generate meanings.

Beth Matusoff Merfish

This article is concerned with the dialogue—and lack thereof—between a single quilt, *Birth Trinity*, in Judy Chicago's[1] ambitious *Birth Project* and the home of that quilt, the University of Houston Clear Lake (UHCL). As a department chair and associate professor of Art History at UHCL I have spent a great deal of time coexisting with, thinking about, and teaching using this quilt, originally a product of a special relationship between Judy Chicago and UHCL and now a kind of relic of that relationship. In this article, I argue that, due to Chicago's success and the very particular problem to which it responded, the quilt has lost its original meaning and must now be invested with new meanings if it is to remain relevant and useful within the university setting, particularly that of a state university in Texas. I first investigate the original purpose of the quilt and Chicago's decision to place it at UHCL; next, I establish that Chicago has met her original goals for the project. Because those goals are met, I then explore three contexts, issues of maternal health and mortality, the university's status as a Hispanic-Serving Institution (HSI), and discussion of condition, in which the quilt can inspire and participate in rich and multi-layered dialogues.

That the quilt is located at UHCL is the result of a particular partnership between the artist and the university that began with the latter's display of *The Dinner Party* in 1980. Judy Chicago's monumental installation *The Dinner Party* is universally regarded as a landmark of Feminist art today; its permanent installation in a pavilion designed in part to house it makes the importance of *The Dinner Party* apparent. In 1979, however, when *The Dinner Party* was first displayed, it did not immediately command respect. Instead, it was deemed craft rather than fine art by critics, and its overt display of female genitalia was judged exhibitionist. Its planned nine-year international tour was canceled after only 3 months of display at the San Francisco Museum of Modern Art (CHICAGO, 1996, 72).

Through the interventions of local activist MaryRoss Taylor and university administrators, the entire *Dinner Party* installation made its next appearance at UHCL, then a small, fledgling university twenty-five miles south of Houston. In 1980, UHCL was only six years old and counted fewer than 2000 enrolled students across its graduate and undergraduate programs. It had been founded to serve the needs of continuing education of NASA employees; Johnson Space Center is just a few miles away. Suffice to say, it was not at all an arts destination. It certainly would not have made any list of top sites for the installation to appear, and, yet, it became one of only sixteen sites world-wide to host *The Dinner Party*. 36,000 people made the trip to the suburb of Clear Lake to see the installation between March 8 and June 1, 1980. As Gretchen Mieszkowski, professor emeritus of Literature and Women's Studies at UHCL has said, "*The Dinner Party* drew more people to UHCL than have ever been here before or since" (DUBOIS 2010). The controversy that surrounded the installation in San Francisco did not skip Clear Lake entirely: the beloved administrator who had worked to bring the work of art to Clear Lake was demoted during the exhibition and subsequently left the university (TENNANT 2018).

Today, UHCL is bigger, with 9,000 total students spread across over 80 degree-granting programs, including 3 doctoral programs. The campus is in the midst of rapid growth—two major buildings have just opened, bringing the total of buildings on campus to four—and the student body is increasingly diverse. No longer focused on serving the needs of NASA employees, the university is made up of four separate colleges. The student body is diverse: over one third of students are of Latino-descent, placing the university in the category of Hispanic Serving Institutions (HSI). A similar number are first-generation college students. Over 10% of all students are international students (UHCL Facts and Statistics).

The campus is dotted with public works of art—some by faculty members in the vibrant and popular studio arts program and others chosen or donated with little public documentation. The most prominent public art, Pablo Serrano's *Spiritus Mundi*, was commissioned and installed in 1977 and marks the main entrance to the university's Bayou Building. Like much of the public art on campus, the monumental sculpture is non-figural, with no potential to offend and little to excite.

UHCL is home to a small university gallery with rotating traveling exhibitions and no permanent collection. The offerings there vary in scale and quality: a notable recent exhibition was a 2016 career retrospective of Faith Wilding, a Paraguayan American multimedia artist who served as a teaching assistant in Judy

1. Judy Chicago (b. 1939) is a pioneering, paradigm-shifting Feminist artist and writer who rose to prominence in the early 1970s as a founder of the Feminist Art Program at the California Institute of the Arts; her work today is found in the collections of major U.S. institutions and has been featured in many monographic exhibitions.

Chicago's Feminist Art Program at California State University, Fresno, in the early 1970s before embarking on her own varied, rich, and independent career (Faith Wilding). It was during the course of discussions surrounding that exhibition that I realized that students at UHCL were mostly oblivious to the university's place in the history of Feminist Art; furthermore, my art history courses full of Humanities and Studio Art majors were largely unaware of the entire Feminist Art movement, to say nothing of Judy Chicago and *The Dinner Party*.

That lack of awareness is not entirely surprising on its face: university student bodies have short institutional memories due to their relatively quick turnover, and, to a student first studying the arts in 2016, 1980 is almost ancient history. What makes it surprising, though, is that UHCL displays its Judy Chicago quilt in the university's main Bayou Building. *Birth Trinity* (fig. 1) is one of very few works of art displayed at UHCL that contains vibrant coloration and human figures. It is 39" by 122" and hangs on the second floor of the building in a major walkway. Next to it is a brief description of the process by which it was made. The quilt is the single permanent public reminder on campus of UHCL's special place in the history of Feminist Art.

The Birth Project was in many ways a response to the triumphs and challenges of *The Dinner Party*. Chicago learned from *The Dinner Party* that she could work effectively in fiber arts and by employing a workshop model. The major problem of *The Dinner Party*, however, was that it was expensive to display and store and required a very specific installation site style. Even before her work on *The Dinner Party* came to an end, Chicago set to work designing a large-scale collective textile project that would be easily transmissible, able to circulate easily and to be seen by large numbers of viewers (CHICAGO 1985, 7).

Fig. 1 Judy Chicago. Birth Trinity. 1985. Original condition. (Fair use)

The Birth Project was all of those things: Chicago's exploration of birth as a subject began with her drawing for the reverse of runner for *The Dinner Party* place setting featuring the 18th century British philosopher Mary Wollstonecraft, a difficult image in which Wollstonecraft is seen dying immediately after childbirth. Chicago recognized needlework as the ideal medium for her original drawing, which she termed "overly graphic" (CHICAGO 1985, 10). Inspired by the subject and the lack of iconography surrounding labor and birth, she observed a live birth and designed birth imagery in sketches which were then sent to women volunteers around the United States, as well as a few volunteers in Canada and New Zealand. Those women, working in their own homes, translated the sketches into cloth using varied techniques, including quilting, embroidery, and needlepoint; each project was then reviewed by Chicago at least three times per year. At the finale of the project, which involved 150 needleworkers for varied lengths of time over the period 1980-1985, 85 completed *Birth Project* works of art toured and were seen in over 100 venues (Through the Flower: The Birth Project). As the logistics involved in the creation of the project and the tour were extensive, MaryRoss Taylor became the project's administrator and then the director of the foundation, "Through the Flower," that oversaw the tour and the publication of the accompanying book documenting the project. At the tour's conclusion, as planned by Chicago, the works of art were donated to sites around the United States as agreed upon by Chicago and Taylor. Some went to museums or traditional fine arts spaces, but the majority went to sites where works of art might not normally be seen, including birthing centers, hospitals, and universities. This, Chicago and Taylor believed, would make this new system of symbols surrounding birth more powerful, universal, and democratic. According to Taylor, UHCL received one quilt from *The Birth Project* because of Chicago's connection to the university as a result of its display of *The Dinner Party*.[2]

The particular quilt UHCL holds comes with benefits and challenges related to its subject and medium. It

2. Mary Ross Taylor in discussion with the author, January 24, 2019.

is one of three large *Birth Trinity* works Chicago designed; the others were executed in needlepoint and in batik. Of the subject, Chicago wrote:

The Birth Trinity is derived from information we gathered on birthing postures. It was once traditional for the woman in labor to be supported from behind by another woman (or, in some cultures, by her husband) while the midwife knelt beneath her. In my version of this posture, the kneeling figure on the left is both the midwife (or 'bringer of life') and the child pulling itself out of the birth canal. And the woman giving birth is both a human female and the Earth—an overlaid image that joins the personal to the universal aspect of the birth process. (CHICAGO 1985, 116)

The scene features three headless nude female figures: an intertwined seated pair and another squatting nearby. Its overt focus on female biology matches that of the Chicago series from which it is drawn. A brown-skinned figure in the center, her landscape-like body divided in half by blood-red waves moving toward a kneeling figure, seems to labor while she is supported by a coral figure behind her. The entire group is surrounded by concentric lines of color.

In form, the figures bear a striking resemblance to the foreground figure groups in Matisse's *Joy of Life*, but, while Matisse's distorted anatomies are bloodless and intentionally flattened, Chicago's laboring figure replaces Matisse's blue modesty cloth with force lines of blood and effort. Chicago's version of life is pulsating, dynamic, physical. In color, the quilt pays homage to its original technique, *mola,* a textile medium developed in indigenous communities in Panama and Colombia, referred to by Chicago as "reverse applique" (CHICAGO 1985, 118). The concentric lines in bright colors are inspired by mola, chosen by Chicago based on a few samples sent to her by Barbara Velazquez, who first worked on this quilt. When Velazquez was unable to complete the quilt, two other needleworkers, Ann Raschke and Jacquelyn Moore, took over.

As required by Chicago, text specifying the process of the quilt's creation hangs beside it at UHCL. Also there are two *mola* samples created by Velazquez to demonstrate the medium to Chicago and a small *mola* quilt ostensibly from South America, although no details are provided. Taylor recently told me that this version of *Birth Trinity*—the mola quilt-- was chosen for UHCL in part because of Houston's large Latino population, but the text does not specify that relationship.[3]

While Chicago's focus on female anatomy was tremendously controversial at the time of its creation, the large quilt now blends into the walls, almost invisible to the many students who pass by it multiple times a day. As one of two art historians on campus and the one responsible for all courses concerning the Renaissance onward, I work to incorporate the quilt into each of my courses. After all, many of our students have never visited an art museum; the revelation that a work of art by an artist in their textbooks is right outside the door of our classroom always inspires a sense of awe. The actual work of art, though? They're often interested in but not inspired by its contents.

As an instructor, I have often looked for ways in which I could compel students to understand not only the original content of *Birth Trinity* and the project of which it is a larger part but also the rebellious nature of the work. That is, to understand Chicago's work on this project, a student should not simply note the iconography Chicago developed but also know that the insertion of these symbols into visual culture was supposed to be abrupt and defiant. Even more that knowing this intellectually, I wonder if I can recreate the process of Chicago's disruption of iconographic norms for my students.

In a course focusing on the critical reception of women artists, I ask students to compare and contrast *Birth Trinity* with a quilt that hangs just down the hall. *Academic Laurels* commemorated UHCL's 20th anniversary. Designed by faculty spouse Judy Cloninger, the quilt was a collective project of about twenty women, including then Texas Governor Ann Richards, who placed a few token stitches near the completion of the project in 1994 (UHCL Archives: Academic Laurels). Students readily identify *Academic Laurels* as more traditional in appearance. They describe the symmetry, the floral details, and the pattern as typical quilting motifs. They see figuration as a distinct project and understand the Chicago quilt to be "less traditional" or "a new form." However, many of them, even having read the text that hangs alongside *Birth Trinity*, do not recognize the subject itself as radical or as controversial.

In some ways, this proves Chicago's success: her goal was to normalize birth imagery, and this composition

3. Mary Ross Taylor in discussion with the author, January 24, 2019.

does not strike its audience as abnormal or even notable. Birth, itself, might be normalized. We are surrounded by media in which we see representations of labor and birth. Amidst those images, Chicago's lyrical representation of figures working in harmony to summon birth appears almost conceptual, so divorced from the tropes of birth we experience in modern life as to be utterly mild and both metaphorically and visually bloodless by comparison.

It may, however, also be because the UHCL quilt's scene is relatively innocuous. Taylor describes it as "palatable," particularly in comparison to repeated motifs like *The Birth Tear*, which Chicago (1985, 85) describes as a representation of "the violence of childbirth." Regardless of why, my assignment is a failure: the strong and meaningful contrast I see between these quilts is not perceived by the students, and they do not seem to be surprised by the iconography of *Birth Trinity*.

Our university does not keep statistics regarding how many of our students are parents, but, anecdotally, I have established that I have yet to teach a course in which at least 10% of students were not also parents. Still, the female-centered birth imagery on display doesn't seem to excite our students. In short: the quilt is not doing what it was meant to do. After all, Judy Chicago and her critics disagreed on many things, but they certainly agreed on this: the work was not art for art's sake.

When I began this examination of *Birth Trinity*, I referred to the quilt as a "relic." Indeed, the placement of the quilt outside of our humanities classrooms, in a major hallway with explanatory text, suggests that it is important for the university, with significant sentimental or historical interest—in other words, it is ostensibly a relic as art historians would define that word. However, as I have demonstrated here, the quilt is also in danger of being a relic as defined in a more colloquial way: as an artefact from a historical moment, no longer retaining its power. The quilt is at risk of appearing outmoded and obsolete. *Birth Trinity* and the larger project of which it is a part responded to one very specific problem—a lack of birth iconography and the hesitation of the canon to accept and integrate images of birth—and, now that those images are more readily accepted, the work of art loses its original purpose and meaning. How then, can the university avoid becoming a reliquary, instead bringing this work of art into active dialogue with our student body?

When I posed these questions to Taylor, she consulted with Chicago, who immediately responded, in relation to the ongoing relevance of the quilt, "Aren't people still being born?" (MaryRoss Taylor in discussion with the author, January 24, 2019.) Taylor, then, suggested that I ask students to ask their mothers about the experience of giving birth in order to approach study of the quilt. This approach is certainly cohesive with one aspect of the project, in which women's personal experiences with the works of art were foregrounded, but that is also the detriment of the approach: it is biographical, emphasizing the experience of birth, itself, and not the work of art as an agent. Indeed, if the quilt is only an illustration of an experience, it remains secondary to that experience: it is a symbol reminding the viewer of the universality of birth. If, however, the quilt is reframed and understood as an object with multi-valent meanings, ambiguities, and possibilities, multiple rich dialogues can arise around it.

The challenge of making the work of art relevant to students falls largely on my shoulders as an art historian and modernist. I am compelled to use the quilt and bring students into dialogue with it by the richness of possible meanings we can create together and by the unique opportunity it represents in a community in which students might not often interact with original objects.

While birth iconography might be more readily accepted in popular culture than it was when Chicago began *The Birth Project*, that iconography is narrow, usually encompassing live birth by healthy mothers. The reality in Texas, particularly among low-income communities, is entirely different. Maternal mortality rates are highly disputed in Texas, but even the most conservative numbers point to a high rate (BAEVA 2018, 762-69). Particularly concerning is the rate among black mothers, who die at twice the rate of white mothers in Texas (Texas Health and Human Services Maternal Mortality and Morbidity Task Force 2018, 11).[4] In addition to this picture of birth, policies recently adopted in Texas state legislative session are a deeply relevant context for reimagining and redefining the quilt. In 2019, the Texas Senate and House passed bills outlawing partnership between Planned Parenthood and local governments for all services

4. In September 2022, the Texas Department of State Health Services announced a delay in releasing more current state maternal mortality data; at the time of the submission of this article, that data had yet to be released. (KLIBANOFF 2022) During the COVID-19 pandemic, maternal mortality rates worsened across the United States, particularly among Black and Hispanic women (THOMA 2022, 1-4).

(SUNDARAM, 2019). At the next session of the Texas legislature, in 2021, abortion was made illegal six weeks after conception, and aiding in or performing the termination of a pregnancy now brings both civil and criminal liability to anyone in Texas. Physicians who perform abortion are subject to felony prosecution and lifetime imprisonment. The public health and economic consequences of these policies are still unfolding, but they are certain to have negative impact with regard to maternal death: therapeutic termination in Texas now requires signs of clear infection, forcing physicians to defy the medical standard of care in many cases (NAMBIAR 2022, 648-650).

In this context, UHCL's quilt might highlight yet another meaning. Chicago's quilt is one of birth, but there is no infant present. The figures are faceless, leaving us with no indication of whether this event is one inspiring joy or pain, whether it is the fulfillment of hope or the beginning of trauma. That the maternal figure is dark-skinned makes the possibility of trauma particularly poignant. Also ambiguous is the stage of pregnancy depicted. The curves of the figure giving birth are echoed in the hills of the landscape; the division of her body allows for the possibility of a full-term pregnancy but does not preclude our interpretation of her body as being in a much earlier stage of gestation. We could, then, be witness to an early pregnancy termination, by miscarriage or by abortion, a full-term delivery, wanted or forced, and a healthy or endangered mother. In our current context, given the political environment in which the quilt is situated, we might find meaning in the ambiguity of this pregnancy: what appeared at first to be an image of birth might in fact allow for multi-valent narratives, including those much closer to Chicago's original image of Mary Wollstonecraft's traumatic and lethal labor. Other textile objects from *The Birth Project* speak to the pain of birth and the possibility of an undesired pregnancy; *Birth Trinity's* flexibility might allow it to enter into dialogue with those.

Now that we are designated as an HSI, perhaps it would also be meaningful to address the quilt based on medium, as I will in my courses about Latin American art. That discussion would bring to the forefront interesting questions of adaptation, appropriation, and privilege. South Texas culture is hybrid by nature, and Houston is a majority-minority city. Adoptions and adaptations of Latin American culture in Texas are ubiquitous, as are conversations regarding the state's southern border with Mexico. The quilt, conceived of by a white woman and executed in a modified form of Latin American textile technique, could stimulate and participate in important and broader conversations around our region's *Latinx* culture and our university's role as an HSI.

Discussions of the mola technique would also highlight another critical issue of the quilt in its current state: while its original coloration reflected the bright tones of traditional *mola*, the quilt has now faded evenly but dramatically (fig. 2), so that its pastel tones bear little resemblance to the *mola* hanging beside it. That fading represents another potential pedagogical direction in which we consider an institution's responsibility to the material object. The *Birth Project* works were donated with no requirements for conservation. The only major specifications attached to the gifts were that the text and images supplied by Chicago and Taylor had to be displayed next to the final works and that they could not be sold or given away but had to be returned to Through the Flower if the institutions could no longer display them (MaryRoss Taylor in discussion with the author, January 24, 2019.). Thus, any reason the institution might have to safeguard the work from fading or other deterioration would be the result of intellectual goodwill and not of contractual obligation. At the University of Houston-Clear Lake, the space available for the quilt has always been exposed to bright sunlight; only recently, in 2022, has the quilt been moved to a more sheltered location. In this case, the material fading creates an apt but unfortunate metaphor for the fading meaning of the quilt: as the colors have lost vibrancy, becoming pastel, the reds turning pale pink, the bodies taking on lighter and lighter hues, there has been a parallel in the loss of meaning—the quilt now blends into its everyday environment.

Birth Trinity, then, becomes emblematic of how we might treat these works of art, in general, which is to say that, as time passes, their reception carries more and more weight relative to an artist's original intent or meaning. This notion, that one does not have to privilege a cultural product's original meaning to make it meaningful, constitutes some degree of loss in the context of this quilt but creates opportunity. In our case, *Birth Trinity* no longer retains its novelty, but, in new contexts, it can continuously reproduce and replace meanings, and that process, in itself, made evident through transparent pedagogy, should make the quilt impactful for our students.

This tension between intent and reception is particularly prominent in the interpretation of textiles. As Julia Bryan-Wilson has written, textiles and their effects are complex: "[textiles] occupy a central place

in traditionalist histories while they also erupt as potential sites of resistance to that very traditionalism, claimed by competing factions at once as hegemonic and counterhegemonic" (BRYAN-WILSON 2017, 3). This notion that the textile is a contested site between a master narrative and a subversive one sheds light on the ways in which pedagogy surrounding the artists of second wave Feminism and its cultural products might be most effective and appropriately complex. While Chicago's original meaning is not "hegemonic," per se, it is tempting to treat her narrative as a master one; that possibility is made even more real by the text that Chicago insists accompany each part of *Birth Project*. Indeed, that text creates a fixed narrative that becomes increasingly less effective. Perhaps a textile was never supposed to have a static meaning, anyway. Bryan-Wilson writes about textile projects which fray under the pressure of competing community priorities: in the case of UHCL's quilt, we have a textile which, defined in only one way, has faded rather than frayed, losing its meaning as its colors are gradually bleached by the sun.

The application of a kind of canonical or fixed narrative to the quilt is particularly problematic or ineffective in an environment which is far from the collegiate canon. The students who encounter this quilt are not the traditionally-aged students of more prominent universities. More importantly, they do not have extensive knowledge of a fine arts canon which can be disrupted by this quilt. To attempt to recreate the disruption of the quilt, one must first reinforce the canon, rendering the exercise one in hegemony and

Fig. 2 Judy Chicago. Birth Trinity. 1985. Current condition. (Fair use)

not in counter-hegemony. That is, in order for UHCL students to understand the ways in which Chicago upended traditional iconographies, instructors must first establish those iconographies. If, however, the quilt functions outside of its original purpose and is brought into contemporary dialogues determined by the community in which it resides, *Birth Trinity* reproduces new meanings and becomes an agent of democratic meaning-making, part of Chicago's original inspiration. This, ultimately, invests the quilt in continued dialogue: having met Chicago's original goals for the project, the quilt can now enter in broader conversations and renew in new contexts Chicago's original struggle against hegemony.

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University Collections as Representatives of Academic Research and Knowledge Transfer – Using the Example of the Ruby-Rod-Laser – an Object on Display in the University Museums Graz

Bernadette Biedermann

Abstract

This paper focuses on university collections by asking the question whether museum objects act as representatives of academic research and teaching and moreover, of knowledge transfer. The paper enriches the state of the art in the context of university museum and collection objects as representative of academic research and teaching by taking advanced contemporary museological theory into consideration. From this perspective the objects in the university collections act as bearers of sense and meaning extending beyond the simple elucidation of objects in terms of the history of the institution and furthermore, the history of science.

The ruby-rod-laser acts as both the object of investigation and as special use case for the paper. This device is on display in the University Museums at the University of Graz (Austria). As the first laser instrument to have been both produced and used in Styria (a federal state in Austria of which Graz is the capital city) this object represents academic research and teaching in the context of knowledge transfer in a special manner. From the background of investigating university collections as representatives of academic research the question of innovatively communicating the related stories to the public arises. Digital strategies can play an important role in this context.

Bernadette Biedermann

Introduction

Museum objects represent, in principle, the manifold stories linked to their unique object life. These narratives can be made visible in a process of museum documentation, which results in museum displays and other museum communication strategies.[1] As a consequence, such items serve as material examples to make stories come alive and to interconnect object narratives linked to times, people and institutions and thus to the meaning they convey and the evidences they represent.[2] Moreover, and from the perspective of the general museology discipline, museum objects also act as tangible material witnesses to many special circumstances, events, times, persons or institutions, which are understood within the context of a scientific process of musealization and documentation.[3] In this context material objects can also serve as representatives of intangible cultural heritage.

University museum collections, however, are by their nature unique items of investigation. What is special about university collections is that they were mostly founded as research and teaching collections; they often consist of items that were part of research processes. Moreover, the pieces presented in the university museum collections of today were once also frequently used in the development of scientific theories. This is the reason why these objects also act as examples to represent research processes. Collections of this kind are consequently also linked to the history of the institution where they were first used for purposes of academic teaching. University collections are places of knowledge generation and knowledge transmission. Universities have thus often used and preserved objects of this kind as research collections and these now form the cores of many well-known university museum collections that attract many visitors today.[4]

Against this background of the nature of university museum collections, the aim of this paper is to focus on university museum collections as representatives of academic research and moreover of knowledge transfer. The paper questions how to do in-depth research, to document the object stories and how to implement existing standards of documentation into digital strategies of university museums. To question this theory, the paper uses a special museum object preserved in the University Museums of the University of Graz. Using this example, the paper poses the question which (hidden) stories this object is able to tell, whereby the aspect of interconnecting stories is especially focused. The ruby-rod laser that is of the University Museums of the University of Graz and on display in the University Museums at the University of Graz (Austria) serves as the object of investigation. It is also communicated to the public simultaneously as a special research object.

