

Intertwining the Physical and Digital Experience at University Museum A Case Study from Keio Museum Commons, Japan

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Abstract Keio University, the oldest institute of western higher education in Japan, opened its first university museum, named Keio Museum Commons (KeMCo) in April 2021. To facilitate cultural encounters and interactions among the students, academics, as well as broader public audiences, KeMCo challenges in weaving the physical museum visit and the online digital experience. This paper aims to explore the practices and experiences we have acquired from the development and implementation and further clarify the fundamental principles of how university museums can create digital-physical hybrid experiences across the academic-public sphere.

Keywords Public humanities. Digital cultural heritage. Digital archiving. Audience-centred. Experience design. University museum. New normal.

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1 Introduction

Keio University, the oldest institute of western higher education in Japan, opened its first university museum named Keio Museum Commons (KeMCo)¹ in April 2021. Throughout its 160-year-plus history, Keio University has accumulated a vast collection of cultural artefacts (objects) from both inside and outside the academic sphere, while the objects were dispersed among different individuals and departments. Thus, KeMCo was designed to serve as a hub to connect these numerous collections of objects, as well as the various educational and research activities that underpin them.

In order to facilitate encounters and interactions between the objects and to create a cultural commons (Hess 2012; Bertacchini et al. 2012) which is accessible to students, academics, as well as broader audiences across the globe, KeMCo challenges in weaving the physical museum visit and the online digital experience through its digital-analogue (physical) fusion project. Although there have been a number of literatures in the area of university museum studies (Boylan 1999; Stanbury 2000; Dransart 2013; Geladaki, Papadimitriou 2014; Simpson 2019) and there is currently a growing literature that came out of the COVID-19 pandemic (Cioppi et al. 2020; Flew, Kirkwood, 2021; Economou et al. 2021), the emerging shift requires more actual responses and reflections which stem from the audiences. This paper reports on a practice-based study, documents the process of developing new approaches in weaving both physical and digital experiences in the new normal era.

1.1 Foundation

The concept of combining the physical and digital experiences within the museum sector has been spreading among scholars. For reference, there are three contrasting examples; one is the CHES (Cultural Heritage Experiences through Socio-personal Interactions and Storytelling) project which conducted an in-depth study into storytelling in museums and provided an interactive participatory experience through building novel mobile systems (Pujol et al. 2012). Another is the meSch (Material EncounterS with digital Cultural Heritage) project, a multi-institutional study that grounded in co-design, enabled cultural heritage professionals to join, use, and create digital interactive technologies alongside the activities held in the physical dimension (Petrelli et al. 2014). And the third is GIFT, a European research project that created “hybrid physical-digital visitor ex-

¹ <https://kemco.keio.ac.jp/en/>.

periences” (Back et al. 2018, 31) through “design exploration of two concepts focusing on gifting and playful appropriation” (31). Moreover, the global pandemic has led the museums to rethink the importance of their digital presence (Debono 2019; UNESCO 2020; Zuanni 2020; Richardson 2021)² and further became an impetus for digital transformation for a myriad of museums regardless of their scope, size, or location.

Accordingly, in the museum sector, there have been a number of previous attempts in implementing digital change. And as the field advances, the role of digital is becoming prominent, in various ways. However, this phenomenon does not and should not be construed so as that “the physical space of the museum is no longer dominant” (Art Fund 2021, 5). Rather, the digital and the physical are both dominant and must co-exist. While the pandemic brought “new and emerging audiences” (Noehrer et al. 2021, 7) and there is an evolving need in “audience development” (EU 2017, 11), we should not forget that the audiences live “both in the physical and the digital domain” (32), and as Galani and Kidd state, the concept of “hybrid materialities” (Galani, Kidd 2020, 298) is the key to create and amplify unique value in the context of museums. Furthermore, in the case of the university museums, “they may be a university’s main or only space where academic-public engagement take place” (Hide 2013, 10). Unlike other museums, university museums are not “powerhouse displays of masterworks” (Cotter 2009). Instead, their multidisciplinary collections should be wide open in “both within and outside the campus” (Stanbury 2000, 7) and available to both academic and public audiences.

