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Design of Narrative Book Collection
Combining Computational and Visualization Approach

Exploring Japanese Culture Through Keio University’s
Pre-Modern Japanese Book Collection

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Graduate School of Media Design

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Abstract of Doctoral Dissertation of Academic Year 2017

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Category: Design

Summary

The digitization of academically valuable materials such as rare books allows global access and can enhance reading experiences in online environments. Although this potential has been already largely explored and has allowed a broader public to access those works, there is still room to fulfill the gap of proficiency and cultural differences among them. This research proposes the design framework of the Narrative Book Collection: a web-based online interactive interface that allows the audience to follow one main narrative—created and curated from a professional perspective—and also create their own narratives from their journey throughout a provided content.

This interface was conceived initially as a support material for the massive online course (MOOC) Japanese Culture Through Rare Books, on the FutureLearn platform. The goal was to create an interface for learners from a diverse variety of backgrounds to enjoy both text and non-text aspects of Japanese rare book collection introduced in the course. The collection is formed by 148 pre-modern titles published in between the 8th and the 19th centuries, owned by Keio University’s library and the Institute of Oriental Classics. Narrative
ABSTRACT

Book Collection combines computational and visualization approaches for learners to interactively experience narratives based on bibliographical knowledge about the collection along the course.

In this thesis, I describe the design process, from the pilot research that took place at the end of 2015 until its implementation in late 2017. During this process, I verified the main principles for the implementation that originated the design framework proposed: (a) story formation—establish viewpoints on the narratives—, (b) data generation—generate and store digital data from the main content—, (c) story-driven data analysis—analyze and interpret data to facilitate knowledge transfer—, and (d) narrative visualization—offer multiple viewpoints and interactions with the collection. The validation analysis was based on the results of three iterations of a design-based study. The results were examined quantitatively and qualitatively on data generated from learners as well as informal discussions with scholars in bibliography.

This research contributes to the modern scholarship in both digital humanities and user-experience design. Narrative Book Collection provides distant and close reading experiences in conjunction with narratives for learners to engage with vast amounts of books and stories. That allows them to create multiple narrative pathways with an extensive range of interpretation of bibliographical information. Also, the analysis revealed that this interface stimulated exploration and facilitated better engagement with the course. In this way, Narrative Book Collection brings new possibilities to the interaction of human beings with books to a new dimension.

Keywords:
Rare Japanese Books, Digital Collection, Narrative, MOOCs, Digital Humanities

Keio University Graduate School of Media Design

Goki Miyakita
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Chapter 1

Introduction

Books are physical artifacts, a medium of communication that relates to our senses by written words or illustrations stimulating our minds. Regardless of the content or genre, whether it is monograph or illustrated, literature or a novel, we humans have been living very closely with books since even before mass printing technologies became widespread and affordable worldwide. Despite the rise and development of digital technology, books retain value through preserving words and images. However, the impact of digitization enables a much greater number of people to engage books from many different perspectives. By adopting digital technology, books are now transformed into digital formats making resources accessible and usable in many different ways.

In this chapter, I first review the history of books. Then, the chapter continues with a description of the transformation of the books in the digital age, and the way books function as cultural artifacts. Then, an observation of the the impact of emergent technologies in rare book collections is presented. Lastly, I contextualize my thesis background and research.

1.1 The History of Books

The history of books correlates with the history of writing, reading, and printing. As time passes, there are many drastic transitions in this history. Although there are various theories, the origin can be traced back to 4000 BCE, when “humans learned to write. Egyptian
hieroglyphs go back to about 3200 BCE, alphabetical writing to 1000 BCE,”¹ according to Robert Darnton (2008). At around 3200-3000 BCE, Cuneiform characters were used as the dominant medium of communication among Sumerians in Mesopotamia. This is thought to be the origin of books.² Then, in ancient Greece, the Greek Alphabet was created, that is, a shift from orality to literacy, which permanently transformed human consciousness.³ Walter Ong discusses the evolution of consciousness and the culture of orality and writing. He characterizes orality and writing as two different systems, and claims that the invention and development of the Greek alphabet has changed thought and society. In his book *Orality and Literacy*, he describes that “[w]ithout writing, the literate mind would not and could not think as it does, not only when engaged in writing but normally even when it is composing its thoughts in oral form. More than any other single invention, writing has transformed human consciousness.”⁴ According to Jack Goody, writing is “a technology of the intellect,” and there are two main functions of writing. One is “the storage function” that delivers words over time and space, and the other is that which “shifts language from the aural to the visual domain” and allows words to be preserved from a different cognitive process.⁵ Consequently, books became an ideal platform in presenting text and images as visual information. Books are artifacts that preserve and transfer an abundance of information and knowledge.

In the early centuries of the Christian era, the codex was developed as a hallmark of hu-

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man ingenuity. The codex is known as the origin of modern books which was first developed from a wooden writing tablet. It substituted scrolls—which were the common written format of that time—and eventually was given a cover, folds a collection of separate sheets, and most importantly, enabled the reader to turn the pages. Darnton (2008) maintains that this “transformed the experience of reading” and lead to the printing revolution. In the mid-fifteenth century, Gutenberg ignited this revolution by inventing the printing press with movable type. Elizabeth L. Eisenstein (1979) referred to this as a “communications revolution,” where books became mass media through making the reproduction of the written word easier and faster, and hence the printing press enabled a much broader range of dissemination of knowledge through books than had ever before been possible. As Francis Bacon (1620), an English philosopher, wrote in his *Instauratio magna*, “printing, gunpowder, and the nautical compass [...] have altered the face and state of the world: first, in literary matters; second, in warfare; third, in navigation.” Indeed, the printing revolution made a great impact on the world. In the book, *The Gutenberg Galaxy: The Making of Typographic Man*, Marshall McLuhan (1963) traces the social and cultural effects of printing and claims that “all reading in the ancient and medieval worlds was reading aloud. With print the eye speeded up and the voice quieted down.” He states that “the book is an extension of the eye” which

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produces a linear process of reading, a complete shift from orality to visually.

While the development and diffusion of printing in the East—in China, Korea, and Japan—differs from the West, it is true that the rise of printing technology stands out as a remarkable event in history and also widespread literacy. David Pearson (2008) regards books as “one of the defining characteristics of developed civilizations.”13 Containing both a visual object and a linguistic entity, books function as a mass medium and play a great role in human history.

1.2 The Transformation of Books in The Digital Age

Books have gained specificity because they are different from other digital media. However, during the last few decades, there was a dramatic shift in the way we appreciate and preserve books. That is, the use of technology and the shift from analog to digital. This shift transformed books to exist not only as genuine physical artifacts, but also as replicated and restructured digital artifacts that exist in the digital world.

On the one hand, the transition from paper to digital distribution has changed our physical interpretation of reading and adapted the reading experience. For example, instead of turning the pages of a bound of papers, one can turn the pages by pressing the keys on a keyboard or touching an electronic screen. Nowadays, such “electronic books” (e-books)14 are taking hold in the book publishing industry, and many software and e-book readers are designed to imitate the physical book reading experience. These electronic books take the feature of portability to a new stage and offer easier access to the text itself through instant viewing and downloading capability. However, the act of turning the page in electronic devices is

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a completely different experience compared to that of printed books. Roger Chartier (2004) distinguishes the difference of printed and electronic books and claims that “[i]n the digital world, all texts, whatever their genre, are produced or received through the same medium and in very similar forms”\textsuperscript{15} such as a computer screen. Indeed, in the digital world, readers cannot appreciate books as physical objects, and are forced to interact in a two-dimensional modality. No matter how far technology advances, in the digital space, readers are unable to experience the unique properties that each book obtains.

On the other hand, digital technologies have fostered innovative ways of delivering books. Despite the physical barriers, the emergence of the Internet and the World Wide Web made various types of books broadly accessible. According to Chartier (2004), the transformation of books in the digital age “for the first time in history, combines a revolution in the technical means for reproducing the written word (as did the invention of the printing press), a revolution in the medium of the written word (like the revolution of the codex), and a revolution in the use of and the perception of texts (as in the various revolutions in reading).”\textsuperscript{16} Darnton (2009) also states that “[a]n e-book, unlike a printed codex, can contain many layers arranged in the shape of a pyramid”\textsuperscript{17} where readers are allowed to explore the book nonlinearly and dive deeper into any topics by following their own interests. Therefore, it is important to note that digital technology did not only transmit physical properties of books into the digital world and adapted our perception, but also transformed an ontology from the physical to the virtual space by offering the promise of new forms and reading experience, and exceeded the limitations of physical books. Digital technologies have now changed the way we interact with books. Now, more than ever before, technologies allow us to create new experiences and


\textsuperscript{16} Ibid., 133-152.

enhance the way we read in unprecedented ways.

1.3 Books as Cultural Artifacts

Traditionally, physical books have mainly functioned as reading material. Composed of text as the main element, books convey meaning through written words and convey facts or stories. However, books as physical objects have several other qualities that appeal to all of our senses. As cultural artifacts, books are historical evidence and contain an abundance of knowledge and information from the past and, most importantly, every book functions as a form of media and sends a ‘message’ from the past to the present. Pearson (2008) states that books are “emblems of our culture” and we should become more conscious about their physical format and cultural values, beyond the text. In The Study of Book History, Leslie Howsam (2015) states that a “book is a material object. From the literary and historical perspectives, the materiality of books is often overlooked, so powerful are their texts and the impacts of those texts upon their times. But bibliographical scholarship demonstrates that the book-as-object holds the evidence of its own making; it carries not only the obvious text on its pages but a further ‘text’ in its format, materials, design and impression.”

Bibliographical scholarship or bibliography is an academic discipline that examine books from the appearance and investigate how social and cultural influences are applied to their interface. Jerome McGann (1991) argues that every literary work contains physical characteristics as “bibliographic codes,” and it should be considered significant along with linguistic

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18 David Pearson, op. cit., 7.
codes. McKenzie (1999) describes bibliography as a study of the “sociology of texts”\textsuperscript{22} and the principle is to transmit both material form and textual meaning into sociocultural context. Although the discipline of bibliography has several different branches—such as, enumerative bibliography, descriptive bibliography, or analytical bibliography—generally, all bibliography focuses on the material conditions and textual features, and examines the role of the book in a particular culture or society.\textsuperscript{23} As one academic discipline, practitioners need specific knowledge to conduct research, yet with the development of humanities research, as well as new forms of digital research dissemination, enables bibliographical scholars to make their research available to wider audiences. According to Leslie (2015), “[b]ibliographical scholarship in practice is highly specialized, like the knowledge of physicists. But (like the knowledge of physicists) its findings can be interpreted for a lay audience.”\textsuperscript{24} Although digital transmission does not reproduce the materiality of books, the development of digital technologies has changed the way people appreciate a book’s physical structure, and has re-contextualized bibliographic studies to be shared with the public.

1.4 The Impact in Rare Books

Digital technologies have extended bibliography’s remit, and the resources are becoming more accessible outside of academic disciplines to be found, shared, and explored online. These transformations have been organizationally driven and led by libraries, and applied especially to books that are distinguished by their early production or printing date, namely rare or spe-


\textsuperscript{23} Philip Gaskell, op. cit.

cial book collections. There is no single definition for rare or special, and every institution defines the term for itself. Yet in a broad sense, these collections find value in the physical characteristics rather than intellectual content and “[p]hysical characteristics include date, imprint, textual state, binding, aesthetic qualities, and condition, among other things.”

With maturing technologies, from digitization and via web based visualization, now not only scholars, but also the public obtain access to rare books. According to the Guidelines for Planning the Digitization of Rare Book and Manuscript Collections, “[d]igitization transforms the discoverability and use of rare and special collections to a greater extent than it does for the general library collection. Once these collections are accessible, they become a core resource. Without digitization, rare and special collections remain obscure and hidden.”

Peter Hirtle (2002) describes the benefits of digitizing a rare collection as the backbone for new types of research, accessibility, and creating new users. “Digitization has brought significant benefits to the users of special collections. It will also challenge the relative value given to paper originals of rare materials as digital holdings increase.” In many cases, digitization can preserve fragile materials by reducing the handling by visitors and other librarians, as well as improving management of all collections by providing databases or other online resources. Humanities Media Interface (HUMI) project, for instance, has developed its own technique in digitizing rare books. One of their prominent activities was the high-quality and full-colored digitization of the Gutenberg bible, which made significant holdings affordable.

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27 The IFLA Rare Book and Special Collections Section, op. cit., pp.4.

and accessible to wide audience at the time of its publication.\textsuperscript{29} Acknowledging the difference between the physical and virtual, the created digital infrastructure provides new insights through its digitized images. The essence of digitized images is made by a sequences of ones and zeros, and its flexibility and instantiation of textuality enables both scholars and the public to take each and every aspect of rare books into consideration.

1.5 Background

The present thesis is motivated by my personal background and research experiences. Having previous research experience in the field of performing arts and visual design, my research has always been focused on using digital technology and increasing participation in arts and cultural activities. During my time as a master student, my research aimed to demonstrate how the Internet and visual technologies could extend the possibilities in performing arts through the implementation and use of ICT.\textsuperscript{30} After earning a Masters degree in Media Design, I then entered a Ph.D. program at KMD to further my research in both design and technology focused media. During my Ph.D., I studied wide range of visual design skills throughout the GID and EBA program,\textsuperscript{31,32} then my research field shifted to the visual culture in humanities. However, the underlying foundation remains in the use of visual media and technologies to widen access to and participation with cultural artifacts. In this research, I am exploring the

\textsuperscript{29} Masaaki Kashimura (2010) Kichosho Digital Archive nojissen gijutsu (Practical Methodologies for Digital Archiving of Rare Books): The Digitization Technology of the HUMI Project, Keio University Press.


\textsuperscript{32} EBA Consortium, Evidence Based Approach Consortium. http://www.eba-consortium.asia
intersection of user-experience design and digital humanities.

1.6 Thesis Outline

The digitization of rare book collections has the potential to make them, their large variety of perspectives, accessible remotely and enhancing their reading experience in a virtual environment. By adopting bibliographical knowledges into digitized rare book collection, this paper proposes an online interactive interface named *Narrative Book Collection* to provide new reading experience in rare Japanese books.

In my research, I work with a vast collection of books from Keio University’s library and the Institute of Oriental Classics, which keeps an extensive collection specializing in pre-modern Japanese books from the 8th to the 19th century. And in collaboration with experts of pre-modern Japanese book studies and bibliography, this thesis itself provides digital access to its collection and reveals insights into both rare Japanese books and culture. Although the term ‘interactive’ as well as ‘interface’ remain vague and broad, in this thesis, I apply computational and visualization approaches to the books retrieved from the extensive collection—148 books in total—and the *Narrative Book Collection* will be designed as a web-based online interface which functions together with the massive open online course (MOOC) *Japanese Culture Through Rare Books*. The online course *Japanese Culture Through Rare Books* is created for consumption on the UK-based social learning platform called FutureLearn,33 where all courses are available to the greatest number of people possible with the lowest barrier to participation.

As supporting material of this course, the design of the *Narrative Book Collection* proposes an experimental and exploratory approach to not only initiate exploration and facilitate understanding in rare Japanese books but also to make book exploration a pleasurable experi-

33 FutureLearn. https://www.futurelearn.com
ence where the learners can engage with the digitized books, and further broaden and deepen their learning experience. Therefore, the visualizations and corresponding interaction techniques will be designed to make it easily accessible on various types of devices and operating systems. The aim of this research is to examine how both computational and visualization approaches play an important role in enhancing the understanding of rare Japanese books and culture by creating opportunities alongside MOOCs with which the general audience can playfully and easily interact.

From the next chapter, I first review the theoretical background, prevalent studies and the challenges, then discuss the fundamental concepts of my thesis. I then continue with a detailed description of the design of the \textit{Narrative Book Collection} along with the implementation procedure in the MOOC. Finally, I evaluate and discuss the effectiveness of the
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1.7 Definitions

In the following, I offer a brief description of essential concepts and terminology of the Narrative Book Collection. The definitions of the following concepts and terminology are mainly detailed in chapter two and three.

1.7.1 Story, Storytelling, and Narrative

In the digital age, there is a considerable number of studies that demonstrate the use of narrative alongside story and storytelling. Every story, storytelling, and narrative takes a variety of forms, however, given its instinctual nature, the core of this thesis is to generate meaning and understanding in every content that learner explores. Hence, following is a set of definitions of Story, Storytelling, and Narrative composed of three primary levels (Figure 1.2):

- Story (Stories): consists of viewpoints with distant and close scale. Enable learners to focus their attention on specific parts of course materials.

- Storytelling: series of stories formulated by the learner that forms different pathways and sequences.

- Narrative: sum of every single aspect of story and storytelling. Learners can perform an open-ended exploration through narratives

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1.7.2 Computational

In this thesis, computational does not only refer to purely computational analysis or algorithms which are frequently used in the discipline of computer science. Instead, I use the term computational as a mediation of transforming data into visualizations that encourage...
new forms of cognitive interpretation and engagement with the *Narrative Book Collection*. Regardless of the level of technology, a constellation of computer-based systems—ranging from computer-supported design works to computer programming—interpret data to engage learners who were not accessible and achievable with traditional and analogue methods. In this research, not only a scientific computational approach but also a humanities-inspired computational approach offers a valuable opportunity to engage with rare books outside of its traditional formats.

1.7.3 Visualization

Instead of anchoring in traditional approaches—functioning as a repository or an archive of books—the visual exploration is the key factor of the *Narrative Book Collection*. In the field of information visualization, visualizations themselves incorporate a large variety of data, including texts and images. In this research, the physical perspectives of books are revealed through the process of generation and manipulation of data, and transformed into visual formats. And the visualizations directly result in user experience through visual interactions. Furthermore, the visualizations and corresponding interaction techniques are designed to make a wide public—regardless of their baseline ethnic, regional, or educational differences—accessible on various types of devices and operating systems. In this thesis, the visualizations are designed to accommodate all various content and facilitate online interactions among users worldwide.
Chapter 2

Literature Review

The Narrative Book Collection enables new interpretations in pre-modern Japanese books, and transforms the features of physical structures into digital formats. In the digital era, there has been a rapid increase in the application of computational and visualization methods to humanities data. Numerous researches and experiments have arisen to understand how digital infrastructure could provide value on top of their contextual backgrounds. Therefore, in this chapter, I aim to understand how computational and visualization approaches can be used in cultural and bibliographical data, and contribute to the development of the Narrative Book Collection. Firstly, I review digital scholarship in museums and libraries, trends of digital collections in both the physical and digital environments. Secondly, under the category of digital humanities, I then survey the trends of digital humanities in rare Japanese books. Thirdly, I review the technological background in digitizing books and the academic study of information visualization and information aesthetics which are placed as sub-disciplines within Human-Computer Interaction (HCI), and look into the concepts of close reading and distant reading as well as the principles of narrative. And lastly, the outline of the pedagogical approach of FutureLearn (platform provider of MOOCs)—where the research experiment takes place—will be reviewed. The reviews of these works will lay the conceptual foundation to the contribution of the design proposed in this thesis, and examine how the digitization of rare Japanese books contributes to modern scholarship in the humanities.
2.1 Digital Revolution in Museums and Libraries

2.1.1 Digital Transformation in Physical Spaces

Scholarship in the humanities is rapidly becoming digital, and now museums and libraries are modernizing their available resources through employing digital technologies. “To succeed, we must focus on a few principles. These begin with the use of digital technology to enhance the in-person visitor experience, engage and involve the public, and extend the benefits of our scholarship and collections to audiences not served today.”