In the context of this paper, however, the object functions as a starting point for carrying out in-depth research into its own "pre-museum biography" (LOURENÇO & GESSNER 2014, 730). Starting from the background of the various stories to which this object is linked, ways to communicate them are derived in terms of museum presentation and communication by drawing on the discipline of science communication. The theoretical background is outlined by the general museology discipline focusing on a displayed item as a bearer of sense and meaning and by asking the question for what this special object stands witness (STRÁNSKÝ 1971 & 1989; WAIDACHER 1997 & 1999; DESVALLÉES & MAIRESSE 2010, 53-56; BIEDERMANN 2016).

In this context the paper first covers museological theory, where objects are defined as bearers of sense and meaning and outlining the ways this theory can be applied to transferring the histories of an object in terms of museum documentation and presentation. Secondly, the paper explores the current presentation of the laser in the museum display and what narratives and information about it are communicated to

1. The movie series "Night at the Museum" exemplified the aspect of awaking stories of museum objects, see Website International Movie Database: https://www.imdb.com/title/tt0477347/ [17.02.2022].
2. Pearce 1992; Pearce 1990; Hooper-Greenhill 2000; the approach of this paper is derived from a lecture given at an international seminar held at the University of Coimbra with the title: Interconnecting narratives. Tangible and Intangible Stories of Science, Arts and Humanities in University Libraries, Archives and Museums, 8th November 2019, see online: https://www.uc.pt/en/article?key=a-a1c768df39 [17.02.2022].
3. Waidacher 1999; Stránský 1989; Stránský 2001; Reisinger 2013; Biedermann 2016.
4. Lourenço 2005; te Heesen. 2008, 486; Lourenço & Gessner 2014, 730-733; Ball (ed.) 2018, 14-15; Seidl 2016, 111; Marshall. 2016; Achen et al. 2018.

the public. Furthermore, the paper looks at the laser against the background of the theory of museology by contextualizing it with current digital standards of museum documentation and communication. This aspect combines museological theory with museum practice. The results build the basis for developing new forms of museum and science communication as media for conveying object stories to the public as the conclusion.

University collections and museum objects – state of research

University collections share a common basic approach in that they are relevant for the academic research and teaching of a university. Most university collections were first established as teaching collections and generally with special reference to a specific scientific discipline. At the University of Graz for instance, a criminological collection dating from 1913 stands pars pro toto for the criminology discipline and the institute of criminology. The initiator of this collection was Hans Gross, a criminal court lawyer in Graz. This collection was primarily used to instruct lawyers, judges and law students, with individual exhibited objects being used to illustrate how investigations are conducted at the scenes of a crime. International examples have shown that one clear reason for developing collections of this kind has always been the impetus they provided for university teaching (TE HEESEN 2008, 486; LOURENÇO 2005, 23-40).

University collections were also developed as the result of research processes. In these cases the objects presented played an important role in research in themselves or served the purpose of self-expression for specific disciplines (TE HEESEN 2008, 486). The collection of scientific instruments of the University of Graz for example, has a clear reference to the discipline of physics. Most of the objects presented in this context were created at the internal workshop of the University Of Graz Institute Of Physics. It can be clearly inferred from this that university museum objects have a double function, acting both as a part of the academic heritage and as witnesses to academic research and teaching (TE HEESEN 2008, 486; LOURENÇO 2005, 23-40). University museum collections function as material evidence and also as expressions of the history of science, while they are also a part of the material academic heritage and express important aspects in the history of an institution (LOURENÇO 2005, 34, 40).

In recent decades European universities have increasingly structured their material cultural heritages by establishing central collection custodianships to coordinate their frequently vast and valuable collections.[5] This process was accompanied with and influenced by the material turn, as also those material cultural studies, which established the material heritage – also in the context of universities (LOURENÇO & GESSNER 2014, 733). By highlighting the academic heritage of universities, collection policies to manage collection related workflows became increasingly relevant and universities concerned themselves ever more intensively with implementing guidelines of this kind. For the practicalities of dealing with university museum collections and their objects, the "Koordinierungsstelle für Universitätssammlungen" in Germany provides instruction manuals and policy guidelines.[6]

A very significant dimension of museum objects is the reference they make to their inventors as an expression of processes linked to the various university researchers and scientists. The material objects are testimonials to the act of creating or inventing and link to a special person, an institution, a statutory body or a public-law foundation. Museum objects are reminders and material evidence of their creators and their various research processes. Researchers and scientists also influence the development of a scientific discipline and moreover shape the course of science and also the source disciplines involved. This aspect also references memory culture by defining the media as signs by which a person or an object can be remembered (ERLL 2017; ASSMANN 1992).

The objects in a university collection are thus material evidence and stand for cultural connections between persons. They provide living narratives linked to facts, cultural or political circumstances and phenomena through which they came into existence. Museum objects are thus real evidence for events, times, persons and places. This idea in particular falls within the scope of the theory of classical museology.

In terms of the background to the discipline of general museology, museum objects represent a special relationship between humans and the human environment. Moreover, general museology focuses as

5. See for example website Goethe University Frankfurt: https://www.ub.uni-frankfurt.de/universitaere_sammlungen/home.html [17.02.2022], the University of Göttingen: https://www.uni-goettingen.de/de/440706.html [17.02.2022], the University of Vienna: https://bibliothek.univie.ac.at/sammlungen/sammlungskoordination.html [17.02.2022].
6. Website Koordinierungsstelle: https://wissenschaftliche-sammlungen.de/de [08.02.2022].

an interdisciplinary philosophical subject on a "special appropriation of natural and cultural reality" (STRÁNSKÝ 2007, 23). This quality is defined as museality and builds definitively on the object of knowledge in the discipline concerned. Museality expresses as a theoretical concept the unique association that exists between people and their environment. It is defined as a "special aspect of reality, which can only be conceived through a recognizing and evaluative relationship of man to reality" (STRÁNSKÝ 1980, 36). This quality serves as a basis whereby people can consider items as sufficiently relevant to be selected, (ideally) preserved indefinitely, systematized and presented to the public (WAIDACHER 1999, 34).[7] Moreover, museality is a time-independent quality and expressed variously in special times (WAIDACHER 1999, 33-34). As a result the collecting, preserving, storing and exhibiting of objects can appear as very different museological terms at different times.

The quality of museality goes beyond the historical and aesthetic value of museum objects, however, and explains that objects are also bearers of immaterial value and of intangible stories. From a museological point of view museality usually seeks objectivity and should be inter-subjectively verifiable (WAIDACHER 1998, 9). The theory of museality later influenced the concept of heritology and the idea of a general museum philosophy (DESVALLÉES & MAIRESSE 2010, 53–66).

Linked to museality is the quality of authenticity, which also plays an important role in terms of the tangible and intangible narratives museum objects can tell. In terms of museological thinking, authenticity means that an object serves as evidence for special events, circumstances, persons and times by acting as an authentic witness. Accordingly, it can be linked to special cultural phenomena of various times, persons, places and institutions and therefore objects can become authentic witnesses for these events (WAIDACHER 1998, 11). In the course of a scientific process this quality of objects can be verified, providing proof that an object is an authentic witness of an event because of its presence at the place and time.

An object is diachronically and synchronously interviewed as source to prove that it is an authentic witness (LOURENÇO & GESSNER 2014, 736). These findings usually take place within a scientific cognitive process of musealisation and documentation whereby particular values determined by a society are considered. Thereby, the attributed meaning of objects reaches beyond the value of objects' material, artificial, historical and personal values (REISINGER 2013). As a consequence, objects can act as witnesses of significant events, persons and also as sources of knowledge. Objects of this kind are proclaimed to be unique and irreplaceable "authentic witnesses from man: of his joy and suffering, his hopes and fears, his achievements and failures; and they tell of nature, of which this man is part of" (WAIDACHER 1997, 20).

In addition, objects can serve as representatives of sense and meaning. Moreover, immaterial aspects such as thoughts and ideas influence the process of inventing objects including scientific instruments or even pieces of art. These qualities are attributed to museum objects within a process of musealisation. This means from a museological point of view the scientific process of attributing meaning to objects by inference an item from the fundament in regard to the quality of museality. In this context any and all aspects related to objects are documented, ordered and categorised. These categories relate for example to the history of the objects and the dates in their biographies or even pre-museum life into consideration. These dates concern the invention or creation of the object, the persons who owned the object (owner) including their own personal timelines, together with the dates related to the selling or the donation of the object, up to the time of its entering a museum collection; moreover, dates that describe the materiality of the objects (well known for example for pieces of art), such as dating, material, technique or fabrication method, depictions or illustrations, genre, measurements, condition, conservation method as well as dates that describe places linked to the objects (such as place of construction, storage, places linked to the related persons) are documented and mapped.

The ruby-rod-laser – a case study

The item that is the object of investigation of this paper is currently on display in the historical-physical collection in the "UniGraz@Museum"[8] which is part of the cross-faculty platform, University Museums of

7. It was the Czech philosopher Zbynék Z. Stránský defining this quality for the first time in 1971 (Stránský 1971) and the Austrian museologist Friedrich Waidacher who developed it further building the theoretical basis and object of knowledge of the general museology discipline, see Waidacher 1999; Stránský 1989; Stránský 2001.

8. The University Museums of University of Graz were founded in 2010 as a cross-faculty platform; Website UniGraz@Museum: https://universitaetsmuseen.uni-graz.at/de/unsere-sammlungen-und-ausstellungen/unigrazmuseum/ [17.02.2022].

the University of Graz[9]. The UniGraz@Museum presents parts of the historical-physical collection of the Institute of Physics of the University of Graz and additionally temporary exhibitions on various research topics related to special research fields of the University of Graz. In addition to the UniGraz@Museum, the University Museums of the University of Graz currently house the "Hans Gross Kriminalmuseum"[10]. This consists of a criminological collection comprised of around 2,500 items, which were collected by its founder Hans Gross in 1895.

Fig. 1 Ruby Rod laser displayed in the University Museums of the University of Graz
picture: Marija Kanizaj/University of Graz

The "Haus der Wissenschaft" belonged to the University Museums until the end of 2021 and displayed interactive exhibitions with changing exhibits in the manner of a science centre. The "Haus der Wissenschaft" closed its doors for organizational reasons at the end of 2021 and the tasks of the "Haus der Wissenschaft" are currently in the hands of the University Museums.

This paper, however, focuses on a special item as its object of investigation, which acts as a representative for academic research and knowledge transfer. The ruby-rod-laser as pars pro toto for this presumption, and which is communicated as being the first laser to have been developed outside the United States of America.

The museum object of the ruby-rod-laser was built by a physicist at the University of Graz in the 1960s. It is currently presented in the UniGraz@Museum permanent exhibition where it is exhibited in a showcase with a short descriptive label (**Fig. 1**).[11] The label provides the information that this item is the oldest laser in Austria and is the second one ever to have been built anywhere. It was developed in 1964 by Franz Aussenegg and Julius Wagner at the institute of physics at the University of Graz and first served as a strong source of light. The American Ted Maiman had previously constructed the first ever workable laser.[12]

Additional stories related to this object are presented to the audience in the context of guided tours whereby the focus is on the way the laser works and how laser technology is now used as a part of everyday life in the world of today (**Fig. 2**).[13] Museum accompanying programs give detailed information by showing the audience how the laser works[14].

Fig. 2 Detail of Ruby Rod laser displayed in the University Museums of the University of Graz, picture: Marija Kanizaj/University of Graz

Examining the laser from the perspective of the history of science by asking the question if it is representative for academic research and knowledge transfer, also implies questioning the authenticity of the object by

9. Website University Museums University of Graz: https://universitaetsmuseen.uni-graz.at/de/ [17.02.2022].
10. Website Kriminalmuseum: https://universitaetsmuseen.uni-graz.at/de/unsere-sammlungen-und-ausstellungen/hans-gross-kriminalmuseum/ [17.02.2022].
11. Website Laser University of Graz: https://physik.uni-graz.at/de/neuigkeiten/detail/article/es-werde-licht/ [17.02.2022].
12. Translation of the exhibition label by the author.
13. Museum educators are presenting the object in the context of guided tours to the visitors.
14. Franz Aussenegg on the occasion of the "long night of the museums" in 2019. This is a regular event in Austria during which museums stay open through the night until one in the morning.

putting it through its paces in terms of museological thinking and as evidence for certain specific facts in terms of persons, times, places, circumstances and events.

In the first step of focusing on the ruby-rod-laser as an authentic witness on display in the University Museums Graz, the persons linked to this object are placed at the centre of research interest. The maker of the laser, Franz Aussenegg, is of special relevance in this context. Now an emeritus University of Graz physics professor,[15] he reports on how in the early 1960s he heard from colleagues about a new technology that was being developed in the United States, which at that time must have seemed to be something like a secret weapon. Using information on the components that would be needed to construct this instrument, which were a ruby rod, a flashbulb and two mirrors, Professor Aussenegg succeeded in constructing this object at the institute of physics at the University of Graz 1964. A flashbulb from a 1960s photographic studio was used as the light source. Moreover, a light amplifying instrument, in this case a ruby rod, was used. Two mirrors serve to oscillate the laser wave. In times of the beginning of laser technology, the ruby rod served as a strong source of light.[16]

Laser technology was originally realized by the American engineer and physicist Theodore Harold "Ted" Maiman (1927–2007), who built the first workable laser (ANDREWS 1997, 26). Aussenegg succeeded in building his laser without ever having seen an instrument like this before, simply from knowing its components.[17] Another person of special relevance in the history and the invention of the laser is Gordon Gould (1920-2005), this American physicist and pioneer of laser technology was the creator of the term "laser" which now has a firm place in the dictionary, but which he coined as an acronym "light amplification by stimulated emission of radiation" from the technical description of the device. He had also been a first experimenter in this technology using microwaves as a source (ANDREWS 1997, 1).

The laser example stands as an information brokering witness for the transfer of knowledge. Moreover, the laser itself acts as medium of knowledge transfer – it was used in a further consequence to teach students of physics about this technology. The laser is based on the technology of a ruby rod in the context of locations and institutions. It has links with both the University of Graz Institute of Physics and also to HRL Laboratories in Malibu, California (United States), where Maiman first constructed a laser.

The Graz item is thus not only a piece in the history of science, but it is also a unique representative for an extraordinarily important research process and a living part of the institutions involved and their histories. It has connections to Graz and Malibu and also a special meaning for society as a whole in terms of the emergence and development of laser technology.

The technology was further developed by using other sources such as gas.[18] Since then it has been used for a broad range of applications including medical examinations and surgical techniques, for example in treatments provided by ophthalmologists or dermatologists, but also in the operative components of DVD-players, laser scanners and printers.[19] Modern telecommunication is also based to a great extent on laser technology. The handling of vast data quantities familiar to us today or signaling via the web in combination with glass fiber technology would not have been possible without the invention of laser technology as it is presented by the laser in the Graz University Museums.[20]

These dates, facts, (cultural) connections and all the tangible and intangible plots, scenarios and story lines the laser can be related to, are part of the process of musealisation and furthermore of museum

15. Franz Aussenegg was a PhD student with professor Julius Wagner and since 1990 has been head of the Erwin Schrödinger Institute of Nanoscale Research, from 1988 until to 1992 he was also head of the Institute of Experimental Physics at the University of Graz. In 2014 he awarded the golden badge of honor by the City of Graz.
16. Based on an interview with professor Franz Aussenegg on the 28th October 2019.
17. Based on an interview with professor Franz Aussenegg on the 28th October 2019.Concerning the technology see also: Aussenegg 1983; Aussenegg, Dinstl 1981; Aussenegg 1978.
18. Various laser sources: Andrews 1997, 28–55.
19. Laser technology is used as laser-measurement technology for medical applications like osteotomy or ablation of histoids, for examining very small cavities, for holography, see: Hartmann (et al.) 2005; laser technology is also used for spectroscopy, photochemistry and to promote chemical reactions, see: Andrews 1997, 168; as well as in the entertainment and information sector for CD- and DVD-players, bar code scanner, telecommunications and teleportation, industrial production like cutting, mating, machining, coating, generating 3d-structures, micro- and nano-technology, chips and sensors, flat screens, Bäuerle 2009, 56; see also: Eichler, 1998.
20. Laser technology is currently again in the focus of attention concerning new ways of solving energy problems on earth by using solar collectors in the outer space, Website Newspaper Standard: https://www.derstandard.at/story/2000118933422/solarfarm-im-all-energie-von-dort-wo-die-sonne-nie [17.02.2022].

documentation, which is one of the core tasks for a museum in the context of making and ordering knowledge. Within this process any and all dates, facts and stories related to objects are noted, ordered and structured.

In the course of researching the object history, the discovery that no additional source material has survived to the present time was made. Nothing remains of the original construction plans nor are there any surviving bills that could document where the materials to construct the laser were bought or what it cost at the time. Nevertheless, it is evident that the instrument was first used for research and then later for university teaching. Since 2011 it has been on display in the Graz University Museum.[21]

Using the example of the laser, this aspect challenges the process of documentation especially for in-depth research. Due to the research and teaching focus of university collections the relevant sources for proving the pre-museum existences of objects were in most of the cases not documented. The missing testimonia frequently makes it impossible to verify the biographies of university collection objects from the perspective of the historical sciences and museology. However, there are immaterial aspects linked to the objects, such as cultural connections and personal memories transferred orally of the various persons involved that tell us much about the narratives linked to the objects.

The example of the laser shows us clearly how in many cases it is virtually impossible to reconstruct the pre-museum life of objects. The necessary sources are no longer available or were not documented and preserved as usual practice in classic museums. This has the result that the responsibility of university collections is then limited to documenting the life of objects from the time when these were received as part of a university collection (LOURENÇO & GESSNER 2014, 730). Museologists use the term "old inventory" to document this aspect of their work and this confirms that there are no historical sources available.

Even the aspect that there is no point of reference to the pre-museum history of an object tells us something about the meaning of these items. It proves that objects were not collected with the primary aim of being part of a historical museum collection that is intended to be preserved indefinitely. In a case such as this the objects would have been documented, adequately preserved and exhibited. The purpose of such object fundaments assembled in university institutes was much more simply to demonstrate something and serve the purpose of teaching students or to be used for the purpose of research.

All of these aspects that an object can be linked express parts of its narrative which is subsequently communicated in various ways of museum presentation strategies. In addition, "immaterial" aspects including ideas and thoughts, anniversaries and memories that can be linked to the objects are part of the same process.

In the current age of laser technology and as a consequence of digitization, the aspect of museum documentation refers to the question of how digital methods can help to order object-related data and also to all the information related to immaterial aspects concerned. In a second step the question of which methods provide users with worthwhile online open access to museum collections arises.

From theory to practice I – Digital university museum documentation

The process of museum documentation generates enormous quantities of data which must be managed. This technology has provided digital documentation standards enabling museum collections to deal with structuring the data and has done so since the start of digital data processing. This is an issue that has led to the questioning of how existing standards of museum documentation can be implemented in digital university museum strategies.

In the context of museum documentation digital databases serve the purpose of structuring and ordering object related data. This is comprised of data related to the object material, to object biographies and furthermore to object related narratives. Museum documentation standards such as "Spectrum" – the UK Museum Documentation Standard[22] - were established to document museum objects in a consistent and uniform manner. Spectrum also represents the workflows relevant to the documenting of museum object related data and the respective workflows linked to the objects.

21. Interview with Franz Aussenegg on 28th October 2019.
22. Website Spectrum: https://collectionstrust.org.uk/spectrum/ [03.02.2022].

To exchange data with web portals, metadata standards formalize the data in machine-readable language, which is for example RDF or XML. "Dublin Core"[23] for instance (represented in RDF or XML) provides 15 core elements. "LIDO"[24] (which stands short for lightweight information describing objects and is represented in XML) structures data on an event-based way. LIDO is compliant with the CIDOC's ontology of the conceptual reference model (CIDOC CRM which stands for the "Conceptual Reference Model" that was established by the Committee for Documentation of the International Council of Museums) that provides "definitions and a formal structure for describing the implicit and explicit concepts and relationships used in cultural heritage documentation"[25]. It references object "entities" and "properties" by a semantic framework.[26] The aim of this reference model is to act as a guideline for data modelling, to define a general structure for content information and to enable associative queries.[27] CIDOC CRM thus establishes the quality of museality in a special manner.[28]

For LIDO, the CRM entities are especially relevant. LIDO was developed to deliver metadata and information to portals for use in a variety of online services. It represents the full range of descriptive information about museum objects. It can be used for all kinds of objects and additionally supports an interdisciplinary approach.[29] LIDO provides 14 groups of information of which only three are mandatory. The concept of events is taken from the CRM including creation, collection and the use of an object. Associated with them are dates, places and actors.[30] LIDO integrates various (meta-)data such as a permanent identifier, the object inventory number, the type of objects, the condition of the object, the measurements, the material, the place of storage, an object description, an identifier linked to controlled vocabularies, metadata concerning the documentation process, like persons who did the pictures, conservation and data gathering and also the CIDOC events.[31]

Moreover, in terms of museum documentation, concepts are summarised by controlled vocabularies respectively thesauri for which the Simple Knowledge Organization System (SKOS)[32] is a schema to digitally structure and represent knowledge (built on RDF language which is a Resource Description Framework[33], whereby every concept is linked to a special identifier). Ideally, the order of abstract concepts is oriented on existing thesauri such as the Getty Arts and Architecture Thesaurus[34] or the German Oberbegriffsdatei[35]. The "Gemeinsame Normdatei" (GND) hosted by German National Library (Deutsche Nationalbibliothek) also provides controlled vocabulary for museum collections.[36]

Referring back to the example of the laser, this device is considered as belonging to the optical instruments and in dependence on the sources used, the device is also comprised of several laser types.[37] There are standards or norm files for core data on persons [38] in GND to map data relating to people and places and hosted by German National Library[39]. Geonames provide standardised links to map a special place or

23. Website Dublincore Metadata Initiative: https://dublincore.org/specifications/dublin-core/dcmi-terms/ [03.02.2022].
24. Website LIDO: https://cidoc.mini.icom.museum/working-groups/lido/ [03.02.2022].
25. Website CIDOC-CRM: http://www.cidoc-crm.org/ [17.02.2022].
26. Website CIDOC-CRM: http://www.cidoc-crm.org/ [17.02.2022].
27. Lampe, Krause, and Doerr 2010.
28. The project WissKI as "Scientific Communication Infrastructure" implements the CIDOC CRM for a user-friendly application, see Website WissKI: http://wiss-ki.eu/ [17.02.2022].
29. Website LIDO: http://www.lido-schema.org/schema/v1.0/lido-v1.0-schema-listing.html [17.02.2022].
30. See for example the digital representation of Website Hans Gross Kriminalmuseum virtuell: https://gams.uni-graz.at/o:km.8002/sdef:LIDO/get?mode=object&context=context:km.objekte [17.02.2022], where LIDO was used as standard for museum documentation. For the historical-physical collection a template for data mapping with LIDO was established on the basis of a seminar in winter term 2019/20 with the title: Methods of Digital Enrichment (Virtual Collections: Enrichment and Presentation, see Website Unigrazonline: [https://online.uni-graz.at/kfu_online/pl/ui/$ctx/wbLv.wbShowLVDetail?pStpSpNr=602422] [17.02.2022] but was not published until now.
31. This metadata was documented for the Hans Gross Kriminalmuseum, see Website Hans Gross Kriminalmuseum LIDO Morgenstern (KM-O.2): https://gams.uni-graz.at/o:km.8002/LIDO_SOURCE [17.02.2022].
32. SKOS: https://www.w3.org/TR/2009/REC-skos-reference-20090818/ [17.02.2022].
33. RDF: https://www.w3.org/RDF/ [03.08.2020].
34. Getty Arts and Architecture Thesaurus: https://www.getty.edu/research/tools/vocabularies/aat/ [17.02.2022].
35. Museumsvokabular: http://www.museumsvokabular.de/node/6 [17.02.2022].
36. See GND online: https://swb.bsz-bw.de/DB=2.104/SET=2/TTL=1/START_WELCOME?retrace=0 [07.02.2022].
37. See Website Art & Architecture Thesaurus online search "laser": http://www.getty.edu/vow/AATFullDisplay?find=laser&logic=AND&note=&subjectid=300024548 [17.02.2022].
38. Online research in GND: https://portal.dnb.de/opac.htm;jsessionid=F403i9LrO_336lfSMxd_lTYnj8qoyI_k19F3y3kX.prod-fly8?view=redirect%3A%2Fopac.htm&dodServiceUrl=https%3A%2F%2Fportal.dnb.de%2Fdod [17.02.2022].
39. Entry for Franz Aussenegg in GND see Website GND search „Franz Aussenegg": http://d-nb.info/gnd/1145348912 [17.02.2022].

region.[40]

Various data bases in use especially in the German-speaking countries (for example EasyDB[41]), virtual research environments (like WissKI[42]) and digital data development systems (for example digiCULT[43] or library software[44]) apply standards like these to organise and store museum object data. All of these systems order, categorize, structure and organize data and consequently serve the purpose to represent tangible and intangible museum object stories wherefore also in-depth research is necessary. This means recording available source material, and enhancing links between different object types using the applied data model and available thesauri. It goes without saying that much more data will need to be generated in order to document intangible stories linked to material such as the object input type, the date of entry and the relevant persons related to objects (such as owners), origin and additional bodies of fact such as documents. New object categories can form new types of standardized vocabulary together with the appropriate thesauri for the development of this. These thesauri would also give a new insight into museum documentation in terms of a museological approach to objects and moreover to their cultural connections.