1.2 Framework

We note that audiences are necessarily wide and diverse. Not only in terms of geographical environment or age difference, but they also have different needs, abilities, and interests. Therefore, for interpreting both the digital/physical sphere, this study operates two unique platforms: a) ‘Keio Object Hub’³ - a Japanese and English bilingual digital archiving platform that provides a comprehensive view of Keio’s art/culture by linking the dispersed digital collections and other culture-related activities within the university; and b) ‘KeM-Co Studi/O’⁴ - a physical space to learn about the relationship be-

² See also Onuoha, L.N.; Devine, C.; Martinez, R.; Smallegange, M. (2020). “ICOM Webinar | Digital Transformation for Museums in the Time of COVID-19”. <https://www.youtube.com/watch?v=WTLXLgopm4s>.

³ <https://objecthub.keio.ac.jp/en>.

⁴ <https://kemco.keio.ac.jp/en/digital/kemco-studio-en/>.

tween digital and physical objects through hands-on experience and designing prototypes, in close contact with the museum's exhibition and collection practices.

This research adopts a human (audience)-centred approach (Holtzblatt, Beyer 2016) and describes the design process and outcomes, from the pilot research that took place in 2019-20 until its implementation in April 2021 through March 2022, the opening year of KeMCo.

Following a design- and practice-led approach in which the findings emerge from the outcomes, as well as reflections on the practical activities, the research consisted of the following phases.

- Conception of the Keio Object Hub: outlines the concept of KeMCo's digital platform. Besides, pilot research studies were conducted to understand and define potential audiences.
- Implementation of the Keio Object Hub: illustrates in detail how it is installed.
- Conception of the KeMCo StudI/O: outlines the concept of KeMCo's physical platform.
- Implementation of the KeMCo StudI/O: illustrates in detail how it is installed.
- Evaluation: examines how both digital/physical sphere are explored by the audiences.
- Discussion and Conclusion: describes the insights and findings gained from the study.

The aim of this paper is to explore the practices and experiences we have acquired from the development and implementation of the platforms, and to further prefigure a new generation of university museums, which intertwines the digital and the physical, builds links between the university and the public at large, and is dedicated to both remote and on-site audiences.

2 Digital Platform: Keio Object Hub (KOH)

We note that university collections are necessarily wide and diverse, ranging in many subject areas (Palmer 2004), depending on their respective fields of research and study. Besides, each collection holder has traditionally had different approaches towards, and practices of, digitising and delivering their collections (Robinson 2014). However, as Lee writes, “[t]he dynamic nature of the interaction between the user and the collection was somehow overlooked” (Lee 2005, 68). Even though they focus on a specific domain, when the archival materials go online, opportunities and challenges arise from audiences' behaviour, in many ways, both among and outside of the research communities (Maron et al. 2013). Thus, merely digitisation does not automatically make collections discoverable or accessible (Terras

2015), and more “navigable representations” (Whitelaw 2015) are required – where audiences can search and explore the collections through browsing.

In the following, we describe the process of design and implementation of the KOH and the rationale behind it. While there are standards as well as guidelines for digitising archival materials (Lourdi, Nikolaidou 2009, IFLA 2014, Campagnolo 2020), there is no intrinsic way of visualising them through the web browser (Whitelaw 2015). Of course, under the broad notion of digital humanities, a number of studies have been proposed to deal with the expectations and behaviour of audiences (Pitti 2004; Drucker 2013; Leon 2015; Tom et al. 2017), however, this paper stands unique in providing a comprehensive methodology of how a university museum – a place where wide audiences meet and interact with the university collections – can implement a sustainable digital archiving platform alongside the physical space.

2.1 Pilot Research

Primarily, we needed to find out who our audiences are, and how they would possibly explore our collections. To communicate ideas and facilitate discussions among the major potential audiences, we conducted an online survey and semi-structured interviews with Keio University students across diverse disciplines [table 1]. This initial round of research was conducted by the authors with the support of 2 students. We circulated a survey to 3 lectures and conducted on-the-spot interviews, as well as one-on-one follow-up interviews. Due to the limitation of human resources and the pandemic, the participants were relatively small in number,⁵ however, we were able to gain insightful feedback from students across different disciplines.

Table 1 Total number of participants

Year	Number of survey answers	Number of interviewees
2019	20	14
2020	112	8

⁵ By the numbers, Keio University has 10 undergraduate faculties, 14 graduate schools, and approximately 33,400 students. See <https://www.keio.ac.jp/en/about/by-the-numbers/>.