This is a quote by G. Wayne Clough (2013) who is a former secretary of the Smithsonian Institution, which is known for their innovation and challenges in enhancing audience experience in museums and libraries with advanced technologies, such as smartphone apps and 3-D printers to “delight visitors while complementing the content of exhibitions.”

Correspondingly, many museums and galleries have been integrating digital technologies to their collection to improve and augment museum experience. To name a few, the Brooklyn Museum’s Ask app is an in-gallery app that enables real-time conversations between visitors and staff. The Cooper Hewitt Design Museum developed a digital device named the Pen, a hardware shaped like a stylus that allows the visitor to interact with the different digital experiences of the museum, and collect information about the items that are on display while they are exploring exhibitions. More recently, the SFMOMA (San Francisco Museum of Modern Art) developed an app that detects your location and guides you throughout the exhibition without any control necessary.

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2 Ibid., 29-54.
by phone. Although the end results are different, through incorporating digital scholarship into their institutional framework, these museums have the same intent: encouraging visitors to actively make sense of what they are experiencing by incorporating new digital methodologies.

On the other hand, libraries remain in keeping their collection in its storage with the tendency to “be ‘traditionalists’ who do not want to change the decades old techniques and tools.” Indeed, there are principle differences in between museums and libraries. While museums and galleries have complexity in their collections and a culture that is built more around...

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curated exhibitions than open access,\(^7\) libraries undertake the preservation, conservation, and restoration\(^8\) as institutional principles and provide open access to visitors. However, as Gibson, Morris and Cleeve (2007) predict, in the 21\(^{st}\) century, museums and libraries should work together “to create a brand new model for learning in an information-rich environment by taking the best aspects of two informal learning environments and blending them to create a seamless integration of resources.”\(^9\)

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7 G. Wayne Clough, op. cit.


2.1.2 The Rise of Digital Collections

Alongside the transformation in their physical environment, museums have expanded their research in the digital space, in aiming to augment their museum collections and facilitate their digitized artifacts for a broader public. One of the pioneers is the Rijksmuseum in the Netherlands, where they made their collection available online in the highest resolution possible, without any copyright restriction and promoted its free customization.\(^\text{10}\) The Stadel Museum created a website that “presents worthwhile background information, art-historical and culture-historical contexts and fundamental exhibition contents.” \(^\text{11}\) Another example is the MET Museum: *One Met. Many Worlds* which allows online visitors to visual search their collection through one keyword and “to respond with pairing details playfully, poetically, and creatively.” \(^\text{12}\) There is a remarkable homogeneity among these collections which is that they are not just representing the collections by production year, types, or in one theme, but transforming the museum experience through reshaping its digital activities, and allowing users freedom to explore collections from a different context as compares with physical visits.

Digitization is all the rage among libraries as well. Millions of books and images have been posted online over the last few decades. Digital libraries or collections are considered to have emerged in the early 1990s then moved to “mass digitization in the 2000s, and the large-scale aggregations undertaken in the last few years.” \(^\text{13}\) An early adopter of digital tech-

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nology was the New York Public Library (NYPL), providing online access to their digital collections. Currently, *NYPL Digital Collections* provide over 700,000 items online and are adding new materials every day.\(^{14}\) *HathiTrust* represents a successful example of mass digitization and large-scale repository, containing materials from both the public domain and copyrighted works.\(^{15}\) Then *Europeana* was launched in 2008. It was known as one of the largest digital platform that provided more than 50 million cultural heritage artifacts including various types of books across Europe.\(^ {16}\) *The Digital Public Library of America (DPLA)*, a national public digital library, was launched in 2013. *DPLA* brings an enormous collection from libraries, archives, and museums in the United States, and has made more than 10 million items available online.\(^ {17}\) However, all these examples share a similar interface which harvests numbers of web pages, regardless of form or content. While museums own and exhibit their unique collections in aiming to promote public access and engagement through adopting advanced digital technologies, libraries—places that contain collections of books—have been putting less emphasis on exhibiting their digital collection to the general public.

The difference between the collection of museums and libraries are prominent in the project offered by Google Inc., which has one of the most common and accepted digitization projects. Many museums and libraries have signed contracts with the corporation, then digitized materials are transformed and distributed throughout the world in a form of digital databases and exhibitions. Both the *Google Books Library Project*\(^ {18}\) and *Google Cultural Insti-


tute\textsuperscript{19} are web-based and easily accessible to all users, however, while Google Cultural Institute presents their archival materials in an interactive and playful interface, Google Books Library Project remains in showing their collections in an rather ordinary and static interface. Instead, as Janet (2011) states, “[l]ibraries exemplify the crucial information-organization principle of collection that puts like things near one another, providing intellectual access to items in the collection according to what they are about. For digital collections, designers can maximize collocation because the same object can appear in multiple places, unlike a single copy of a physical book.”\textsuperscript{20} Indeed, there are experimental studies that are aiming to reshape the library experiences online, such as NYPL Labs\textsuperscript{21}, and the virtual exhibition held between Europeana and DPLA,\textsuperscript{22} however, the procedure has not been sufficiently established. A large design gap remains in the field of transforming libraries’ digital collection.

2.2 Books in the Digital Humanities

2.2.1 Overview of the Digital Humanities

In the digital age, we are confronting a large variety of concepts in the computational and visualization fields. Methods and tools are widespread in the scholarly community, not only in the scientific disciplines but also in the humanities within the framework of digital humanities. Although the pioneer of integrating the humanities and computers is considered to be

\textsuperscript{19} Google Cultural Institute, Google Arts & Culture. https://www.google.com/culturalinstitute/beta/.


\textsuperscript{21} The New York City Public Library (NYPL), NYPL Labs. https://www.nyp.org/collections/labs.

2.2 Books in the Digital Humanities

Figure 2.3: Google Books Library Project: Google Books
Source: https://www.google.com/googlebooks/library/

Figure 2.4: Google Arts & Culture
Source: https://www.google.com/culturalinstitute/beta/
Father Roberto Busa—an Italian Jesuit priest—who collaborated with IBM and developed an “index verborum of all the words [...] totaling some 11 million words of medieval Latin,” digital humanities is a relatively new field, and the term was coined 2001, then widely diffused when the book: *A companion to Digital Humanities* was published in 2004. While the definition and the usage of digital humanities is broad, “Digital Humanities is defined by the opportunities and challenges that arise from the conjunction of the term digital with the term humanities to form a new collective singular.” Indeed, the single terms ‘digital’ and ‘humanities’ are apart and their natures are completely different, however, under the concrete term ‘digital humanities,’ now humanities scholars are adopting computational and visualization methods from the field of sciences—such as computer science, network science, or data science—to follow new research questions within their own field.

### 2.2.2 Digital Humanities in Japan: Digitizing Pre-Modern Japanese Books

While the term ‘Digital Humanities’ and its distribution evolved in the United States and Europe, digital humanities research and education is recently emerging in Japan. The importance and need for digitization in the field of rare Japanese books has also been advocated in the last few decades. One of the leading research institution is the Art Research Center (ARC) at Ritsumeikan University, established in 1998. The ARC focuses on Japanese and Kyoto-
based cultural properties—such as Japanese ceramics, Ukiyo-e (Japanese woodblock prints), and woodblock-printed books—and provides extensive resources online. For rare book digitization, they developed their own method called ‘Bungee System,’ and published the collection in their database The Early Japanese Books Portal Database\(^{28}\), unifying the digitization and publication phases.\(^9\) Waseda University Library is known for their noble digital collection. Waseda University Library’s Kotenseki Sogo Database provides approximately 300,000 digitized Japanese and Chinese classic items in both JPEG and PDF format. The entire collection contains bibliographical information, full-text images, and allows user to not only view but also download high-resolution digital images.\(^{30}\) Another example is the Hyakugo Archives WEB—a collection of medieval Japanese documents—which released nearly 25,000 documents all under a Creative Commons Attribution 2.1 Japan License that allows one to “copy and redistribute the material in any medium or format”.\(^{31,32}\) More recently, since 2014, the National Institute of Japanese Literature (NIJL) has started a 10 year project named Project to Build an International Collaborative Research Network for Pre-modern Japanese Texts (NIJL-NW project). This project aims to develop a new large-scale database by collecting

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31 Creative Commons Japan Website. https://creativecommons.org/licenses/by-nc-nd/2.1/jp/deed.en.

32 Kyoto Prefectural Library and Archives, The Hyakugo Archives WEB. http://hyakugo.kyoto.jp/eng/.
300,000 pre-modern Japanese books from universities and institutions across Japan.\textsuperscript{33} Furthermore, NIJL collaborates with the Center for Open Data in the Humanities (CODH)—a center that promotes data-driven research for humanities—and provide their collection as datasets to promote the use of pre-modern Japanese book collections on global scale.\textsuperscript{34} As of June 2017, they released 701 books with 158,553 images.\textsuperscript{35} However, most research remains focused on developing digitization techniques, creating a database or an online archive mainly for academic usage. Although many researchers in the digital humanities welcome public outreach, the above examples merely align the book titles or images in simple aligned format, which makes it difficult for “a user who is unfamiliar with the collection’s scope, contents, or structure”\textsuperscript{36} to wander around the collection. For non-academic people, the digital collection (its interface) is often the first interaction they have with pre-modern Japanese books, yet for most collections “keyword search is the central—often the only—way to access the collection.”\textsuperscript{37} Mitchell Whitelaw (2015) claims that “search is ungenerous” and makes it difficult for the uninitiated to get to know new digital collections, and suggests that websites should provide more “navigable representations” where users can explore the collection through browsing. While a number of academic labo-


\textsuperscript{34} Center for Open Data in the Humanities (CODH). http://codh.rois.ac.jp/dataset/index.html.en.

\textsuperscript{35} Center for Open Data in the Humanities, NIJL dataset. http://codh.rois.ac.jp/pmjt/.


Laboratory researches remain in catering too much to and for academics, under the broad notion of digital humanities, the integration of humanities and technology has a large potential to advance the researches and experimental studies to attract a broader public, with interest for both academic and non-academic audiences. Rather than seeing their computational and visualization methods as mere resources or tools to create a new knowledge among scholars, it is also important to realize that using these tools give rise to new perspectives and paradigms for general audiences outside the academic sphere.

2.3 Computational and Visualization Approach

2.3.1 HCI and Information Visualization

In designing a digital collection in the World Wide Web, it is necessary to consider the way users interact with the collection. And to reach a wider audience on the Internet, adopting the idea of Human-Computer Interaction (HCI) is an effective means. HCI is a design philosophy that combines both scientific and practical explorations, and is “concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.”

Laying the foundation for this HCI as a design principle, usability and user experience are considered to be important components when creating an interface of digital collections. When people engage the collection through displays, their human perceptual system contains several high-bandwidth information channels, and hence HCI has a strong perceptual component. Along with HCI, the collection is privileged among sensory modalities and occupies a significant portion of

research in the design.

More specifically, works on visualization will be the important elements. Although visualization itself does not necessarily require the use of computers, “the computational turn”\textsuperscript{41} offers new ways of visualizing the humanities collection. While the term computational relies upon diverse concepts and practices—such as computational social sciences, simulation, or creating algorithms\textsuperscript{42}—in the field of computational information visualization, computational approach have been a key component in transforming datasets and became “integral to the burgeoning practice of visualizing data”.\textsuperscript{43} The use and implementation of computational information visualization is an emerging discipline that utilizes “the use of computer-supported, interactive, visual representations of abstract data to amplify cognition”\textsuperscript{44} according to Card et al (1999). Computational and visualization approaches make more sense on the human perceptual system than just observing the raw information or data, such as merely digitized materials of the book collections. Spence (2007) states that “[i]nteraction between human and computer is at the heart of modern information visualization.”\textsuperscript{45} However, only having interaction is not a guarantee that users are cognitively engaged with the visual representations. Thus, it is crucial to understand the information visualization basics while creating interactive computational information visualizations, and consider the way in which to visualize rare books in a coherent and functional context. The details of visualizations will be introduced in chapter three.

\textsuperscript{41} David M Berry (2011)\textit{ The computational turn: thinking about the digital humanities}, Culture Machine, 12.


\textsuperscript{44} Stuart K. Card, Jock Mackinlay, and Ben Shneiderman (1999) \textit{Readings in Information Visualization: Using Vision to Think (Interactive Technologies)}, Morgan Kaufmann, 6.

2.3.2 Information Aesthetics

Whether the visual representation takes multiple forms, the aesthetics of information visualization has been identified as a key factor to engage audiences. Lev Manovich (2008) defines aesthetics—*Info-Aesthetics* in his words—as a cultural practice that “examines the various cultural fields […] where the use of computers for design and production gives rise to new forms.”\(^{46}\) As Lang (2010) states, “beauty of a visualization is not equal to its artistic quality, and that aesthetics is more than ‘pretty pictures’. Aesthetics has to be recognized as not just being a by-product of science […] but an integral part of science.”\(^{47}\) According to Liu (2012), information aesthetics are missing from the text-oriented side of the digital humanities.\(^{48}\) The merely use of ordinary visual design reflects “the near-total imaginative poverty of the field in crafting an aesthetics of data.”\(^{49}\) He also claims that there is more focus on metadata than “the look-and-feel of data.”\(^{50}\) Accordingly, it is necessary to consider the coherence of data and how the data reflects the information. Data is structured information with potential for meaning, and based on that data, visual and functional aspects must blend in a balanced and effective way to achieve a successful result. Although a large design space remains in the field of visualization, this research advances the discussion by integrating information aesthetics format with design in aiming to provide an effective and intuitive experience for diverse audiences. Different types of information communicate on different levels with different readers. Hence, to meet their diverse requirements, it is important to understand the basic standards

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\(^{49}\) Ibid., 27.

\(^{50}\) Ibid., 27.
and efficacy in building a digital collection.

2.3.3 From Metadata to Implementation

When considering data of digital collections, metadata is known as data about data, and necessary for digital preservation and for digital reformatting. Although metadata is nothing new, the importance of metadata has grown and is still growing with the development of the Internet in order to support and enhance the use of digital data with the resources in a formal standardized manner.\(^5^\) For instance, the Getty Institution describes the importance of metadata in the following way: “the mere act of creating digital copies of collection materials does not make those materials findable, understandable, or utilizable to our ever-expanding audience of online users. But digitization combined with the creation of carefully crafted metadata can significantly enhance end-user access—and our users are the primary reason we create digital resources.”\(^5^2\) Hence, behind the mass digitization of books, there are standardized forms with metadata and its set of elements. The Dublin Core standard is one of the renowned metadata schemas. There are a significant number of large-scale deployments of Dublin Core metadata and it has become a preferred schema for metadata mapping and harvesting. There are fifteen core elements in The Dublin Core standard: contributor, coverage, creator, date, description, format, identifier, language, publisher, relation, rights, source, subject, title, and type of the artifact.\(^5^3\)

However, based on their administrative, descriptive, or technical backgrounds, there are different types of metadata categories depending on their principles. Moreover, libraries have increasingly been joining the global movement for open data and opening up their databases, 


\(^{5^2}\) Ibid.

sharing their images and releasing their knowledge through metadata. One example is the British Library which has released their metadata strategy roadmap.\textsuperscript{54} The library is aiming to have all of the library’s collection metadata assets available by 2020. In addition, the importance of application program interface (API) is also emerging. API enables different types of metadata, programs as well as individual components of a software application to communicate with each other. In the context of digital collections, an API enables machine-readable access to digital collections data. In recent years, many cultural institutions released their own APIs and made it possible to download their entire digital collections’ data as a single CSV file. MoMa and Tate Museum are two examples of this.\textsuperscript{55, 56}

Most recently, many libraries and institutions in Japan are now adopting international standards—including the Text Encoding Initiative (TEI) for texts, and the International Image Interoperability Framework (IIIF)\textsuperscript{57} for images—which the use is not limited to rare books, however, effective to those to preserve and widen access in the Internet and also share among libraries and institutions. For text data, TEI is a consortium which collectively develops and maintains a standard for the representation of texts in digital form. Its guideline describes encoding methods for machine-readable texts, chiefly in the humanities, social sciences and linguistics.\textsuperscript{58} For images, IIIF is “a community of academic and national libraries, research institutions, museums, archives, nonprofits and commercial organizations that are committed to interoperable image delivery on the web. A community that develops API, implements


\textsuperscript{56} GitHub, Tate Collection metadata, GitHub. https://github.com/tategallery/collection.


them in Software, and exposes interoperable Content.”\textsuperscript{59} Two of these standards are now widely introduced and discussed in aiming to support and change the libraries in the digital space from its technological background.

Although the use and implementation of metadata, API, and standards depends and differs in each institution, these examples and emerging technologies give light to future research directions in developing the \textit{Narrative Book Collection}.

### 2.4 Narrative in the Narrative Book Collection

#### 2.4.1 The Wide Use of Narrative

The classical definition of a narrative is considered “as the representation of a real or fictitious event or series of events by language, and more specifically by written language.”\textsuperscript{60} However, in the digital age, narrative is not limited to text and the essence of narrative is applied within the virtual space in different formats. Narrative is now used as an act, event, or an element of storytelling, which connects real/virtual space presented in a sequence of written/spoken words or still/moving images across mediums.\textsuperscript{61} For instance, Manovich (2001) discusses the relationship between database and narrative, and concludes that “the database supports a range of cultural forms which range from direct translation (i.e., a database stays a database) to a form whose logic is the opposite of the logic of the material form itself” – a narrative\textsuperscript{62}


\textsuperscript{60} Gerard Genette and Ann Levonas (1976) \textit{Boundaries of Narrative}, New Literary History, Vol.8, No.1, Readers and Spectators, Some Views and Reviews, 1.


While this may seem a little overly simplistic, it is true that narrative is now an inherent preference and the basis of every cultural artifact. Ryan (2004) makes a clear distinction in the way we approach current narrative as “being a narrative” or “possessing narrativity”. She states that “being a narrative” can affirm any textual object produced with the intent of creating “a narrative script in the mind of audience”, however, “having narrativity,” on the other hand, refers to the ability to evoke such narrative script, and allows a narrative to move around various forms of media, beyond linguistic artifacts. Even though the main elements of this research are pre-modern Japanese books, considered as textual objects, this research aims to create new interpretations in pre-modern Japanese books—focusing on cultural perspectives—through the development of the Narrative Book Collection. Thus, this research advances the discussion with “having narrativity” in the design.