In reference to the laser at the University of Graz University Museum it is also of relevance in museological terms to document the object as representative of the relevant research process, the process of knowledge production and the actual relevance the technology has for a society. Many technical achievements would not have been possible without the invention of laser technology, and signaling via the web is only one example of these. This is one of the reasons why the laser on display at the University Museums Graz is a representative of the most significant achievements in physics of the 20th century. Its varied use influences our daily lives, not least as the field of physics at the University of Graz where laser technology is applied in the field of nano-optics.

This is the reason why the ruby-rod laser acts from a museological background as bearer of museality. Because of its widespread use it is of special importance for the society. It also has extraordinary cultural value because of the tangible and intangible stories it bears.

From theory to practice II – Museum plus science communication

Strategies are developed on the basis of the laser as bearer of museality and consequently on the basis of its history museum communication and these also in the context of imparting scientific knowledge. From the perspective of museology, the aim of museum communication strategies is primarily to enable an encounter between museum visitors and the real and authentic museum object. In the course of this a process of establishing inner contact can be set in motion. This encounter can serve as the starting point for a deeper concern and understanding of museum objects among visitors, with this offering a fruitful leisure activity or usefully shared time with friends or family (WAIDACHER 1997, 20; MONTI & KEENE 2013, 10).

It is in this context specifically that the contemporary relevance of the presented object and its importance for both society as a whole and for museum visitors in particular can be conveyed. Science communication, the importance of which has increased significantly for universities in the past few years, communicates the relevance of scientific research and conveys all the aspects of this for the various target groups in a manner that can be readily understood. Furthermore, innovative museum presentation and communication methods on the basis of enabling an encounter between visitors and the museum object are now in the status of being established.[45] Attractive advanced organizers are now in process of being developed for the purpose of guiding visitors through the research history of the University of Graz. In the course of this Nobel prize winners and other research results and instruments of which the laser is one object of special

40. Search query “Graz” see Website Geonames search “Graz”: https://www.geonames.org/search.html?q=graz&country= [17.02.2022].
41. EasyDB: https://www.programmfabrik.de/en/ [08.02.2022] used for example by the Universities of Marburg and Göttingen.
42. WissKi: https://wiss-ki.eu/ [08.02.2022], used by the Germanische Nationalmuseum Nürnberg.
43. DigiCult: https://www.digicult-verbund.de/de [08.02.2022].
44. Alma: https://exlibrisgroup.com/products/alma-library-services-platform/ [08.02.2022].
45. The laser has a significant place in the museum accompanying events. Every year Franz Aussenegg the laser constructor himself, gives a presentation show with the laser sword as a highlight of the long night of museums that takes place on the first weekend of October. This event was also a highlight in the “long museum night” on 5th October 2019, where lots of museums in Austria open their doors for a long night, from 6pm to 1am. The pandemic situation did not allow this presentation to be made in 2020 and also in 2021.

relevance will be highlighted.

Additionally, the modes of presentation are being improved by visually enriching the display with attractive labels. Highlighting the item, for example by using special lighting modes, can improve its attractiveness and also hold the attention of visitors by explaining the relevance of this object. These visual modes boost the power of museum objects as they invite visitors to spend (more) time in front of the displayed object and to engage with its story.

Moreover, innovative accompanying events have been designed based on the relevance of the laser technology. For example, experiments visitors can do themselves or interactive installations support the process of encountering the relevance, the sense and the meaning of the museum objects. The widespread use of laser technology for example, in medical applications, for internet, telecommunication or even teleportation can a focus for the audience by the provision of experiments to perform. Short videos on the use of laser technology are now in production for presentation in the university social media channels.

These modes of communicating the stories related to objects and the meaning of the objects to the public are to be supplemented by digital forms of museum presentation. A digital presentation via a 3D-model both on the museum website and also as an additional medium in the classic museum space is in preparation.

By using these communication channels visitors are encouraged to gain insights of their own into the way a laser is constructed. Communicating the current use and relevance of laser technology visitors and users of the (online) museum provisions have the opportunity of being attracted by the object and encountering it, for example to deepen their understanding of why laser technology is so important in everyday use.

The effectiveness and efficiency of museum presentation and communication modes are understood by visitor surveys and studies, which map the way a museum exhibition communicates with the public. In the course of this exhibition arrangements, labels and accompanying events are explored by using the qualitative and quantitative methods of empirical social studies. These studies show not only the effectiveness of museum programs in the context of the laser but also questions the interests and motivations visitors might have concerning an item, a collection or a museum in general. Visitors are observed in terms of their behavior in respect to the laser. Additionally, a questionnaire or interview can map for example visitor interpretations concerning the laser and the way in which this has been influenced by the exhibition. Visitor studies of this kind show if and in which way visitors are attracted by museum presentation and communication programs (BITGOOD, 2013; FALK, 2006, 106–126) and ideally exhibits are adapted in accordance with the study results.

Conclusion and perspective

The cultural connections linked to the example of the laser showed that immaterial, intangible aspects such as ideas and thoughts constitute the process of scientific research and inventions, and these can be given concrete form by special objects often preserved and stored in university museums.

These museum objects have public appeal as authentic witnesses of scientific research processes and academic teaching. They are evidence of the scientific practice of their times and stand for continuities and breaches that have occurred in research and teaching. They are the manifest history of science and bearers of meaning in terms of the institution and the educational establishment of a society. Museum objects of this kind are verifiable references for scientific work, they are documentary evidence and illustrative material and, at the same time, sources and material evidence for academic research and teaching and moreover, of university culture.

In addition to their historic significance, their value is constituted in visualizing these complex cultural connections of research processes. Extending beyond this, they serve to establish identity through the process of self-reflection which they generate in scientific disciplines and more specifically for individual institutions where they serve as the basis for transforming questions.

These complex narratives related to museum objects are the medium of communication with the exhibition visitors. In depth research in the context of the ruby-rod revealed that it is no longer possible to obtain much of the historic documentation relating to the origins and the pre-museum life of the object concerned. In this context orally transferred findings are thus a source of incalculable valuable to document the research history of this object. On the other hand, the object is related to several narrative threads, all of which would be well worth unravelling and presenting in the communication strategies of

the museum to deepen the encounter between the object and the visitors.

The university museums of the University of Graz are currently at work on implementing the communication strategies outlined in this paper as a means of improving and holding the attracting power of the items displayed. Moreover, a visitor study is in the planning stage. The example of the laser clearly demonstrated from the theoretical stance of museology how objects of this kind are both the main point of reference and the object of research for the quality of museality. When all is said and done, however, it is the museum objects themselves and the remarkable narratives attached to them that are the main reference points and subjects of interest from which all modes of museum communication are derived and prepared for the public.

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‘Living with viruses’: informing and educating the public against all conspiracy odds.

Dominick Verschelde, Hanne Windels, Andrew Simpson, Kathy Messens and Mieke Uyttendaele

Abstract

While there is hope the coronavirus (SARS-CoV-2) can be brought under control, it will continue to impact global society in many ways. Adapting to new ways of working and communicating has influenced everyone, including the (university) museum community.

Wanting to address the public's call for information, and the fear triggered by the stream of disinformation from the internet, media, and rising conspiracy theories; we engaged ourselves to inform teachers and students on 'living with viruses' through the organization of debating sessions in the university museum.

In a collaboration between the University of Gent Faculty of Bioscience Engineering, and the Ghent University Museum, an educational master's thesis was developed and written on finding a way to educate the public on the biology of viruses, and their impact on society, with the aim of arming the public against misinformation, and wrongly induced fear due to the “infodemic” and conflicting reports related to these coronaviruses that provide fuel for conspiracy theories. This program was enabled by emphasizing the scientific method and critical thinking. As a result a teacher's package was produced enabling teachers to address the subject with secondary school students, and a follow-up debate in the Ghent University Museum. We argue this is a proactive way for universities, through their museums, to inform and engage the general public and students in debates in order to ensure critical scientific thinking, and induce calmness and reason instead of fear of unknowns and uncertainties. This form of debate and reflection can be used with any type of collection or object. A well-prepared dialogic exchange with the public framed by the university museum is a good means to have people open to informed decision-making and reflect on other points of view, and different perceptions.

Introduction

Around December 2019 the world heard about a new and highly contagious SARS-virus in Asia. By March 11 2020 the World Health Organization declared COVID-19 to be a pandemic (CUCINOTTA & VANELLI, 2020), the first in over 100 years. COVID-19, a disease caused by the SARS-CoV-2-virus, was a new viral strand within the Coronavirus family. SARS stands for Severe Acute Respiratory Syndrome (Sciensano 2020, VAN REETH, 2019-2020).

By that time, as people were desperate for information and scientists still needed to study the new virus fully, a stream of unclear, confusing, and sometimes wrong information started to emerge (WHO, 2020). Fear and doubts concerning the pandemic started an "infodemic" on the internet although the information wasn't always accurate nor founded on actual research (SPERRY & SCHEIBE 2020, VAN RAEMDONCK 2020, WHO 2020). Fear, misinformation, and disinformation soon led to a series of conspiracy theories.

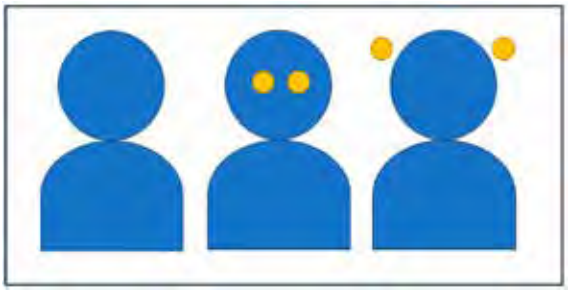

Fig. 1: First impressions: It is important to dot the 'I's correctly

It has been argued recently that belief in misinformation and conspiracy theories are no longer fringe phenomena or mundane concerns with little real-world impacts. Instead they are politically, socially and economically relevant to us all (USCINSKI 2019, 1). During the early days of the pandemic one theory claimed that 5G cellular network is the cause of the disease. De CONNICK et al. (2021) document the impact this widespread belief had with attacks on telecom workers in the U.K. (VINCENT 2020) and the burning of mobile phone masts in the Netherlands (WASSENS 2020). De CONNICK et al. (2021) also chronicle studies that show disease-related conspiracy theories encourage lower vaccination intentions, lower levels of trust in governments and health instrumentalities (LUTKENHAUS et al. 2019), and less willingness to abide by restrictive measures put in place to curtail spread of the disease (IMHOFF & LAMBERTY 2020).

In general it people were not sufficiently armed enough against or suspicious of the flood of (dis) information, and science was understandably not in any position to provide needed scientifically founded explanations. The public debate on COVID-19 was loaded with disinformation. This led to further conflict and even violence which in turn also endangered human safety and rights (WHO 2020). It has been argued that disinformation is linked with a lack of the usual social or ethical standards in group and individual behavior (McCARTHY et al. 2021). Even today conspiracy theories and distrust still endanger the efficacy of vaccination programs.

There has been a clear and urgent need to not only inform the public about viruses and how we can live with them as a pandemic response, but even more on how to deal with, and how to process the mountain of information that is readily available and accessible out there as an "infodemic" response. When misinformation is fueled by rumors, stigma, and conspiracy theories there are potentially serious implications for individuals and communities. Magnification of misinformation through social media can give it higher visibility and priority over evidence-based information. In a four month study in early 2020, 82% of online COVID-19 stories were found to be false (ISLAM et al. 2020). Other studies use the concept of technological affordances to explain differing impacts of different platforms (THEOCHARIS et al. 2021). To counteract some of the negative consequences such as vaccine hesitancy, some have suggested 'localized' public education and role-modelling as helping a lot in building public trust (e.g. VERGARA et al. 2021). Our program is one such response through the agency of the university museum.

In this program we focus on the following three central questions:

- What do young people learn about viruses, and what do they need to know?
- How can we promote and critical thinking and media literacy in youth?
- Is debate a good practice to educate people in critical thinking and media literacy?

Where to start?

Educating the general public includes teaching children at an early age. We looked at the organization of Flemish school curricula (Belgium), and teaching plans to know at what age teenagers are taught about viruses, and the need for critical thinking in high school (VALCKE & STANDAERT 2020).

So we recognized different shortages concerning the knowledge on the life of viruses, and at the same time on the use of the scientific method and critical thinking.

The corona pandemic generated a flood of wrong, confusing and untested, and hence misleading, information (WHO, 2020). It also generated one massive and multi-part "infodemic". The uncertainty and fear this caused even effects the public view on the vaccine development and subsequent vaccination efforts.

We postulate that teaching about viruses and critical thinking at a young age would render a degree of early media wisdom. We came up with a plan of action in which university museums and collections can contribute and play a fundamental role. Our aim therefore, was to develop a teaching program both on the life of viruses, and the use and concerns of the scientific method. The resulting program can be used by the teacher and students in the classroom, and can then be followed by a group debate in the university museum.

Corona viruses

On March 11, 2020, the World Health Organization (WHO) declared COVID-19 to be a pandemic, meaning that the disease was spread all over the world, stopping at no borders, and had infected a huge number of people. COVID-19 is a disease caused by the SARS-CoV-2-virus, a new virus within the Corona virus (CoV) family. Coronaviruses are single-stranded RNA viruses. They can infect a wide variety of animals including humans (KOORAKI et al. 2020). These viruses were first studied in cultures from patients with the common cold (TYRRELL & BYNOE 1966). These viruses were named coronaviruses because of their spherical virions morphology with a shell and surface projections that look like a solar corona (SAADAT et al. 2020). In Latin corona means crown. There are many different subfamilies that have been identified.

SARS stands for Severe Acute Respiratory Syndrome (VAN REETH 2019-2020). The genetic material of such viruses is known as ribonucleic acid (RNA), which undergoes mutations more easily and more frequently than deoxyribonucleic acid (DNA) as is found in our cells. This feature, along with the lifecycle, infectiousness, disease symptoms, likes and dislikes of this virus are key to understand and appreciate the severity of the problem. In itself all of this is critical information for any effective community-borne and supported battle plan to collectively tackle such a pandemic.

The impact of the pandemic meant that epidemic modelling was at the forefront of public policy making (BERTOZZI et al. 2020) at a time when little was known of the different factors that would effect, i.e. either inhibit or enhance the contagion. This prompted a sudden profusion of analyses in the scientific literature digesting huge data sets to elaborate and identify pertinent factors that would assist public policy making. These included the effects of climate (CHEN et al. 2020), seasonality (LIU et al. 2021) and population density (ROCKLÖV & SJÖDIN 2020, WONG & LI 2020). Others have noted that while classical statistical models can produce some satisfactory results they can miss intricacies and argue that datasets for such complex modelling should be used to train artificial neural networks before deriving useful predictions (e.g. CAR et al. 2020).

The Scientific Method and Critical thinking

The scientific method and critical thinking is not exclusive to research and researchers, but can help everyone to understand, and to make positive contributions to society as engaged citizens. The scientific

method teaches us to be open to all ideas, and urges us to look for proof in order to think of the best possible solutions and hence help with our decisions and actions. To have media literacy you need a degree of scientific literacy. The ability and enthusiasm to argue and debate on subjects is also inherent to critical thinking. 'Scientific thinking is something people do, not something they have' (KUHN 2011).

A scientist needs to regard all hypothesis as possible, but will only accept an idea when proven to be true. From a scientific point of view, you don't have to believe that 'God exists' as that has yet to be proven, but you cannot say that 'God does not exists', as you cannot prove that either. Critical thinking is a way of looking at situations and interpreting observations as objectively as possible. It can also help in trying to distinguish information from disinformation. It's purpose is not to influence people, but to enable them to form and take an educated standpoint. It has been argued that scientific literacy through critical thinking skills can be introduced early in a child's educational journey (VIEIRA & TENREIRO-VIEIRA 2016). We argue that developing the critical thinking skills of visitors to the university museum should be considered as part of the university's social contract. People have the right to, and need to be taught how to, form critically analyzed opinions free from fear and without it leading to conspiracy theories. This takes a degree of 'scientific literacy' (THOMSON et al. 2016). This is not an inherent human ability, but something that everyone needs to learn how to do and apply.

Science is a never ending process (HULL 1988) and cycle. As suggested in the above example, ideas and hypotheses are tested again and again and are only accepted as a fact when proven (BioInteractive, 2018). A hypothesis that ends up being disproven is discarded. When new information or proof is found, the theory is immediately adapted to this new information and fact. Science is not a faith, but must grow through constant vigilance, critical analysis and regular testing (SIMPSON & WINCHESTER-SEETO 2005). Science works towards augmenting knowledge, reducing uncertainty, and hence reducing fear of the unknown. Science does not believe, but tests over and over again. Science is not the knowledge produced by a few persons, but the result of the cooperation of an entire community working together. The development of COVID-19 vaccines is a good example of this: the world achieved in one year what otherwise would have taken an individual company a decade. This achievement is currently being documented in a university museum, the History of Science Museum at Oxford University (ACKERMAN 2021).

Twenty first century skills: the need for media literacy

Problem solving, creative thought, critical control, communication, cooperation are not only important for science, but also for society. These traits are sometimes referred to as twenty first century skills, but have been used long before now (VALCKE & DE WEVER 2019). Some have argued their importance now results from fundamental changes through the significant shift in advanced economies from manufacturing to knowledge services. Information and communication technology changes have transformed the nature of work and the meaning of social relationships. New social practices have evolved because of the massive expansion in use of new digital technologies (BINKLEY et al. 2012).

It is very important to be able to distinguish propaganda from information. In 2019 the Flemish government actually added 'digital literacy', *i.e.* computer – and information skills combined with media wisdom (THIJS et al. 2014, VALCKE & DE WEVER 2019), as one of the 16 key competences to the new teaching plans for high schools. It is essential that student learn to search, find, assess, and process all possible information readily available on the internet. Teaching this at a young age is important as, honestly, it can take a lifetime to master it. The true danger of disinformation and prejudice is that it competes with the actual truth. People can have different opinions, but we need a form of consensus on what is true, and what is debatable in order to be able to comprehend and consider different points of view (VAN RAEMDONCK, 2020). In the Flemish education system the term 'Democratic Dialogue' is used to cover this process of managing divergent points of view in a facilitated educational setting (GÖREGEN & VAN RAEMDONCK 2020).

Debate or discussion – a moderated discussion

A debate is characterized by the fact that subject, certain questions, participants, and timeframe are decided upon in advance. The participants are knowledgeable on the subject, and they debate in front of an audience. A moderator assures that everyone gets his or her turn to speak, and keeps an eye on the allotted time. In this program we want to include the audience as active participants in the dialogue. This introduces the possibility of different elements coming into the discussion and possibly enlivening the

debate. This engages the audience (e.g. schoolchildren or students) to actively think about the subject, and gradually formulate their own 'educated' or informed view on the topic. The best way to describe an undertaking such as this is a Moderated Discussion. There are no defined or prescribed outcomes, but the process and exchanges are facilitated by a neutral moderator.

In this project, preparations for the moderated discussion are done in the classroom prior to the visit to the university museum. After exposure to the subject material at school, students can prepare a few questions which are then carried forward to the university museum. Questions emerge as a result of collaborative learning dialogue in the school setting that provides individual students with motivation for the university museum component. The museum's moderator combines these questions with the museum's own program for the debate, resulting in the format of the moderated discussion. This process of building motivation in students in this way has been noted in studies of asynchronous peer-supported on-line discussions (XIE & KE 2011).

The Ghent University Museum (GUM)

The Ghent University Museum opened its doors for the public during October, 2020, in full corona circumstances; an institutional child of the pandemic. Many years in planning, It involved bringing a number of museums and collections together into a centralized facility and was part of a trend in a number of universities at the time to manage their material collections with an institution-level strategy (SIMPSON 2014). The museum consists of the following collections: Archaeology, Ethnography, History of Medicine, History of Sciences, Morphology, and Zoology. There is also a strong cooperation with the Botanical Garden.

The new museum has a cross-disciplinary remit as a forum for science, doubt and arts. It combines and presents a range of objects from the various Ghent University collections presented around the story of the scientist and science capturing the nature of scientific investigation and the process of discovery encompassing: chaos, doubt, imagination, knowledge, measuring, modeling, and networking. The GUM focuses on the story of the scientist; a journey with obstacles, false leads, doubts, and always a search for answers. This journey is repeated time after time. The moderated discussion through the use of a facilitator is a common design element in many GUM programs (e.g. DE SCHRIJVER et al. 2016). For many of the museum programs the 'journey of the scientist' is represented by a time-limited guided tour through the permanent exhibition, as a way of evoking a personal understanding of the 'journey' for our visitors.

For this 'Living with viruses' project we list the main features and messages of the classroom and university museum phase of the program below.

1. For the preliminary classroom work prior to the visit to the university museum we focus on scaffolding with what students need to know to engage with the topic. For this we prepared a teachers package with the following information:

    - What is a virus? How does it compare with Prokaryota and Eukaryota?
    - Virus' structure, and genetic makeup
    - Virus' lifecycle, multiplication and 'evolution' (mutations, recombination)
    - Ways to tackle a viral infection; what is a vaccine?
    - What is Sars and CoV-19?
    - After these five content areas are covered, students prepare questions they would like to be discussed and possibly answered at the moderated discussion in the university museum.