First, in 2019, one of the questions that we asked was, “What kind of environment and/or exhibition would you like to see and experience at KeMCo?” and the following are the comments as well as answers extracted from this open-ended question:

I think it would be nice if we could get information about the artworks in both audio and written form from smartphones. (Student who attended the lecture “Museum Information and Media”)

I'd like to see the artworks in an atmosphere that welcomes students and further allows a casual/lively atmosphere, rather than a formal atmosphere (i.e., a perfectly organised ‘typical’ museum that prevents conversations and requires silence). It would also be nice to have some background music playing. (Student who attended the lecture “Museum Information and Media”)

Students will get bored of just seeing the artworks. It would be great if you could provide us with a more experience-based approach, such as touching, listening to music, and stimulating the five senses. (Junior student majoring in Economics)

Through observing these comments and other survey results, we learned that the younger generation puts more value on physical interaction with the objects as well as with their surrounding environments. And next, in 2020, to gain a deeper understanding of how they see the current state of university museums and further capture their expectations for KeMCo, we conducted another round of surveys with different questions. The following are the extracted questions and answers - (a), (b), and (c).

Answers to the question (a) “What kind of image do you have when you hear the words ‘university museum’?”:

Students of that university have seen it [the museum] on campus, but they just pass by. (Senior student majoring in French Literature)

The museum is for ‘education,’ so the place is quiet and in a sombre mood. (Sophomore student majoring in Information and Computer Science)

Used only for academic purposes and are not widely available to the public. (Junior student majoring in Bioinformatics)

While I think it is valuable to have the opportunity to see research materials owned by a university, it seems that many of the exhibits are quite maniacal (that’s just an image), and unless I have a

great interest in them or they become a popular topic of conversation, I don't think I would go to a university museum - as I only occasionally go to museums to acquire general education and topics. (Senior student majoring in Ethics)

Answers to the question (b) "If your university (Keio University) were to have a university museum, what would you expect to see?":

I hope that the atmosphere will be such that people can easily go there and become more interested in art, even if they were not very interested in art before. (Senior student majoring in Human Science)

Exhibitions by students should also be possible. (Senior student majoring in Literature)

The artworks should be (easily) accessible at home, at the university, or anywhere else. (Junior student majoring in Human Science)

Events for online participation, cultural festivals, etc. (Senior student majoring in Science and Technology)

I would like to see the exhibits/artworks owned by or originating from Keio that we don't usually pay attention to, but actually have great cultural value. I would also like to see the museum divided into two sections, one for the permanent collection and one for a special exhibition, so that visitors can visit the museum as often as they like. Furthermore, it would be great to have a guest lecturer/speaker in every six months or so. Of course, it is desirable that the museum is open to everyone, to the wider public. (Senior student majoring in Japanese History)

Answers to the question (c) "KeMCo is currently preparing the following programs/contents. Please tell us what you are interested in" (multiple-choice question) **[fig. 1]**.

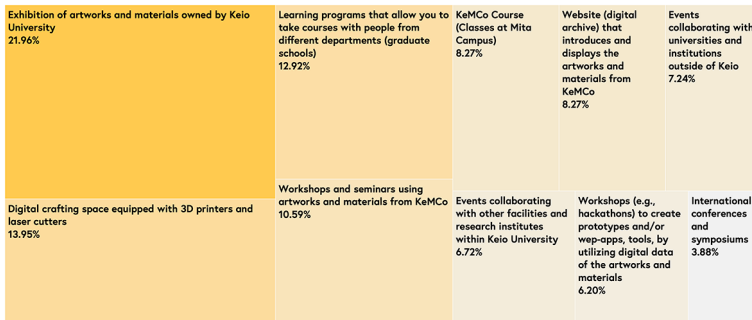


Figure 1 Answer Results to Question (c). Tree Map reflecting the Percentage

The results offered useful insights and shed light on potential audiences' behaviour and expectations. While there was growing awareness towards university museums in Japan (Kinoshita, Yasui 2000), still today, the place is considered to be a 'closed' and confined place. As a matter of fact, when we asked the same students if they have heard the term 'university museum', nearly 80% of respondents (n=112) had never heard of it. However, on the bright side, the students are not fixed on the idea of typical university museums and as shown in the answers to the question (b), we may take their comments into consideration and start from scratch, generate new possibilities in presenting and interacting with the university collections in both physical and digital means.

Additionally, as figure 1 indicates, the majority of students are most interested in the exhibition itself whilst they are also interested in using digital equipment, as well as joining interdisciplinary courses and workshops. From these students' feedback, it is clear that through incorporating digital scholarship into the institutional framework, a university museum can encourage audiences to actively engage with the collections.