The integration of a narrative with the computational backend has been a recent development in web-based environments, in aiming to enhance user experience in cultural artifacts. I have witnessed many examples, yet one of the telling example is the OntoMedia ontology, which uses “semantic annotation of the narrative components of media” to generate meaning and understanding from the relationships between multimedia items. Another example is the Labyrinth, an ontology-based system that allows a narrative-based semantic exploration in their digital ‘cultural archetypes.’ In this system, users can explore the archive by means of the narrative elements—such as stories, actions, or objects—displayed in the archive. Another instance is the Storyscope. Storyscope organizes stories into a set of dossiers—a metaphorical reference to the type of cardboard dossier for physical exhibition—and each

65 Labyrinth http://www.cirma.unito.it/portfolio_page/labyrinth/.
“dossier is made up of a number of museum narratives (termed stories within the Storyscope interface) […] comprises a title, text, image gallery, and set of tags.”67 And what these studies have in common is the multimodality, where multiple possibilities are oriented in one environment. According to Eric (2015), “multimodality can help to provide multiple narratives and different types of evidence. Narrative fragments can be threaded and buried through an environment, coaxing people to explore, reflect and integrate their personal exploration into what they have uncovered.”68 With having multimodality with the support of narrative structures, users are able to access to the stories according to their own curiosity and interests, and find meaningful connections between cultural artifacts.

By taking inspiration from the above studies, the concept of narrative is considered significant in building the *Narrative Book Collection*. Within the context of computational and visualization approaches, it is important to note that all narratives contains different data types and ways of representation. Moreover, with having narrative as a core element of interpretation, the visual representations should serve a wide range of users for “further exploration of transitions between author- and reader- driven elements presents an exciting area for researchers and practitioners.”69 Rather than imposing one single representation without giving any choice to the user, the *Narrative Book Collection* should provide multiple perspectives to the users with aiming to augment their user experience.


2.4.2 Close Reading and Distant Reading

Under the umbrella term ‘digital humanities,’ there are two different concepts in the way of reading books, such as Close Reading and Distant Reading, which are often conceptualized in opposition. Close Reading—a way to read books closely—has been adopted in the humanities field for many years. Nancy Boyles (2012) defines it as “[e]ssentially, Close Reading means reading to uncover layers of meaning that lead to deep comprehension.” Close Reading, in other words, is an approach of intensive reading which requires readers to read its individual words or illustrations, then capture and understand the contexts of books. On the contrary, Distant Reading—a term introduced by a literary scholar, Franco Moretti (2000)—is an approach which proposes new ways to study world literature, and enables us to capture books from multiple sources across institutions and archives. By utilizing computational methods in aiming to understand a large number of works from a macro point of view, Distant Reading “allows you to focus on units that are much smaller or much larger than the text: devices, themes, tropes—or genres and systems.” However, Moretti devoted himself into the field of digital humanities and the meaning of Distant Reading has shifted to acculturate to the use of data in reading. He states the importance of Distant Reading as “[a] canon of two hundred novels, for instance, sounds very large for nineteenth-century Britain […] , but is still less than one per cent of the novels that were actually published: twenty thousand, thirty, more, no one really knows—and Close Reading won’t help here, a novel a day every day of the year would take a century or so. […] a field this large cannot be understood by stitching together separate bits of knowledge about individual cases, because it isn’t a sum of individual cases:

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it’s a collective system, that should be grasped as such, as a whole.” For instance, Distant Reading tools such as natural language processing applications, sentiment analysis, or word embedding, are widely distributed methods in tracking and modeling the temporal development and regional variation in texts. A well-known example is Google’s Ngram Viewer, an online interface for Distant Reading that charts frequencies of words. It is based on a corpus of literary sources printed between 1500 and 2008, which contains an indexed count of n-grams, a contiguous sequence of n items from a given sequence of text or speech. It enables users to analyze and trace words and word combinations in the literature through graphical line plots over a horizontal dimension of time. However, these tools allow few insights into the cause of an apparent change in the use of certain words, and leads to the failure in enabling humanistic and qualitative enquiry into the culture and history of the sources it represents.

Thus, it is important to understand that Distant Reading cannot replace, and should always accompany Close Reading. Bradley (2012) raises a question of if it is “possible to develop a visualization technique that does not destroy the original text in the process.” Janicke et al. (2015) who investigated the last ten years of research on visualizations that interprets both Close and Distant Reading, elaborates that the exploration of analysis and visualization techniques will be a bridge between Distant and Close Reading. Both Close and Distant Reading reveal not just what is in a data set, but how that data might be enacted, and give new insights. The point is that, while Close Reading focuses on every isolated feature, and Distant Reading illuminates common features throughout, visualization techniques support both Close

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75 Ibid., 3-4.
and *Distant Reading*, and developing solutions can provide beneficial contributions for both fields. Therefore, in this research, I examine the role of *Close* and *Distant Reading* as a form of context necessary for interpreting data. The combination of *Close* and *Distant Reading* will be necessary and that multi-scale and multi-resolution will continue to develop approaches and paradigms in creating the *Narrative Book Collection*.

### 2.5 Delivering the *Narrative Book Collection* in the MOOCs

#### 2.5.1 The FutureLearn Platform

Massive Open Online Courses (MOOCs) have transformed higher education and made University education available to everyone, regardless of their location or an academic background.
Although there are many different types of MOOC platforms with different pedagogies, FutureLearn, a UK-based MOOC platform, is one of the major platforms that has a user base of more than 6 million people as online registered learners in global scale.\textsuperscript{77} FutureLearn offers a diverse range of courses from universities and institutions from around the world and states their pedagogical principle in ‘visible teaching’ and ‘visible learning’ where both teaching and learning process are visible\textsuperscript{78} with sharing a simple and linear structure—such as short duration course (continual learning process in phased manner) and simplified learning activities (watching, reading, and commenting)—and the content is presented in videos, articles (images and texts), quiz, and discussion\textsuperscript{79} Moreover, FutureLearn is unique with its social learning approach, which emphasizes learning through social interaction (posting comments in almost every step, joining in discussions, enabling likes and the ability to follow individual learners) throughout the duration of the course. In short, on FutureLearn, learners are suggested to complete each content—all contents are called step(s)—one by one and study the topics weekly at their own pace alongside sharing and making comments (Figure 2.6).

Keio University, Japan’s first private institution of higher education, signed a course distribution agreement with FutureLearn in 2015, and has been delivering courses on FutureLearn’s platform since 2016.\textsuperscript{80} The first course—in which the Narrative Book Collection will be implemented was coordinated by the professors at the Institute of Oriental Classics, and allowed learners to “explore Japan’s history of book production from its beginnings in the 8th

\textsuperscript{77} FutureLearn, Twitter post, 27 April 2017, 8:43. https://twitter.com/futurelearn/status/857621194115342338.


\textsuperscript{80} Keio University, Press Release, Keio University—The First in Japan to Join FutureLearn, the UK-led Massive Open Online Course (MOOC) Platform 7 August 2015
century, drawing on Keio University’s extensive collection of rare Japanese books”81 (Figure 2.7).

2.5.2 Envisaged Learners

The Narrative Book Collection will be designed alongside the FutureLearn course Japanese Culture Through Rare Books,82 and function as supporting materials of the course to provide a synergistic learning experience that encourages learners—mainly registered users on FutureLearn—to experience the rare Japanese book collection from a variety of perspectives. I will review the course structure and discuss the design and implementation of the Narrative Book Collection (in the FutureLearn course) as part of the following chapters, yet it is important to grasp the demographics of potential users who access the Narrative Book Collection together

81 Ibid.
with the FutureLearn course.

![Keio FutureLearn Course](https://www.futurelearn.com/courses/japanese-rare-books-culture)

**Figure 2.7: Keio FutureLearn Course**

*Source: https://www.futurelearn.com/courses/japanese-rare-books-culture*

In theory, FutureLearn among all other MOOCs platform is built to open up higher education worldwide. However, existing research in MOOCs demographic information shows that many MOOCs learners are from developed countries with higher levels of formal education, and already well educated.\(^{83}\) While understanding this, FutureLearn sets their purpose to *help everyone fulfill their potential in a changing world, by transforming education based on their “shared belief that that everyone should have access to education to make the world a better place.”*\(^{84}\) Therefore, via the Internet, all courses on FutureLearn are accessible

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on mobile, tablet and desktop, with the idea being that individuals can fit learning around their other commitments. Furthermore, the latest available data (as of Feb 2016) from FutureLearn reveals that learners who signed up to FutureLearn represent a wide spectrum of ages (the broad spread from age 13 to over 65), from 211 countries and territories with 27% of learners who do not have any degree in higher education. More recently, the researchers in FutureLearn investigated the patterns of learners’ behavior and summarized archetypes. According to their research output, learners in FutureLearn can be identified in seven different ‘learner archetypes’ and divided into three broad context areas, namely: 1. Work and Study (Advancers: to develop and improve professional and academic qualifications, and to fulfill their continuing professional development, Prepares: to increase chances of success in specific career and academic goals, Explorers: to explore new options, careers and opportunities), 2. Personal Life (Flourishers: to improve their well-being and personal effectiveness, Fixers: to understand and manage what’s going on in their personal life), and 3. Leisure (Hobbyists: to support their hobbies and leisure activities, Vitalisers: to pass their time and learn for the love of learning).

As mentioned previously, the Narrative Book Collection intends to make their collection available for both fellow scholars and a public audience on a global scale. Thus, the demographics as well as the characteristics of FutureLearn learners is best suited to simultaneously address both expected audiences. Moreover, since FutureLearn exists as UK-led, yet multi-institutional MOOC platform, the interconnection of the Narrative Book Collection and the FutureLearn course Japanese Culture Through Rare Books offers even better opportunities.

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for great populations of humanity who are unfamiliar with Japan—including those who do not understand Japanese or do not possess knowledge related to Japan—to first interact with Japanese culture through pre-modern Japanese books.

2.6 The Conception and Contribution of the Narrative Book Collection

This research proposes a new dimension in interacting with rare Japanese books on the internet through designing an online interactive interface, the Narrative Book Collection. As presented in this chapter, in the digital age, cultural artifacts such as art and books have been exhibited not only in the physical space but also in the virtual space through adopting advanced digital technologies. Many researches and experimental studies have been lead by museums and galleries which own unique collections in aiming to promote public access and engagement through their collections. However, despite the fact that libraries have also been collecting, archiving, and publishing their collections, they have less emphasis on exhibiting their collection to the wider public. Even though there have been several prevalence studies and works for digital archiving or exhibition, most collections are limited to merely digitization and academic uses. While the use of digital technologies made significant changes in the way we interact with rare Japanese books from physical to virtual, there is still a chronic lack of progress in user experience including usability for the wider audience. Therefore, the Narrative Book Collection offers an important new dimension in interpreting rare Japanese books through the Internet to express the physical collection’s full potential as a digital collection which turns the library catalog from a database or an archive into an intuitive interface.

The core element of the Narrative Book Collection is based on a collection of 148 books retrieved from the MOOC, and covers many different forms of books, such as, ancient scrolls, original manuscripts, and other unique manifestations of pre-modern Japanese literature.
Making use of the latest and emerging computational and visualization approaches, *Narrative Book Collection* aims at encouraging open-ended explorations of various types of pre-modern Japanese book collections for lay audiences. Thus, this research contributes to the modern scholarship in both the digital humanities as well as in user-experience design. This research assist learners to further explore and engage with Japanese rare books in narrative structures, and the bibliographical knowledges will be a key to access beyond the wall of traditional ways of reading books. By enabling options such as multiple pathways—both distant and close reading in a narrative context—this interface provides a unique experience for general audiences to explore diverse elements of books, and both physical and visual attributes play a significant role during open-ended explorations. Moreover, this research shares insights from the collaborative design process between the *Narrative Book Collection* and the MOOC, and the feedback from a massive audience as well as usage data gathered during the deployment of the resulting case study will demonstrate the potential of new procedural techniques and design in online book collections.
Chapter 3
Design of the Narrative Book Collection

The research presented in this thesis proposes a new reading experience through designing an interactive interface of rare Japanese books. With the Narrative Book Collection, I intend to create an open-ended browsing experience that promotes public access and engagement through the collection. In this thesis, engagement does not only mean making the collection accessible or reaching out to people, it also aims at enhancing understanding of rare Japanese books through establishing affective, easy and useful interface. Thus, in this chapter, I refer to the design process elaborated by Karen Holtzblatt and Hugh Beyer in the book *Contextual Design: Design for Life (Interactive Technologies 2nd edition)* and begin with pilot research in the FutureLearn course *Japanese Culture Through Rare Books* to investigate enrolled learners activities.

The pilot research studies on the *Japanese Culture Through Rare Books* course were conducted in summer 2016 and early 2017 where the Narrative Book Collection was not yet implemented, though the courses were published as a first and second run on FutureLearn. During the pilot studies, I conducted informal discussion with scholars in bibliography and examined how FutureLearn learners behave on the course. Then next, based on the insights gained from the studies, I formalized the design process, tested an early prototype of the Nar-

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Table 3.1: Outline of the Research Schedule

<table>
<thead>
<tr>
<th>Run</th>
<th>Description</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Pilot Research</td>
<td>18 July - 21 August, 2016</td>
</tr>
<tr>
<td>2nd</td>
<td>Pilot Research</td>
<td>9 January - 26 February, 2017</td>
</tr>
<tr>
<td>3rd</td>
<td>Initial Design (Prototype)</td>
<td>22 May - 30 July, 2017</td>
</tr>
<tr>
<td>4th</td>
<td>Refined Design / Proof of Concept</td>
<td>25 September - 12 November, 2017</td>
</tr>
</tbody>
</table>

I presented the refined design and formulated design principles for the Narrative Book Collection (Table 3.1).

### 3.1 Pilot Research on FutureLearn

Takahiro Sasaki (2016), one of the leading scholars in bibliography of classical Japanese literature as well as the lead educator of the course states that “[t]o be sure, the bibliography of classical Japanese texts is itself a broad field, one encompassing a variety of subjects and approaches,” however, he believes that their skills and knowledge can be interpreted for a lay audience, and in collaboration with FutureLearn, they opened up their collection to the whole world for the first time. The course *Japanese Culture Through Rare Books* has run multiple times with four to five month intervals in between since July 2016. And for this pilot research, I examined the courses, classified as runs, that were offered in 1) July through August 2016: 1st course run and 2) January through February 2017: 2nd course run. To observe how bibliographical scholars teach and show their collection in the FutureLearn course, and to examine the requirements of the learners—the potential users of the *Narrative Book Collection*—this pilot research examined every phase of course design, such as developing, conducting, and analyzing phase. In the following section, I will first describe the learner attributes of both

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runs, then summarize the result and research findings distilled from the pilot research (Figure 3.1).

![Diagram of pilot research flow]

Figure 3.1: Overview of the pilot research flow

3.1.1 Learner Attributes

1st Course Run

The 1st course run started on 18th July and by the end of the run (21st August 2016), 8,666 learners have registered for the course—with 3,951 learners (45.6%) who viewed at least one step of the course, and 2,990 active learners who completed at least one step. Learners enrolled from over 140 countries, and the country that provided the largest percentage was the UK with 21%, followed by US 15%, Japan 9%, Australia 4%. A majority of them were in the age range of 26-35 (26%), followed by 18-25 (18%), and 24% were over 56 years old. Also, according to the optional pre survey result (n=191), approximately half of the respondents indicated that they have some previous experience in the subject area (i.e. studied it at university 31.4%,...
work in a related field 23.0%, or taken other courses or classes 17.8%), whereas 47.1% indicated that they have no previous experience at all.

2\textsuperscript{nd} Course Run

The 2\textsuperscript{nd} course run started on 9th January and ended at 26th February, 2017. Although the total number decreased compared with the first course run, 5,617 learners registered for the course—with 2,584 learners (46.0%) who viewed at least one step of the course, and 1,826 active learners who completed at least one step. Learners enrolled from over 130 countries, and the country that provided the largest percentage was the UK with 26%, followed by US 11%, Japan 4% and Australia 4%. Majority of them were in the age range of 26-35 (21%), followed by 18-25 (19%), yet 29% were over 56 years old. According to the optional pre survey result (n=292), approximately 40% of the respondents indicated that they have more or less previous experience in the subject area (i.e. work in a related field 19.2%, studied it at university 16.1%, or taken other courses or classes 14.4%), whereas 61.3% indicated that they have no previous experience at all.

The following Figure 3.2 indicates the number of registered learners per location. The size of the circle correlates with the number.

Table 3.2: Learner Attributes (1st Course Run & 2nd Course Run)

<table>
<thead>
<tr>
<th></th>
<th>Registered Learners</th>
<th>Learners</th>
<th>Active Learners</th>
<th>Social Learns</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Course Run</td>
<td>8,666</td>
<td>3,951</td>
<td>2,990</td>
<td>895</td>
</tr>
<tr>
<td>2nd Course Run</td>
<td>5,617</td>
<td>2,584</td>
<td>1,826</td>
<td>579</td>
</tr>
</tbody>
</table>
3.1.2 Developing the Course

The course was led and taught by the faculty members of the Institute of Oriental Classics at Keio University, and covered various topics in bibliographical studies. The course introduced the role of books in Japan’s culture and history from the 8th to the 19th century with focusing on the 159 masterpiece collection from both Keio University’s library and the Institute of Oriental Classics. To attract worldwide interest in rare Japanese books, the course was designed as an introductory course and open to anyone with an interest in the history of Japanese books. It was organized to be three-weeks long and required three hours of weekly workload. Within each week, the course had a main study topic, such as *The relationship between visual appearance and content in Japanese books* (Week 1), *Manuscripts and illustrated versions of the Japanese classics* (Week 2), and *Scholarship and publishing in the Edo period* (Week 3). As explained in the previous chapter, FutureLearn presents the contents in various formats, and for this course, contents were categorized into 4 format types as: *Article* (n=15),
Video (n=30), Quiz (n=4), and Discussion (n=6).

Following items are the learning topics covered in the entire course.

• How to handle old Japanese books

• Evolution of scripts and materials used in traditional Japanese books

• Binding methods and the practice of reformatting

• The hierarchy of book formats in traditional Japan

• Relationship between format and content in traditional Japanese books

• Genre and binding

• History of illustrated manuscripts and printed illustrated books

• History of printing and publishing in Japan

• Printed books and the development of scholarship in early-modern Japan

Founded in 1938, while housing more than 160,000 volumes of classical and rare books, the Institute of Oriental Classics remained in keeping their collection for academic and internal use only. However, the opening of the FutureLearn course became a trigger for the institute to open their collection to the wider public.

As a research member of the FutureLearn course design team at Keio University, I worked closely with the scholars from the developing phase. To make the course available for every learner, the team designed each course step carefully, including cultural knowledge and background. For example, some steps included a historical background of Japan, basic information about the characters, and the way to handle rare Japanese books. Moreover, 105 titles—264 digitized images—out of a 159 masterpiece collection were accessible as high-resolution
zoomable images by using web-based viewer *iipmooviewer* on IIPImage server\(^3\) which implements IIIF Image API.

### 3.1.3 Conducting the Course

During both course runs, I observed learners’ behavior and occasionally posted comments to assist learners by being a *host*, “a facilitator who understands the FutureLearn platform and can act as a guide to learners.”\(^4\) Through observing and interacting with the comments, I found out that the demographics of the learners are diverse not only in geographical environment or age difference, but also in the ‘learner archetypes.’ I observed learners from Work and Study (e.g., librarians, university scholars), Personal Life (e.g., retired, teacher), and Leisure (e.g., artists, university students) in good balance. Many of them were not confident in Japanese language, yet the language barrier seemed not to be a hurdle in this course.