The following topics are also introduced in the classroom, but are addressed in more detail during the GUM workshop:

    - How to arm oneself against misinformation; the first steps towards media literacy
    - The scientific method, and the power of critical thinking
    - What to expect in and during the moderated discussion at the Ghent University Museum.

2. For the following session in the university museum we introduce the concept of the moderated discussion. This part of the program consists of the following elements:

- Collection objects are used to 'decorate' the discussion room or table, and to illustrate the introduction to the moderated discussion
- The strength of the scientific method and the nature of critical reasoning
- Discussion on whether a virus is a living organism?
- Discussion what a virus' strengths are
- Hence what do we need to look out for, and how should we react to the threats they pose?
- Distinguish between what is known, what is needed to be known, and what is unclear
- Approach of being cautious but not fearing the unknown.
- Where to look for information that is reliable
- Inform yourself well and think before you react: changing media habits
- Remember the importance of critical thinking
- Summarize the messages from the discussion to be taken home

Discussion

Conspiracy theories are both ubiquitous and challenging for contemporary society. This is a rapidly emerging socio-psychological research field. They are characterized by four specific attributes; they are consequential with real impact on people; they are universal in that belief in them is widespread; they are emotional not based on rational deliberations; and they are social i.e. closely associated with motivations underlying intergroup conflict (VAN PROOIJEN & DOUGLAS 2018). Uncertainty and fear accompany conspiracy theories. While there are a broad range of social responses that are needed to ameliorate the potential dangers posed by widespread belief in conspiracy theories, an obvious strategy for university museums and collections is to deploy their spaces and collections for positive programs that promote critical thinking and question irrational beliefs. There is meaning and opportunity for all kinds of university collections to use their objects as a tool or a focal point for debate with the public on any related subject. This involves fostering the ability to see multiple sides to a singular issue, being able to reason dispassionately, being open to new evidence that disrupts your assumptions, deducing conclusions from facts and demanding that claims are backed by evidence. This has always been an important remit for museum education (e.g. FELTON & KUHN 2007). But when it is based in the university museum, this represents the university enacting its social contract with society. The university museum provides the necessary and essential context so the details of the issues can be understood (see Figure 1).

Informing the public, addressing their questions, and taking their concerns into account are crucial steps in addressing local and universal challenges and threats by promoting rationality and providing insight and perspective on critical issues. University museums can help inform the public on a range of subjects, arm them against misinformation, and hence prevent fear and panic. In this paper we try to address teenagers concerns about the COVID-19 pandemic by creating a package on the strength of the scientific method and critical thinking. 'Living with viruses': informing and educating the public against all conspiracy odds was the result. To serve the community concerning this global issue, the teachers' package and discussion form in English are available on request from the Ghent University Museum. We hope to be able to report on the impact of the program in the future.

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This paper stemmed from a workshop presentation during the UMAC Universeum 2021 conference (held entirely online during the COVID-19 pandemic). The idea to develop into an article stemmed from Dominick Verschelde. As the Ghent University Museums Zoology Collections manager, and the Sciences Research and Education Coordinator, he recognized the need to document new engagement practices in the museum in response to the impact of the pandemic. He provided an initial draft and oversaw the process of writing the paper. Hanne Windels is a bio-engineer who recently finished an educational Masters thesis on 'Living with viruses' at the Faculty of Bioscience Engineering in cooperation with the Ghent University Museum. She focused on critical and scientific thinking in the context of the current pandemic. Professor Dr Kathy Messens, an associate professor at the Department of Biotechnology of the

Faculty of Bioscience Engineering teaches a wide variety of courses from biotechnology to nutrition. Her knowledge of genetics contributed to the paper. Professor Dr Mieke Uyttendaele is a professor in food microbiology at the Department Food Technology, Food Safety and Health of the Faculty of Bioscience Engineering. She is also the Faculty Director of Education and Internationalization and engaged in the Educational Master's program in Science and Technology. She brings microbiological insights and an understanding of teaching practices to the paper. Andrew Simpson, Research Fellow at the Chau Chak Wing Museum, Sydney University chaired the workshop session at the conference and incorporated extra content from the workshop into the manuscript.

Dominick Verschelde is a marine Biologist with expertise in taxonomy. He is the Ghent University Museums Zoology Collections manager, and the Sciences Research and Educations Coordinator in which he aims to bridge the public and collections with the universities research and education programs.

In loving memory of Amélie.

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Viruses, pandemic, education, moderated discussion, scientific method, critical thinking

Reflections on a disrupted Object-Based Learning Program

Eve Guerry & Jane Thogersen

Abstract

The Chau Chak Wing Museum (CCWM) is a public museum of art, science, history and ancient cultures at the University of Sydney that opened in November 2020. Like many other museums around the world, the CCWM was hugely impacted by the shifting landscape caused by the pandemic. The new museum opened amidst this uncertainty, with a newly conceived Object-Based Learning (OBL) program and a dedicated Academic Engagement Curatorial role. This paper explores the challenges and opportunities experienced by the program in its inaugural years and the sudden need to teach with digital collections. It also sheds light on the under-represented Asia-Pacific perspective of the COVID experience within the museum sector. Our experiences are viewed alongside those of other OBL programs, gleaned through surveying colleagues in the sector and a series of in-person visits around Australia. To meet the expectations of modern learners, it is clear that multi-modal and hybrid teaching models are here to stay. We distil these learnings and successes in order to refine and prepare museum OBL for best practice moving forward.

Eve Guerry & Jane Thogersen

Introduction

The Chau Chak Wing Museum (CCWM) is a public museum of art, science, history and ancient cultures at the University of Sydney. Bringing together the Macleay, Nicholson and University Art Collections, the CCWM is a bridge between the university and wider community. It is also a resource that enriches the academic environment for all disciplines on campus. An Object-Based Learning (OBL) program that reaches all students was a key element of the original vision and strategy for the museum. It is significant that two of the five identified key objectives for the museum depend on OBL, including 'Integrated cross-disciplinary teaching and learning' and 'Focus on delivering object-based learning'.[1] This was an incredibly unique opportunity to activate the collections for transformative learning.

A dedicated Academic Engagement curatorial role was therefore created with the opening of the museum in 2020, a role which is currently shared by the present authors. OBL in museums fills an important role in facilitating engagement with collections in meaningful ways (CHATTERJEE 2010, CHATTERJEE & HANNAN 2015). In the CCWM, OBL is implemented in its broadest form, allowing learners to connect with artefacts, artworks and specimens through object handling, close-up inspection, digital engagement and in-gallery experiences. The effectiveness of these collection-based learning experiences lies in the thoughtful curation of the objects and associated activities matched to each class. The OBL program gives utility to what might otherwise be under-utilised collections and the centralised model of the CCWM enables cross-disciplinarity in the conception, design and delivery of OBL classes.

It was clear that an initial period of trial and error, incremental adjustments and continual reflection and refinement would be paramount to running a successful OBL program in a new museum intending to reach new audiences. Now, more than two years into the CCWM OBL program, we seek to reflect on its progress, evolution and impact and to view our experiences alongside those of others as we have collectively faced years of pandemic-related uncertainty, disruption and constant adaptations to the way we approach teaching with museum collections. The CCWM opened in November 2020 and this paper reports on the OBL program in its inaugural years, 2021-2022. In addition to our own reflections, we sought those of others by circulating a survey throughout 2021 and conducting in-person visits in 2022 to OBL practitioners in museums, galleries, libraries and archives around Australia, including university, public and private collections. The survey responses and learnings from the OBL visits are considered alongside our own experiences in the CCWM in an attempt to capture the impact of recent years on museum OBL and to refine and prepare for best practice moving forward.

Fig. 1. students examine collection items at the Chau Chak Wing Museum

1. The five objectives were: (1) Integrated cross-disciplinary teaching and learning (2) Focus on delivering object based learning (3) Focal point for University-wide cultural outreach (4) Consolidate Macleay and Nicholson Museums and University Art Gallery (5) Manifest a commitment to sustainable living.

The Object-Based Learning Program at the Chau Chak Wing Museum

In anticipation of the museum opening, the OBL curatorial role began in February 2020. Prior to this time the three disparate collections had some engagement with university teaching, especially with the department of Archaeology, however, there was no intermingling of the three collections, no dedicated role to facilitate engagement and no dedicated teaching space. Just three weeks after the start of the newly created OBL position, Sydney's first COVID-19 lockdown took effect in March 2020 and the expectations for the OBL program were instantly upended. The situation was unusual in that the new museum was not yet opened, however, the small amount of university teaching that was planned to remain in place between the closure of the Nicholson and opening of the CCWM was cancelled and what was previously envisioned to be a period of familiarisation with collections and the building of contacts across the university faculties, shifted to online. There was, at this stage, no expectation for the OBL program to operate through digital engagement with collections. As the semester (and the pandemic) progressed, significant efforts were made to connect the museum with all areas of the university by attending online departmental, school and faculty meetings wherever possible and showcasing relevant collection integration suggestions for each using high resolution 2D images of collection items. Although it was not possible to present physical objects to prospective OBL users, we were aided in this 'cold-calling' endeavour by the agility afforded by effortlessly clicking in and out of virtual meetings. Additionally, attendees inspected the digital surrogates on their own personal device in a way that would have been ineffective and underwhelming on the shared screen of a departmental meeting room.

The second semester of 2020 saw our first tentative steps into teaching with digital collections. There was some limited return to onsite teaching in Sydney, however, most courses were taught remotely and construction of the CCWM was not yet complete. Once again, the expectation was that the OBL program could not yet function. Nonetheless, we supported three units of study during this semester over zoom. The first was an archaeology unit with long-standing ties to the collections, which achieved the 'pivot' to remote learning through a series of pre-recorded videos made where the lecturer discussed an object held to the camera. The other two units, from the departments of Art History and Anatomy, had not previously worked with the museum. In both of these cases a 2-hour online class was offered, in which we trialled approaches to OBL activities with digital surrogates, exploring the 'aura' of a digital object and supporting learning using platforms that benefit from online learning environments. Examples include searching other museum collections online for parallels, live gaming software (e.g., Kahoot, PollEverywhere, Mentimeter), platforms that allow students to contribute their ideas and findings simultaneously and in real time (e.g. Padlet), and running activities that rely on multiple students being able to conduct extremely close-up observation of the same object at the same time. The CCWM opened in November 2020, after the close of the teaching period. We offered a series of introductory OBL Professional Development workshops open to university teaching staff from all disciplines, which proved to be highly successful and led to further engagement, including bookings for 2021 units of study.

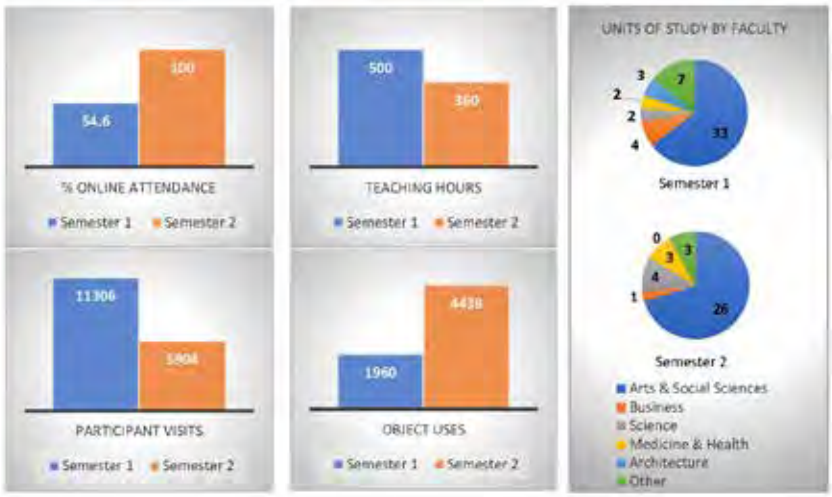
The first fully operational teaching period for the CCWM OBL program was Semester 1, 2021 and it coincided with the university-wide introduction of the "hyflex" learning model. This is a hybrid and flexible classroom allowing students to decide on the day whether they will attend either in person or online without having to acknowledge this beforehand. This was hugely challenging for OBL as it was unclear how many participants would appear in the classroom to handle physical objects (what would be the optimal set-up and number of objects), versus how many would require digital access for any given class. We also found that the digital component requires different preparation and a different selection of objects more suited to the online environment. Therefore, being unaware of the onsite/online ratio for any given class made it very difficult to focus our workload in preparing for a class across both delivery modes. Despite these unforeseen challenges, the semester was very successful and enjoyed an overwhelming response from eager users from all parts of the university. Across the thirteen teaching weeks of semester 1 2021, the OBL program delivered 401 classes for 51 discrete Units of Study or programs, spanning a combined 500 teaching hours. Through these classes there were 1690 object uses from 1074 unique collection items, many of which had long sat unused in storage (see Table 1 for breakdown of participant and session information).

During this time social distancing and mask wearing were in place in the museum, though Sydney was not under lock-down conditions at any stage during the semester. Nonetheless, under the hyflex learning model, 54.6% of our participants chose to attend online. We underwent a steep learning curve during

this teaching period, trialling different methods for online and hybrid OBL activities. Hyflex classes were managed through AV equipment in the purpose-built Object Study rooms, which allowed remote students to join the classroom via zoom. This set-up was designed pre-pandemic with the intention to allow expert guest lecturers to join the class remotely, so there were some limitations in converting it into a hyflex classroom, such as difficulties detecting group conversation over the speaker system. We found that remote learners worked better when provided with access to digital images (high resolution 2D and 3D digital models wherever available) that they could manipulate and zoom-in on at their leisure, rather than relying on the physical objects as seen through the cameras fitted in the room as they were handled by their classmates or demonstrated by the lecturer. Most hyflex classes started and ended with a joint discussion, while group work was done depending on attendance mode. The huge take-up by disciplines from across the breadth of campus for curated museum engagement meant that there was a considerable range of needs and experience with many classes being completely new to the museum and OBL as pedagogy. Therefore, the OBL curator facilitated the majority of the sessions, working across 3 teaching spaces plus online cohorts simultaneously with the equivalent of one fulltime curator. This was not sustainable.

The COVID-19 Delta lockdown in Sydney began in late June 2021 and as a result the entirety of semester 2 was taught online. The switch to 100% remote attendance was challenging but now presents an exceptional opportunity for a direct comparison of effective delivery methods for OBL across various learning environments. We can assess the hyflex model implemented in semester 1, followed by the fully online mode in semester 2, reflect and report on the relative benefits and challenges of each and discuss how OBL best practice has been reshaped for the fluid educational environment of the future.

Table 1. OBL program across different teaching modes in 2021



Semester 1: January-June 2021. Hyflex teaching | Semester 2: July-December 2021. Fully remote teaching.

The museum closure in semester 2 compelled us to revisit our digital content and methods of engagement for digital OBL experiences. Apart from staff time, we had no resources to support this so focused on methods and platforms that did not carry a cost, particularly leveraging new and existing partnerships where expertise and resources could be shared, whilst making better use of free digital learning tools. The museum's online Collections Search was an essential tool and we first used it to create unit-specific catalogue pages to support hyflex learning in semester 1. These pages present a curated group of objects and are searchable by a unit code (e.g., "SLAM4003"). This responded to the limitation posed by the online catalogue's inability to perform intuitive searches and the occasionally limited and inconsistent metadata attached to object records. An added benefit was the opportunity for students to easily engage pre- and post-session with the curated objects. In semester 2 these online pages became essential tools both for in-class activities and for asynchronous tasks, self-guided research and assessment tasks. Twelve unit-specific catalogue pages were created in semester 1, whereas 51 unique pages were created in semester 2. One consideration for the future is to add digital analytics making it possible to track student engagement through these pages pre- and post-museum class. In semester 1 we instigated partnerships with Archaeology to populate our Sketchfab account with 3D models and with Faculty of Medicine & Health Media Lab to produce an interactive 360° image capture of the galleries. This became invaluable in semester 2, when we leaned heavily into this digital output for online OBL. In addition, we continued to survey and adopt freely available digital learning tools.

One of the greatest challenges to overcome was the perception that an OBL class in the museum could not proceed during the lockdown and that attempting to do so would offer an inferior experience and therefore be detrimental to any future engagement with the museum. There was a general attitude at the university that museum engagement would be impossible, or at least underwhelming, if students did not have the option of attending in-person to handle artefacts, specimens and artworks. This was even after the previous semester's hyflex model where more than half of the participants had joined their class remotely. For this reason, once the lockdown begun, no new classes booked into the OBL program and thus compared to semester 1 there were fewer classes and participants. Conversely, of the bookings that already existed, some of which were new units (including Economics, Early Childhood Education, History & Philosophy of Science, Italian Studies), none cancelled. Despite many lecturers being initially apprehensive as to whether the workshop could function as a purely online offering, all of the planned classes went ahead and were extremely well received by both students and academic staff. In each instance, we sought neither to offer a 'virtual museum visit' nor a streamed version of would have been delivered in-person. Instead, we developed completely new, fit-for-purpose digital OBL experiences, for example focusing attention on a detail of a historic photograph, or having the class inspect a discrete part before viewing the whole object.

In this endeavour several benefits of teaching with digital collections came to the fore. As expected, a key benefit was the ability to reach more learners in a more equitable way, in diverse locations and living situations. It also saw increased use of collection items, given the capacity for high frequency use with zero impact on object physical safety, including using items that would otherwise be excluded from OBL programs such as those that are too fragile, toxic, bulky, sharp, etc. to be suitable for object movement and handling. Despite having fewer participants, during Semester 2 there were 4438 object uses, compared to 1690 object uses over semester 1. This demonstrates that digital OBL enables more objects to be more easily used. Additionally teaching with digital collections allows multiple students and classes to inspect a single object at the same time, zoom and manipulate at high resolutions and discuss the object simultaneously. It encourages the development of digital literacy skills and familiarity with digital learning tools (for educators and students) and leads to more sustained engagement with the collections post-visit. Finally, where OBL is fully online it significantly reduces the demand on museum staff resources in the preparation, movement and supervision of collection items.

The primary challenges for shifting online revolved around the digitisation of the collection; what had already been digitised, capacity to prioritise for the immediate future and the quality of the data and image capture. This placed greater expectation and strain on the digital assets and staff resources and expertise. In cases where online access became unstable the impact was all-encompassing and far-reaching, for example if the online Collection Search was temporarily down it was difficult for the class to proceed. Digital OBL was deceptively time consuming as it necessitated a system of rigorous preparation and back-ups of digital assets before each class.

Impact of COVID-19 on OBL programs and new directions

The pandemic caused severe disruption to museum education and outreach, carrying with it a general sense of being unprepared and ill-equipped to respond (CIOPPI et al. 2020). To gain insight into the experiences of other OBL programs during this period and to help form a vision for the future, a short survey was circulated to OBL practitioners throughout 2021. Understanding that there were already several surveys circulating the GLAM sector at this time around the "digital pivot", we made the survey brief, targeted local communities of practice, sought depth of understanding and qualitative data. Thirty-one valid responses were returned, of which nearly half were from respondents based in Sydney and a further twelve from other locations around Australia (Table 2).

All respondents reported an overall drop in OBL engagement for participant numbers during the pandemic and a general feeling that they were offering an inferior OBL experience, despite the fact that many reported reaching new audiences through moving online. The data showed that many respondents did not find a solution to continue offering OBL at this time and therefore their programming was suspended. Other practitioners offered limited onsite OBL experiences to extremely restricted numbers, with no handling permitted. Those who embraced teaching with collections online adopted several different approaches to digital OBL, including the use of: high resolution 2D images, 3D digital object collections, virtual exhibition tours, video resources with objects/collections, live-streamed gallery talks with objects/collections/exhibitions. Another solution was to ask students to conduct OBL activities using their own

objects found around the home. There was a subset of educators whose digital OBL model was actually a hybrid classroom where the teacher held up the objects to the camera in the museum, either pre-recorded or live, whilst the students joined remotely and observed. It was interesting that the definition of "digital OBL" varied significantly between practitioners, no doubt due to resourcing, skills and expertise but also a lack of a unified theory of what constitutes digital OBL, or even what constitutes OBL in general. In fact, several respondents stated that they ran education programs with collections but specifically did not identify this as OBL practice. This clearly shows the need for a broader discussion within the sector.

Table 2. OBL survey respondents

Impact of COVID-19 on OBL survey respondents	
Sydney	15
Regional NSW	4
Melbourne	5
Regional VIC	1
Tasmania	1
Perth	1
USA	2
Europe	2
Large organisation	11
Small-medium organisation	19
City-based	26
Regional	5

It became clear that some methods were more effective than others and that best-practice OBL may take elements from both digital and in-person experiences. Three respondents identified that previously (2015-2019) their digital engagement was an asynchronous offering of learning resources and tools. The pandemic-fuelled digital shift saw them adopting more synchronous, live and interactive learning opportunities as this was deemed to be a better experience for their online audiences. However, the data showed that pre-recorded digital OBL experiences tended to rely on 2D and 3D collection images that were also available for the learners to interrogate at their own pace. By contrast some synchronous online OBL classes were more likely to involve the educator simply holding the object up to the camera. Interestingly, this meant that the asynchronous pre-recorded model could be *more* interactive for the participant who was able to take an active and autonomous role.

Interestingly some practitioners who identified as having digital OBL engagement with collections in 2015-2019 were not able to continue this practice during the pandemic. The data did not further capture the reasons why these activities were halted but it raises the question of what level of in-person engagement is still required for certain digital teaching models. This warrants further investigation.

A key argument for digital OBL, regardless of the pandemic, is often the capacity to increase accessibility, however, several of our respondents identified that digital access significantly decreased some audience engagement, particularly seniors who struggled with the technology, those without reliable broadband networks or those without a private learning space.

Where restrictions allowed, even though the museum/gallery was closed to the public, some respondents reported having hung a whole new exhibition so that it could be captured digitally and shared online, even if it meant it was never to be viewed by the public on-site. One might question the justification for not creating this entirely in the virtual realm without the need to physically install an exhibition, however, this has now given rise to an incredibly rich archival resource that can be utilised well beyond an exhibition's lifespan and may have the potential to change archival practice for exhibitions moving forward.

Another key point to come out of the survey was the ongoing discussion around the value and perceived "realness" of digital 3D models of objects. In the CCWM OBL Program, students in the museum will often question whether the objects in front of them are real or replicas and the answer will impact the value they place on the learning experience that follows. The digital classroom, however, relies on digital surrogates and therefore the question of whether the digital 3D models were generated using real or replica objects has far less impact on students' perceptions of the learning experience.

In general, respondents focused their attention on assessing and creating digital resources with the pandemic "fast-tracking the emphasis on digital capacity", however, they were still limited by the technical, human and financial resources available to them. Just simply having the impetus and tools to make digital content available is not the same as having staff to produce content for meaningful digital OBL. In fact, several survey responses highlighted that for online OBL to be meaningful and engaging, it is not enough for content to be made available, rather content needed to have an element of immersive co-creation

during the OBL session. The remote access also changed the way that OBL practitioners engaged with each other across institutions, facilitating greater collaboration.

Looking to the future of OBL, the survey results highlight a clear expectation that hybrid delivery models as well as digital access to content are here to stay, as an expectation of current audiences and learners. Only one respondent felt that digital OBL would be prioritised post-pandemic, whereas all other responses had a clear preference for in-person OBL and felt the digital was best used to augment but not replace the in-person OBL experience. Following the qualitative analysis key local institutions were identified to further the conversation through planned visits in 2022.