1.3 User Types and Strategic Purposes

Based on the insights gained from the pilot research, a series of workshops were conducted in the middle of 2020. To reflect a dual interest from both academic and non-academic, the participants consisted of students, researchers, designers, engineers, as well as office workers [fig. 2].



Figure 2 LEFT: Photos from the workshops / RIGHT: Outputs from the workshops

After testing prototypes, experimenting with the different types of user journeys, we segmented potential audiences in four different types as follows.

- Researchers (lecturers, academic staff, etc.) who utilise literal and visual assets of the KOH, utilise the KOH to access to physical artwork
- Learners (students, alumni, etc.) who utilise mainly visual assets of the KOH, utilise the KOH to explore topic of interests
- Creators (artists, students, etc.) who publish their content on the KOH, contribute to the Keio community
- Visitors (hobbyists, administrative staff, etc.) who simply explore the KOH, get a brief understanding of the KOH

Furthermore, the main user groups were set as Researchers and Learners, and to fulfil their respective expectations and behaviour, the following strategic purposes were identified.

- Functional: the KOH is first and foremost an online archive, and therefore must behave like one. The platform has to include the minimum functions and usage patterns of an online archive and should function well and as expected according to conventions.
- Academic: the KOH's priority is to serve users who use it for academic purposes. For this purpose, it provides objective information about art pieces, collections, events, etc. It should empower them to fulfil their research efficiently and with ease.
- Educational: the KOH plays an educational role for certain users, providing introductory knowledge of arts, inspiring them with suggestions and content that expand their curiosity. For

this purpose, the KOH should be inviting, proactive and supportive.

- Collective: the KOH curates contents and data provided by users ranging from Keio affiliates to art creators. The platform also allows its different user types to interact, creating a sense of community around art and academics.

In consequence, the following three features were implemented to motivate users - especially Researchers and Learners - and assist their active exploration.

Creating a Serendipitous Discovery: on the KOH's top page, thumbnails of Keio's cultural assets will slowly stream across the top, both to exemplify the diversity of the collections and to create chance encounters with different materials. Besides, by using Google Cloud's Vision API,⁶ the images of each object are analysed by Artificial intelligence (AI), and the keywords are automatically assigned as 'AI Suggests' [fig. 3]. In this way, the KOH creates an opportunity for an unplanned and unpredictable discovery through browsing the vast collections.

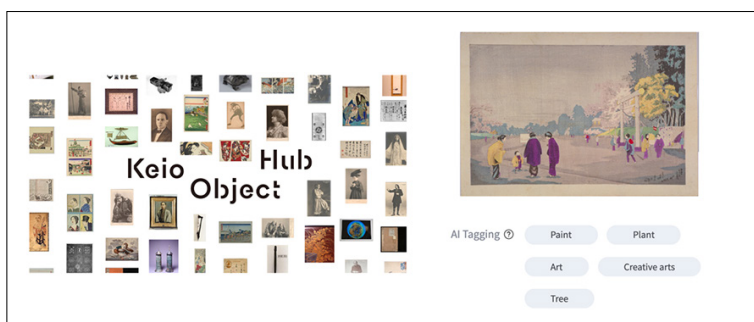


Figure 3 LEFT: Screenshot of the top page / RIGHT: Screenshot of AI Tagging

Enhancing Open Access: to ensure the application of the FAIR (Findable, Accessible, Interoperable and Reusable) principles (Wilkinson et al. 2016), the images are compatible with the International Image Interoperability Framework (IIIF) version 2 and version 3,⁷ so that the images, as well as metadata records can be used not only in the KOH but also in other various software. In addition, most of the images are provided under a Creative Commons Attribution 4.0 Inter-

⁶ <https://cloud.google.com/vision/>.

⁷ <https://iiif.io/>.

national (CC BY 4.0) license,⁸ which allows secondary usage. Furthermore, from May 2021, the KOH was linked to the Japan Search,⁹ “a national platform for aggregating metadata of digital resources of various fields” (Kobayashi 2022) and enables cross-searching among a wide variety of cultural assets provided by other partner organisations. As of May 2022, there are 83 organisations providing their metadata to the Japan Search and the topics cover “various fields, such as Book/Publication, Official Document, Humanities and Art” (Digital Archive Japan Promotion Committee and Practitioner Review Committee 2020). According to Navarrete and Villaespesa (2020), “cultural consumption must be freed from museum websites” (Navarrete, Villaespesa 2020, 242) and it is crucial for us to advance the use of open data.