The total number of comments were 7,618 (from 895 unique authors) for the 1\(^{st}\) course run and 5,844 (from 579 unique authors) for the 2\(^{nd}\) course run. While drop-out or non-completion rates are substantially high in every MOOCs, known as the “funnel of participation,”\(^5\) I did not see much reduction in the comments itself. Instead, I noticed many conversational comments happening in every week, and covering the topics of each step. This result suggests that every topics covered in this course evoked learners’ interest despite the number of enrollments.


3.1.4 Analyzing the Course

For analyzation, I investigated the vast quantities of data generated from the learners’ behavioral patterns and outcomes. The data used in this study were the datasets containing comments (posted by the learners) and the post-survey result. Neither comments nor survey results provided by the platform contain any information of non-commenters or non-answers; however, it is worth noting to understand the learning behavior through these outcomes in both qualitative and quantitative approaches. On one hand, a quantitative approach enables assessments to see behavioral patterns in large-scale. Since massiveness is one specific nature of the MOOCs, examining conserved quantities—through numerical terms—are useful to understand the behavioral patterns from diverse levels. On the other hand, “[i]nteraction directed to cognitive outcomes is characterized more by the qualitative nature of the interaction and less by quantitative measures.” Thus, this research should be evaluated by a qualitative dimension as well, which reveals a more formed discourse from and among the learners. As Holtzblatt and Beyer (2016) state “[q]ualitative and quantitative techniques build on each other,” and it is important to bring both aspects into focus. Thus, this study discusses how the course worked and further provide a valuable contribution towards adapting the Narrative Book Collection from both approaches.

Quantitative Approach

Alongside each of the steps, learners expressed their thoughts and opinions by posting comments on discussion boards, where they can leave messages and communicate with other learners and experts. Comments are either directly associated with course content, or a response to another learner’s comment. This is one of the features in FutureLearn, emphasizing...
learning through social interaction. During the 1st course run, 897 learners out of 3,951 learners (22.7%) posted at least one comment and 579 learners out of 2,584 learners (22.4%) posted at the 2nd course run. In order to understand the learners’ preference in scale, I first investigated the posted comments through text mining.

Text Mining

After manually cleaning the dataset through tidying inconsistencies of terms and spelling (e.g., unify the term ‘book’ and ‘books’ to ‘books’), removing stop-words which are “words that are not useful for an analysis, typically extremely common words such as “the”, “of”, “to”, and so forth in English,” all comment data were organized and analyzed using the R through text mining. In this study, I used two sources: 7,618 comments from the 1st course run and 5,844 comments from the 2nd course run.

Table 3.3 and Table 3.4 present the summary results of the term frequency (pairs of two consecutive words, known as bigram). The results shows that for both runs, the top 10 term frequency (co-occurrence pairs) are similar and follows the general topics and terms of this course. It also reveals that within all comments, there is a large number of URL (en.wikipedia.org) sharing comments. Furthermore, in Figure 3.3 and Figure 3.4, by plotting the top 50 term frequency—with having texts, nodes and edges (directionality of the pairs are added with an arrow and the shades reflects the frequency)—it shows a connected, yet widespread comments rooting on ‘books’ along with other various terms. It is also interesting to see that alongside ‘en.wikipedia.org’ there is a path to YouTube ‘www.youtube.com,’ which indicates that large amount of people are interested in looking into further explana-

10 Silge J and Robinson D, op. cit.
Table 3.3: Top 10 Term Frequency (1st course run)

<table>
<thead>
<tr>
<th>No.</th>
<th>bigram</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>illustrated books</td>
<td>219</td>
</tr>
<tr>
<td>2</td>
<td>printed books</td>
<td>203</td>
</tr>
<tr>
<td>3</td>
<td>japanese books</td>
<td>198</td>
</tr>
<tr>
<td>4</td>
<td>japanese culture</td>
<td>167</td>
</tr>
<tr>
<td>5</td>
<td>edo period</td>
<td>138</td>
</tr>
<tr>
<td>6</td>
<td>rare books</td>
<td>123</td>
</tr>
<tr>
<td>7</td>
<td>en.wikipedia.org.wiki</td>
<td>102</td>
</tr>
<tr>
<td>8</td>
<td>https en.wikipedia.org</td>
<td>101</td>
</tr>
<tr>
<td>9</td>
<td>books binding</td>
<td>84</td>
</tr>
<tr>
<td>10</td>
<td>keio university</td>
<td>77</td>
</tr>
</tbody>
</table>

Qualitative Approach

Next, to interpret with text data more closely and to gain behavioral insights about learners (e.g., how they felt or thought in the course), I looked into the descriptions. In both comments posted by the learners and the post-survey result, most comments were positive with the course contents and the way it was organized, however, as shown in the following comments extracted from the discussion boards as well as post-survey results, there were considerable amount of opinions and requests for further visual representations.

“I also find it a bit confusing. There could be some more pictures illustrating the differences, or diagrams.” (Comment from the 1st course run: Week 1, Step 1.12)

“A very enjoyable course, however it has been frustrating because I could not hold and physically examine the books shown. They were extremely beautiful. I will
Table 3.4: Top 10 Term Frequency (2nd course run)

<table>
<thead>
<tr>
<th>No.</th>
<th>bigram</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>japanese books</td>
<td>131</td>
</tr>
<tr>
<td>2</td>
<td>illustrated books</td>
<td>127</td>
</tr>
<tr>
<td>3</td>
<td>japanese culture</td>
<td>120</td>
</tr>
<tr>
<td>4</td>
<td>printed books</td>
<td>114</td>
</tr>
<tr>
<td>5</td>
<td>prof sasaki</td>
<td>112</td>
</tr>
<tr>
<td>6</td>
<td>rare books</td>
<td>90</td>
</tr>
<tr>
<td>7</td>
<td>edo period</td>
<td>80</td>
</tr>
<tr>
<td>8</td>
<td>en.wikipedia.org.wiki</td>
<td>75</td>
</tr>
<tr>
<td>9</td>
<td>https en.wikipedia.org</td>
<td>74</td>
</tr>
<tr>
<td>10</td>
<td>19th century</td>
<td>54</td>
</tr>
</tbody>
</table>

endeavour to find a local source [...]” (Comment from the 1st course run: Week 3, Step 3.18)

“The ability to zoom the camera in more and blow up the pictures more to see detail would have helped a lot.” (Post-Survey Result from the 1st course run: Answer to the Question How could the course be improved?)

“I feel that charts comparing each bookbinding time, and each type of paper, would have made it easier to discern each type from each other [...] for most people re-reviewing materials in a different format helps retain the material better [...]” (Post-Survey Result from the 1st course run: Answer to the Question How could the course be improved?)

“I’d like to examine more illustrated works and have comments on the objects/people/processes in the images.” (Post-Survey Result from the 2nd course run: Answer to the Question How could the course be improved?)
In addition, some learners felt overloaded with the widespread information and thought that the course itself was too reliant on the video explanations alone. One learner mentioned that “I found myself overwhelmed with too much condensed factual information […] which made it difficult to closely follow and retain all of it. I think the course could benefit from a reorganisation of this material […] diluting the content into a more manageable size.” (Post-Survey Result from the 1st course run: Answer to the Question How could the course be improved?) Another learner mentioned that the course was “[v]ery interesting was the info about books as objects […] difficult to remember types of papers, ways of binding etc.” (Post-
Survey Result from the 2nd course run: Answer to the Question *What was your favourite part of the course, and why?* Moreover, one learner complained that “*when the videos were too long and had not many interactions I easily lost concentration.*” (Post-Survey Result from the 2nd course run: Answer to the Question *What was your least favourite part of the course, and why?*)
3.1.5 Results and Findings

The course was designed to be an introductory course covering a wide range of topics in the field of bibliography, and made use of a number of visual resources. As mentioned in the beginning, the age group and demographics of learners were notable in both course runs. While almost half of the learners did not have any prior knowledge related to Japanese culture or rare books, the course was designed carefully for learners at all levels. Hence, compared with average FutureLearn course data (around 100,000 responses from the FutureLearn course run from 2015 to February 2017\(^1\)), the satisfaction rate of overall experience was much more higher. According to the optional post-survey result, 76.2% (n=319 from 1\(^{st}\) course run) and 70.7% (n=157 from 2\(^{nd}\) course run) of the respondents rated Excellent for their course experience while the average is 56.3%. Thus, in overall, both course runs received high reputations from enrolled learners including both academics. The combination of texts and visual images, including the high-resolution zoomable images raised learners’ satisfaction throughout the course.

However, the insights while conducting the course and the results from the qualitative and quantitative analysis suggests further development of the course. On one hand, as shown in Figure 3.3 and 3.4, I saw connections in every course topic—for instance, there were terms mentioning about the books physical appearance, binding style, scripts and production year, etc.—and broad patterns of learners’ interests on a massive scale. On the other hand, the comments, as well as the results from surveys, reveal that not all topics—which were represented as course steps—were delivered to the learners in an appropriate context. More radically, some contents were too self-explanatory in structure, lacking interaction with the learners, and not in narrative context. As mentioned in the previous chapter, narrative should be built between both the designer and the user. Alongside the ‘social interaction’—the main feature

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of FutureLearn—we, as course designers should invite every learner to explore the meaning of every topic through engaging with the contents. To summarize, the following three issues were drawn from this pilot research:

- **Lack of interaction with the course materials and the content:** The sequential flow of the course as well as restricted course materials limited learners to engage with the course and collection. Linearity is restricting the interactions in the course materials and leads to its lack.

- **Expectations for a wider range of features to explore the course narrative:** What many learners explored were not only constructed on top of pure materials or the linguistic representations, and led them exploring in external sites.

- **Limitations in organizing course materials:** Although learning goals were predefined by the scholars, learning pathways structured on the FutureLearn environment—linear and sequential structure—have limitation in providing diverse narratives.

### 3.2 Design Goals

The results and findings from the pilot research provided reliable evidence and became a strong basis of the design concept. The design of the *Narrative Book Collection* correlates with the content of the FutureLearn course *Japanese Culture Through Rare Books*, yet has further potential in providing a unique experience in exploring diverse elements of rare Japanese books. The central point of this research is to design and implement a digital collection of rare Japanese books for general audiences regardless of their baseline ethnic, regional, or educational differences, and to evaluate the effectiveness of the model through the process and implementation. Thus, in accordance with the discovered issues from the pilot research, I formulate three design goals as follows:
• Stimulate exploration and facilitate the understanding of the course through browser-based interactions

The *Narrative Book Collection* concerns not only the visual representation or multiple pathways, but also the satisfaction in regards with the use of the interface. Thus, in order to make effective use of the visual representation as well as multiple pathways, it is important to consider creating simple yet intuitive interactions to effectively communicate across diverse audiences. While the learners are facing a laptop or desktop computer, the users are confined to screens and keyboards. Besides, tablet or mobile devices—which have touch screens—take advantage through their intuitive gestures. However, in either case, all learners faces a display screen, and every element on the screen commands their attention. The point is to enhance the user experience through creating a richer and more intuitive interaction that maximizes learners’ participation and interaction as much as possible.

• Enable a wider range of interpretation of bibliographical information

In this research, I employ the term ‘bibliographical information’ with two meanings. The first refers to the digitized images that visually depict books. While exploring the course, many learners expect more information about the books and links to the related content. Hence, providing more digitized elements of the books will improve engagement with the course. Another meaning of the term refers to the cultural information that functions together with these images. Besides the mere image of books, cultural datasets contain a wide range of information—such as historical background and physical characteristics. Thus, it is important to focus on the thematic structure of this information and transform it into a visually appealing and compelling representation that radically affects learning experience.

• Provide both distant and close reading experiences to enable multiple pathways in different narrative contexts
Referring to their learning design guidelines, all FutureLearn courses are designed in a linear structure with structured course steps. FutureLearn emphasize that “course steps are ‘building blocks’ that can be put together in different combinations to create flows of activity that drive the learning forwards.” However, I argue that there still remain design spaces alongside the steps.

By offering the Narrative Book Collection as a supplementary material of the course, its interface—with multiple modalities—can further augment the learning experience without disrupting their learning process. Furthermore, as mentioned in the previous chapter, the multiple pathways allow learners to have authorship with serving both distant and close reading experiences in various types of narrative contexts.

Summary

The Narrative Book Collection will be built through computational and visualization approaches to enhance learners’ learning experience, and functions as supporting material for the course. A wide variety of characteristics appears in rare Japanese books, and those can be readable—through both close and distant reading—and further reveals the cultural history, correlations and trends in narrative format. By focusing on the bibliographical features, their large variety of aspects, the Narrative Book Collection functions effectively and promotes understanding in rare Japanese books.

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3.3 Design Process

3.3.1 Design Process of the Narrative Book Collection

In terms of design process—in the field of information visualization—many scholars have defined and shared their unique process of building their visualization.\textsuperscript{13} \textsuperscript{14} However, these prior approaches are all data-driven, having roots in datasets, and lacking in audiences (users) field of view. Instead, the Narrative Book Collection will be built upon learners’ perspective and the design process consists of four components: (a) story formation: establish stories (viewpoints) based on the course narrative, (b) data generation: generate and store digital data from the main content, (c) story-driven data analysis: analyze and interpret data to facilitate knowledge transfer, (d) narrative visualization: offer multiple viewpoints and interactions with the collection. The interface built up with these components enables both fellow scholars and a public audience to access, read, and interact with the vast collection from Keio University’s collection of pre-modern Japanese books (Figure 3.5).

Figure 3.5: Design Process

\textsuperscript{13} Benjamin Fry (2004) Computational Information Design, PhD diss, Massachusetts Institute of Technology.
3.4  Initial Design

As an initial experiment, I developed a prototype of the *Narrative Book Collection* and tested with the enrolled learners of the 3rd course run—which was conducted in spring 2017. This “low-fidelity”

15 prototype functioned as a browser-based interactive interface in order to examine the effectiveness of the user experience and receive feedback from the real FutureLearn learners (Figure 3.6).

![Prototype Overview](image)

Figure 3.6: Prototype Overview

3.4.1  Design Process

(a) Story Formation

Based on the results of the pilot research, I found learners’ interest spreading in broad patterns, yet following the covered course topics. As shown in the previous section, each course

step had a large number of conversational comments. Hence, in the *Narrative Book Collection*, I intend to create a more open-ended environment where learners can cultivate their own pathways and wander around the collection. Accordingly, I extracted and summarized the topics as viewpoints which become the basis of every story-outlines. The viewpoints are categorized as 1) distant viewpoints: cover image, genre, timeline and 2) close viewpoints: 10 non-text factors (Table 3.5, 3.6).

<table>
<thead>
<tr>
<th>Cover image</th>
<th>Genre</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 3.5: Distant Viewpoints</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Types of book production</th>
<th>Illustrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of paper</td>
<td>Positioning of the title (Gedai)</td>
</tr>
<tr>
<td>Color</td>
<td>Binding Styles</td>
</tr>
<tr>
<td>Design (Patterns)</td>
<td>Re-Binding Styles</td>
</tr>
<tr>
<td>Writing Styles (Fonts)</td>
<td>Sizes</td>
</tr>
</tbody>
</table>

To examine a preliminary overview of the design concept and investigate the potential use of each viewpoint, this initial prototype enabled interpretations through two distant viewpoints (cover image, timeline) and two close viewpoints (color, size).

(b) Data Generation

As same as the 1st and 2nd course run, the 3rd course run introduced 159 masterpiece from the collection, and 105 titles—254 digitized images—were accessible in high-resolution zoomable images. To first build the prototype, 95 titles (excluding few non-book materials, such as Ukiyo-e) were retouched from the course and the corresponding data were either retrieved or generated under the supervision of expert scholars.
(c) Story-driven Data Analysis

Based on the viewpoints developed from (a) Story Formation and data generated from (b) Data Generation, I analyzed the books—correlations among data—from its bibliographical features as well as visual representations. For the color, three to five representative colors were computationally analyzed by each cover of books (382 color in total). For the size, 31 books were measured in weight and height (Figure 3.7, 3.8).

![Figure 3.7: Viewpoint (Size)](image)

(d) Narrative Visualization

In accordance with (a) Story Formation, (b) Data Generation, and (c) Story-Driven Data Analysis, the visualization provides flexible visual pathways for exploring the book collection. In the Narrative Book Collection, the visualization takes form as an interactive interface associated with viewpoints. Instead of merely connecting audiences to one concrete story or pathway, this research stands unique in fostering freedom to explore the collection from different narrative viewpoints and interaction with the collection through intuitive interactions.
—namely through clicking and dragging.\textsuperscript{16}

The initial prototype was designed to first enter the top index page—an introduction page. Then, by clicking the top menu bar, learners were allowed to freely explore the collection in cover, timeline, color or size viewpoints. Furthermore, by clicking the book image or text link: \textit{Take a Closer Link}, learners were led to separate page with high-resolution zoomable images (Figure 3.9).

3.4.2 Learner Attributes

\textit{3rd Course Run}

The 3rd course run started on 22nd May and ended 30th July 2017. 2,228 learners registered for the course—with 1,357 learners (60.9\%) who viewed at least one step of the course, and 831 active learners who completed at least one step. Learners enrolled from over 113 countries, and the country that provided the largest percentage was the UK with 22\%, followed by US 10\%, Mexico 6\%, Japan 4\% and Russia 4\%. Majority of them were in the age range of 18-25 and over 65 (19\% each), followed by 26-35 (17\%), 36-45 and 56-65 (14\% each), 46-55 (10\%), and

Additionally, according to the optional pre-survey result (n=278), approximately 40% of the respondents indicated that they have more or less previous experience in the subject area (i.e., work in a related field 14.4%, studied it at university 10.4%, or taken another face-to-face course or class in this subject 7.2%) and 45.0% indicated that they have no previous experience at all. Yet from this run, the pre-survey question was revised from the previous course runs, and 56.5% answered that it’s their personal interest or hobby whereas we don’t know if they have any previous experience or not.

However, it is important to note that for this initial experiment, the Narrative Book Collection was provided as an external and optional resource. The linkage (URL) to the Narrative Book Collection was available only in the course comments—posted by the course educator and host—and through notification in the weekly emails.
Table 3.7: Learner Attributes (3rd Course Run)

<table>
<thead>
<tr>
<th></th>
<th>Registered Learners</th>
<th>Learners</th>
<th>Active Learners</th>
<th>Social Learns</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd Course Run</td>
<td>2,228</td>
<td>1,357</td>
<td>831</td>
<td>256</td>
</tr>
</tbody>
</table>

3.4.3 Results and Findings

Quantitative

The analytics—implemented in the *Narrative Book Collection*—indicated that there were 105 visitors (learners) formed by 54% of the new users, and 46% returning users (who accessed more than once). There were 193 sessions—a set of user interactions per visit—with 1,336 page views in total, and the duration of visits (per session) was 6 minutes and 43 seconds in average. The bounce rate was 38.14%. Besides, Figure 3.10 shows the user flow of the learners. This figure shows the relative volume of page view along with the gray lines which shows the flow (pathway) of learners, and the red lines which represents the leaving (drop off) learners.

![Figure 3.10: Prototype User Flow](image)

These results suggest that there are a number of learners finding their own path and exploring several viewpoints—in both distant and close. However, simultaneously, there are
considerable amount of learners—almost half of the learners who first visited the top index page—who drop off immediately after entering the site.