The "New Normal": CCWM OBL program 2022 onwards

In 2022 the OBL program saw an increase in the reach across the university with more classes than in previous years. Interestingly, we saw smaller participant numbers due to high attendance attrition rates across these classes as student behaviour was still unpredictable. Where lecturers endeavoured to continue to offer students flexible learning opportunities we often saw "flexible" shift to "optional" and this had a negative impact on attendance. This was a particular issue for any extra-curricular offerings that were not strictly tied to assessable outcomes of a unit of study. This trend started to change towards the end of 2022 as students started returning en-masse and has continued an upward trajectory in 2023. The increase in classes also meant that we saw a greater number of students returning to the museum for different classes as more and more lecturers were engaging with the OBL program. As a result, we needed to be even more aware of avoiding any repetition in the program design and object selection for each class, so that students could have a new experience each time and continuously build their skillset. We are fortunate to have the majority of the CCWM collections available for teaching as restricting the classes to a dedicated education collection would not be feasible in this context.

Reflecting on these changes crystallised the need to shift focus from measuring and reporting on participant numbers as the key measure of success. Instead, success in the OBL program is indicated by reach across all the various disciplines at the university; depth of study into collection items, concepts and connections; and using diverse objects from across the breadth of the collections to challenge students to think differently. Unexpectedly, seeing the OBL program move beyond a one-off-visit, dependent on an individual academic connection, to becoming integrated into the continuum of learning across multiple stages of a course/degree is a particularly strong measure of success. Learning to capture all of this more complex data has relied on a full team approach, collaborating closely with the Collection Manager, Documentation and Digitisation, to create the possibility of recording in the museum's database (Axiell EMu) as the one central repository for logistics management and reporting. Especially within a university context, having the capacity to measure, record and report on the measures of success is essential.

Moving forward there is capacity for the program to continue to grow throughout the university. At the end of 2022 an assistant curator role was casually appointed to support the OBL program. As we move beyond the expectation of a single dedicated curator role to the possibility of a team of OBL experts that work across curatorial, collections management and education, and with multiple delivery platforms, the potential would be limitless. Embedding museum OBL as a core strategy that aligns with boarder university priorities is an approach that should be more widely implemented throughout the higher education sector.

Disclosure Statement

The authors report there are no competing interests to declare.

Data Availability Statement

This paper incorporates qualitative data collected via an online survey. The data that supports the findings of this study are not publicly available at present beyond the discussion presented in the current paper but can be made available from the authors upon reasonable request.

The ethical aspects of this study have been approved by the Human Research Ethics Committee (HREC) of The University of Sydney [Ethics Approved Project No.: 2021/549] according to the National Statement on Ethical Conduct in Human Research (2007).

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Object-Based Learning, digital OBL, interdisciplinary, COVID-19, university collections

Heritage and Museum Sciences – an immersive USA graduate model for educating museum and heritage professionals

Eileen Johnson & Nicola Ladkin

Abstract

In today's academic market, the education and training of museum and heritage professionals takes many forms. The traditional educational format is that of on-campus classroom learning within an academic department. The Heritage and Museum Sciences graduate program at Texas Tech University (USA) builds on the traditional format to create a model immersive experience that produces academically and professionally prepared graduates who compete successfully in the US museum and heritage job markets.

Eileen Johnson & Nicola Ladkin

Introduction

During the past decades, five aspects mark the professional growth of US museums – modern definition, prevailing ethics, accreditation, accountability, and graduate degree-programs. Further, museums in the 21st century need to demonstrate an impact in their communities and establish their public value or worth to their community, be considered essential, and be accountable to their constituency[1]. An educated professional workforce is critical. Learning must be occurring, with ideas being explored and inspired, identities being shaped, and connections being made.

Having a professional staff is part of the US definition of a museum (SWINNEY 1978; the Museum and Library Services Act 1996 and reauthorized Act 2018[2]). A professional staff is composed of people educated and trained in the profession-shared body of knowledge. In recognizing that museum professionals have to be a group of people with a shared body of knowledge, the need to transmit information systematically, educate, and train people in that shared body of knowledge is required.

Today, an advanced degree should provide the student the background and theoretical/philosophical framework in which to understand museums, past, current, and future trends and issues, standards and best practices, and the role of museums in society. It should position the person to evaluate and make informed decisions based on museum principles, ethics, and practices at whatever level or position. The advanced degree should provide the education as well as the training and skills to be an emerging museum professional. These same attributes apply to the post-graduate education for heritage professionals.

Heritage and Museum Sciences is a master's degree-granting, stand-alone (i.e., not embedded in a discipline-specific department), residential program located at Texas Tech University in Lubbock, Texas (western Texas), USA. The purpose of the program is to educate and prepare museum and heritage leaders for today and tomorrow on a national to international scale. For this current review, the aims are to: place the program within its pedagogical philosophy; and outline some of the challenges currently being addressed. This study is substantive rather than conceptual in nature, yet some concepts are discussed briefly and terminology clarified. It primarily is a pragmatic perspective on the approach taken in creating an immersive environment for the education and training of museum and heritage graduate students.

Background

Heritage and Museum Sciences is an interdisciplinary program governed by the University's Graduate School and housed in the Museum of Texas Tech University. The Museum of Texas Tech University was founded in 1929 (then called the West Texas Museum) as a community museum and a university research institution. This highly unusual model for the time was successful in garnering support from both university (then Texas Technological College) and public communities. Its collections were driven by mission and scope of collections (arid and semi-arid lands) and generated primarily by a paid curatorial staff. Founding collections were in anthropology, history, and vertebrate paleontology.

Today, the Museum's mission (with modernizing language updates through the years) and dual purpose remain the same as does the approach to generating its collections. The collections number almost 9 million objects along with their documentation and reflect the current collecting divisions of anthropology, art, clothing and textiles, history, natural sciences, and paleontology. At present, the Museum complex consists of the core museum, the Natural Science Research Laboratory, and the Lubbock Lake Landmark. The Lubbock Lake National Historic Landmark is a heritage satellite facility governed by the Museum and located ~4 km (2.5 miles) north of the Museum. The interior square footage of the Museum complex comprises ~24,155 square meters (206,000 square feet). A new ~1748.2 square meter (18,818 square feet) wing currently under construction has the entire second floor as dedicated space for Heritage and Museum Sciences. The Museum complex is accredited by the American Alliance of Museums (AAM).

Today's world and into the future requires scholars with a global approach to problem solving. Inquiry and discovery cross the boundaries of many disciplines. This interdisciplinary mode of thinking requires

1. accessed at https://www.aam-us.org/programs/ethics-standards-and-professional-practices/core-standards-for-museums/.
2. accessed at https://www.imls.gov/about-us/legislation-budget/timeline.

21st century learning skills such as critical thinking, analysis, synthesizing information, interpretation, research competence, creativity and innovation, leadership, collaboration, and technology (TRILLING & FADEL 2009).

In the last ~20 years, certificate and master's level programs have proliferated across the US due to student demand for graduate training or education (http://aam-us.org/resources/careers/museum-studies). This demand has been fueled by increased competition for and job growth in museums and heritage properties. For the period 1990 to 2020, US Bureau of Labor Statistics figures indicate that the museum and heritage industry in the non-academic sector has been in an economic upward trend. That trend peaks at the end of 2019 with the beginning on COVID-19 impacts (fig. 1). Employment projections for 2019-2029 reflect the expectation prior to COVID-19 that the museum and heritage industry would continue to grow (up to a 13% increase in jobs[3]). While the short-term effects of the global pandemic have been devastating for US museums and heritage properties (AAM 2020) (and even more so for museums globally [ICOM 2020; UNESCO, 2020], the long-term impact to that growth trend is not yet known. Even though US employment statistics for 2020 note the very steep decline in the museum and heritage industry, they also indicate a bottoming out and an upward trend in the latter part of the year (fig. 1). That rebound while good news for the museum and heritage industry transcends to students and should help alleviate the concerns and future employment uncertainties US students are experiencing (AUCEJO et al. 2020).

According to the Smithsonian Museum Studies Training Directory[4], currently 118 undergraduate and graduate programs exist in some form of museum or heritage studies in the United States. Of those, 23 graduate programs offer master's degrees in Museum Studies or Heritage Studies while an additional 24 entries have some form of a certificate program. Most are embedded within a discipline-based department (e.g., art or art history, anthropology, history, school of design). Many of the graduate programs have a single focus such as Museum Education or Museum Decorative Arts while others have a broader approach. Most are classroom or online only or classroom plus field trips or visits to local museums as observers. Heritage and Museum Sciences is one of only a few programs integrated into a functioning and accredited

Fig. 1. US Bureau of Labor Statistics employment data for the museum and heritage industries for the 10-year period 2011-2020 showing the upward trend, then the COVID-19 pandemic impact, followed by a beginning rebound (http://data.bls.gov [National Employment Matrix]).

museum and that actively and regularly combines theory with hands-on practice and application. This work-integrated learning is reflected in the experiential component of the curriculum. The graduate students are participants and not observers.

Concepts

A number of theoretical approaches can be used today to examine higher education, the process of learning, student success, and the societal or economic gains/needs of a nation. Three approaches frequently are taken in examining experiential learning and the formal vs. informal (nonformal) dichotomy (e.g., KOLB 1984; GUILE & YOUNG 1998; PARILLA & HESSER 1998; SCRIBNER & COLE 1973; SIDES & MRVICA 2007; BAY 2021; TRILLING & FADEL 2009; BELLANCA 2015).

One is activity theory based on VYGOTSKY (1978) perspectives, also known as the cultural learning theory (SIDES & MRVICA 2007), that focuses on a social view of learning. A principal concept is that of the zone of proximal development. Learning through social interactions takes place in the zone. It lies between the level of what a person can do already and the level of what they can do with assistance. The zone is a dynamic place where tools, people, and other resources are available to facilitate acquisition of

3. accessed at http://data.bls.gov (Employment Projections program).
4. accessed at http://aam-us.org/resources/careers/museum-studies

new knowledge, skills development, and creation of communities of shared practices. It focuses on the process of learning as socially constructed learning rather than on the individual (COLE 1985; BROWN & FERRARA 1985; SIDES & MRVICA 2007).

The social theory of learning expands on the cultural theory of learning as a more inclusive theory that incorporates reflexive learning (GUILE & YOUNG 1998). Reflexive learning is a process that acknowledges the role of context and experience in a social setting (MOON 2004; SUGERMAN, DOHERTY & GARVEY 2000). Reflexive learning and experiential learning theories are closely aligned. Experiential learning is an approach to learning and education as a lifelong process. It examines the linkages between education, work, and personal development, emphasizing the critical linkage between the classroom (theory) and the real world (practice) (KOLB 1984, 3-4). Learning is a process "whereby knowledge is created through the transformation of experience" (KOLB 1984, 38). Experience plays a central role in the learning process and is transformative in nature (KOLB, BOYATZIS, & MAINEMELIS 2001; KOLB & FRY 1975). It emphasizes active learning by doing that facilitates information processing. Learning is enhanced when individual learners take an active role in the learning process (KOLB 1984; KOLB, BOYATZIS, & MAINEMELIS 2001; HAWTRY 2007; McCARTHY 2010; SMART & CSAPO 2007).

Situated learning theory is the second approach. Situated learning also posits that learning is a social process and also contextual. The focus is on the relationship between learning and the social setting in which it transpires rather than on the individual learner. Skills and knowledge are acquired in the contexts in which knowledge is obtained and applied in everyday, real-world situations (ANDERSON, REDER & SIMON 1996; LAVE & WENGER 1991; PATEL 2017; STEIN 1998; SIDES & MRVICA 2007). Learning is problem driven rather than content or subject driven (STEIN 1998). Learners confront real challenges and resolve obstacles in overcoming those challenges, with the knowledge and skills gained applicable to beyond the one challenge or situation. They develop the knowledge and skills necessary in conjunction with a community of experienced people having greater knowledge. It becomes communal learning within a sociocultural environment. Practice is a way to refine knowledge and hone skills (SIDES & MRVICA 2007).

With the third approach, 21st Century learning posits converging forces today that lead to new ways of learning in this century in response to globalization. While innovative ways to learning are essential, a major concept is that of 21st century skills. These skills are categorized as: learning and innovation skills; digital literacy skills; and career and life skills (TRILLING & FADEL 2009, xxvi). Critical thinking and problem solving become the basics of 21st Century learning (TRILLING & FADEL 2009, 50).

High Impact Practices (HIPs) and Deep Learning are aligned concepts within the 21st Century learning approach. HIPs increase rates of student retention and engagement and help level the playing field for underrepresented students (KUH 2008:9, 22). Although HIPs focus on the undergraduate learning environment, they are readily adaptable to graduate learning. HIPs foster experiential learning and deep approaches to learning (i.e., integrative learning). Deep Learning emphasizes acquiring information and understanding the broader and essential meaning of that information through integration, synthesis, and deliberation (BELLANCA 2014; KUH 2008:14; NELSON LAIRD et al., 2008:469; RAMSDEN 2003:47; TAGG 2003:81). These aspects are key for learner success.

Following upon HIPs, today's marketable skills in the US (and FADEL, BIALIK, & TRILLING [2015] argue globally) center around critical thinking, teamwork, and communication and calls for identified marketable skills and student awareness. Marketable skills are related to the HIP essential learning outcomes that detail a number of skills (e.g., teamwork, problem solving, critical and creative thinking, inquiry and analysis, synthesis, written and oral communication; SCHNEIDER 2008:4). That skill set is similar to 21st century skills called for by TRILLING & FADEL (2009) and adapted by the Institute of Museum and Library Services[5] for museums to incorporate into their public education programming. Their adaptation has distilled five skills: critical thinking; synthesizing information; ability to apply education to real life circumstances; innovation and creativity; teamwork and collaboration. The American Alliance of Museums (AAM) has gone a step further in linking 21st century skills and museum leadership and examining the skills needed to be an adaptive, flexible leader[6]. AAM has endorsed the five IMLS identified skills as the minimum marketable skills for leadership.

5. accessed at https://www.imls.gov/issues/national-initiatives/museums-libraries-and-21st-century-skills/
6. accessed at https:/www.aam-us.org/resources/online-programs/past-program-archives/perspectives-on-museums/.

Terminology

Three terms are used in the experiential component of Heritage and Museum Sciences, that of practicum, apprenticeship, and internship. These terms are not synonymous or interchangeable, although some scholars (e.g., BAY 2021; BURKE & CARTON 2013; RYAN, TOOHEY & HUGHES 1996; SIDES & MRVICA 2007) differ in that view. All are curricular opportunities, provide students the critical bridge between theory and practice, and afford learning experiences prior to graduation. Although each varies in their setting, degree of independent responsibilities and supervision, and time investment, the focus is on work-based learning (e.g., RAELIN 2010). A practicum provides a student with a level of practical, real-world experience and more in-depth skills than within a classroom setting (RYAN, TOOHEY & HUGHES 1996; STIER 2002). For Heritage and Museum Sciences, a practicum is an individualized instruction course of supervised experiences involving hands-on activities. The purpose is to provide students opportunities to apply relevant knowledge and skills or gain new skills within an actual work environment while receiving course credit. Heritage and Museum Sciences students are afforded that work environment in a functioning museum and heritage facility (Museum of Texas Tech University complex). Students design and implement an individual practical project in direct consultation with and under the guidance of an experienced museum or heritage practicing professional. The practicum is a HIP course involving a stated minimum total work hours (based on semester contact hours), a practicum agreement signed by the student, faculty member, and work supervisor (if different from the faculty member), maintenance of a journal, and a reflection paper on what was learned from completion of the practicum.

The apprenticeship system has a long history (since at least the Middle Ages) and primarily was focused on learning a trade, either in lieu of formal education or post-secondary education (ALDRICH 1999; FRENETTE 2015; RORABAUGH 1986; SMITH 1981; SNELL 1996;) but included medicine and law professions (ALDRICH 1999). It is work-based learning in the form of skill acquisition and learning (FRENETTE 2015; GUILE & YOUNG 1998) and viewed as vocational education (CLARKE 1999; FULLER 1996; GUILE & YOUNG 1998). The apprenticeship system facilitates the transition from school to work in training youth for trades and crafts and today involves employers, trade unions, and young people (FRENETTE 2015; FULLER 1996). Modern apprenticeships systems are governed by laws and involve a relationship between the economy, work, and skills. They are industry based but focused on higher level skills acquisition and effective learning. Experiential learning should be coupled with both on the job and off the job training to enhance quality of learning and integration of learning (FULLER 1996).

The US apprenticeship system had a much shorter and unstable history. Although brought to colonial America, (FRENETTE 2015:353; RORABAUGH 1986), by the late 19th century, apprenticeships were rare (ELBAUME 1989; ROBERTS 1957). The National Apprenticeship Act (Fitzgerald Act) of 1937 revived the apprenticeship system in the US (FRENETTE 2015; PERLIN 2011; SUTLIFF 1995), formalized it, and established governmental standards for training in trades and crafts. The focus remained work-based learning and industry-focused.

FULLER & UNWIN (1998:151) contend that a modern apprenticeship system should place the apprentice with a community of practice (being a group of more experienced workers) with the community of practice centering "on the workplace and the off the job training location." ROGOFF(1990:39) argues that the concept of apprenticeship can be used as a model for children's cognitive development, i.e., apprentices in thinking whereas the role of the child is as a novice with guided participation. She (ROGOFF 1990:10) views cognitive development and learning as shared problem-solving involving emotions and social structure and relations. Following these perspectives, the apprenticeship concept can be applied to different settings and not restricted to that of learning a trade or craft within an industry-based framework.

For Heritage and Museum Sciences, an apprenticeship is another internal hands-on learning experience that is a paid arrangement for supervised basic training between an experienced person and an inexperienced person for the transfer of knowledge and skills. The experienced person is a museum or heritage practitioner and the inexperienced person is the pre-professional student. Apprenticeship positions are paid (hourly wages), carry responsibilities and obligations, and are project or program oriented with an expected level of productivity and time-commitment by the student. Students have the opportunity to put into practice the concepts they are learning in the classrooms. The apprenticeship program is based on a mutually beneficial approach and the positions are an important aspect for Museum staff in accomplishing the operations of the Museum complex. Apprentices assigned to the same work area/supervisor may be from the same cohort of students or a mix of cohorts. The Museum staff, Heritage and Museum Sciences

faculty (many of whom have joint Museum staff positions), and Heritage and Museum Sciences graduate students form the community of practice and the Museum complex is both the workplace and the off-the-job training location.

Whereas the practicum is a semester experience, the apprenticeship is an extended, intensive experience. Students are eligible for an apprenticeship position the entirety of their program (including summers) until they begin their internship or graduate (if following the thesis option). A student can maintain their apprenticeship position in the same area of the Museum complex or have up to three apprenticeship placements over the course of their tailored program. Coupled with different practicums, students can have extended experience in multiple areas of the Museum complex. This flexibility allows for strengthening skills and relationship as well as developing breadth of skills and interactions.

The closest antecedent for internships is the apprenticeship system (FRENETTE 2015) but the focus is different. While the apprenticeship focus was on trades and crafts, the internship focus is on professions. Internships in the U.S. began in the late 19th century with the medical profession followed by other professions in the early 20th century (PERLIN 2011; WENTZ & FORD 1984). Modern internships in the US can be viewed as academic or commercial (e.g., DISCENNA 2016; KING & SWEITZER 2014). Academic (or professional) internships are student-oriented, part of an academic program, provide meaningful, structured, career-relevant experiences, a deliberative learning activity with a degree of supervision, and involves refection and feedback within learning goals, objectives, and outcomes (e.g., BURKE & CARTON 2013; O'NEILL 2010; STIRLING et al. 2017; PARILLA & HESSER 1998). Academic internships generally are undertaken prior to graduation. They should be of high educational quality and grounded in empirical learning theory (STIRLING ET AL. 2017). Commercial internships are open to anyone, are work-force oriented, and not tied to an academic program (e.g., CURIALE 2010; HARTHILL 2014; HUGHES & LAGOMARSINE 2015; KING & SWEITZER 2014; PERLIN 2011). They may be undertaken pre- or post-graduation.

Traditionally, internships generally have been unpaid and the length of time involved varies widely (refs). This model has been used for both academic and commercial internships. In the US, recent court cases have involved commercial internships and whether the intern had the right to be paid based on the Fair Labor Standards Act (FLSA) of 1938. While court rulings are mixed, questions surround who is the primary beneficiary (intern or company/institution) and whether the arrangement is mutually beneficial (e.g., BERGMAN 2014; CHRYSLER 2014; HARTHILL 2014; HACKER 2016; HUGHES & LAGOMARSINE 2015). Governmental agencies and non-profits remain exempt from these guidelines but that exemption has been questioned (CURIALE 2010; DURACK 2013; JONES & SELTZER 2015; PERLIN 2012; TUCCI 2012). Nevertheless, the White House Internship Program recently announced (2022)[7] that for the first-time, internships will be paid in order to remove any economic barriers for participants. While the legal issues continue to play out, professionals are questioning the ethics of unpaid internships regardless of whether academic or commercial. Unpaid internships are viewed as exploitive/wage theft, exclusionary/class-based privilege, furthering obstacles for socio-economic mobility, contributing to a lack of diversity (ethnic, social, gender), and having a disproportionate burden on the economically disadvantaged (increasing financial insecurity; heightening wealth inequality) (BENNETT 2011; BURKE & CARTON 2013; CHRYSLER 2014; CURIALE 2010; DISCENNA 2016; DURACK 2013; GREGORY 1998; HARTHILL 2014; MCHUGH 2017; HORA, WOLFGRAM & CHEN 2019; PERLIN 2011; RAVISHANKAR 2021; SHADE & JACOBSON 2015). This view is reflected in other countries where the intern economy is being examined (FORKERT & LOPES 2015; GRANT-SMITH & MCDONALD 2018; SIEBERT & WILSON 2013; SKUJINA & LOOTS 2020; SWAN 2015). Further, unpaid interns are not protected under US employment laws (e.g., CHRYSLER 2014; FREDERICKSEN 2013; HACKER 2016). In the US, museum professionals are beginning to voice an ethical stance and call for only paid internships (GREENE 2022; FISHER 2013; NEMPN 2022[8]).

Heritage and Museum Sciences has two options towards graduation, that of a thesis or an internship. Since its inception, Heritage and Museum Sciences has required a paid, full-time, 6-month internship. In addition, students enroll in Internship hours for their final course credits for graduation. These internships have been external to the University and expected to be mutually beneficial for the student and host institution. Although provided guidance and advice in their search, students are responsible for

7. accessed at https://www.whitehouse.gov/get-involved/internships/.
8. accessed at https://nationalempnetwork.org/press-releases/statement-on-exploitative-workplaces/.

locating, applying, and interviewing to secure an appropriate internship. This responsibility is by design and viewed as an introductory practice towards the process of securing their first post-graduate position. Job descriptions for available internship positions vary by host institution. Internship offers are reviewed by the student's committee, Graduate Advisor, and HMS chair to ensure the standards are met for an academic internship, compensation is adequate, and the intern's supervisor at the host institution is a museum or heritage professional. A signed internship learning agreement between the host institution, HMS, and the intern outlines the duties and responsibilities of the intern and educational outcomes. Other requirements include interim reports by the intern to the chair of the student's committee, a mid-term (i.e., 3-months) report by the host institution intern supervisor, final reports and internship evaluations by the intern and the supervisor. The intern is expected to keep a journal and reflect on the activities and events of the internship, knowledge and skills gained, and overall experience. The internship is designed to be a HIP-focused experience within the HMS experiential component.