Disclosing the Archiving Process: the KOH not only advances the openness of data, but through inquiries into what kinds of experiences can be designed through the utilisation of data, it promotes initiatives regarding the use and application of data. Although the design of the interface does not yet fully meet the W3C standards,¹⁰ our team have compiled a style guide documents guidelines for how experience should be represented in a visual way.¹¹ Besides, the KOH is designed to extend the physical experience into digital. For instance, the activities as well as outputs created at the KeMCo StudI/O are presented in the section “Behind the Hub” [fig. 4] and “Open Data Design” where they reveal the process of archiving activities and the way of using those data.

8 <https://creativecommons.org/licenses/by/4.0/deed.en>.

9 <https://jpsearch.go.jp/>.

10 <https://www.w3.org/standards/>.

11 As of May 2022, the style guide is not publicly accessible, but is available from the corresponding author on reasonable request.

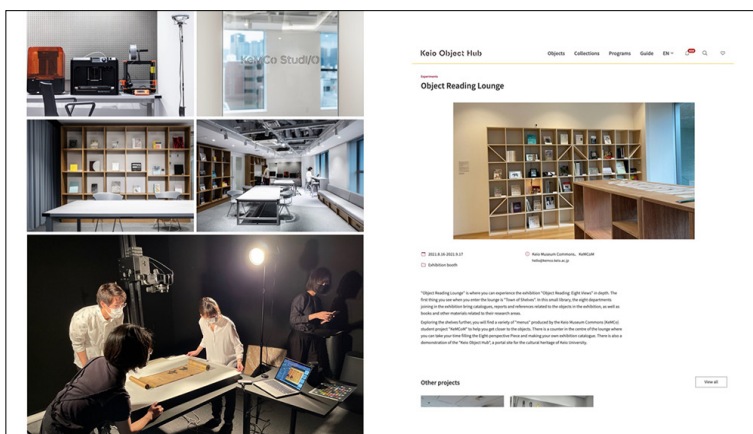


Figure 4 LEFT: Photos from the KeMCo Studi/O/RIGHT: Screenshot of “Behind the Hub”

2.2 Summary

The outbreak of the COVID-19 pandemic forced many museums to share their collections and exhibitions online. However, even before the pandemic, museums had begun to share their collections in a digital sphere in an accessible manner (Wayne 2013). Yet today, a wide range of cultural heritage collections are available in a more transparent and open environment, in which the interpretation of collections is being reformed. For university museums, this movement takes the objects out of the educational environment and provides the opportunity to increase public engagement, unfolds progression of resources and content.

The KOH currently publishes 12,910 items from 19 collections of 6 institutions in the university. The fields of items cover History, Ethnology, Japanese and Chinese Literature, Japanese Arts, Western Arts, Performing Arts and Calligraphy.

In the KOH, each object’s metadata and digital image are created, managed, and stored by the institutions separately, using different data management systems. The KOH developed a process to connect each database and regularly aggregate the metadata and digital data. The aggregated data is registered to the KOH’s collection management system, called Museum System, where metadata mapping for cross-search, keyword generation for ‘AI Suggests,’ and image transfer to the IIIF server are processed. The public interface of the KOH is structured up-

on an open-source web content management platform, called Drupal,¹² connected via API with the Museum System.

Through the KOH, a wide range of visitors can engage with objects from the university's collections by accessing rich information such as descriptive texts, digital images including 3D models, related exhibitions, gallery talks, etc.

While the KOH does not have permission to do everything, it was designed to hold a diversity of multimedia content, beyond what would fit in a physical realm, and further enables the audiences to blend in a physical sphere.

3 Physical Platform: KeMCo Studi/O

The KeMCo Studi/O - located in the same building where the exhibition space is - was set up as a creative studio (Fablab) to connect the physical (real) cultural properties with those that exist in digital spaces such as the KOH. The 'I' in Studi/O stands for 'input' and 'O' for 'output,' and it was designed as a place to input and output the tangible and intangible cultural assets that Keio University has accumulated. The 'input' literally means 'to input,' and it promotes the transformation of Keio's cultural assets into digital objects and their introduction into digital spaces, including the World Wide Web. On the other hand, the 'output' refers to the release and sharing of the input data and its utilisation both inside and outside the university.