Qualitative

To receive direct feedback from the learners, I asked the learners (who experienced the prototype) to fill out an optional online survey (see also Appendix A). Although the survey answers were relatively small in numbers (n=6), I had insightful comments for each design goal. The following are the comments as well as answers to the open-ended questions about the Narrative Book Collection:

- Stimulate exploration and facilitate the understanding of the course through browser-based interactions

“[…] Some of the fonts used for explanatory text look basic at the moment, I think if more consideration was given to the whole look of the site it would be more in keeping with the beauty of the images of the books and the lovely idea and uniqueness of the site overall.” (Optional Survey Result: Answer to the Question Please let us know what we could do for our next step, and to better meet your expectations.)

“COVER LIST: good. When first loaded, covers overlap, so cannot see "closer look"; when returned to this page, covers separate so better […] SIZE: good. Size in cm useful. Would be helpful to have Japanese name for size in Romanisation. COLOUR: did not work. I am not sure why this is useful. TIMELINE: good. But not clear how to move along timeline.” (Optional Survey Result: Answer to the Question Please let us know what we could do for our next step, and to better meet your expectations.)

- Enable a wider range of interpretation of bibliographical information
“[…] I love the way the books appear one by one. It’s like getting lots of gifts.”
(Comment: Week 2, Step 2.15)

“Fascinating! So interesting it requires a lot of time to really examine all these documents!” (Optional Survey Result: Answer to the Question Please let us know your thoughts and suggestions.)

“Better index/listing; Colours on the timeline option—grey on grey with white should be changed as it is very difficult to read.” (Optional Survey Result: Answer to the Question Please let us know what we could do for our next step, and to better meet your expectations.)

• Provide both distant and close reading experiences to enable multiple pathways in different narrative contexts

“I loved being able to look closely at the books, I particularly loved the timeline.” (Optional Survey Result: Answer to the Question Please let us know your thoughts and suggestions.)

“First entry into cover section had most books covered by others. But, each time I looked into a book and returned to the menu, many more books became accessible. Interesting way to tease with promise of ‘more’.” (Optional Survey Result: Answer to the Question Please let us know your thoughts and suggestions.)

Summary

Rare Japanese books have qualities that appeal to all of our senses. The form of the object and its intended function are taught throughout the course. In this initial experiment, I intend to argue how these books can be delivered through designing and implementing the interface alongside the FutureLearn course.
Through observing the prototype in use, comments and survey results, I learned a number of practical lessons that will be fed into the following refined design. The results support the overall concept of the *Narrative Book Collection*, yet the main improvements suggested by the learners relate to the interface design. According to their feedback, the problem stems from representing a cluttered visual appearance which led to disengagement. To summarize, corresponding with the design goals, the following three insights were drawn from this experiment.

- It is necessary to consider the balance of the total visual design. The importance relies on the ways viewpoints should be available and how the *Narrative Book Collection* should be used in the same context of FutureLearn course. Close connection to the course context and deep investigation of the learning behavior creates aesthetic interaction.

- There is a need to provide close connection to the course context and deep investigation of the learning behavior. A wider range of interpretation of bibliographical information have a positive impact on the experience among learners; however, it is necessary to consider the balance of the total visual design and take into account the texture of the collection.

- To promote engagement through the collection, the visualizations should guide the learners and facilitate their pathways. Furthermore, it is important to consider the balance and tension between the full insight and summarized information.

Accordingly, effective design and experience must be accessible to a plurality of people with different language, culture, and ability to originate aesthetic information visualization that composes the collection. Moreover, it is important to consider the balance of stories (viewpoints), the way to visualize rare Japanese books in a coherent and functional context with aiming in-depth detailed understanding of interrelationships alongside the course.
3.5  Refined Design

Based on the results and findings from the initial experiment, I devised and refined the design from scratch. On a local scale, I identified a large potential of the Narrative Book Collection through the initial prototype. A sequence of viewpoints has been followed, derived concentration in which users direct their own interest, however, the insights also gave me the opportunity to better address the form of interaction as well as interface design.

Although the initial prototype functioned as an external website where only motivated or interested learners took place, I aim in evolving the Narrative Book Collection into an essential component of a distributed and populated in concert with the course. Emphasizing the tight focus on user experience, the refinements require a deeper engagement with the subject matter as well as course content. Hence, the refined design put more emphasis on its artisanal and aesthetic value as a supporting materials of the course in order to provide a synergistic learning experience among all enrolled learners (Figure 3.11).

Figure 3.11: Overview of the Narrative Book Collection
3.5.1 Design Process

(a) Story Formation

In accordance with both distant and close viewpoints—established after the pilot research (Table 3.5, 3.6)—the refined design creates additional context across multiple scales. To focus more on the historical or artifactual value independent of its content, and enable learners to find and select their own pathways throughout the viewpoints, the refined design sets the cover image as main component (not a viewpoint) then features six viewpoints, such as Time (timeline), Genre, Typology (binding style), Appearance (color and size), and Content (writing style). See also Table 3.8, 3.9.

Table 3.8: Distant Viewpoints

<table>
<thead>
<tr>
<th>Genre</th>
<th>Timeline</th>
</tr>
</thead>
</table>

Table 3.9: Close Viewpoints

<table>
<thead>
<tr>
<th>Typology</th>
<th>Appearance</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binding Style</td>
<td>Color</td>
<td>Size</td>
</tr>
<tr>
<td></td>
<td>Writing Style</td>
<td></td>
</tr>
</tbody>
</table>

(b) Data Generation

Since the 1st course run, 105 titles—264 digitized images—were accessible in high-resolution images and 95 titles were available on the prototype. However, many of the digitized books did not contain enough bibliographic records and not all books were available as high resolution images. Therefore, based on the viewpoints I summarized at (a) Story Formation, I created/added bibliographic records and 53 newly digitized titles (401 images)—every image with 10 million pixels or more, with 16-bit color depth and sRGB color space (Figure 3.12).
(c) Story-Driven Data Analysis

Based on (a) Story Formation and (b) Data Generation, I conduct both manual and computational analysis of the generated data. The data contained both bibliographical records and visual images of rare books, and due to the lack of heterogeneity in data (e.g., uncertainty of production age, changes in color, etc.), the analysis has been coordinated with scholars and experts in bibliography.

(d) Narrative Visualization

In the *Narrative Book Collection*, narrative is created by providing viewpoints and allowing learners to find their own pathways. Even though the interface functions as supporting material of the FutureLearn course, learners can decide their own direction and extend their reading engagement. To provide a synergistic learning experience between the *Narrative Book Collection* and the FutureLearn course, I used a metaphor as setting a Bookshelf
View—provides an overview of the collection through tiled cover images—linking to a Book View—provides high-resolution zoomable images accompanying bibliographical records—which bridges to the FutureLearn course. The interface allows learners to explore and deepen engagement with materials promoted by learning objectives specified in the course.

However, it is important to note that the design and development of the interface was paralleled by the execution of the 4\textsuperscript{th} course run (for the first two weeks), and the visualization evolved during the course run based on learners and experts feedback. Following figure shows the main features newly adopted in each iteration (Figure 3.13).

<table>
<thead>
<tr>
<th>First Iteration</th>
<th>Second Iteration</th>
</tr>
</thead>
<tbody>
<tr>
<td>(September 25 - October 8, 2017)</td>
<td>(October 9 - November 12, 2017)</td>
</tr>
<tr>
<td><strong>BOOKSHELF VIEW</strong></td>
<td><strong>BOOK VIEW</strong></td>
</tr>
<tr>
<td>• Clickable timeline</td>
<td>• Draggable timeline</td>
</tr>
<tr>
<td>• Single page interface</td>
<td>• Showing filters</td>
</tr>
<tr>
<td>• Facilitate browsing</td>
<td>• Precompute the numbers</td>
</tr>
<tr>
<td>• Muted color</td>
<td></td>
</tr>
<tr>
<td>• Added 53 titles</td>
<td>• Added book spine images</td>
</tr>
<tr>
<td></td>
<td>• 709 images from 148 titles</td>
</tr>
</tbody>
</table>

Figure 3.13: Main features in first and second iteration

3.5.2 Design of the *Narrative Book Collection*

The *Narrative Book Collection* is developed using a standard web technology in order to make it accessible to widest possible audiences, regardless of their environment or digital literacy.
In the following, I describe the design decisions behind the visualization of the *Narrative Book Collection* along with the six viewpoints: Time (timeline), Genre, Typology (binding style), Appearance (color and size), and Content (writing style). The design was processed by keeping the consistency in terms of button appearance and positioning, spatial layout, and interaction behavior.

### 3.5.3 Bookshelf View

The famous principle from Ben Shneiderman (1996), “Overview first, zoom and filter, then details-on-demand”\(^{17}\) which has been frequently used and applied to the modern computational information visualization examples, yet summarizes many of the requirements of effective interaction.

Accordingly, Bookshelf View offers an overview with multiple viewpoints—formed with icons—to easily instruct learners. Following one’s own interest, Bookshelf View allows learners to slide/click on viewpoints. Although links between the course and the viewpoints can make use in many different ways, in this research, Bookshelf View is associated with Time (timeline), Genre, Typology (binding style), Appearance (color and size), and Content (writing style). Learners are able to select, combine and filter any viewpoints (Figure 3.14).

**Time: timeline**

Books are cultural artifacts. Its function, form, and design have changed over time. Therefore, timeline enables learners to explore books in time scale through Japanese era and year (range) of published. While few books are published within certain years, uncertainty looms over many books. However, in order to provide aggregated overview, in the second iteration, the year (range) along with the uncertainties were translated into numbers, and included in

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the timeline. For example, the books published during the latter half of 17th Century appears in between 1650-1699 through the draggable timeline (See also Figure 3.13).

Genre

This collection covers a wide variety of genres. We have categorized it into 5 different categories as: Sutra, Poetry (Japanese poem known as Waka), Tales (Monogatari), Illustrated Tales, and Illustrated book. In the past, these genres had strict hierarchy and relation to the appearance of book. The genre classification gives an overview of rare Japanese books to all learners (Table 3.10).

Typology: binding style

In classical Japanese history, there were five main binding styles. During that era, each phase of their manufacture was done by hand from the creation of the type and paper used to the composition and imposition of the text and finally to the binding (Figure 3.15).
Appearance: color

Color is one of the biggest features of pre-modern Japanese books. The traditional colors of Japan have been inspired and generated from Japan’s natural beauty, seasonal scenery, and a unique way of implementing those. Various colors were used in books, and in the *Narrative Book Collection*, up to five representative colors were selected (computationally) by each cover of books. After extracting the color, I classified each color along 9 typical Japanese color series—all based on the colors specified by Japanese Industrial Standard—such as Red, Violet,

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Blue, Green, Gold/Yellow, Brown, Grey/Silver, White, and Black Series. Despite the fact that all the books were damaged and/or the color changed due to deterioration over time, with full respect to those (natural) changes, we kept the extracted color as it stands (Figure 3.16).

Appearance: size

Pre-modern Japanese books differ widely in its shape and size. During the Edo-period (1603 - ), many books came in standard formats, but there were some variations during the Heian to Muromachi periods. Following are the typical formats from the Heian to Muromachi periods, and Edo period (Figure 3.17).

Content: writing style

Ancient Japan did not have its own writing system, so first, Chinese scripts/characters (Kanji) was imported from China. Then, the Japanese invented their own unique way to pronounce Kanji—which is called Man’yogana—then developed Hiragana and Katakana syllabaries. Each writing style is perceived as different and used differently in the beginning, yet gradually, some were used in combination. In the latter years, illustration became an important
Thus, in this thesis, I summarized the style in following seven patterns (Table 3.11).

<table>
<thead>
<tr>
<th>Table 3.11: Viewpoints (Content)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man’yōgana</td>
</tr>
<tr>
<td>Kanji</td>
</tr>
<tr>
<td>Katakana and Kanji</td>
</tr>
<tr>
<td>Hiragana and Kanji</td>
</tr>
<tr>
<td>Kanji with Illustration</td>
</tr>
<tr>
<td>Hiragana and Kanji with Illustration</td>
</tr>
<tr>
<td>Illustration Only</td>
</tr>
</tbody>
</table>

Extra Features

Provided as extra features, 1) learners can switch the cover images to page images, and explore the books from different perspective (inside the page), 2) integrated shuffle button that allows learners to shuffle multiple images randomly that may lead to new discoveries, and 3) search box that helps learners to find specific titles—for those who intend to search books through
Design of the Narrative Book Collection

3.5 Refined Design

titles, then 4) URL sharing function that generates unique URL and allows learners to save and share their own filter settings online (Figure 3.18).

![Figure 3.18: Extra Features of Bookshelf View](image)

3.5.4 Book View

Book view was developed by previous high-resolution zoomable image page. Accompanying bibliographical records, learners can deepen their knowledge in particular books. Book view also functions as a bridge to the FutureLearn course—by having link to related course step(s)—as well as link icons which are pre-classified to the related viewpoints.

To summarize, in the Book View, learners can see a) a list of digitized images of the book (all selectable), b) an image with Japanese title and imprints, c) detailed description of the book, d) zoom link that allows learners to view higher resolution image, and e) clickable link icons that leads learners to the unique Bookshelf View (Figure 3.19).
3.6 Implementing the **Narrative Book Collection**

The seamless linkage among the Bookshelf View, Book View, and FutureLearn course provides a unique experience to explore diverse elements of books from both distant and close reading in a narrative context. However, the goal of adopting computational analysis and visualization, designing the *Narrative Book Collection* are not, after all, to reproduce new knowledges in rare Japanese books, but to focus on supporting online learners who attempt to learn about rare Japanese books on FutureLearn course.

3.6.1 Expected pathways

There are several pathways that can be followed during the learner’s journey, with mainly two touch points. The first one is the Bookshelf View itself, where the user can visualize the whole content in a glance. The journey can start from the timeline, that gives immediate response filtering the contents according to the period of publication. After clicking one of the books, the learner jumps to the Book View, where other pathways can be followed (Figure 3.20):
• (X) Zooming in the pictures: reveals details such as texture and binding techniques

• (Y) Different filtering features: genre, typology, timeline, color, size, content

• (Z) Jumping to the FutureLearn website

Figure 3.20: Expected pathways from the Bookshelf View

The other touch point is the course description in the FutureLearn website. From the link published in the course steps, the learner can jump into the Book View, and then have access to the pathways described previously (Figure 3.21):
In the following chapter, I implement *Narrative Book Collection* in the 4\textsuperscript{th} run of *Japanese Culture Through Rare Books* course and try to prove the concept of *Narrative Book Collection* (Figure 3.22). Furthermore, for continuous and comprehensive evaluation, the overall design process will be transparent and interpretive for feedback and review. Constant feedback and reviewing from both experts and users ensures the quality of the results.
Chapter 4
Proof of Concept of the Narrative Book Collection

With a broad overview and concrete structure, this thesis proposes Narrative Book Collection, an interactive interface that allows FutureLearn learners to explore diverse elements of rare Japanese books. In collaborative and interdisciplinary research with Keio University’s Institute of Oriental Classics, this research examines the way to combine computational analysis and visualization in narrative format, and reveals the connection of books.

In this chapter, I first implement the Narrative Book Collection into the 4th course run of FutureLearn which took place in autumn 2017—started 25th September. Second, I examine the usability and effectiveness of the Narrative Book Collection through both quantitative and qualitative approach. Third, I examine the flow and interactions made by individual learners that represents three context areas in FutureLearn—namely 1) Work and Study, 2) Personal Life, and 3) Leisure—and discuss findings from a deployment of the Narrative Book Collection. This research does not generalize its approach by only focusing on the techniques, yet the synergic improvements in the FutureLearn course as well as the visualized outcomes, such as capability and effectiveness of narrative viewpoints, will also be evaluated.
4.1 Research Setting

The Narrative Book Collection was published on the Web Wide Web to welcome all potential users who are interested in Japanese culture and books, however, it was designed to work best alongside taking the FutureLearn course Japanese Culture Through Rare Books in greater depth. During the course, the Book View was directly accessible from 148 titles with 709 high resolution book images which were shown in 46 out of 55 course steps. Besides, the Bookshelf View along with Book View was first introduced in course step 1.5 as one part of the introduction of the course, then it was introduced in official announcements (e.g., through e-mail announcements to the registered users) as new feature (Figure 4.1). The complete list of books included in the Narrative Book Collection is available in Appendix B as well.

In addition to broadening and deepening the visitor experience through the Narrative Book Collection, the video and article that offers different viewing options will function together to enhance individual readers to collaborate and create new reading experiences.

4.1.1 Learner Attributes

4th Course Run

Running from 25th September until 12th November 2017—when 7 weeks of the course was finished—1,797 learners registered for the 4th course run with 1,045 learners (58.2%) who viewed at least one step of the course, and 563 active learners who completed at least one course step. Learners enrolled from over 95 countries, and the country that provided the largest percentage was the UK with 21%, followed by Japan 13%, US 9%, Vietnam 6% and Mexico 6%. The age range started from 26-35 (26%), followed by 18-25 (18%), >65 (16%), 56-65 (12%), 36-45 (11%), 46-55 (9%), and <18 (3%) years old.

4.2 Evaluation

Having the foundation in literature review and pilot research, I first apply qualitative and quantitative approaches to the generated data and examine whether the experience created by the *Narrative Book Collection* did better enhance the learning experience of learners.

4.2.1 Quantitative Data Analysis

During the course, 136 learners out of 1,045 learners (13.0%) posted at least one comment, totaling up to 1,454 comments. To first overview the learners’ preference in scale, I investigate all posted comments through text mining. I then summarize the number and flow of users...
who have accessed and explored *Narrative Book Collection* alongside the course.

**Text Mining**

Following the method used for the pilot research, after cleaning the data, I plotted the top 50 term frequency of 5,873 entries. As shown in Figure 4.2, as similar to the results of the pilot research, terms are wide-spread, yet many of them are rooted in ‘books.’ Instead, it is interesting to see that there are no more references or mentions about Wikipedia or YouTube. Because the dataset and the number of participants are different from the pilot research, the results cannot strictly be compared. However, this result suggests that the *Narrative Book Collection* tends to complement the learners’ requirement of additional resources.

**Learners interacting in and out of the *Narrative Book Collection***

The number shown in Figure 4.3 indicates the total number and flow of learners’ sessions—who have explored the course, Book View, and Bookshelf View—and the deployment was logged over a 7 week period from 25th September until 12th November 2017. As the number indicates, large number of learners are exploring the paths throughout the course, Book View, and Bookshelf View (See also Appendix C).

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2 Silge J and Robinson D, op. cit.
Access to Bookshelf View

There were 1,132 sessions in total for Bookshelf View. The audience was formed by 46.4% of new users, and 53.6% of returning users. The duration of visits (per session) was 4 minutes and 23 seconds in average. The bounce rate was 34.4%. In more details, the Bookshelf View was accessed from 525 users from over 60 countries, and the largest of users reached the site from Japan (37%), followed by US (14%), UK (12%), Australia (5%) and Spain (3%). Regarding the devices used to access the collection, 81.0% accessed from computers, 11.8% from mobiles, and 7.2% used tablets.