Since 2010, paid, full-time, 12-month internships have been offered in the Museum and at the Lubbock Lake Landmark. The number varies from three to five depending on funding availability. These internal internships are subject to the same standards and processes of the external internships, including the signed agreement and various reports and evaluations. These internships carry full University benefits. Students compete for and the positions are filled each year. The extended time is based on exit interviews of students and comments by host institution supervisors that the 6-month timeframe frequently was not long enough to accomplish everything or see the larger project through to completion.

While apprenticeships are internal to the Museum, part-time (i.e., 15 hours/week) student positions, and work around a student's class schedule, internships are full-time (i.e., 40 hours/work week), generally considered staff positions, and most are external to the University. Another difference is that internships are competitive in contrast to apprenticeships that are not. The cost of the apprenticeship program (i.e., student wages) is covered through Heritage and Museum Sciences funds. The cost of the internship is covered by the host institution.

Heritage and Museum Sciences as an immersive model

Established in 1974 as a comprehensive master's program, Heritage and Museum Sciences (then called Museum Science) is one of the oldest museum graduate programs in the US. It incorporates at least six of Kuh's (2008:9-11) HIPs (common intellectual experiences; writing-intensive courses; collaborative assignments and projects; service learning; internship; research). The rigorous 45-credit hour program culminates with either an internship or thesis option (student choice). The two options provide greater flexibility for students and their career goals with either an intensive work or academic research experience.

Heritage and Museum Sciences builds on the educational traditional format to create a model immersive experience that produces academically and professionally prepared graduates who compete successfully in the museum and heritage job markets (based on analysis of internal data for the last 10 years that indicates a 92% hire rate within a year of graduation). Heritage and Museum Sciences has dedicated faculty lines. This structure means that Heritage and Museum Sciences is the home department. Tenure-track faculty (the US system for the pathway to achieve a permanent post through a university's policy governing the process and review) are tenured in Heritage and Museum Sciences and not some other department as is common for other US museum studies programs. Faculty efforts and responsibilities are focused within Heritage and Museum Sciences without competing external departmental interests.

Learning philosophy

Heritage and Museum Sciences, as an integral part of the academic mission of Texas Tech University, develops and implements innovative and creative teaching, research, and scholarship. Graduate students are educated in the museum and heritage disciplines. Heritage and Museum Sciences through its interdisciplinary, practice-based methodology applies a combination of work-integrated learning, project-based learning, and problem-based learning to prepare graduates to be leaders in a globally competitive workforce. This approach empowers students to be successful lifelong learners who will continue to develop their intellectual and professional capabilities within the changing museum and heritage disciplines.

By incorporating this approach into the core curriculum, students are provided with a range of meaningful learning opportunities that strengthen 21st century skills and allow them to:

- Communicate effectively, work collaboratively, and think critically;
- Identify, anticipate, address, and solve important, complex, unpredictable issues and problems;
- Plan, organize, and make professionally-informed decisions;
- Demonstrate leadership and ethical practice; and
- Initiate and develop new ideas that translate into practice.

Integration into the operations of the Museum complex provides classroom, experiential, and service-learning opportunities.

Heritage and Museum Sciences enables graduate students to study and work in an immersive museum environment while developing a track in Heritage Management or Museum Science that is unique to their long-term career goals. This program allows students: 1) to design a degree comprised of core and elective courses that provide them with the knowledge and skills for independent research and creative expression for solving fundamental problems of today and into the future within the sphere of museums and heritage properties; and 2) to succeed in the future workforce that is continually becoming more interdisciplinary. Analysis of internal 10-year data by track taken and first post-graduate professional position show that 90% of Museum Science track graduates are hired by museums and 77% of Heritage Management track graduates by heritage facilities. Cross-over does occur as 10% of Museum Science track graduates go on to work in heritage facilities and 23% of Heritage Management track graduates in museums. Nevertheless, the strong trend is clear and indicates a growing market for heritage students.

The integrated pedagogy of learning and teaching theories (as outlined in the Concepts section) and robust experiential practice allows for an emphasis on what museums and heritage sites do and why they matter to be recognized and understood in every area of museum business and operations. Thus, formal courses, practicums, research, theses, and internships may all address today's technology while exploring the past and its preservation into the future.

Key elements of the model

The immersive model has two key elements that govern the program and shape the pedagogy. These are: 1) being housed in and integrated into a museum; and 2) an incorporated experiential component of the curriculum. A hallmark of the model is the immersive, hands-on environment within a museum. Immersion in the museum environment enables and strengthens learning that is relevant, genuine, practical, and transferrable.

Fig. 2. Heritage and Museum Sciences students participating in cleaning and maintenance of outdoor bronze sculptures at the Lubbock Lake Landmark as a lab in the Collections Management course. Source: Lubbock Lake National Historic Landmark.

Fig. 3. Heritage and Museum Sciences students participate with staff in the safe moving of vintage and historic vehicles from collections storage into exhibit galleries as part of a semester-long course project. Source: Museum of Texas Tech University.

Being housed within and integrated into the Museum of Texas Tech University rather than an academic department has distinct advantages. Courses are held in the Museum's classrooms and everywhere and anywhere (figs. 2, 3) in the Museum complex is fair game to hold labs associated with the courses. The Museum's teaching collection is used to support labs in required and elective courses. As examples, in the Collections Management course, objects from the teaching collection are used in a variety of experiential

lab exercises. Among these exercises are simulating the accessioning process, completing electronic condition reports and catalog records, as well as barcoding, labeling (including sewing on labels), packaging, customized archival box making, and housing. In the Preventive Conservation course, the same objects are used to generate preservation and stabilization recommendations, as well as preventive packaging and housing recommendations. Projects in this course also use environmental monitoring and integrated pest management equipment and supplies so that students have real, hands-on experience of using such items in a museum environmental monitoring setting. Other projects include provision of a preservation service (such as stabilization and archival packaging and housing to materials from local museums loaned specifically for a service project) (fig. 4).

Fig 4. Heritage and Museum Sciences students completing condition reports and identifying textile materials for stabilizing recommendations for a local heritage society. Source: Museum of Texas Tech University.

The Museum controls its classroom spaces and Heritage and Museum Sciences has priority in scheduling. This situation is not the case for departments across campus where the University controls space and scheduling. The matter has become crucial over the past decade as classroom space across campus has reached a critical shortage. This shortage is particularly acute in the pandemic years with mandated social distancing and other health safety protocols necessary for teaching face-to-face courses. Heritage and Museum Sciences has not experienced the extended closures of universities and university museums and online pivots of courses as experienced globally (e.g., CIOPPI et al. 2020). While Heritage and Museum Sciences courses did pivot online in April 2020, that lasted only three months and since August 2020 have resumed face-to-face.

Another advantage is that most of the Heritage and Museum Sciences faculty has concurrent professional appointments within the Museum complex. These internal appointments enhance both teaching and learning and the integration of theory and practice. What this situation means is that faculty are both academic educators and active, practicing professionals in the museum or heritage fields.

An experiential component that is part of the curriculum beyond lab exercises provides for a strong participatory involvement, a solid basis for beginning a paid internship, and an underpinning to competing successfully for that internship as well as the first professional position. A learning environment is fostered that aids and reinforces the integration and translation of theory into practice. This same learning environment is critical for students undertaking the thesis option as it creates a social network and shared experience that helps nurture the developing research efforts of the student.

The experiential component has both internal and external constituents. An internship or thesis is compulsory. The non-compulsory experiential component has two aspects, that of internal and of external experiences. The internal aspect consists of the practicum (involving course credit) and the

Fig. 5. Heritage and Museum Sciences student vacuums a textile in a cleaning and stabilizing practicum. Source: Museum of Texas Tech University.

apprenticeship program (paid placements). Both are a pragmatic approach where education is enhanced and reinforced through hands-on training and experiential learning carried out in all aspects of the Museum's daily operations. Apprenticeship placements are mutually beneficial and students are immersed in Museum operations throughout the Museum (figs. 6-8). They work in such areas as curation (including collections processing, registration), exhibits, museum or heritage education, administration, or heritage (management, landscape restoration and preservation). A major strength of the Museum that greatly benefits Heritage and Museum Sciences is the size and diversity of its collections.

Fig. 6. Heritage and Museum Sciences apprentices involved in the packing and moving of a large, donated collection at a private residence. Under supervision of two curatorial staff members, apprentices inventoried, completed digital condition reports, photographed, created custom-made boxes, wrapped and padded objects in boxes, produced object level barcodes labels for each box, and helped transport the collection to the Museum. Source: Museum of Texas Tech University.

Fig. 7. Heritage and Museum Sciences apprentices clean and move objects in the over-sized storage area of the History Division of the Museum of Texas Tech University. Source: Museum of Texas Tech University.

Fig. 8. A Heritage and Museum Sciences apprentice learning tree maintenance with the Historic Maintenance Supervisor at the Lubbock Lake Landmark as part of heritage landscape care and safeguarding public safety. Source: Lubbock Lake National Historic Landmark.

Experiential learning immerses students within daily operations of a museum recognized as following national professional standards and best practices. Students learn how to apply principles and concepts from the classroom and gain extended hands-on experience in their application, practicality, and problem-solving. These activities are real responsibilities, well beyond class exercises. The graduate students are integrated into the daily operations of the Museum with expectations of learning, application, and having a role in achieving the Museum's efforts. The apprenticeship positions are an important aspect to Museum staff in accomplishing the operations of the Museum and fulfilling divisional objectives and charges.

The Museum's collections are integral to practicums and the apprenticeship program. As examples, with objects conservation, students participate in stabilization efforts ranging from appropriate housing to minimally invasive methods. Customized box-making is a learned skill that translates conservation

theory into best practices within budgetary constraints (fig. 9).

Fig. 9. A Heritage and Museum Sciences apprentice creating a custom-made box as part of her duties in the Ethnographic Collections of the Anthropology Division of the Museum of Texas Tech University. Source: Museum of Texas Tech University.

Fig. 10. Heritage and Museum Sciences students participating in the competitive student poster session at the Mountain-Plains Museums Association annual conference (various years represented). Source: Museum of Texas Tech University.

External transformational experiences are individualized and focus on experiences that foster active participation in professional organizations and networking. These experiences provide the student opportunities to convey the impacts of their efforts (e.g., public programming, work-related problem solving, research) and develop presentation and communication skills in reaching broader audiences. Examples are presenting at a professional conference (podium or poster; fig. 10), attending competitive-placement workshops, and producing scholarly publications (e.g., CHO & CHANDRAPAL 2015; CHO & JOLLEY 2016; CHO & GENDRON 2018; MACFARLAND & JOHNSON 2004; REEL et al. 2021; STEPP et al. 2020). Heritage and Museum Sciences invests in its students and provides funding to help defray registration and travel costs involved. This investment not only demonstrates to the graduate students strong support by the department but financially frees the student to partake of external opportunities that enhance their career development. Students gain self-confidence in themselves and engaging with museum and heritage professionals. As they build their resume, they may use this initial network in seeking their internship or their first post-graduate position.

Additional aspects

Heritage and Museum Sciences is a 2-track program that provides extensive opportunities for students to achieve independent proficiency in a full array of course work and activities. The structured format of the degree program provides a strong foundation in general museum and heritage knowledge and skills. This structure allows students to design their own degree plan, choose career directions and specialty areas, and select the desired balance among various learning opportunities. The 2-track program is structured in a way that students can develop as self-initiated and critical learners who can make responsible decisions and learn the benefits of review and collaboration.

The program offers 30 courses a year. Within that offering, four courses are required for all students. Students then choose one of the two tracks, either museum science or heritage management. Students select to take five track courses and then four additional elective courses in any area of graduate study including courses in the other track. Currently, most students are electing to take their additional coursework in the other track (i.e., if their track is museum science, then their elective four courses are in heritage management).

At the completion of course work and passing an oral exam, students embark on one of two options towards graduation. With the internship option, both external and internal internships are suitable. Interns are expected to be staff members with staff-level responsibilities that provide mutual benefits for the intern and the host institution. The objective is to offer entry into the museum and heritage professions in a supervised staff situation that is beneficial to both parties. The projected outcome is increased professional work experience, the credential of having completed a structured internship, and an established network for career advancement. Towards the end of the internship in the semester of graduation, the student takes comprehensive and oral exams and presents an internship defense for a public audience.

The internship option provides hands-on responsibilities and expectations within a real-world setting. Internships are expected to provide a quality experience that helps enhance or develop skills, knowledge, and perspective. The internship option helps solidify the experiential translation gained within Heritage and Museum Sciences and ease the transition from graduate student to emerging professional.

The thesis option requires a research question or hypothesis pertinent to museums or the heritage profession, couched in a theoretical or philosophical framework. A thesis prospectus is required and thesis research cannot proceed until the prospectus is approved by the student's advisory committee. The thesis prospectus provides the student and advisory committee with a roadmap to the finished thesis and allows all to agree on how the thesis will be accomplished. Students in this option generally take longer to graduate than those in the internship option. A different skill set is learned than in an internship and students are expected to produce publishable quality work. While the internship option is taken more commonly, ~25% of the students follow the thesis option and particularly those who want to go on to a doctoral program in a related discipline. Towards the end of the thesis process in the semester of graduation, the student takes comprehensive and oral exams and presents a thesis defense for a public audience.

Assessment takes place on an annual basis. Student assessment and curriculum assessment is focused on metrics, curriculum effectiveness, and student success. Curriculum assessment centers on ensuring that course content addresses current issues and needs and reflects national to international perspectives, along with the basics. Program assessment at the state level occurs every 10 years and that at the University level every 5 years. Program assessments lead to plans that address actions for improvements and ways to document the progress made.

Challenges

Current challenges facing Heritage and Museum Sciences are in recruitment and increasing diversity among the student body. These challenges are linked and both tied to increasing the number of graduate students. Retention is not an issue for the program as once students enroll, they tend to stay in the program and graduate. The issue in both challenges is attracting and securing the applicant. Current recruitment efforts rely on passive methods of word of mouth and the program's website.

Word-of-mouth has been a powerful recruitment tool for Heritage and Museum Sciences. Graduate students frequently come into the program through contact with alumni and their encouragement to pursue the program at Texas Tech University. Alumni hold positions in museums, heritage properties, archives, other non-profit agencies, governmental agencies, museum and heritage support businesses, and academia. This type of recruitment effort has been a major source of support by the alumni.

Although the Heritage and Museum Sciences website recently was expanded, it is undergoing further renovation to increase its usefulness and effectiveness further. Program overview, application process and eligibility requirements, curriculum, and financial assistance are standard. Additional information will address such matters as research opportunities and faculty research profiles. Emphasis also will be placed on more practical matters such as post-graduate employment rate and where graduates are being hired based on analysis of internal data for the last 10 years. These are important considerations for potential students in a competitive graduate program marketplace. Yet, more should be done for effective recruitment.

Heritage and Museum Sciences usually has between 40 to 43 enrolled graduate students on an annual basis. As effective as the passive recruitment efforts have been, they are not sufficient to sustain or grow the program in today's changing environment nor address the second challenge of increasing diversity among the student body. The recruiting paradigm needs to shift to a proactive mode. Two potential methods being considered are direct contact and targeted advertising. Contact with undergraduate advisors would be through e-mail, post cards and other recruitment mailings, and follow-up telephone calls. Skype or Zoom interviews with prospective students and invitations for on-site visits with follow-up e-mails or telephone calls would reinforce student interest, the concept of good fit, and provide the student with maximum information to make an informed decision. Targeted advertising in the program brochures of regional and national museum and heritage conferences as well as digital advertisement on the American Alliance of Museums website would reach a broad audience as well as raise awareness of Heritage and Museum Sciences.

As for the second challenge, increasing diversity in the student body is not an issue limited to Heritage and Museum Sciences. Underrepresented groups within US museums and the heritage sector are a chronic matter and critical issue recognized by the museum and heritage professions (e.g., COLE 2016). Recent studies on diversity in the museum workforce focus on art museums but generally reflect the status of museums as a whole across the country (GAN et al. 2014; SCHONFELD et al. 2015; TREVIÑO et al. 2017). They quantify the demographic landscape and reality of the US museum workforce (BAILEY-BRYANT 2017, 27). A 2013 study (GAN et al 2014) has examined the gender gap at the director level regardless of color. Results indicate the gap is two-fold: 1) women held ~43% of art museum directorships; 2) salary compensation for women directors was ~79% of that for men (GAN et al. 2014, 4-5).

The gap was even more noticeable in comparing two size categories of art museums based on annual budget. At the largest art museums (~25%), women held only 24% of the directorships and their salary compensation was 71% of that for men. For the second smaller category (i.e., the other ~75%), women held 43% of the directorships with salary compensation approximately equal that for men (GAN et al. 2014, 12; SCHWARZER 2010). A 2016 follow-up study (TREVIÑO et al. 2017) found that the gender gap persists but changes are occurring. On the positive side, women then held 48% of art museum directorships (a 5% increase) and 60% of directorships in college/university art museums. Despite those gains, women remained at a salary disadvantage and experienced a salary decrease, on average earning 73% of that for men (a 6% decrease) (TREVIÑO et al. 2017, 5, 7). Other aspects remained the same as the 2013 findings (TREVIÑO et al. 2017)

Two important points from these studies are germane to museum and heritage academic programs. One is that closing the gender gap requires increased professional development opportunities for women. The other is addressing the gender gap in the talent pipeline where women may be starting off at a disadvantage (GAN et al. 2014, 13-14; KINSLEY & WITTMAN 2016; TREVIÑO et al. 2017). Women entering and advancing in the museum and heritage professions need advanced education and capacity building (training, leadership, professional networks) to be competitive in the museum and heritage workforce.

A 2015 Mellon Foundation study (SCHONFELD et al. 2015) examined the entire museum and heritage workforce through categorizations of race and Hispanic/Latino status, gender, and job position. In launching this study, the Foundation previously had recognized the need to expand the museum workplace for students from underrepresented minorities (SCHONFELD et al. 2015, 2). Results indicated that the museum workforce at the time was 72% White non-Hispanic and 28% minority, while women made up 60% of that workforce. Low-level positions in security and facilities were split between White non-Hispanic and minority categories. But curatorial, conservation, public education, and leadership roles were predominately (84%) White non-Hispanic. By job position, males dominated some positions such as in leadership but also in exhibition design, IT, security, and facilities. Females dominated positions such as in curatorial and conservation as well as marketing, retail services, and finance/human resources. In general, White non-Hispanic staff dominated those positions more closely aligned with the educational and intellectual mission of museums (SCHONFELD et al. 2015). Less than 5% of museums in the study had minorities (regardless of gender) in senior management positions (COLE 2016, 30; BAILEY-BRYANT 2017, 29).

Two important points from this study are germane to efforts by Heritage and Museum Science to diversify its student body. One is that the pipeline for leadership positions are through curatorial, conservation, and public educational roles not just as heads of those major departments but onto a directorship of a museum. The other is the need for more programs that encourage minority/underrepresented students to pursue graduate degrees in museum studies (SCHONFELD et al. 2015, 4). Heritage and Museum Sciences can provide the advanced educational and training experience to address both these points and create a more diverse, competitive pool for the museum and heritage workforce.

Further, the path towards a museum or heritage career in the past has been through diverse routes. With the rise of museum and heritage studies programs across the country, that path will become more focused and will be through a graduate degree in museum or heritage studies. Results from data gathered on US museum studies programs by the American Alliance of Museums Center for the Future of Museums indicate that 80% of students in these programs are female and 80% are white non-Hispanic (IVY 2016, 37). The lack of diversity creates a broken pipeline to advanced careers in museums (KINSLEY & WITTMAN 2016, 42). Nevertheless, as awareness grows of the diversity imbalances in US museums, opportunities will arise.

The diversity profile for Heritage and Museum Sciences reflects 567 alumni and 21 current students (total 588; 1974-2020). The profile reflects the ethnicity category names of the Texas Higher Education Coordinating Board to which such data are reported. Of that total number, 87.6% are White non-Hispanic, 6% Hispanic, 4.6% Asian, 1% African American, and the remainder from other underrepresented groups. Females dominate (88.9%) regardless of ethnicity. Figures for the past five years (2016-2020) reflect an improving situation with Asian and African American but not with Hispanic students, with 84.3% White non-Hispanic, 5.7% Hispanic, 5.7% Asian, and 4.3% African American. While females still dominate (70%), males (30%) have increased. Heritage and Museums Sciences overall has done better in recruiting males than the current national average while trailing behind that average in recruiting underrepresented groups. Nevertheless, the diversity profile generally is reflective of the current demographics for museums. While Heritage and Museum Sciences has an established track record in recruiting underrepresented groups, that record needs improvement.

Improving that record is an opportunity to make an impact not only for the graduate program but on the museum and heritage fields. Both proactive and passive recruitment approaches are being proposed that build on the current foundation but go a few steps beyond. Proactively, a targeted approach will focus on historically black colleges, Hispanic-serving universities, Liberal Arts colleges, and universities with Veterans programs. These institutions will be targeted through the undergraduate advisors as a ready pool of potential applicants. Contacts with the undergraduate advisors and follow-ups with prospective students will be similar to that of increased recruitment efforts in general. Most important is reinforcing the concept of good fit and the student being able to see themselves both within the program's student body and the university's student body. Currently, Texas Tech University undergraduate ethnic diversity profile (top three categories) is 54.3% White, 29.7% Hispanic, and 6.5% African American. Its graduate ethnic diversity profile (top three categories) is 49.6% White, 16.9% Hispanic, and 0.6% African American. The University has stepped up its efforts in diversity recruitment at the graduate level. That in itself is an opportunity for Heritage and Museum Sciences to participate in those efforts while using the current profiles and the University's efforts as a point of reference in the good fit endorsement.

A passive approach is presenting an inviting and informative website that engenders a feeling of a prospective student fitting in and benefiting from the program and being at the university. Two proposed examples are being considered. One example is the prominent display of such information as Texas Tech University is a Hispanic-serving University[9], a Purple Heart University (the first to be so designated in Texas)[10], and a Veteran Friendly School. Hispanic-serving University is a designation by the US Department of Education for institutions of higher education that have at least a sustained 25% Hispanic enrollment at the undergraduate level. It is a coveted designation by many universities for the federal support and grant opportunities it opens up.

The Purple Heart designation, awarded by the Military Order of the Purple Heart, recognizes a university for its support of veterans wounded in combat. Currently, the University ranks 62 overall and 49 among public institutions in the 2021 Best Colleges for Veterans rankings[11] and ranks 9 in the Military Friendly ratings[12]. Veterans comprise 2.8% of the overall 2021 enrollment at Texas Tech University and the University has a proactive Military & Veterans Programs. Veteran enrollment is expected to rise and presents another opportunity for recruitment into Heritage and Museum Sciences. In the past five years, Heritage and Museum Sciences has had at least three veterans enrolled. A 2018 non-veteran graduate has been recruited to join the US Army Reserves as a Civil Affairs 38G/6V Heritage and Preservation Officer and to undergo Army Monuments Officer Training (AMOT). The 38G/6V Heritage and Preservation program is a modern version of the World War II Monuments Men program to protect and preserve cultural property during armed conflict (DEJESSE & DELACRUZ 2022). A 2018 veteran graduate is the US Army Civil Affairs Psychological Operations Command's 38G Program Director and Lead for the 38G/6V Heritage and Preservation Program. A 1993 non-veteran graduate serves as an instructor for AMOT.