The studio is equipped with a variety of digital/physical fabrication facilities, allowing museum visitors, students, researchers, and the wider public to come into close contact with the museum's exhibition and collection practices. With its digitisation facilities and creation tools, the studio allows visitors to learn about the relationship between digital and physical objects through hands-on experience and cross-media creation, ranging from speedy prototyping to full-scale content creation. Also, as a symbolic work for the studio and KeMCo as a whole, a commissioned work *FFIGURATI #314* by Enrico Isamu Oyama,¹³ an artist and graduate of the Faculty of Environment and Information Studies, has been installed [fig. 5].

¹² <https://www.drupal.org>.

¹³ <https://www.enricoisamuoyama.net/>.



Figure 5 Photo of the KeMCo StudI/O with FFIGURATI #314 (the pillar and curtain)

In the following, we describe the concept and activities held at the studio, as well as discuss the outcomes derived from the activities from both the ‘input’ and ‘output’ perspectives.

3.1 Input: Promoting Digital Archiving

Part of the KeMCo StudI/O functions as a photography studio for still and moving images of various types of objects, such as manuscripts, art and craft works, and large paintings. Under the supervision of Caloworks Corporation, a company that has been photographing the collection of Keio University Library, the studio performs digital archiving (input) for many departments and institutions at Keio University. We have a variety of equipment, among which two types of mirrorless digital cameras are used for still photography. One can capture high-quality still images with more than 100 million pixels, making it possible to visualise every detail of the target work, and it is also useful for recording and digitally preserving works that will inevitably deteriorate or be damaged over time. Another is an IR (Infrared Rays) camera that is capable of infrared photography. Infrared photography detects underpaintings and text that are difficult to see with the naked eye, and can also check the condition of materials and scratches, making it useful for curators to conduct research. Besides, another area of the KeMCo StudI/O is used for 3D digital ar-

chiving of cultural properties, and currently, two high-precision 3D scanners are being used to create 3D data [fig. 6].



Figure 6 Left: photo of Photography Archiving; right: photo of 3D Archiving

3.2 Output: KeMCoM (Student Members of KeMCo) Project

KeMCoM Project is the name given to the activities of undergraduate and graduate students across disciplines and campuses. Based at the KeMCo Studi/O, the students develop cross-media creative works. They share their interests, knowledge, and experiences, and explore new possibilities in culture/arts and fabrication from their own unique perspectives. Typical examples include the creation of ‘kawaii (cute)’ content inspired by the visual design of exhibition exhibits and posters (e.g. AR filters on Instagram),¹⁴ the creation of a virtual representation of KeMCo in digital space (e.g. KeMCo 360 VIEW),¹⁵ and the development of aesthetic visuals such as projection mapping. Instead of spending a lot of time and effort to create a one-of-a-kind product, through peer-to-peer learning, they build and show prototypes, reflect on the feedback received, and yet remain open to new ideas. Furthermore, to accelerate the use of 3D data, they are making full use of the 3D printers incorporated into the studio. Through modelling of the data, the output is displayed not only in digital form (= intangible) but also in physical form (= tangible). Of course, the scale, techniques, and materials used are different from the original cultural properties, but the students’ hands are moving back and forth between the digital and physical sphere, giving the objects a new perspective [fig. 7].

14 <https://www.instagram.com/kemcomembers/>.

15 <https://studio.kemco.keio.ac.jp/360/>.



Figure 7 Left: photo of student members; right: photo of a member showing tangible outputs

3.3 Summary

The years 2020-21 were marked by the expansion of the pandemic, which forced society to undergo a significant transformation. With a greater sense of urgency than ever before, we all realised that building a digital environment and sharing its activities online is not optional, but an essential part of the museums' infrastructure. However, as mentioned previously, museums have long placed a strong emphasis on the physical encounter with objects and spaces that are at the centre of the experience, and accordingly, the digital sphere needs to be connected to the physical. Therefore, as described, KeMCo defines itself strongly as an experimental place that explores the phenomenon of digital/pericycle space by advances in digitalisation and fabrication.

4 Evaluation

The above deliverables from both the KOH and the KeMCo Studi/O, were assessed through quantitative and qualitative approach. As for the quantitative data, the authors summarised the number of users who have accessed and explored the KOH. As for the qualitative data, to gain feedback from the actual audiences, we circulated a survey to the audiences who visited the exhibitions held at KeMCo.¹⁶ Furthermore, during the exhibition opening period, we conducted a series of fabrication workshop for junior school students and circulated an additional survey to those students [table 2].