Inside Bookshelf View, analytics indicated that there were 3,490 clicking and dragging with the six viewpoints. The percentage ranges as: Time ( timelines) [56%], Genre [15%], Typology (binding style) [10%], Appearance (color [6%] and size [4%]) [10%] in total, and Content (writing style) [9%] (Figure 4.4).
4.2 Evaluation

Figure 4.3: Sessions Throughout Narrative Book Collection

Figure 4.4: Percentage of the use of 6 viewpoints
Access to Book View

Based on the access log, in 7 weeks there were 2,678 sessions in total for Book View. In more details, there was access to 11,857 books and 18,063 images. And the average access number for each book title and image (inside Book View) per day were 4.4 books and 6.7 images (Figure 4.5).

![Bar chart showing average number of access to Titles and Images per day](image)

Figure 4.5: Average number of access to Titles and Images (inside Book View) per day

The access to Book View was coming from FutureLearn as well as Bookshelf View. For example, access to Book View per day was 165 books from FutureLearn and 77 books from Bookshelf View (Figure 4.6).

Encouraged to re-join the course

The Narrative Book Collection also contributed to increase the relative number of returnees of the course. Returnees are defined as those leaners who registered for at least one past run of the same course. As shown in Figure 4.7, the 4th course run showed 21% of returnees from the previous runs.
Results and Findings

The *Narrative Book Collection* provided several new ways to examine the cultural relation of books at the macro scale (in distant reading) as well as micro scale (in close reading). The re-
results suggest multiple filtering and zooming of a collection and visual resources—that are arranged along a contextualized timeline—enhanced learners experience, and the way in which people can access rare books is becoming broader and more multifaceted than ever. Furthermore, by taking a closer look at the learners behavior patterns in the FutureLearn course linking the *Narrative Book Collection* (both Bookshelf and Book View), I could identify and categorize the user flow in three different broad pathways as follows (See also Figure 4.8):

![Diagram showing three types of learners' pathways](image)

**Figure 4.8: Three Types of Learners’ pathways**

- **A**: Bookshelf View → Book View → FutureLearn
- **B**: FutureLearn → Book View → FutureLearn
- **C**: FutureLearn → Book View → Bookshelf View → Book View → FutureLearn

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For the pathway A, most learners seemed to have their own initial interest and curiosity in rare Japanese books. Learners start with a large number of images and viewpoints by accessing to the Bookshelf View which provides the possibility to choose their own path. Some start with exploring the Bookshelf View and some learners seems to be interested in seeing particular books (moving to Book View → FutureLearn) which are both inspirational experience and improves engagement with the books. For the pathway B, learners tend to follow the course structure. When they see an interesting book that interests them in the course, they select that image and take a closer look, then go back to the course and continue their study. They keep the clear sequential flow while taking the course. And for the pathway C, learners are normally in an exploratory mode and looking for more information, going back and forth between the course, Book View, and Bookshelf View. Through looking at the books in both close and distant scale alongside the course, they create more in-depth pathways and deepen their understanding in the contents.

In the following concept proof section, I will describe detailed user scenarios based on the learner archetypes introduced in chapter two.

4.2.2 Qualitative Data Analysis

Learners Feedback

To further examine how the Narrative Book Collection has been received by the learners, I extracted 71 comments which mentioned Narrative Book Collection and also examined the post-survey and optional survey results. Moreover, to further investigate how each learner goes about their tasks, an interview (optional) was paired with surveys. Most comments were positive with the design and the way it was implemented in the course—referring to its easy usability, as follows.

“This is one of the coolest things I’ve ever seen anyone do with technology. Oh, thank you so much! I am loving this.” (Comment from Week 1, Step 1.5)
“I found NBC extremely detailed and allows me to search by Genre, Typology, Timeline, Color, Size, and Content, etc. It provides high-quality digital images and you can easily flick through the items that were scanned. The description of the item is very useful and helps to understand a bit of the history [...]” (Comment from Week 1, Step 1.5)

“What an amazing resource! This has convinced me to upgrade to the paid version of the course because I want to take more time to look at all these beautiful books [...]” (Comment from Week 1, Step 1.5)

“[...] I love the sound of the hishi paper and the fact that it cannot be commercially cultivated. I am enjoying this course very much. Thank you for the very high level of the online materials and the NBC in particular.” (Comment from Week 1, Step 1.16)

“Incredible software—really impressed with the ease of access to material.” (Comment from Week 1, Step 1.5)

“Zooming in on the books—almost as good as actually seeing them in real life. Brought the course to life and made all the lectures much more meaningful.” (Post-Survey Result: Answer to the Question What was your favourite part of the course, and why?)

“The digital archive available for use by students is a fantastic resource—very impressed.” (Post-Survey Result: Answer to the Question What was your favourite part of the course, and why?)

However, few learners seemed to have difficulty in accessing to the Narrative Book Collection and said "In clicking on the individual books titles I am unable to get the digitalized copies with navigation to come up. If I am unable to do so it is likely that I will not be able to
continue exploring the course as being able to view the books is critical to the learning process.” or just stating “I can not make it open.” These two comments were made at Step 1.5, and I—by being a host of the course—have replied back immediately to check if they have enabled Javascript on their browser, however, it remains unclear if they could have solved their issue. Although these statements were only few, it is necessary to take it into consideration in order to provide successful learning experiences for all FutureLearn learners.

Expert Insights

Throughout the process and the development of the Narrative Book Collection, I worked closely with the domain experts in the field of bibliography and received feedback from the experts as well. The lead educator of this course, Takahiro Sasaki, provided me with a great deal of feedback on a constant, ongoing basis, and after the Narrative Book Collection was officially launched, stated that ”[…] [i]n order to enjoy the beauty and pleasure of Japanese books, we have greatly enhanced the image system. It is a level system that cannot be enjoyed elsewhere. I am glad that people who have already taken the course will register again and check this system.” Subsequently, there was an internal conversation between Sasaki and one course alumni (foreign expert in classical Japanese books), which led in opening a Facebook alumni group page: Japanese Culture through Rare Books Online Course—to be informed of course upgrades (especially about the Narrative Book Collection) among all past and current enrolled learners.

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3 Facebook, Facebook post by Takahiro Sasaki, 26 September 2017, 16:19.
Results and Findings

Observations and statements from the learners as well as experts indicate that our design goals have largely been met and encourage further explorations through the Narrative Book Collection along with the FutureLearn course. Its synergic design allowed learners to look into the diverse elements of books—in both distant and close reading in a narrative context—with open-ended explorations. With the advances in interactivity and improved usability, the Narrative Book Collection has been successfully implemented in the course.

4.3 Concept Proof

While FutureLearn learners are from diverse demographics, backgrounds, motivations or expectations, referring to the learner archetypes, individual learners can be categorized under three context areas, such as 1) Work and Study, 2) Personal Life, and 3) Leisure. In this section, I first look into the behavior patterns of learners in each context areas, then embed the three different broad pathways (defined in the previous section) to each learner and look into the learners behavior patterns in more details. Learners behavior are based on real evidence (data), extracted and observed from the access log.

4.3.1 Limitations in concept proof

The FutureLearn course, Book View, and Bookshelf View of the Narrative Book Collection were all developed in different systems. Hence, there were different policies and restrictions in the way data was generated, provided and used. Due to this nature, the data obtained and utilized in this section contain multiple informants—meaning, most data are evidence based and extracted from the access log, yet the datasets are manually specified and combined with pseudonymity—and these limitations can and will have an effect on the findings. However, my goal is not only to evaluate the usability and effectiveness of the Narrative Book Collection,
but also to gain a broader understanding of the advantages and challenges of the interface and how it assisted learner’s knowledge discovery along with FutureLearn. Therefore, this section is necessary to conduct and proves the concept from the practical uses of the Narrative Book Collection.

4.3.2 Testing the Narrative Book Collection on FutureLearn

In the following section, I describe and present three user scenarios to show how the synergic integration of the course and the Narrative Book Collection allowed learners to browse and interact with the collection, and further facilitate their learning. The goal is to find out patterns of learner behavior and discuss how the interface enhanced their learning experience. Referring to Holtzblatt and Beyer (2016), I first describe the characteristics and background of each learner, next continue with their experience on FutureLearn, then summarize with contextual inquiries.

1) Work and Study: Librarian

   • A: Bookshelf View → Book View → FutureLearn

Background

Satoshi is a 48-year-old librarian who lives in Japan and works with a special collection of rare Japanese books. He wants to deepen his knowledge not only for his career prospects but also for his personal interest. Ever since he was a child, he was fascinated by books, especially old books which led him to work in a library. He is a diligent person, trying to stay up to date with the latest research and trends, learn from others, and further improve future career prospects. Although he is not that good at English, he heard about the course through the grapevine, and decided to register for the course.

Karen Holtzblatt and Hugh Beyer, op. cit.
Experience

It was Satoshi’s second time to register and take this course. He previously joined the 1st course run which started at 18th July 2016, and was satisfied with the course. Although he already possess extensive knowledge in rare Japanese books, it was an interesting experience to look into the books (which he have never been seen before) in many visible formats. He could also learn the bibliographical aspects that he wasn’t aware of.

The reason that he re-joined the course is because the Narrative Book Collection was newly designed and implemented. It aroused his interest and triggered him to register again. Because he had once finished the course, he did not intend to complete all steps again, but for 1 week (from 11th till 17th October), he visited the Bookshelf View everyday, and spent time browsing the books alongside the course. Referring to the access log, when he first visited Bookshelf View on the 11th (22:02 in Japan), after reading the instructions, he started browsing the collection through dragging the timeline 28 times and sorting the books in chronological order. Next, he clicked all other viewpoints (tried multiple selection), starting with genre, binding style, writing style, size, and ending with color. Then, he chosen a book called ‘Goshūwakashū’ and enjoyed Book View page—and probably also the linked FutureLearn course—for about 10 minutes. Then, he came back to the Bookshelf View and continued browsing the books till 22:38.

In seven days total, he accessed 14 book titles (29 images) in Book View, mainly from Bookshelf View (10 titles), yet few from the course website (4 titles) as well.

Contextual Inquiry

Pre-modern Japanese books possess unique features, starting with their wide variety of scripts and design. For librarians like Satoshi, these are like treasures. These diversity in traditional Japanese books and their evolution stands out in Japanese culture, and a number of scholars have been studied and introduced its unique perspectives to the wide public. However, the
**Narrative Book Collection**’s presentation was something new for him. Satoshi commented “in one word, I enjoyed it a lot. Based on my own interest and curiosity, I was able to wander around, find the connections which we haven’t seen before, and further look into specific information.” He also said that “if you could develop this system and implement more large number of books—even books from outside the institution—this system can be used for exclusive studies as well.”

2) Personal Life: Retired

  • B: FutureLearn → Book View → FutureLearn

**Background**

Kacy is a retired English teacher living in the West Coast of the United States. She worked at a high school as a English teacher for 39 years, and raised one daughter with her husband. She is now 65 years old and enjoying her life after retirement, yet energetic to learn new things. Moreover, she wants to share what she learns, help others, build her network and keep her brain active. She first became interested in the culture of Japan in 1991, when she had a chance to visit her friend who was living in Kyoto. Since then, she developed a keen interest in Japan, and was searching for an online course where she can learn more about Japan.

**Experience**

Kacy started taking the course from 28th September and finished at 27th October. For the whole month, she accessed to the course three to four days per week and studied constantly. Because there were a lot of topics and materials to explore, she set herself to complete 2 to 3 steps a day to keep her concentration throughout the class. She strictly followed the course narrative—completing each step in provided linear structure—and mainly explored Book View with zooming at the high resolution images. While taking the class, she accessed to 131
book titles (348 images) and enjoyed close reading through each Book View pages along with zooming function.

At almost every step, she accessed Book View page and particularly liked seeing the details of the books. For example, by looking at the holes (which were opened on both covers near the spine), she was able to get a sense of how the entire book was put together, of a most beautiful aspect. In addition, she was excited to see the texture of paper and paint in illustrations. Hence, for Kacy, learning about the books through the course materials together with Book View, did fit her interest. Further, she decided to upgrade the course and have a certificate and continuous access to the course materials.

Contextual Inquiry

Kacy has found Book View best supports her learning. Depending on what she learned in each step as well as her personal interest, through Book View, she enjoyed closing up to page by page to examine calligraphy, the texture of the paper, and the painted images. Also, by reading its bibliographical description, she could review the outer look details of each book. She commented that Book View “gives the viewer a much more comprehensive understanding of the book itself, as well as the type of book and the time period of production.” However, because she was always followed the linear course structure, she was not so sure about the usage of Bookshelf View. For Kacy, Book View was solely to support her learning experience. Furthermore, based on the lessons and knowledge she gained, she is now willing to make a book by herself.

3) Leisure: University Student

• C: FutureLearn → Book View → Bookshelf View → Book View → FutureLearn
Background

Emma is an 18-year-old university student who lives in the Netherlands. She studies art history in her university and whenever she has time, she likes to spend time on the Internet, work on her personal projects or leisure activities and deepen her knowledge in arts. Recently, she looked for a non-vocational course that suits her interest and found this course. Although she does not speak Japanese and has never been to Japan before, she was interested in the traditional Japanese art forms, and decided to take this course to cultivate a better understanding of Japanese arts through books.

Experience

This was her first time to register for an online course. Emma started the course from 5th October and finished at 5th November. Because she was busy with school, she couldn’t access the course at regular intervals, but managed to spare one to two days per week. For her, learning about rare Japanese books was a totally new subject. She was first perplexed by the completely different culture (compared with the West) and lecture videos conducted in Japanese (with English subtitles), yet gradually, got used to it. She loved the chance to look at the beautiful images of the traditional Japanese books and enjoyed learning about the Japanese culture through books. Throughout the FutureLearn course website, Book View, and Bookshelf View, she liked exploring the history and idea of making beautiful objects as well as unique calligraphies. The following is one example of Emma’s learning experience based on the access log.

It was a cloudy day with light drizzle (Friday October 6, 2017) in Netherlands which led Emma to study indoors. Within about an hour, from 13:06 to 14:05, she actively viewed the course materials and explored the course steps, Book View, and Bookshelf View. First, in the Step 1.5 of the course website, Emma followed the introduction of the Narrative Book Collection and chosen the book ‘Chūjōhime’ and moved to Book View. After looking closely
at the cover of ‘Chûjôhime’, she then moved to Bookshelf View by clicking the ‘Content’ icon. In Bookshelf View, she explored several viewpoints, and accessed to Book View page of two books; ‘Kinsei onna daigaku’ and ‘Hôryûji Hyakumantôdaran’i’—the oldest and latest book introduced in the Narrative Book Collection. Then, Emma decided to go back to Book View page of ‘Chûjôhime’, and from the upper part (where images of the book are displayed), she accessed to one another page. Next, from around 13:52 till 14:05, Emma moved to Step 1.6 of the course, and went through Book View of 3 titles (4 images)—‘Nihon shoki’, ‘Man’yôshû’, and ‘Kokinwakashû jochû’—with following the course order.

As described, by making the best use of the Narrative Book Collection, Emma was able to see a larger number of books than what was featured in the provided step and was also able to review what she had learned during the course. And by the end of the course, she accessed 41 book titles (62 images) in Book View from the course website (33 titles) as well as Bookshelf View (8 titles).

Contextual Inquiry

Generally, Emma was very positive on the design and usefulness of the Narrative Book Collection. For her, the combination of the FutureLearn course website, Book View, and Bookshelf View craved flexibility and provided multiple pathways in her learning experience. She commented that she used “the ‘Book view’ mainly for the zoom feature, when I want to observe particular details in a book (e.g., illustrations, writings, bindings, etc.) I use the ‘Bookshelf View’ mainly for the timeline feature, when I want to compare works from the same era in a certain area (e.g., binding type, illustrated/non-illustrated, etc.).” And she further emphasized that the Narrative Book Collection was helpful to make comparisons among books and as a reference tool for anyone interested in comparing works across the ages, and who needs a quick reference to books in a certain period of time.
4.3.3 Results and Findings

While there are promising practices in the field of rare Japanese book studies, this research, along with the *Narrative Book Collection* revealed the structures and patterns from various narrative viewpoints and created visually appealing contents to augment learners’ experience in the course. The results indicate that the *Narrative Book Collection* allows learners to enter into a dialogue—which is collaboratively created by both the designer and the user (learner) in an open-ended environment—alongside the course topics. In the above three contexts, the implementation of the *Narrative Book Collection* enhanced and transformed learners’ experience in exploring rare Japanese books, and proved that the concepts could make the learning experience more exploratory and deepen learner’s knowledge of Japanese culture.

4.3.4 Discussion

Design choices improve learning experience

In this research, interface design is something more than mere illustration, style or fashion. Although all the data can be transformed into many ways of representation, from the results and findings, some clear satisfaction emerged and ensured that the experience and interaction with the *Narrative Book Collection* was pleasant for the learners. The majority of respondents held positive opinions with the content within the interface, finding the content easy to understand, comprehensive, accurate and overall helpful to explore rare Japanese books. Hence, it is clear that these methods turned up important patterns that people couldn’t see before. The visual resources, multiple-pathways, and interaction within the *Narrative Book Collection*—which were implemented in the FutureLearn course—have sufficed its design goals.

Different forms of motivation and learning

Another interesting finding in this research is the learners’ unique way and form of participation. Self-organized learning represents the nature of learners’ experiences within the
MOOCs. From the perspective of learning, the underlying principle of the *Narrative Book Collection* was to combine visually appealing and intellectually engaging knowledge representation alongside the online course. Through its implementation in FutureLearn, the proposed interactive interface has proven that the principles were valuable for learners and evoked intellectual understanding on both personal and communal levels. However, all learners had different motivations, interests, and experiences within the FutureLearn course. I saw a certain amount of learners with a particular interest or motivation in exploring the collection. In contrast, there were users coming to the *Narrative Book Collection*—particularly Bookshelf View—with a more unfocused goal, first looking for some examples for inspiration, and letting the interface lead them. Indeed, some people might have found—not all of the contents, yet—just one or few particular features useful and supportive for their learning. However, the results suggest that the *Narrative Book Collection* provided an opportunity for almost every learner, where they can find content that fits their learning goals more easily with the course. Therefore, it is important to remember that this research did (and should) not determine how people learn most effectively, but suggested how the *Narrative Book Collection* could best support each learner to accomplish their own learning goal.

Feeling connected and staying engaged

Having connectivity is an important contribution to the field of contemporary MOOCs. The results and findings indicate that the *Narrative Book Collection* encouraged learners to enter into a dialogue in more depth—not only inside the course, but also outside (e.g., established Facebook group). In *Hamlet on the Holodeck*, Janet Murray (1997) said that “[t]he kaleidoscopic powers the computer offers us, the ability to see multiple patterns in the same elements, might also lead to compelling narratives that capture our new situation as citizens of a global community.”.  

research created a sense of community well beyond the course and led learners accountable to it. Moreover, this research explored some of the future possibilities that will help further advance individual and collective learning experience. Thus, it is important to further investigate longer affects their lives and seek future possibilities in sustaining their engagement—in both the collection and among learners.