The second example is displaying graphically the theorized pipeline and a pathway to leadership in the heritage and museum professions. The message needs to be that you can be a leader in the heritage or

9. accessed https://www.depts.ttu.edu/diversity/institutional-diversity/hispanic-serving/
10. accessed https://www.depts.ttu.edu/mvp/awards.php
11. accessed https://today.ttu.edu/posts/2021/06/Stories/texas-tech-named-in-military-times-2021-best-for-vets-colleges-list
12. accessed https://www.militaryfriendly.com/texas-tech-university/

museum profession and that Heritage and Museum Sciences at Texas Tech University is the place to be for the foundation to achieve that aspiration.

Concluding Remarks

Experiential learning is a key aspect of the immersion approach taken by Heritage and Museum Sciences in graduate education and training. Students are placed within a communal learning environment with faculty and seasoned museum and heritage practitioners. Work to learn apprenticeship placements within the Museum complex, high-impact practicums, and high-impact, extended, paid internships provide opportunities to address real problems and challenges and ways to resolve them. The experiential aspect of the curriculum translates the theoretical of course instruction into practice. Within this translation, 21st century skills are emphasized. Faculty, staff, and graduate students form a community of practice and the Museum complex functions as both the workplace and the off-the-job training location.

Placed in a broad perspective, the immersive model has at least two major advantages. One is that the academic program is housed in and integrated into a working, accredited museum. Neither the program, faculty, nor students are dependent on having to seek outside museums to provide opportunities for projects, classes, tours, and other activities that supplement the curriculum. The issues of supplemental programs, non-profit museums subsidizing academic programs, recompense, uncertain partnerships, continuity and quality control are avoided with an immersive program.

Second is that graduates are ready to ent+er the museum and heritage job markets as prepared, beginning professionals. No department, program, or university can guarantee employment after graduation no matter how good the job market. Nevertheless, a university's responsibility, and that of Heritage and Museum Sciences, is to educate well and provide substantive and meaningful training and other opportunities that make the graduates competitive in the job market. While times are tough, Heritage and Museum Sciences graduates are competitive in the US museum job market, with analysis of internal data for the last 10 years indicating a 92% placement rate.

Students in graduate museum programs come from a variety of backgrounds. For those in Heritage and Museum Sciences, it is not just working in a museum or heritage facility but rather seeking an understanding of how museums and heritage facilities work and how they might have an impact or contribute to the field that drives them. An immersive program provides an integrative approach to address these interests and concerns, develop critical thinking and intellectual pursuits, and conduct research, while building the foundations for future leadership in the profession.

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Suggesting a Re-evaluation of Plaster Cast Collections in Japanese Art Schools

Rintaro Terakado

Abstract

Universities have accumulations of a wide variety of material objects. Things that have lost their original functions and been left haphazardly can be reborn as academically meaningful collections by giving them new roles and classifying them. Since the end of the 19th century, Japanese art schools have used plaster cast reproductions of ancient and early modern sculptures from the West as educational tools for drawing. The author proposes to re-evaluate plaster cast reproductions as academic resources and to put them on the table of art history research in the same way curators research authentic artworks at art museums. Implementing such museum- and object-based art history research on plaster cast reproductions would update and reinterpret the art history in Japan from a Western perspective to a non-Western one.

Rintaro Terakado

Introduction

Universities accumulate a wide variety of material objects. Some of these objects have been classified as academic resources, while others have been overlooked in terms of their academic meaning and value. However, a museum is not a random space to accumulate material objects. Instead, it is a place to question the agency and significance of things. Accumulations that have lost their original functions and have been left haphazardly can be summarized in the context of museums. They can then be regenerated into academically meaningful collections, thus giving them new roles. That is because, as Pomian (1987) stated, while objects lose their original use value, a new aura is created when accumulated as a collection.

Since the expectations of museum collections and their displays have changed from taxonomic and flat to narrative and three-dimensional (CONN 2010), there is a solid need to revalue and re-localize plaster cast reproductions. According to Appadurai (1986), objects have a social life constructed by their use and interpretation. To borrow Kopytoff's (1986) terminology of "life" and "afterlife," their value fluctuates between "life" as an accumulation of mere things and "afterlife" as a collection of cultural properties. This paper focuses on the accumulation of reproductions of plaster models in Japanese institutions of higher education, especially art schools, as a typical example of tangible objects whose educational value has been overlooked. The author then outlines the importance of re-evaluating them from a mere accumulation to a collection and putting them on the table of museum-/object-based art history research.

(1) Cast court project

The author's university has a court with more than 50 plaster cast reproductions for drawing training (fig. 1). The art school of this university continues to purchase reproductions as educational tools. That is an exception for Japanese art schools. In addition, the most significant feature is a full-size reproduction of Michelangelo's original statue of David (h. 517 cm), which is placed at the center of the court. Further, there is a plaster reproduction cast directly from the *Artemision Bronze* at the National Archeological Museum in Athens, which is said to have been purchased from the Ministry of Culture and Science Archeological Receipts Fund of the Greek government in 1980 (ITO 1982). This group of plaster cast reproductions

Fig. 1. Cast Court (Studio for Drawing Practice) of the University of Tsukuba (Photographed by the author)

was purchased in the early years after the university's opening in 1970 and likely symbolized the spirit of traditional art academism, an epitome of Western culture. However, these reproductions are not systematically "displayed" but merely "placed" haphazardly as teaching materials. The author's future project intends to open tangible "on-site displays" on Japanese university campuses and intangible "online cast courts" on the Internet, similar to the cast courts that were popular in Europe and the United States in the 19th century. The aim is to mutually utilize academic resources between universities and art schools.

In the past, plaster cast reproductions became an educational tool for drawing with the establishment and development of art academism in Western Europe. In the 19th century, they became the subject of study

in art history and classical archaeology and objects of public appreciation. The European trend spread to the United States, and museums and universities established collections of plaster cast reproductions one after another. However, this trend declined after the shift in modernist aesthetics, and some reproductions were even destroyed in the latter half of the 20th century (BORN 2002).

In contrast, plaster cast reproductions imported to Japan at the end of the 19th century have only been accepted as teaching materials for drawing training. Nevertheless, the accumulation of plaster cast reproductions has rapidly lost importance because of the diversification of art concepts and the backlash against art academism. This situation could be considered a crisis of relevance for the existence of plaster cast reproductions.

(2) Plaster cast reproductions in Europe and the United States

In general, there are four correlations among plaster casts according to their use (KANIA 2012): (A) artistic appreciation, (B) depiction/representation, (C) research means, and (D) educational means. In this context, uses (A) and (C) are easily connected, and so are (B) and (D). In Western Europe, uses (B) and (D) developed first, but they later shifted to (A) and (C). That is, the reproductions became popular as drawing materials in art academia from the latter half of the 17th century; in the 19th century, they were appreciated as substitutes for "real" works of art and became primary materials to be examined in classical archaeology and art history.

The idea of plaster cast reproductions as objects of appreciation was greatly influenced by Winckelmann (1755), who pioneered classical archaeology. The collection of plaster casts established in Dresden was a precursor to this idea. The motto of *edle Einfalt und stille Groesse* (noble simplicity and quiet grandeur), which celebrates the beauty of ancient Greek forms, was not derived from the original statues of ancient Greece but from plaster cast reproductions made in the 18th century. That is, the material itself—plaster—was given aesthetic value. The Berlin Academy, founded in the late 17th century and lost its collection in a fire in the mid-18th century, formed a systematic reproduction collection in the late 17th and early 19th centuries (SEDLARZ 2010).

This trend soon spread to the United States. It was motivated by an active interest in German-style university education (BORN 2002). Following the academy in New York, universities across the United States began building collections of plaster cast reproductions, enabling Americans to visually experience ancient civilizations and study art history and classical archaeology (DYSON 2010).

Thus, at least throughout the 19th century, plaster cast reproductions were appreciated as a substitute for "real" artworks in Europe and the United States. They became a primary source of reference in classical archaeology and art history. The Cast Courts (opened in 1873) of the Victoria and Albert Museum, London, is the best example of this phenomenon. However, in the 20th century, plaster cast reproductions, whose innate characteristics are replication and imitation, were eventually forced to leave the exhibition rooms of art and university museums. In general, art as fine art was a Western European concept limited to modern European societies, where singularity and authenticity were always at the core of the meaning (KOPYTOFF 1986).

While "real" works of art have become objects of collection in modern museums, "used" plaster cast reproductions have become the subjects of deliberate destruction after World War II. Nevertheless, many of the remaining plaster casts have been reassembled into new collections in the 21st century and have become the subject of research. The forerunner was an international conference held in Oxford in 2007. The subsequent report (FREDERIKSEN & MARCHAND 2010), with 36 papers by a wide range of authors, including art historians, curators, conservation scientists and technicians, and artists, has become an essential reference for the study of plaster casts.

In the United States, Cornell University is a representative case in this regard. Since 2008, the university has been reorganizing its collection by restoring and reproducing statues and fragments of statues scattered around the campus and seeking ways to utilize them for research and education. In Germany, the Museum für Abgüsse Klassischer Bildwerke München, the teaching collection of the Institute of Classical Archaeology of the Ludwig-Maximilians-Universität in Munich, began its activities as a full-fledged museum in the 1990s after renovations to the building and review of exhibition methods. Since the 1990s, they have been experimenting with collaborations with digital art (SCHMÖLDER-VEIT & SCHRÖDER-GRIEBEL 2019). The latest research was published in Denmark in a significant book on the plaster casts

collected by Bertel Thorvaldsen, an 18th and early 19th-century sculptor and collector, and bequeathed to the city of Copenhagen (ZAHLE 2020). The book systematically catalogs 657 plaster casts by information such as their origin, history, and place of manufacture. In addition, it includes a discussion of the market for plaster casts in the first half of the 19th century.

(3) Plaster cast reproductions in Japan

Plaster cast reproductions were imported to Japan in the Meiji era (1868–1912) along with the arts and crafts education system. After World War II, they gained a firm place in the entrance examinations and classes at Japan's art universities. Kobu Bijutsu Gakko (Technological Art School), which opened in 1876 as the first art school in Japan, invited teachers from Italy. Several plaster cast reproductions were brought in as training materials for drawing at that time. The 400 plaster casts comprising this collection's core have been transferred to the Department of Architecture, Faculty of Engineering, at the University of Tokyo. The Tokyo Fine Arts School (now Faculty of Fine Arts, Tokyo University of Arts) purchased several casts from L'atelier de moulage du musée du Louvre (Paris) in 1913. In addition, in 1935, the school received a gift from the Museum of Fine Arts, Boston. After the 1909 renovation of the Museum of Fine Arts, Boston, plaster cast reproductions were relegated to the periphery, and the Board of Trustees voted to dispose of them. These unwanted casts were transferred to Tokyo. Art historian Yashiro Yukio had spearheaded the acquisition, hoping Japan would follow the West in using plaster cast reproductions to educate the masses, but this never happened (ARAKI 2011).

In Japan, plaster cast reproductions became educational tools for drawing, and many art schools purchased plaster casts. However, the demand for plaster casts as teaching materials decreased drastically, and some were even abandoned. The reason was the diversification of the concept of art and the backlash against art academism. That was also related to preconceptions that reduce plaster casts to mere consumer goods and separate them from "real" artworks and the resulting indifference.

Compared with the increasing acceptance and transition in the West, how limited is the function of plaster cast reproductions in modern Japan? First, it is essential to note that few permanent facilities exist in art schools and universities in Japan that systematically and historically display and exhibit plaster cast reproductions.

In 1985 the Association for the Study of Modern Japanese Art History conducted the first study on plaster cast reproductions in Japan. Araki (2011) focuses on the history of art education, especially the plaster casts themselves, and the importation, establishment, and development of drawing techniques from the West. Kanai (2012) discusses the importation of the concept and system of "art" from the West, focusing on the relationship between plaster casting and reproduction based on past original works in sculpture making.

Conclusion

As Born (2002) has already indicated, plaster cast reproductions are tangible artifacts representing the taste and value of a past that is increasingly distant as an educational tool; moreover, they provide evidence of the existence of an original sculpture that is now lost. Finally, plaster cast reproductions reveal the cultural aspirations of the 19th century to the present, as they taught the people of the 19th and 20th centuries about classical civilization.

In Japan, plaster cast reproductions have been used only as teaching materials for drawing training since the Meiji period. Such activity is likely based on Western culture and its concept of normative art. To examine the process by which this pedagogical method came to be considered standard, we must first systematically organize the accumulation of mere material objects and place them within the framework of a new collection. The first task is transforming them from teaching or former teaching materials and consumer goods into tangible academic resources. By finding the "life" and "afterlife" of plaster cast reproductions, it would be possible to answer the initial academic questions posed in the present study.

Plaster cast reproductions are not authentic artworks. However, it is essential to place those reproductions on the table of art history research as academic resources. As Kanai (2012) suggests, the reception and transformation of plaster cast reproductions in Japan and other East Asian countries is not a passive, monolithic phenomenon of Westernization. Instead, it is a manifestation of active, pluralistic non-Westernization. In other words, organizing the accumulation of plaster cast reproductions in Japanese art

schools into a systematic collection and turning it into an academic resource will allow us to understand the realities of the translation of modern Western art concepts and update art history from a non-Western perspective.

We should first investigate the plaster cast reproductions owned by the university individually, create a systematic catalog, and analyze the mode of non-Westernization based on that. Of course, the cast court at the author's institution is just a studio for drawing practice. However, re-evaluating and systematizing plaster cast reproduction would make the court an exhibition room that shows traces of the transformation of the passive current of Westernization into a non-Western and independent cultural phenomenon.

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Keywords

plaster cast reproduction, academic resources, university art collection

Like Counting Grains of Sand: An Overview of University Museums in Brazil

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Abstract

This study presents an overview of Brazilian university museums based on an internet survey conducted after the beginning of the COVID-19 pandemic. The survey mapped 461 physical and virtual university museums. The findings are discussed in light of the literature on the topic, the historical reality of these spaces and the empirical observation of their online presence, whose importance is stressed and analysed. The museums were classified by their principal area of interest that revealed 3.6% were museums of anthropology and ethnography, 3.6% specialised in archaeology, 10.2% were art museums, 47.6% were museums of the natural sciences and natural history, 12.9% were science and technology museums, 9.5% were historical museums and 12.6% were classified as "other".

Victor Emmanuel Teixeira Mendes Abalada & Marcus Granato

Introduction

The study aims to present an image of the state of Brazilian university museums as it was obtained by a survey conducted mostly during the COVID-19 pandemic, stressing both the hardships and peculiarities of this particular picture. Motivated by the absence of current and reliable data on the museums and wanting to know the needs of these institutions in order to, in another moment, trace strategies to mitigate or supress them, the study aimed to provide further data regarding the museum's collections by presenting a classification based on the self-declared main areas of interest of each institution identified. As such, starting as a research circumscribed to identify the reality of university museums of science and technology in Brazil, in view of the gaps found, it came to broaden its scope as to be able to provide data on and analyse university museums in general, even providing some glimpses and answers on how COVID impacted the already unstable conjuncture of university museums in Brazil.

According to Simpson (2014), university museums and heritage came to be seen as central to the process of academic change in Europe in the 2010s, rising from their origins in association with specific disciplines to play more dynamic and important roles in universities, either as a way of affirming their institutional identity or as mechanisms for interacting with different groups in the academic community and society in general. This scenario stands in stark contrast with the situation in Brazil, where university heritage and museums are not exploited to anything like their full potential; not dissimilar to the state of affairs Simpson (2014, 21-2) himself notes in Australia, where this heritage has tended to be addressed somewhat haphazardly, resulting in the creation of new but short-lived spaces.

In Brazil, the situation is aggravated by the general lack of knowledge about these museums although there is no shortage of academic studies. The tragic fires at the National Museum (Federal University of Rio de Janeiro), in 2018, and a collection storage facility of the Natural History Museum (Federal University of Minas Gerais), in 2020, have kindled new interest and important projects for these spaces, as this study shows. However, the reality seems to be so dynamic that as soon as one study is published, a new gap comes to light. And even a perfunctory comparison between the state of university museums internationally, particularly in Europe, and in Brazil reveals divergences in their uses, understandings and appreciation, and even in efforts to establish concrete data on the sector, their circulation and international dissemination. Take as an example the last three issues of the *University Museums and Collections Journal* (v.12, n.1 and 2 2020; v.13, n. 1 2021), which published important data on issues faced by university museums during the COVID-19 pandemic: only one item was from Brazil, consisting of the abstract of a presentation given by Ana Avelar (2021) at UMAC-Universeum 2021, which focused on how Niemeyer House (University of Brasília) had managed to gain an online presence through "improvisation" and the use of social media. As such, by such a discrete presence, of the many countries that provided and explored extensive data of the reality of their museums – especially university museums – during the pandemic, Brazil could hardly be ranked among them.

Of course, this absence of data is also a matter for workers and researchers in the area, as well as museums themselves, which often seem to have trouble being noticed outside their own universities and by others who may be receptive to dialogue. An emblematic example is the low proportion of Brazilian university museums whose data is registered on the UMAC Worldwide Database of University Museums and Collections. Even those which have registered have sometimes done so incorrectly, making repeated entries for a given venue, registering a museum in the wrong geographical location or making other kinds of mistakes (ABALADA & GRANATO 2019). Indeed, a discrepancy has also been identified in the number of museums at the University of São Paulo as reported in different studies, as well as contradictory information on different pages of the university's website vis-a-vis the UMAC database (ABALADA & GRANATO 2019). All in all, a particularly unfavourable picture that may not be Brazil specific, but reinforces the hardships that conducting research in such a context implies, as well as suggests the lack of consensus on concepts that should be common ground, such as what is a museum or what is a collection, etc. – and without which any considerable advance on the area becomes at least twice as hard.

Perennial issues faced by Brazilian university museums include their ability to present themselves as public spaces for the safeguard of heritage and research, both online and in-person. This is not to say that no progress has been made. Over the years some initiatives designed to enhance their stability and visibility have been taken, but have often failed, either partially or completely. While the formation of

networks of museums from a given university seems to have become a consolidated means of strengthening their position within their host entity[1], attempts to create networks of a national or even Latin American footprint had until recently not achieved the desired level of concrete results, including cases that seem never to have got off the drawing board, apparently leaving no physical traces of their existence[2].

However, the aforementioned fires and changes wrought by the pandemic seem to have made a difference. For instance, in this period two thematic dossiers were published on university museums in *Revista CPC* (v. 15 n. 30 esp, 2020; v. 16 n. 32, 2021); events were held in 2018 and 2021 (the V and VI Permanent Forum of University Museums); the body responsible for overseeing federal public spending published the *Acórdão 1243/2019*[3], which recommended the articulation of an action plan for the supervision and guidance of federal university museums; the digital platform of the Brazilian Network of University Collections and Museums[4] was launched in 2021; and the Map of University Museums in Brazil[5] was published in 2020.

The Map is the outcome of a project run by the Museum of Astronomy and Related Sciences (*Museu de Astronomia e Ciências Afins*, MAST) entitled 'Science and Technology Heritage and University Museums: Research, Analysis and Characterisation of Strategic Relations'. As an ongoing research project, its final aim is to forge ties between Brazil's university museums and its science and technology heritage[6], through mapping out their current state and providing support by identifying infrastructure issues and ways to preserve this heritage. As we will explain below, the pandemic caused the project to change, but it was originally conceived in order to address the uncertainty of the number and identity of university museums in Brazil – a problem that still exists today, preventing collaboration efforts. While nationwide data have been published elsewhere (ALMEIDA 2001, MEIRELLES 2015, RIBEIRO *et al.* 2019), they not only need updating, but until recently these numbers were not linked to any kind of list with the names of these university museums, as such there was no truly reliable data on the subject out of which to take a sample.

An effort was made to find reliable data and identify museums of interest to the project, whose scope covers science and technology collections, particularly earth and exact sciences and engineering, dating from the 1980s or earlier. However, these searches were unfruitful except for a smattering of incomplete records in the UMAC database. In light of the existence of (out-of-date) data from a previous project, *Promoting Scientific Heritage* (GRANATO *et al.* 2014), it was decided to broaden the sample of the present project to a more general survey of university museums. As such, if the project had as a central question what are the specific difficulties faced by Brazilian university museums today – and in what ways, if any, could MAST work to provide assistance – it was forced to take a detour and first identify the name, location and quantity of these museums from the vastness of Brazilian territory. The COVID-19 pandemic meant the search, that on the original plans covered field visits which would help to inspect the state of Scientific Heritage on these museums, was restricted to the internet, but it still enabled the project to find a way of observing the locations, concentration and state of the university museums in Brazil.

Setting parameters: concepts, scope and method

The change to a web-based survey had two consequences. First, some museums without an internet presence have certainly been missed. As Chalub and Gauz (2013) note, most university websites, at least in south-eastern Brazil (the region they studied), do not adequately promote their museums. As such,

1. A more in-depth study of the networks and other coordination strategies employed by Brazilian university museums can be found in Soares (2020).
2. Such is apparently the case of the Latin American Network of University Museums, whose only extant online reference is a text on its creation in 2007, in which Brazil participated and to which it was a signatory, having been signed by a representative from a museum from the University of São Paulo (ROSAS 2008).
3. The document, published by the Federal Cort of accounts, can be accessed at: https://pesquisa.apps.tcu.gov.br/#/documento/acordao-completo/1243%252F2019/%2520/DTRELEVANCIA%2520desc%252C%2520NUMACORDAOINT%2520desc/0/%2520?uuid=da64ef00-ae86-11ea-bb6c-3559b936bd11 (Accessed June 14 2020).
4. http://rbcmu.com.br/ (Accessed January 21 2022)
5. https://indd.adobe.com/view/84f4ba02-cf76-4a0c-be64-88a900e984c8 (Accessed January 21 2022).
6. The definition of science and technology heritage has been refined over the years. In its most recent formulation, in the Rio de Janeiro Charter, it "constitutes the tangible and intangible legacy of science and technology knowledge produced by humanity in all areas of knowledge which refers to the scientific dynamics of the development of technology and teaching, and the memory and action of individuals in spaces of scientific knowledge. The historical nature of these assets means they may be transformed and selectively attributed with values, meanings and significance, enabling them to emerge as assets of cultural value". The Rio de Janeiro Charter on Science and Technology Cultural Heritage. http://site.mast.br/Carta%20do%20Rio%20de%20Janeiro%20sobre%20Patrim%C3%B4nio%20Cultural%20da%20Ci%C3%AAncia%20e%20Tecnologia.pdf (Accessed 30 November 2021)

there could be a discrepancy between the figures identified, restricted to the virtual world, and the real figures, concerning the actual reality, even if this partial data is already of a lot of help providing some information on the subject.

The underlying factor is that this kind of work is much needed to lend visibility to spaces that often go under the radar even of their own host universities, yet it sometimes feels like counting grains of sand in a desert, as the terrain is forever shifting and it is impossible to estimate what the state of affairs in the real world actually is and how it tallies with what appears online. During the COVID-19 pandemic, this situation seems to have been exacerbated, as some URLs that had already been traced have changed or disappeared, while new URLs showcasing university museums have appeared and/or started to offer enhanced and more up-to-date content.

Second, the internet as the only search mechanism meant a need to find ways to address the reliability, contemporary nature and validity of the information collected. For a university museum to be counted, it had to be mentioned somewhere in the university's official website or appear on a webpage that provided specific dates for its entries or (latest) updates that were less than five years old – a timeframe chosen because it was before the end of the *Promoting project* – even though data could be out of date. These measures were taken to prevent collecting information that was too old, potentially leading to the counting of museums that had ceased to exist. Museums not meeting the less than 5-year criterion, yet falling within the scope of the study, was noted as information to be checked later through direct contact. They were not, however, included in the total number of university museums in Brazil, as the information about their continued activity, existence and institutional status was likely to have changed. Similarly, although initially virtual museums were outside the scope, the COVID-19 pandemic prompted us to include them, which added a new set of research issues and questions (GRANATO et al. 2020).