¹⁶ During the exhibitions, the visitors were able to interact with the KOH inside the exhibition room.

Table 2 Dates, Titles, and Numbers from the Opening Year of KeMCo

Exhibition dates	Exhibition title	Number of visitors	Number of survey answers	Number of survey answers from workshop attendees
2021, Apr 19 – Jun 2	Cross-scapes: Interconnecting Art	940	30	12
2021, Aug 16 – Sep 17	Eight Perspectives on Reading Objects	361	147	13
2021, Oct 18 – Dec 3	Tangite me: Reconsidering Conservation during the Pandemic	725	46	18
2022, Jan 11 – Feb 10	Where the Tigers Are	605	208	14

4.1 Quantitative

The examination of the number of accesses to the KOH led to two major findings. First, as figure 8 indicates, a substantial number of users have visited the KOH constantly, without large fluctuations [fig. 8]. While it is difficult to compare these numbers with other museums, this becomes a baseline for future improvements. Second, as figure 9 shows, by segmenting the number of unique users (audiences) by country, more than 90% were from Japan, followed by China, United States, Guam, Canada, and so on. Although nine out of ten users are from Japan, it is interesting, as well as insightful, to see the variety and diverseness [fig. 9].

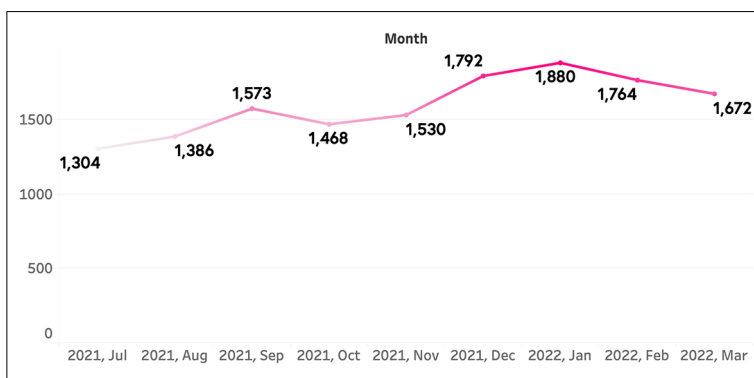


Figure 8 Unique users (audiences) who accessed the KOH (from July, 2021 till March, 2022)

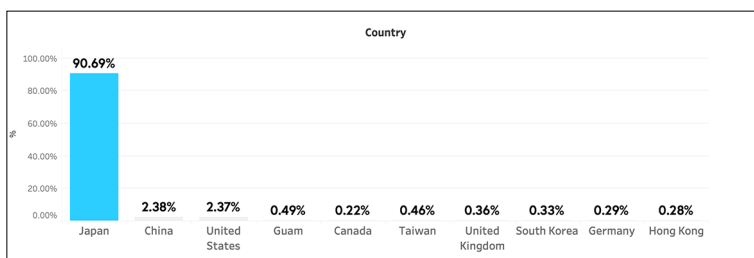


Figure 9 Top 10 by country – percentage average in 9 months (from July, 2021 till March, 2022)

4.2 Qualitative

To gain deeper understanding and behavioural insights of the audiences, we looked into the survey results provided by the visitors and the workshop attendees. The following are the extracted responses from the segmented audiences – Researchers, Learners, Creators, and Visitors.

Researchers' response to the question "How did the KOH stimulate your curiosity in cultural properties?"

Curiosity was greatly stimulated, as unexpected and interesting material could be found in the objects that appeared by entering the random words, and just looking at the images on the KOH front page seemed to be a good way to broaden interest, as one could find material that one would not normally find. (Researcher at Keio University)

Learners' response to the question "What were your overall impressions of the workshop? Please be as specific as possible and describe what you felt/thought":

It was a very valuable experience for us to visit the university and see many works of art that we had not seen before. I feel that this was a great opportunity for us to visit the university, as we did not have many chances to visit the university when we were first-year students due to the spread of the infection. We also learned a lot from the explanations and knowledge of the Chemco staff, and I feel that it was a great learning experience. (Junior high school student, workshop attendee)

Creators' response to the question "Please leave your comments and opinions":

The 9th floor had artworks, including a unique Picasso piece; the 3rd floor had historical artefacts, so I could learn how tools were used in this period; the 8th floor had the latest technology, including a 3D printer, which was fun to experience. There were also works by the calligraphy club, all of which were unique. (Junior high school student)

Visitors' response to the question "Please leave your comments and opinions":