4.3.5 Summary

This research has broader implications for various types of rare book collections, and hence the strategy and design of this collection was evaluated by both the experience and feasibility among general audiences and experts in bibliographical study. Through digitizing and visualizing temporal data in a narrative format, and focusing on both text and non-text formats of the books, this research allowed learners to interact with its diverse elements of Japanese culture, from both micro to macro level. The implementation of digital collection provides practical and comprehensive insights of Japanese culture through pre-modern Japanese book collection. A considerable amount of work in creating digital collections targets expert researchers, however, the focus here is on designing specifically for the general audiences. Furthermore, this thesis suggests that gaining new insights through bibliographical data does not only require technological advancement, but also an appropriate transformation and interpretation of the data through combining computational and visualization approach.

Looking back at the initial design goals, the first goal ‘Stimulate exploration and facilitate the understanding of the course through browser-based interactions’ was achieved through creating an engaging, accessible and open, interface that is supportive for the course might have an effect on the on-going motivation as well as on favorable learning outcomes. And while existing research aims to create standards within the academy, on the contrary, this research aimed to provide ways for the wider public to interact with rare Japanese books in an exploratory and enlightening way. Hence, the second goal ‘Enable a wider range of interpretation of bibliographical information’ was also achieved. Finally, from the results and findings,
I can see that every learner is developing their own knowledge and experience in their own way, as a total experience. Therefore, the third goal ‘Provide both distant and close reading experiences to enable multiple pathways in different narrative contexts’ was achieved as well.

Rather than having a complex system or design, the **Narrative Book Collection** proposed in this research remains general with basic functions. However, due to the diverseness of the audiences, one of the most interesting hurdles to overcome was the accessibility and balance of usability and design aesthetics—a space that seems to be incredibly broad. Each user’s way of interpretation, as well as aesthetic preferences, may differ according to their nationalities or backgrounds. However, I presume that by focusing on the relationship between usability and aesthetics in one single context, this was minimized. The development of coherent shared usability and aesthetics fostered engagement within and across the collection. As a result, this research did not only assist learners to further explore and engage with rare Japanese books in narrative structure, yet offered a new dimension in interacting with rare Japanese books on the Internet and opened up the books to a broader range of audience in a virtual environment.
Chapter 5
Conclusions

5.1 Conclusions

5.1.1 Contributions of this research

As described in this thesis, a subset of online digital collection focuses on mediation of multimedia repositories for popular consumption, via exhibitions. And these exhibitions take many forms, such as virtual galleries, museums or libraries. In this research, I focused on exhibiting a rare Japanese book collection—an extensive collection from Keio University’s library and the Institute of Oriental Classics—that act as supporting materials for an open educational course. While links between open educational courses, resources, and mediations such as exhibitions take many forms, this research focused particularly on one MOOC: FutureLearn. Links between courses and external resources can make use of many interfaces, yet I designed the Narrative Book Collection as an interactive interface associated with Time (timeline), Genre, Typology (binding style), Appearance (color and size), and Content (writing style). In summary, the main contribution of this paper is the exploration and evaluation of the role of interface design in supporting online learners with specific interests relating to time, appearance, typology and content, with a case study focused on a FutureLearn course Japanese Culture Through Rare Books.

While libraries and other cultural institutions generally acknowledge the importance of
digital technologies in attracting the wider public, only a few institutions have considered
user experience as an important factor to engage with diverse audience. For years, the collec-
tions of the libraries—in both physical and virtual forms—has been preserved and accessible
only by the academics or people with considerable amount of knowledge. Indeed, the way
for representing digital collections are as varied as their collections, and no approach to digital
technology would be appropriate to one and all without adjustments. However, as described
in this thesis, the design and implementation of the *Narrative Book Collection* provides a
foundation as both practical and theoretical framework that incorporates both academic and
non-academic people—regardless of their baseline differences in ethnic, regional, or knowl-
edge of Japanese. As discussed in this research—through collaborating with FutureLearn—in
many ways, libraries can collaborate and work together with other entities. Furthermore,
through the enrolled learners on FutureLearn, the scholars received direct feedback from the
learners and realized the potential of computational and visualization approach, and wel-
comes it to be integrated into their core strategy. Sasaki (2017) states that “[…] this is the
first time ever in my life I have been thanked by tremendous number of people” in referring
to the FutureLearn learners. He continues as “there is a huge potential in delivering classi-
cal Japanese culture worldwide […] in the bibliographical study of classical Japanese texts
as well. By utilizing the rare books we each own, we can vitalize the research community
in more different fields.” Accordingly, the practices described in this dissertation have also
contributed to the academic field of the humanities, and there is massive potential in further
expanding.

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1 Takahiro Sasaki (2017) MOOC (ムーク) コース制作体験記—日本の書物文化を世界に発信して, リ

2 Ibid.
5.1.2 Limitations of this research

It must be noted that there are several limitations in this study that have to be considered in future research. The following is a summary of these limitations:

- As noted in the previous chapter, due to different policies and restrictions in the way data was generated, provided and used, there is a lack of proper accuracy in analyzing the overall learning behavior in the FutureLearn as well as the Narrative Book Collection. However, by integrating a seamless and connectable learning tools such as LTI (Learning Tools Interoperability)\(^3\) could contribute to greater reliability in the future works.

- To examine learners behavioral patterns on a large-scale, in this research, I analyzed learners text data (comments and survey answers) through text mining. I also looked into the descriptions to take a closer look. However, it is worth noting that there are several other methods (e.g., topic modeling, network analysis) to be considered to apply in future research.

- The main experiment was conducted during the 4\(^{th}\) run of the Japanese Culture Through Rare Books course, and during the first two weeks, there were constant updates in the design of the Narrative Book Collection. Because the course period was set to three weeks (and all enrolled learners had additional 2 weeks to access to the course), I assume that most learners had experienced the latest iteration. However, there is a possibility that some learners have only experienced the first iteration.

- In this research, the Narrative Book Collection functioned as a supporting material of the FutureLearn course to provide a synergistic learning experience with pre-modern

Japanese books. Thus, the evaluation and proof of concept were conducted only by
the enrolled learners. However, the interface was publicly available on the Internet,
and there were considerable amount of visitors (the interface had 430 direct access and
57 access by organic search) who might not referred to the FutureLearn course, yet only
explored Bookshelf View and Book View. This results illustrate the need for additional
research to investigate those visitors satisfaction.

• While this research was conducted on one particular MOOC platform: FutureLearn,
there are multiple MOOC platforms and different platforms have different approaches
and structures in providing their courses (e.g., Coursera, Udacity, and others). Al-
though this Narrative Book Collection was specifically designed to create a synergic
learning environment together with the FutureLearn course, the framework can be
generalized and applied to other courses, platforms, or even without platforms and
function on its own. Therefore, future research should consider a broad range of adap-
tation and integration of this interface.

5.1.3 Accessibility

To enable access on a global scale, the Narrative Book Collection was built in HTML, CSS,
and Javascript, and ran in modern, standards-compliant browsers on a wide range of devices
and platforms. However, significant challenges still remain in terms of accessibility.

First, although most browsers implement Javascript, there seemed to be small number of
learners who disabled or could not activate Javascript. To support these learners, the Book
View was built with only HTML/CSS and an alert message support was implemented in the
Bookshelf View. However, this may cause an insufficient learning experience to the learners
which needs to be addressed. It is necessary to consider the possibility to define what modal-
ities and how those modalities can be presented as an alternative.

Next, because the interface made use of a number of visual resources (mainly digitized
book images), this may limit learners access, especially those with visual impairments or poor internet connectivity. For the latter, multiple image tiles were used in the Bookshelf View to reduce image loading time, but still, learners with disabilities or a bad internet connection may have had difficulties. Hence, it is necessary to consider how to provide a more inclusive digital experience and content accessibility. For future research, reference to accessibility guidelines (e.g., following W3C standards and testing through validation services) should be conducted to address the above limitations. A close linkage of inclusive design might be a key solution as well.

Lastly, usability problems may not necessarily be due by technology issues or disabilities. Language can be another barrier while offering the *Narrative Book Collection* on a global scale. To meet diverse learners, all content (originally in Japanese) was interpreted into English. However, it is important to consider that for many learners, English is not their first language, and making the interface multilingual will be the next challenge.

### 5.2 Future Directions

#### 5.2.1 Technology and Feasibility

Although this research did not focus on establishing robust infrastructure, there is a practical consideration in developing the feasibility from a technical aspect. While the *Narrative Book Collection* has been designed to act as supporting material of the FutureLearn course and integrated in one step as course activity, the interface stands independent and is not yet interoperable with FutureLearn. To investigate further contextual information of every learning activity throughout the course and the *Narrative Book Collection*, it is worth considering implementing learning tools—for example, above mentioned LTI (Learning Tools Interoperability)—to trace and analyze more consistent data generated by the learners.

Moreover, to reach out and enhance participation with the lowest barrier, the *Narrative*
Book Collection was designed with standard web technologies, however, there are a variety of new computational and visualization approaches that incorporate recent advances in the virtual space. For example, visual representations can be made automatically through a recommendation system that uses search algorithms, metadata or latent signals that lead users to relevant content. Furthermore, through Virtual Reality, human perceptions are being transported into the virtual space. And Augmented Reality combines real and virtual objects in the same interactive scene. Although these technologies are designed and adapted with different purposes, they give us new and augmented abilities to interact with cultural artifacts. These emergent digital technologies further assist users to engage and interact with digitized cultural artifacts from different perspectives (e.g., create more immersion in rare books). This goes slightly beyond the scope of initial purpose and design of the Narrative Book Collection, but is certainly an interesting perspective to follow up and consider as one potential direction. As digital technologies constantly update themselves, the nature of technical fundamentals and the substantive focus of the role are expected to evolve in the future.

5.2.2 Openness and Scalability

The culture of openness and sharing is spreading among the scholars worldwide to promote shared understanding, learning and open discussion among and within individuals. For reference, Lev Manovich (2017) established a new term called “Cultural Analytics” in 2007 and recently, elaborates more in the open use of large-scale data collection, analysis and visualization. He emphasizes the significance and capabilities of massive datasets through “deep cul-

---

Many cultural institutions are becoming more and more digitally literate and facilitate open access to their collection data. Although we did not restrict open use of every images (we required learners to contact through phone, fax, letter or through the web form\(^7\)), our image use policy was way far from providing complementary and structured datasets. Even though this research aimed in exhibiting the collection and not in preserving or archiving the collection, for long-term profitability, I should consider adopting structured metadata—such as *The Dublin Core standard, TEI, or DOI (Digital Object Identifier)*\(^8\)—to make the data open. One possible direction I can take is by making the interface completely IIIF compatible. In this research, Image API (on IIIF) have been implemented to allow image zooming only in Book View, however, to make full use of IIIF, the use of *Presentation API* on IIIF\(^9\) (which allows transfer and sharing of images among different styles of viewer\(^10\)) should be considered to ensure both preservation and accessibility and moreover, to meet ones specific needs in the world wide web.

### 5.2.3 Design Framework of the *Narrative Book Collection*

As the main designer of this research, transforming the analog (physical) rare Japanese book collection into a digital collection—both conceptually and practically—involves interesting challenges. Based on the findings and insights gained throughout this research, here I sum-

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\(^7\) Keio University Online Course on FutureLearn: Image Use Policy. [https://gc.sfc.keio.ac.jp/fl_img/course01/copyright.html](https://gc.sfc.keio.ac.jp/fl_img/course01/copyright.html).

\(^8\) The DOI System. [https://www.doi.org/](https://www.doi.org/).

\(^9\) IIIF Presentation API 2.1.1. [http://iiif.io/api/presentation/2.1/](http://iiif.io/api/presentation/2.1/).

marize the general requirements according to the underlying design process.

- (a) Story Formation: In this research, stories (both close and distant viewpoints) were established based on the course narrative. The narrative was initiated by the faculty members of the Institute of Oriental Classics at Keio University, and structured as one FutureLearn course. However, in a broader adaptation, it is not necessary to have roots in FutureLearn or any MOOC for that matter. What is important is to derive stories from knowledge and experience that bibliographical experts have acquired from their professional and academic careers.

- (b) Data Generation: Having a foundation in (a) Story Formation, the data can range in variety of types and forms, and it is beyond the scope of this thesis to generalize the data generation techniques. However, it is necessary to consider the way to make a meaningful interpretation in the practical use of data. For instance, in this research, I set up every digitized image in 10 million pixels or more, with 16-bit color depth and sRGB color space to provide zooming experience in high-resolution images.

- (c) Story-Driven Data Analysis: There are no strict guidelines that has to be fully met in applying analysis. Depending on the generated datasets, there are various ways to conduct analysis, yet besides the use of computational approach, the key will be the scholars knowledge. While doing research, I conducted countless discussions with the scholars to decide the most suitable ways to tackle the uncertainties (e.g., the uncertainties of the book creation/production year). Although there are no concrete answers, in this stage, structuring and ordering data into certain categories is a must.

- (d) Narrative Visualization: Combined with computational approach, visualization have a strong impact on viewer’s perception. In this research, the role of visualization went beyond static perception and offered potential ways—in providing both distant and close reading experiences—in which the learners (who enrolled in the FutureLearn
course) can explore rare Japanese books regardless of their preliminary knowledge. The key elements are to 1) acknowledge users’ expertise, 2) decide an appropriate visual representation, and 3) provide both distant and close reading experiences in conjunction with narratives.

5.2.4 Consideration on FutureLearn

As examined in this thesis, the FutureLearn course and its supplementary material—the Narrative Book Collection in this case—enabled enrolled learners to build a self-organized and personalized learning pathway(s), and benefit their contexts or personal interests which led to enrich their learning experience. Although FutureLearn and many other MOOC platforms are now shifting their focus on how they can attract or retain learners with high motivation, as the participants engage in informal learning, their intrinsic motivation or own perception of dropping out is not important. Instead, what is important is their perception of personal learning success. Some learners are simply engaged in the courses for rather leisure purposes or because they have time to spend. Thus, this research has shown a potential of FutureLearn—acting as a learning platform—to fill new demands. Besides the default linear structure, a customization and personalization will further enact FutureLearn to be a place for everyone regardless of their baseline differences or profession.

5.2.5 Consideration on Design and Designers

The design and actual use of the Narrative Book Collection suggest that the combination of computational and visualization approaches augment the usage of digital collections and further indicates the potential benefits of interdisciplinary collaboration among different fields. This research has been realized through collaboration with the Institute of Oriental Classics and their understanding in broader use of their (formerly) obscured collection in a digital environment. As the main designer, accounting and breaking down the humanistic and tech-
nical specifications of each field were complex and challenging tasks.

Throughout the research process, I found that the practice of design makes contributions across disciplines. In many institutions, design or designers are considered as just one part of the process of making digital collections. However, from my experience in this research, I emphasize that designers are the ones who should propose a general plan of the project and connect all the disciplines involved, as well as listen to the expectations and constraints of users. It is important for designers to bring attention from stakeholders by providing a compelling vision from the very early stage of development. Although the designers do not need to have multiple assets or skills, it is crucial to understand the knowledge domains and to produce outputs that have not yet been realized. And this thesis acts as evidence of how design and designers can be involved in all stages of developing a digital collection.

5.3 Final Conclusions

This research challenged us to rethink traditional ideas about text-based interpretation of books through adopting bibliographical knowledge. The integration of scholarly knowledge as well as the application of interactive interface has created great opportunities for the collection to be developed coherently and effectively in exploring rare Japanese book collections. Alongside the FutureLearn course Japanese Culture Through Rare Books, the Narrative Book Collection enabled online learners to create their own narrative and experience rare Japanese books from a variety of bibliographical perspectives through both distant (Bookshelf View) and close (Book View) scale. In many ways, this research enhanced the learners’ learning experience as one example of media rich modern MOOC and facilitate understanding in rare Japanese books with having narrativity. Clearly, the results suggest that the combination of computational and visualization approaches as well as user experience design will become an integrated part of the libraries as time passes, and the need for which will increase.


Art Research Center, Ritsumeikan University, accessed October 20th, 2017, http://www.arc.ritsumei.ac.jp.

REFERENCES


REFERENCES


Creative Commons Japan, accessed October 20th, 2017, https://creativecommons.org/licenses/by-nc-nd/2.1/jp/deed.en.


REFERENCES


REFERENCES


FutureLearn, Post-course survey data (2015 to February 2017), accessed October 20th,
REFERENCES


REFERENCES


REFERENCES


REFERENCES


REFERENCES


Manovich, Lev (2000) “Database as a Genre of New Media,” AI & SOCIETY.


REFERENCES


REFERENCES


Norman, Donald A. (2002) The Design of Everyday Things: Ingram Publisher Services US.


REFERENCES


REFERENCES


REFERENCES


Appendices
Appendix A

Questionnaires

The following are the surveys conducted at the 3rd and 4th Course Run.

A.1 Surveys Conducted at the 3rd and 4th Course Run
Narrative Book Collection (1st Run): Survey

Thank you very much for taking your time. Your feedback helps us a lot to keep continuing our research and improving this digital collection.

This survey should only take less than 5 minutes, and the results will be used only for research purposes.

* börde

A. Your overall experience

Please share your thoughts and opinions.

1. 1. Where/How did you hear about this site? *

   □ E-mail from FutureLearn Course "Japanese Culture Through Rare Books"
   □ Comment(s) on FutureLearn Course "Japanese Culture Through Rare Books"
   □ Announcement from my Colleagues
   □ その他: ________________________________

2. 2. Are you taking the FutureLearn Course "Japanese Culture Through Rare Books"? * If Yes, please describe your current status as well!

   • 1つだけマークしてください。
   □ Yes (and already finished all steps)
   □ Yes (and currently at Week 3)
   □ Yes (and currently at Week 2)
   □ Yes (and currently at Week 1)
   □ Yes (registered, but not yet started)
   □ No
   □ その他: ________________________________

3. 3. At this site "Narrative Book Collection", which content (application menu) have you tried? * Select all*

   □ Cover List
   □ Size
   □ Color
   □ Timeline
   □ その他: ________________________________

Figure A.1: Optional Survey (Conducted at the 3rd Course Run [1/6])
4. 4. How would you rate your overall experience of this application? 🤔
1 つだけマークしてください。
- Very poor
- Poor
- OK
- Good
- Excellent
- Don’t know

5. 5. Relating to the above answer, please let us know your thoughts and suggestions. 🧐


6. 6. What kind/type of content would you like to see more? *Select all* 🎨
当てはまるものをすべて選択してください。
- Chronology (Timeline) of Book History in Japan
- Historical Events (Additional to Book History in Japan)
- Types of Book production in Japan
- Types of paper of Books in Japan
- Color of Books in Japan
- Design (pattern) of Books in Japan
- Binding types of Books in Japan
- Fonts (which are used in Books) in Japan
- Shapes, sizes, and weight of Books in Japan
- Positioning of the title of Books in Japan
- Re-Binding types of Books in Japan
- Texts of Books in Japan (translated/transcribed)
- Illustration of Books in Japan
- その他:

Figure A.2: Optional Survey (Conducted at the 3rd Course Run [2/6])
7. Please let us know what we could do for our next step, and to better meet your expectations.

---

B. Usability of this site

Please rate how much you agree or disagree with each system usability.