The first stage of this study of university museums, however, consisted of defining exactly what a university museum is. Too strict a definition, diverging too far from the general definition of a museum, would not be helpful, because there are 'official' definitions of museums in Brazilian legislation[7] and the International Council of Museums (ICOM)[8]. As such, a university museum could be seen basically as a museum that was part of a university structure. This decision not to draw a line between the concept of museum and the concept of university museum was taken to be consistent with the demands and consolidation of the museum sector and its conceptual range.

Nevertheless, it is worth recognising that many – perhaps most – spaces which go under the name of a university museum (namely in Brazil) do not meet the minimum requirements set forth by ICOM and the national legislation, exhibiting dynamics and features which could only be revealed in an ethnographic study. In the literature some attempts have been made to encapsulate the essence of the university museum, although definitions are scarce and range from the intentionally generic and pro-forma statement that it is "a museum that has a dependency tie with a university" (GIL 2002, 1) to far stricter definitions which argue that university museums must:

> *meet the criteria of the International Council of Museums (ICOM); be under the auspices of a university; have enough staff and physical space to perform the five main museological functions (acquisition, conservation, research, communication and education); and serve and/or served throughout or in part of their existence the three pillars of the university, composed of research (knowledge production), teaching (higher education) and outreach (dissemination of culture and relations with the external community). (MENDONÇA 2017, 38)*

Between these two extremes are others, such as Almeida's (2002, 205) definition of a university museum as "every museum and/or collection that is under the total or partial responsibility of a higher education establishment, including the safeguard of the collection, and the human resources and physical space to maintain it". While this conception seems to apply better to the plurality and specificities of these spaces, it also contains some aspects open to debate.

7. The "Statute of Museums" states that "a museum is a non-profit institution that investigates, communicates, interprets and exhibits, for the purposes of preservation, study, research, education, contemplation and tourism, sets and collections of historic, artistic, scientific, technical or any other type of a cultural nature, open to the public, and at the service of society and its development" (BRASIL 2009).

8. "A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment". See https://icom.museum/en/resources/standards-guidelines/museum-definition/

In this study, we understand that collections, however organised they are and whether or not they can be visited, may only be studied as university museums if they call or present themselves as a museum, whether or not they fulfil all the standard prerequisites to be one. This way, we give precedence to their self-declared identity over any strict observance of a preconceived idea of what a museum should be: any definition provided should thus be seen more as an ideal to be envisaged than a limiting factor. Consequently, respecting the nomenclature chosen by the spaces themselves excludes from this analysis of university museums any space or collection that either/or does not self-identify as a museum or does not observe the official criteria for museums. This decision has the advantage of helping illuminate how near or far these museums are to effectively fulfilling the legal criteria for museums and what changes they would have to undertake to if they wanted to attain this status.

Similarly, this study understands that for a space to be classified as a university museum, it must exist within its host university's premises. This restriction is not just a question of etymology, but because the Brazilian legislation (BRASIL 2006) distinguishes three kinds of (either private or public) higher education establishment – faculties, university centres and universities – according to their complexity and quality, of which only universities are required to operate in all three areas of education, research and outreach. In other words, universities are required to do research and open up to the public in general, making them the only type of higher education establishment that must produce objects that can be viewed as heritage, and the only one that is required to communicate its processes beyond the academic community, meeting the broader needs of society by different means, including museums. This is why this survey is restricted only to universities, even though museums are known to exist at other types of higher education establishment.

The idea of defining what can be considered a university museum while at the same time leaving its interpretation open to the multiple realities in which they exist may seem ambiguous or even contradictory, but it is important not only for identifying these spaces, but also for any attempt to draw a parallel with the larger museum sector in Brazil. After all, despite the existence of specific legislation, the registration of museums carried out by the Brazilian Institute of Museums (IBRAM) was not restricted to spaces that meet all the criteria set forth in the legislation, as it was designed to enable an in-depth diagnosis of the state of the museum milieu and take this as a baseline for ongoing improvements in the area, its institutions and public policies (VIAL 2017, 175).

However, the decision to respect the way the different spaces wanted to be seen simultaneously revealed other features and peculiarities which had to be weighed up and reflected upon in the research. For example, there were some spaces called laboratories, which failed to meet both the criterion of self-identifying as a museum and the criterion of being presented as a museum on their host university's websites, yet which were found to be listed as interactive exhibition spaces in the Guide to Accessible Science Museums and Centres in Latin America and the Caribbean (ROCHA 2017), lending them some external recognition as museums, even if they did not claim this identity. Other cases included that of the Technology Museum of the Federal Technological University of Paraná[9], which, on an old but still accessible website, acknowledged that although it was called a museum, it was actually only a "collection". Meanwhile, what went by the name of "Museum of Anatomy" was actually a series of annual temporary exhibitions put on by the university. It had no collection or space of its own and no guarantee of continuity or that it would ever become anything more permanent.

What is the best approach in such cases? Could one or other of these spaces be included or excluded without compromising the study's conceptual rigour? What should have more weight: the given name, the way a space presents itself or the way it is seen? Is the way a space presents itself (its name) always a clear statement on how it wants to be seen? On a deeper level, even though in academia there is an effort to strictly define the concept of what a museum consists of, do all these spaces share even a minimally common understanding of the concept? Even if an attempt is made here to settle on a common approach that might encompass such diverse spaces under the same conceptual category, do they themselves have a similar concern either in their choice of name or in the way they conceive of themselves as belonging to a group – if, indeed, they do? How can these different conceptions be brought into unison while striking the right balance between the conceptual scope and tolerance of the anthropological variables of reality? How can this be done without imposing taxonomies or limitations that do nothing to engage these spaces themselves into this discussion and may even discourage them from endeavouring to operate more fully as museums?

9. http://200.134.10.33/museu/?page_id=2 (Accessed 30 January 2020)

Within this specific framework and in view of cases of this kind, it was decided that the only one of these confusing cases mentioned to be included in the project, whose registration form was based on the form used for the *Promoting project*, was the Technology Museum of the Federal Technological University of Paraná. This was because even though it, as previously pointed out, refuted on an old website its own title of "museum" on conceptual terms, admitting its shortcomings, it was the only one of the examples brought that both actually named itself a museum and was not temporary (the second of which, the reason why most so-called museums of anatomy were excluded, as they were merely temporary exhibits, which did not even have any continuity during the pandemic). Records were made of museums with no collection (science centres), or museums temporarily without dedicated spaces (recognising, nonetheless, that this situation may go on indefinitely), or which had their own space and collection but were closed to the public, for whatever reason. In all these cases, however, there was the idea of continuity and perpetuation of memory that is absent from a temporary exhibition, even if it calls itself a museum and even if it occurs with a degree of regularity. It is a state of affairs that underlines the need to establish clear boundaries for the research and the concept of the museum, which must nonetheless, be open to change and to being challenged by real-world phenomena.

Having delimited the concepts and scope of the study, the survey could be based on a list containing information on the institutions present on the National Registry of Higher Education Courses and Institutions, known as e-MEC[10], identifying the public and private universities whose websites were to be consulted in search of university museums. In the identification of the museums, the records available on the UMAC committee page were also used, as well as the records from the *Promoting project*. The methodology initially envisaged the registration of all the museums identified within the scope using data obtained via the internet and on visits by collaborators from different parts of Brazil, thereby covering the whole country. In other words, the online survey of university museums – covering all areas of knowledge – was supposed to be just the first step of the project. Subsequent information-gathering visits were to be conducted to find out other things of interest, such as their infrastructure and the state of conservation of the collections, which could only be appraised through direct contact, since individuals involved with such spaces and their collections inevitably get used to their surroundings or else may be reticent about expressing any shortfalls to outsiders. However, this stage of the research was put on hold because of the COVID-19 pandemic. Attempts to circumvent this limitation by other means were by and large unsuccessful, as even email requests often never received a reply. This was probably because almost all the museums were closed, as universities were working remotely.

Shifting results: the art of reading between the lines

Pre-COVID research and results

In 2019, 201 universities were identified in the e-MEC database. These were then searched to identify any museums they may host, which appeared online in a variety of forms. Apart from virtual museums per se, the university museums' online presence ranged from having well-structured websites of their own and prominent pages in their host universities' websites to occasional mentions, small items or snippets of news about their activities, or complete absence from their host universities' websites, being identified solely through mentions on other websites or in blogs or Facebook pages they maintained. This was the varied online terrain in which our preliminary list of university museums was drawn up and published in October 2019. After this, some new information and feedback was received, which was added to the results to make a new list. Table 1 shows the development of the numbers obtained, details of which are explained below.

Table 1 – Number of museums included on each list

	1st List	2nd List (Map of University Museums)
Physical museums	415	442
Virtual museums	-	19
Total number of museums	**415**	**461**
Museums which may have collections from the areas of interest to the project	111	117

10. http://emec.mec.gov.br/ (Accessed 14 January 2022)

The first stage of the survey identified 415 museums: 20 in the north region, 82 in the northeast, 36 in the central west, 165 in the southeast and 112 in the south. At this point, virtual museums were not considered; 111 museums were identified as potentially falling within the areas of interest to the study (as stated, earth and exact sciences and engineering).

Communications received in response to the publication of this first list served (and surprisingly still serve) not only to identify institutions which had shut down or were no longer part of a university, but also museums that had been overlooked. All the information received was checked online, which means that some cases are still unresolved because the information received could not be traced on the web. One such case was the Carlos Isotta Museum of Minerals and Rocks, which we were told was not present on the web, but which dated back to the 1980s, had a collection and exhibition space, and was maintained by the Federal University of Amazonas. Our search for more information revealed that the museum was actually linked not to the university, but to the National Department of Mineral Production, a regulatory agency linked to the Ministry of Mines and Energy and funded by companies operating in cassiterite mining[11], while an email written to the address on the National Museums Registry[12] with a view to ascertaining whether the museum had been transferred from this agency to the university – something that is not uncommon among autonomous science spaces – went unanswered.

With the COVID-19 pandemic and the increasing importance of the internet for all sectors, it was decided that rather than merely preparing an updated list, we would situate the museums in an interactive map, which subsequently came to include virtual museums as well. The map would contain hyperlinks to the places where the museums could be accessed online.

Post-COVID research and results

As the pandemic progressed, many spaces that had not previously had an online presence started to appear online, since the internet became their only way of communicating with society. Meanwhile, other museums which already had an online presence became more active online and/or altered their URLs, making it necessary to monitor them constantly.

This is what led to the creation of the Map of Brazilian University Museums. At the time of writing, having added and excluded several spaces, it includes 442 physical university museums: 21 in the north, 90 in the northeast, 35 in the central west, 182 in the southeast and 114 in the south of the country. The difference between the total of the first list and this new list may be relatively small numerically, but is nonetheless significant, since it was not just a matter of adding new spaces. While this reveals a painstaking effort to identify museums and check their information, it also reveals the mutable and unstable nature of the scenario in which they operate. This changeability is aptly illustrated by the fact that the Brazilian Network of University Museums and Collections published a survey on its platform which drew, among other sources, on our map, published just a few months earlier, in which it listed 537 university collections and museums. Clearly, this difference may be attributed in part to the fact that it also included collections, but a closer look reveals that this was not the only divergence. Only by knowing what criteria and information they used can this discrepancy be understood. Once again, this demonstrates the difficulty and diversity of the phenomena being studied, making the experience almost analogous to counting grains of sand.

The data from the Brazilian Network survey served as the basis for an interesting study (whose comparison with the data from the map is still in progress) about the digital archives of university collections and museums, revealing that fewer than 30% published some type of digital object on their websites, although 5% of these were actually social media pages and only 7% used some type of digital repository (MARTINS & MARTINS 2021). These data are interesting, as they reveal that even though the digital culture expanded during the pandemic, it is still not so much a reality for Brazil's university museums as a potential avenue for them to explore. Furthermore, in view of the importance of exhibiting updated information on the web, the need to integrate this information, and the importance of the web for publicising and communicating the work of university museums, especially since COVID-19, it was decided that virtual museums should be included in the count of university museums for the Map. Thirty self-styled virtual museums were initially identified, but some of these were not included, such as two which were still under construction, with no content available, three which had physical counterparts, and the AfroDigital Museum, which appeared in association with different institutions from different regions, but which is actually a single

11. https://idd.org.br/acervo/museu-de-minerais-e-rochas-carlos-isotta/ (Accessed 3 July 2020)
12. http://museus.cultura.gov.br/espaco/7070/ (Accessed 3 July 2020)

museum with five "stations", although two of these were off air at the time of the search – as were other two museums, consequently not included.

This resulted in the addition of just 19 virtual spaces: two affiliated to universities from the northeast, three from the central west, eight from the southeast, and five from the south (one of which was created with the objective of building a memory of the pandemic), as well as one nationwide museum with three stations in operation: two from universities from the northeast and one from the southeast. This brought the number of Brazilian university museums, both physical and virtual, to 461.

As for the disciplines of interest to our study, this number rose to 117. Two physical museums were added, as were four virtual museums. There are also two museums which are still being constructed and therefore could not be included: the Virtual Museum of Valongo Observatory (Federal University of Rio de Janeiro) and the Virtual IT Museum (Federal University of Rio Grande do Sul). There was no strict parity between the total number of museums and the number identified as possibly safeguarding a collection in the areas of interest. It should be noted that to be classified as belonging to an area of interest, museums did not have to be exclusively from any such area (e.g. science, geology, physics, astronomy, etc.); they simply had to contain some artefacts that could be interpreted as being of scientific and technical heritage. Institutional museums are a good case for understanding the situation better: they often have collections from several different departments which fall inside and outside the scope of our study, and which are therefore not classified as museums of science but are obviously counted here as museums harbouring collections of interest.

The small number of museums that met the research criteria indicates that even higher education establishments entrusted with offering education, research and outreach do not always perceive the need to maintain museums, which could help strengthen the memory and identity of these institutions or of particular areas and produce research and knowledge. This in turn reflects contemporary society's complicated and ambivalent relationship with science, making it hard to get citizens, or even the academic community, to see heritage as a natural result of doing science and something worth preserving. In particular, there is very little heritage maintained from the exact and earth sciences and engineering, although this only becomes clear when we see that interpreting the cold reality of the survey results requires reading between the lines, seeing them in contexts so they can be used to form and tell stories about each of the museums they represent.

Interpreting data and classifying museums

The situation mapped is certainly a historical legacy. At the turn of the century, Almeida (2001, 51-52) identified 129 (physical) university museums in Brazil, breaking them down into the natural sciences (geology, botany, etc.) (54), history (31), anthropology (18), arts (17), science centres or museums of science and technology (6), and medicine, cartography and architecture (1 each).

Similarly, it is worth noting how our survey brings forth important differences vis-a-vis other important pioneering studies, not just because of the passage of time, in which different spaces closed, merged and above all opened, but also because of the search strategy and conceptual parameters employed. While Almeida's list concentrated on art museums, there are museums found in our study that were missing from it and important discrepancies arising from the fact that her study covered not just university museums, but museums at faculties and university centres too. It is a situation that makes the numerical divergence between the two surveys greater and more significant.

Even when compared with data from other more recent studies (e.g. MEIRELLES 2015, RIBEIRO et al. 2019), which identified 273 and 157 university museums in Brazil, respectively, our study uncovers far more, fuelling the debate around the use of the internet and potential confounders of studies of this kind, as well as the need for these museums to gain greater visibility, since their online presence tends to be limited and they are often unknown even by the community of their own host institutions, except their immediate departments. In fact in some cases, the aforementioned *Acórdão* actually brought the existence of some museum spaces to the attention of the universities hosting them.

While using the internet to map out these spaces is already challenging, the barriers to finding out more specific information about their archives and collections are even greater, as proved by the fact that in our study a great many spaces were identified only as probably having a collection or archive that fitted the research criteria; the online data was not enough to confirm this. There is apparently no inventory or

database of these or other museums, let alone an integrated platform, since even the UMAC database is out-of-date and has major gaps because of the lack of engagement of the spaces themselves.

In an attempt to find out more about these spaces, they were classified into different groups according to the nature of their main collections and/or their declared areas of interest (given that some museums, such as science centres, do not have their own collections), bearing in mind that their collections could be more wide-ranging and their artefacts could be interpreted in different ways by different observers or in different contexts or studies. The Brazilian Institute of Museums (IBRAM 2011) classification was taken as the basis for this stage of the research and adapted into the following categories:

- Anthropology and Ethnography – anthropological and social studies of different cultures;
- Archaeology – artefacts from digs, prospections and archaeological finds;
- Arts – artworks of different kinds, including the applied arts;
- Natural Sciences and Natural History – biological sciences (biology, botany, genetics, zoology, ecology, etc.), health sciences (medicine, veterinary medicine, biomedicine, nursing, etc.), earth sciences (geology, minerology, etc.) and oceanography;
- Science & Technology – study and application of the exact sciences, such as engineering, relating to the demonstration of principles and the development of science and technology;
- History – events or periods in history of an international, regional, national, local or even institutional nature.

The remaining museums were classified as "Other" because either they did not have high enough numbers to be classified under any one category or we were unable to ascertain any details of their work or collection or they had very varied collections, preventing them from being classified into just one. A good example of this is the Federal University of Acre's University Museum[13], whose website states that it has "historical archives, arts (art museum) and natural history", which is consistent with the peculiar nature of university museums and their oftentimes diverse collections, even if they may tend to concentrate more on one type of heritage.

Having classified the museums, the results are presented in Table 2, as follows.

Table 2 – Number and percentage of museums by area of classification

Area	Number	%
Anthropology and Ethnography	16	3.6
Archaeology	16	3.6
Art	45	10.2
Natural Sciences and Natural History	210	47.6
Science and Technology	57	12.9
History	42	9.5
Other	56	12.6

It is striking that nearly half of the museums were of the natural sciences and natural history, although this may be attributed to both the number of sciences this label encompasses and the historical organisation of knowledge, with these terms covering areas traditionally associated with the collection and safeguard in museums, herbariums, gardens, botanic gardens, etc. of countless specimens of unquestionable importance to the production and spread of knowledge. And in a country whose wealth of flora and fauna fascinated travellers and scholars even before Domenico Vandelli, it is no surprise that these collections still abound.

13. http://www2.ufac.br/site/nucleos/museu (Accessed 3 July 2020)

Table 3 below shows the percentages of each type of museum broken down by the macro-regions of Brazil.

Table 3 – Percentages of different types of museum per macro-region of Brazil

Region Type of Museum	North (%)	Northeast (%)	Central West (%)	Southeast (%)	South (%)
Anthropology and Ethnography	6.2	37.5	25.0	12.5	18.8
Archaeology	12.5	43.7	12.5	18.8	12.5
Arts	8.9	37.8	8.9	35.5	8.9
Natural Sciences and Natural History	5.7	18.5	9.0	38.8	28.0
Science and T echnology	3.5	7.0	10.5	50.9	28.1
History	0.0	14.3	7.1	47.6	31.0
Other	1.8	17.9	1.8	48.2	30.3

This breakdown brings forth anomalies, such as the absence of any historical university museum in the north of Brazil. As for the scope of this project, which covers the natural sciences, natural history, and science and technology, the southeast is particularly strong, accounting for over half of the science and technology museums. This regional predominance is reflected in all the categories, followed by the south, except for archaeology museums, most of which are to be found in the northeast.

Most of these museums are hosted by public (federal, state, and even municipal) universities. Of the 104 such universities identified, 88 had at least one museum. However, the relationship between the public and private spheres in these spaces and between different public entities is by no means clear-cut. There are museums managed by universities that actually belong to private institutions and are not part of their assets. A case in point, until 2015, was Marmelos Zero Power Plant Museum, owned by *Companhia Energética de Minas Gerais* but administered by the Federal University of Juiz de Fora[14], although it is still listed in the UMAC database as a university museum. There are also museums which belong to a university but which delegate their administration to third parties, such as the Museum of Contemporary Art, the former Assis Chateubriend Art Museum, which is owned by the State University of Paraíba but whose administration was transferred to the Pedro Américo Foundation and the Padre Anchieta Foundation for a 25-year period as of mid 2019[15].

By the same token, museums that already exist under public or private administration may be taken over by a university, a case in point being the National Museum, taken over by the Federal University of Rio de Janeiro in the 1940s. Similarly, museums may be split from their host university and face an uncertain future, such as the Bahia Museum of Science and Technology, which was originally linked to the State University of Bahia, then transferred in 2013 to the state's department of science, technology and innovation with the purpose of revitalising it. This did not, however, come about and the museum's future is now unclear, although some institutions, including the Catholic University of Salvador, have expressed interest in it (ABALADA & GRANATO 2019, 13). Alongside the instabilities often noted in the literature, the fact that many of these museums are created on the personal initiative of professors or departments means they often operate in fluid and uncertain circumstances, making them particularly vulnerable.

This can be seen even in the simplest act of gaining an online presence. Inadequate funding, red tape and lack of institutional support are some of the factors that prevent many museums from doing so. While the pandemic spurred efforts to expand online presence and circumvent the barriers that prevent this, there is still much to be done, not least because it means having platforms and other tools that enable data on these institutions to be analysed and communicated to the public.

14. https://www2.ufjf.br/centrodeciencias/2015/11/06/museu-usina-marmelos-zero-volta-a-ser-administrado-apenas-pela-cemig/ (Accessed 15 July 2020)
15. https://paraibadebate.com.br/sem-recursos-uepb-entrega-estrutura-do-museu-de-arte-contemporanea-a-unifacisa/ (Accessed 15 July 2020)

Concluding concerns

With all the changes in the rules pertaining to in-person activities and the potential return to normal activities in the context of the pandemic, affecting how university museums and society as a whole relate to museums and heritage, how can museums already mired in instability cope? Or does the "new normal" provide physical or virtual opportunities for the historical issues behind this instability to be overcome?

If the reality this study uncovers stands for anything, it is how important it is for these spaces to gain an online presence as at least a first step towards greater interaction with the public, whether it be the academic public or society at large. This is why surveys of the kind conducted here, while inevitably incomplete and reflecting a snapshot of a given moment in time are so important. But the work cannot stop here. The spaces must themselves make an effort to gain greater visibility both online and in the real world – something that a good number of them seem to have understood during the pandemic.

Gaining visibility means showing off their activities and their archives and collections. More information is still needed, and it needs to be cross-checked with other data through diagnostic and other studies, leading to effective measures, such as protocols and agreements, which must, once signed, actually be put into practice. At a time when even the task of conserving these spaces' physical infrastructure and collections – ever a funding- and personnel-starved activity – seems Herculean, how much more so is the task of expanding the scope of this work to gain an online presence, including data on their collections, which can be seriously jeopardised if not adequately conserved, and integrating this data in order to make the valuable potential of the heritage accessible to all?

If there is little to suggest that more concrete actions to address these myriad problems are soon to materialise, at least Brazil is witnessing a proliferation of research and working groups devoted to understanding and transforming the status quo. The different inventories done for the Map or by the Network, among others, show that while the stakeholders are largely dispersed, there are efforts to connect them, especially through online tools and digital culture.

Contextual and structural issues are inevitably constant challenges for any concrete action, making even the simple act of counting Brazil's university museums feel like attempting to count grains of sand, but the work cannot stop here, however precarious things may seem. This must be the first step on a path of affirmation, preservation and autonomy for spaces that have ever been important both for producing knowledge in diverse areas and for constructing a memory of science and universities. Only then will our university museums, often kept afloat only by the extreme dedication of the professionals involved, earn the recognition and support they rightly deserve from institutions, academia and society as a whole.

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