The clarity and quality of the digital archive images are amazing. It was very interesting to see the different ways of viewing the images. (Unknown visitor)

As presented, it is apparent that the overall conception and implementation were successful in both the digital and the physical realm. However, it is necessary to note that there were different policies and restrictions in the way we generated, collected, and shared both quantitative and qualitative data. Due to its nature, the data obtained and used in this section contain multiple informants and these limitations will influence the findings. This explains the complex survey design. Because of this complexity, it is difficult for us to clearly distinguish among questions and answers related to KOH, the KeMCo StudI/O and the exhibition. Nevertheless, the goal of this study is to intertwine all spheres and not to separately evaluate each, so the affect of the complexity should be to the minimum.

5 Discussion

Both the KOH and the KeMCo StudI/O are emblematic of KeMCo platforms. Its content and functionality bring together resources, collections, and expertise from across Keio University. As more and more digital collections and data are becoming available and accessible, under the wide umbrella of KeMCo, the KOH and the KeMCo StudI/O support and enhance each other's function. As described, the KOH will keep evolving by involving more Keio collections and artworks created at the KeMCo StudI/O. Furthermore, the activities as well as outcomes stimulate KeMCo to reach new audiences through both physical and digital experiences. Accordingly, we summarised and extracted four key common principles as follows:

- Neutral: Both the KOH and the KeMCo StudI/O are for diverse groups of people of all ages who are interested in art, such as people in Keio, people outside of Keio, professional artists, amateur creators, and so on. Thus, the perceptual design should be timeless and less opinionated to be appreciated by anyone.

- Art-centric: Both the KOH and the KeMCo StudI/O host art collections in many different styles. The atmosphere should not disturb the contents but rather make them stand out. The space must respect each Keio collection and treat them without partiality.
- Expert: Both the KOH and the KeMCo StudI/O should communicate the accuracy, objectivity, and trustworthiness of the collections. Thus, the design choice should be durable for both frequent and extensive use.
- Engaging: For both the KOH and the KeMCo StudI/O, the details of the design should catch audiences' attention and encourage them to explore further. Besides, the design should be subtle, and should not disturb the essential experience.

The interdisciplinary opportunities in both the physical and digital sphere will be of value to all audiences, regardless of their baseline differences. Onsite, the KeMCo StudI/O allows access to the real objects, while online, the KOH brings different perspectives to the collections. Besides, it is important to note that the key common principles have developed trusting, solid relationships with both remote and on-site audiences. The studio connects audiences throughout the university, and the KOH encourages audience involvement in not just consuming but also producing and disseminating knowledge. The concept, activities, and the outcomes provide a foundation as both a practical and theoretical framework in intertwining the physical and digital experience.

6 Conclusion

This research contributes to modern scholarship in both digital/physical archiving as well as an audience-centred approach. Our discussion does not claim that there is only one way to support the expectations or needs of all audiences, however, the overall process and results clarify the fundamental principles of how university museums can create new physical/digital hybrid, and act as a 'hub' to facilitate encounters and interactions between the audiences and digital collections. By making our objects accessible to researchers, learners, and the wider public, we gained new perspectives on the objects as well as knowledge and skills, which brings a lot of potential for development and change in university museums, that need to become resilient institutions, fit for the new normal.

Throughout our research, we have developed a deep knowledge of the needs of audiences. The successful outcomes of the KOH and the KeMCo StudI/O are due to a development process centred on audience research and their needs. Whilst our case study covered only

one small university museum in Far East Asia, we are now ever more convinced of “the need to involve everyone in society in the ongoing process of defining and managing cultural heritage” (Council of Europe 2005). Besides, with the availability of growing numbers of collections, we feel the necessity to rethink the nature of museum work. As researchers working in a university museum, we know that just giving access to the objects is not enough. Given the emergency context, we suggest that all university museums expand their conception of physical/digital, and explicitly recognise the significance of blending them together. The physical and digital processes should not be developed as separate parallel tracks or merely co-exist as “copies” (Manovich 2021) of real-life visits. Instead, the physical and digital spheres should be intertwined, deliver the content and experiences that could not be replicated in other contexts.

In the new normal era, university museums must reconsider their role inside the university as well as society, adapt their activity to meet the needs, deepen access and participation for local and global audiences. We note that there is still more work that needs to be done, however, we hope that this study, which illustrated the opportunities and challenges involved in designing a university museum today, will inspire such discussion.

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