8. I think that I would like to use this system frequently. *

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<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Strongly Disagree</td>
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</tr>
<tr>
<td>Strongly Agree</td>
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</table>

9. I found the system unnecessarily complex. *

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<th>5</th>
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<tbody>
<tr>
<td>Strongly Disagree</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Strongly Agree</td>
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</table>

10. I thought the system was easy to use. *

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<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Strongly Disagree</td>
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<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>[ ]</td>
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</table>

11. I think that I would need the support of a technical person to be able to use this system. *

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<th>3</th>
<th>4</th>
<th>5</th>
</tr>
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<tbody>
<tr>
<td>Strongly Disagree</td>
<td>[ ]</td>
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<td>[ ]</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>[ ]</td>
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</tbody>
</table>

Figure A.3: Optional Survey (Conducted at the 3rd Course Run [3/6])
12. **I found the various functions in this system were well integrated.**

   1  2  3  4  5

   Strongly Disagree | | | | | Strongly Agree

13. **I thought there was too much inconsistency in this system.**

   1  2  3  4  5

   Strongly Disagree | | | | | Strongly Agree

14. **I would imagine that most people would learn to use this system very quickly.**

   1  2  3  4  5

   Strongly Disagree | | | | | Strongly Agree

15. **I found the system very cumbersome to use.**

   1  2  3  4  5

   Strongly Disagree | | | | | Strongly Agree

16. **I felt very confident using the system.**

   1  2  3  4  5

   Strongly Disagree | | | | | Strongly Agree

17. **I needed to learn a lot of things before I could get going with this system.**

   1  2  3  4  5

   Strongly Disagree | | | | | Strongly Agree

---

*Figure A.4: Optional Survey (Conducted at the 3rd Course Run [4/6])*
19. If you have any comments or suggestions relating to the above, please let us know below:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

C. Your General Information

Following questions are all optional, but we would like to find out more about your background.

19. Male/Female
   つだけマークしてください。
   
   ○ Female
   ○ Male

20. Age
   つだけマークしてください。
   
   ○ 10-19
   ○ 20-29
   ○ 30-39
   ○ 40-49
   ○ 50-59
   ○ Above 60
   ○ その他:

21. Your previous experience of the Subject
   つだけマークしてください。
   
   ○ I studied it at school
   ○ I’ve taken another face-to-face course or class in this subject
   ○ I studied it at university
   ○ I’ve taken another online course in this subject
   ○ I work in a related field
   ○ It’s a personal interest or hobby
   ○ I’m currently studying this subject at university or college
   ○ I have no previous experience in this subject
   ○ その他: ________________________________

Figure A.5: Optional Survey (Conducted at the 3rd Course Run [5/6])
22. How confident are you in Japanese?
1つだけマークしてください。

| Not at all confident | 1 | 2 | 3 | 4 | 5 Native |

Call for research participants

For further development, we are looking for several research participants (in global scale) who could give us more feedback from different perspectives. If you are interested, please provide us your email address. "Any personal information provided would be used for research purposes only."

Call for research participants

For further development, we are looking for several research participants (in global scale) who could give us more feedback from different perspectives. If you are interested, please provide us your email address. "Any personal information provided would be used for research purposes only."

23. Contact email address

Figure A.6: Optional Survey (Conducted at the 3rd Course Run {6/6})
9. What is your proficiency in English language?
   - No proficiency
   - Elementary proficiency
   - Limited working proficiency
   - Professional working proficiency
   - Full professional proficiency
   - Native or bilingual proficiency

10. What is your proficiency in Japanese language?
    - No proficiency
    - Elementary proficiency
    - Limited working proficiency
    - Professional working proficiency
    - Full professional proficiency
    - Native or bilingual proficiency

11. During the course, how useful did you find the following resources?

<table>
<thead>
<tr>
<th>Resource</th>
<th>Not useful</th>
<th>Quite useful</th>
<th>Useful</th>
<th>Very useful</th>
<th>Not applicable (I did not use this resource)</th>
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<tr>
<td>External Website</td>
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<tr>
<td>PDF (in Japanese)</td>
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<tr>
<td>PDF (in English)</td>
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<tr>
<td>Video subtitles (in Japanese)</td>
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<tr>
<td>Video subtitles (in English)</td>
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</tbody>
</table>

12. If you have further feedback about these resources, please add it below to help us improve:

   External websites
   PDF files
   Video subtitles

Figure A.7: Additional Questions (Added to the default post-survey provided by FutureLearn)
Online Survey (Feedback for the NBC)

Thank you very much in advance for taking your time. Your feedback helps us a lot to keep continuing our research and improving NBC along with the FutureLearn course ‘Japanese Culture Through Rare Books.’ *This survey shouldn’t take more than ten minutes to complete. And the results will be used only for research purposes.

*必須

A. Your overall experience of the NBC (Narrative Book Collection)

Please share your thoughts and opinions.

1. Which course run have you participated? Select all that apply. *
   当てはまるものをすべて選択してください。

   - July through August, 2016 (1st course run)
   - January through February, 2017 (2nd course run)
   - May through June, 2017 (3rd course run)
   - Ongoing since September, 2017 (4th course run)
   - その他:

2. Where/How did you hear about the NBC? *
   当てはまるものをすべて選択してください。

   - Through FutureLearn Course "Japanese Culture Through Rare Books"
   - E-mail from FutureLearn
   - Through SNs (such as Facebook, Twitter, etc.)
   - Announcement from my Colleagues
   - その他:

Your experience in exploring multiple pathways through the FutureLearn Course and NBC (⇨ Book view ⇦ Bookshelf view)

Figure A.8: Optional Survey (Conducted at the 4th Course Run [1/7])
3. Have you used NBC (Bookshelf view, Book view) alongside FutureLearn course? *
   1つだけマークしてください。
   ○ Yes, I explored all—the Course, Book view, and Bookshelf view—together
   ○ Yes, but I explored only the Course and Book view (NOT Bookshelf view)
   ○ Yes, but I explored only the Course and Bookshelf view (NOT Book view)
   ○ No, I explored only the Book view and Bookshelf view (NOT the FutureLearn Course)
   ○ その他: ____________________

4. Relating to the above answer, we would like you to please describe the reason in details. How was your experience? *
   ______________________________________________________________
   ______________________________________________________________
   ______________________________________________________________
   ______________________________________________________________

5. Relating to the above answer—since NBC is designed to work best alongside taking the course—we would like to know if NBC enhanced your learning experience. Do you think NBC enhanced your learning experience? *
   1つだけマークしてください。
   1 2 3 4

   Strongly Disagree ○ ○ ○ ○ Strongly Agree

Figure A.9: Optional Survey (Conducted at the 4th Course Run [2/7])
6. How did NBC enhanced your learning experience (or not)? Please describe in details.


7. In addition to the previous question, did you find any new narratives in exploring NBC? Please describe your findings (if you have any).


B. Design, layout and functionality of the NBC

Please rate how much you agree or disagree with each system design, layout and functionality. Then describe the reasons (as detailed as possible).

8. 1. It is easy to find the NBC within the FutureLearn course

1  2  3  4

Strongly Disagree  ☐  ☐  ☐  ☐  Strongly Agree

9. Reason of the above answer


10. 2. The visuals of the NBC is attractive/useful

1  2  3  4

Strongly Disagree  ☐  ☐  ☐  ☐  Strongly Agree

Figure A.10: Optional Survey (Conducted at the 4th Course Run [3/7])
11. **Reason of the above answer**

---

12. **3. The NBC is easy to navigate**

1 つだけマークしてください。

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<tr>
<td>Strongly Disagree</td>
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<td></td>
<td>Strongly Agree</td>
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13. **Reason of the above answer**

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14. **4. I am likely to visit the NBC again**

1 つだけマークしてください。

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<td>Strongly Disagree</td>
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<td>Strongly Agree</td>
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15. **Reason of the above answer**

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16. **5. The NBC is an effective interface to search and explore rare Japanese books**

1 つだけマークしてください。

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<tr>
<td>Strongly Disagree</td>
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<td>Strongly Agree</td>
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Figure A.11: Optional Survey (Conducted at the 4th Course Run [4/7])
17. Reason of the above answer


18. 6. If you used Bookshelf view, which feature(s) did you find interesting? Select all that apply.

- Timeline (Books across and through Time)
- Genre (5 Major Genres)
- Typology (5 Major Typologies (Binding Styles))
- Color (9 Japanese Color Series)
- Size (Wide Variety of Shapes and Sizes)
- Content (Different Writing Styles and its Combination)
- その他:

19. Reason of the above answer. Why do you find the feature(s) interesting?


Figure A.12: Optional Survey (Conducted at the 4th Course Run [5/7])
20. 7. Bookshelf view has a function to save and share your findings (filter settings) online. If you have used this function, please share us your thoughts and opinions.

21. 8. If you used Book view, which feature(s) did you find interesting? Select all that apply.

- [ ] a: a list of digitized images of the book (all selectable)
- [ ] b: an image with Japanese title and imprints
- [ ] c: detailed description of the book
- [ ] d: zoom link that allows you to view higher resolution image
- [ ] e: clickable link icons that leads you to the unique Bookshelf view.
- [ ] その他:

22. Reason of the above answer. Why do you find the feature(s) interesting?

Figure A.13: Optional Survey (Conducted at the 4th Course Run [6/7])
23. If you have any comments or suggestions for future improvement of NBC, please write down below.

________________________________________________________

________________________________________________________

________________________________________________________

C. Your General Information

Please share us your background information.

24. Male/Female (OPTION)
   つだけマークしてください。

   ☐ Female
   ☐ Male

25. Age (OPTION)
   つだけマークしてください。

   ☐ <18
   ☐ 18-25
   ☐ 26-35
   ☐ 36-45
   ☐ 46-55
   ☐ 56-65
   ☐ >65
   ☐ その他:

26. Which of the following best describes your reason for taking the course. Choose the one that best suits.*
   つだけマークしてください。

   ☐ Academic Research (to develop and improve professional and academical qualifications)
   ☐ Non-Academic Personal Interest (intend to learn and understand Japanese culture and/or rare books)
   ☐ Part of Leisure Activity (interested in Japan and/or rare books. For the love of learning)
   ☐ その他:

Figure A.14: Optional Survey (Conducted at the 4th Course Run [7/7])
Appendix B

Narrative Book Collection Book List

The following is the complete list of books included in the Narrative Book Collection.

B.1 Book List (in Japanese and English)

1. 慶應義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品 000・025・58
   「集古十種稿」（しゅこうじしゅこう）集古十種稿〔江戸後期〕刊 八十五冊箱入り
   Shūko jishu-kō, formerly in the Nanki Archive of the Tayasu family, with box, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

2. 慶應義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品 000・025・鐘銘
   「集古十種稿」（しゅこうじしゅこう）〔江戸後期〕刊・箱入り・鐘銘
   Shūko jishu-kō, Toku-ohan (Collected Antiquities in Ten Categories, 1800), with case, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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   「集古十種稿」（しゅこうじしゅこう）〔江戸後期〕刊・箱入り・兵器
   Shūko jishu-kō, Toku-ohan (Collected Antiquities in Ten Categories, 1800), with case, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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   Shūko jishu-kō, Toku-ohan (Collected Antiquities in Ten Categories, 1800), with case, Century Cultural Foundation Collection, Keio Institute of Oriental Classics
Shōko jisshu-kō, Toku-ōhon (Collected Antiquities in Ten Categories, 1800), with case, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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『起世因本経』（きせいはんきょう）巻第一〈足利尊氏顕経〉 文和三年 (一三五四) 頃性玄写 一帖
Kise inbon-kyō, with votive dedication by Ashikaga Takauji, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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『大般若波羅蜜多経』（だいはんにゃはらみたきょう）巻第六十七〈東大寺八幡経〉 鎌倉 祐一軸
Daihannya haramitakyō, Tōdaiji Hachimankyō, book 67, Kamakura, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

7. 慶應義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品 せ 201・025
『右筆条々』（ゆうひつじょうじょう）〔江戸後期〕写 一冊
Yūhitsu jōjuō, 1 booklet, late-Edo-period, manuscript, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

8. 慶應義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品 せ 202・167・1
『詠草さとし種』（えいそうさとしきゅう）『詠草さとし種』横本一冊
Eisōsatoshigusa, 1853 edition, 1 vol., Century Cultural Foundation Collection, Keio Institute of Oriental Classics

9. 慶應義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品 せ 206・050・1
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Gosenwakashū, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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『古今和歌集』（こきんわかしゅう）二十巻 〔鎌倉後期〕写 伝二条為忠筆 一帖
Kokinwakashū, 1 vol., late Kamakura, Century Cultural Foundation Collection, Keio Institute of Oriental Classics
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『後拾遺和歌集』（ごしゅういわかしゅう）二十巻（江戸前期）写二帖・下巻
Gashūi wakashū, (shihan), Vol2, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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Gashūi wakashū, (shihan), Vol1, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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『浜松中納言物語』（はまつちゅうなごんものがたり）（江戸後期）写二冊
Hamamatsu chūnagon monogatari, [The Tale of the Hamamatsu Middle Counsellor], 2 vols., late Edo period, manuscript, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

14. 慶應義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品 206・092・4 貴
『浜松中納言物語』（はまつちゅうなごんものがたり）四冊 十一世紀
Hamamatsu chūnagon monogatari, [The Tale of the Hamamatsu Middle Counsellor, 11th c.], Century Cultural Foundation Collection, Keio Institute of Oriental Classics

15. 慶應義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品 209・028・2 貴
『尤之双紙』（もっとものそうし）『尤之双紙』
Mottomo no sōbī, 1634 edition, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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Kyō ōezu, [Grand Map of the Capital], Century Cultural Foundation Collection, Keio Institute of Oriental Classics

17. 慶應義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品せ 210・110・1
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Aki no kuni Itsukushima shōkei-zu, 1689, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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Gunsho ruiji, 666 vols, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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Rekidai Kunshin zuozō, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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『嵯峨本三十六歌仙』（さがばんさんじゅろっがっせん）『嵯峨本三十六歌仙』一冊
Sanjūrokkasen, Saga-bon (Saga-version The Thirty-six Immortals of waka, 1 vol., Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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Man'yōshū nukigaki, Katō Chikage, 1795, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

22. 慶應義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品せ 225・156・1・2
『梅園奇賞』（ばいえんきしょう）二巻文政十一年（一八二八）（大坂）野梅園刊二

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Baien kishô, [Baien Curiosities], Century Cultural Foundation Collection, Keio Institute of Oriental Classics

23. 広島義塾大学附属研究所 斯道文庫 センチュリー文化財団寄託品 せ 2322
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Itsukushima mõde-ki, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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Kitano Tenjin engi emaki, dankan, 1 panel, Kamakura period, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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Kokinwakashû, late-Kamakura period, attrib. Nijô no Tameyo, Century Cultural Foundation Collection, Keio Institute of Oriental Classics

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『敦忠集』（あつただしゅう）〔江戸前期〕写 一帖 個人蔵
Aisutada shû, early Edo period, manuscript, 1 booklet, Private Collection
29. 個人蔵
『大般若波羅蜜多経』（だいはんにゃはらみたきょう）巻五六一〔鎌倉〕写一帖
Mabāprajñāpāramitā Sūtra, vol. 561, Booklet 1, Kamakura period copy, Private Collection

30. 個人蔵
『源氏物語・藤符』（げんじものがたり・ふじぼかま）藤原季有（ふじわらのすえあり）筆　〔江戸前期〕写　一帖
Genji monogatari “Fujiwakama”, [Tale of Genji], 1 booklet, early Edo period, Private Collection

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『源氏物語・花散里』（げんじものがたり・はなちるさと）〔江戸前期〕写　一帖個人蔵
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Nosezaru Sōshi, one of the 23 Otogi Sōshi stories, early-Edo period, 1 booklet, Private Collection

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『拾遺和歌集』（しゅういわかしゅう）嘉永六年（一八五三）京・出雲路文治郎、江戸・須原屋茂兵衛他刊二冊
Shūi Wakashū, 2 vols, Kaei 6 (1853) Kyo/Izumoji Bunjio, Edo/Suharaya Mohei et al., Private Collection

34. 個人蔵
『つきしま』（つきしま）〔篠島〕〔寛永〕刊　丹経本　一冊
Tsukishima, Ken’ei, Tanroku-bon, 1 booklet, Private Collection

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『薬師琉璃光如来本願功德経』（やくしゅるりこうにょらいほんがんくどくきょう）
36. 慶應義塾 高橋誠一郎 『潮干のつと』 (しおひのつと) 潮干のつと絵本 一帖 喜多川歌麿画朱楽菅江編
江戸 蔦屋重三郎 [寛政初年頃]刊
Shiohi no tsuto, (Gifts from the Ebb Tide), 1 booklet, illustrations by Kitagawa Utamaro, edited by Akera Kankō, Edo: Tsutaya Jūzaburō, early Kansei era, The Takahashi Seiichiro Collection of Ukiyo-e Prints, Keio University

37. 慶應義塾大学附属研究所 斯道文庫 091・ト 121・1
『傾城禁短気』 (けいせいきんたんき) 六卷存卷六宝永八年 (一七一一) (江戸) 八文字屋八左衛門刊 一冊
Keisei kintanki, [Courtesans Forbidden to Lose their Temper, 1711], Keio Institute of Oriental Classics

38. 慶應義塾大学附属研究所 斯道文庫 091・ト 154・1
『秋の夜長物かたり』 (あきのよなかものがたり) 『秋の夜長物かたり』 一冊古活字
Aki no yonagamonogatari, 1 volume, movable type, Keio Institute of Oriental Classics

39. 慶應義塾大学附属研究所 斯道文庫 091・ト 154・1・ガ 50
『秋の夜長物語』 (あきのよなかものがたり) [慶長元和]刊 古活字 一冊
Akinoyonaga monogatari, Keichoganwa, printing, 1 vol, Keio Institute of Oriental Classics

40. 慶應義塾大学附属研究所 斯道文庫 091・ト 237・1
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Kin'yōwakashū, early Edo period, Keio Institute of Oriental Classics

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『源氏物語系図』 (げんじものがたりけいず) [江戸前期]写 一帖
Genji monogatari keizu, early edo era, Keio Institute of Oriental Classics
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Hekianshò, early Edo period, manuscript, 1 volume, Keio Institute of Oriental Classics

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『ふんしやう』（ふんしやう）〈文正草子〉三巻 〔江戸前期〕写 奈良絵本
Funshò Sòsi, vol.3 (early edo period) manuscript Nara Ehon (illustrated book), Keio Institute of Oriental Classics

44. 慶應義塾大学附属研究所 斯道文庫 091・ト 301
『名所風俗金王桜』（めいしょぶりこんのうざくら）中本『名所風俗金王桜』富川吟雪画
Meisbo buri Kon‘nzakura, Kusazshi (kuro-hon), Keio Institute of Oriental Classics

45. 慶應義塾大学附属研究所 斯道文庫 091・ト 309・1
『源氏物語』（げんじものがたり）『源氏物語』　若菜上 一帖
Genji monogatari, Wakananoue Part 1, 1 vol., Keio Institute of Oriental Classics

46. 慶應義塾大学附属研究所 斯道文庫 091・ト 323・1
『平家物語』（へいけものがたり）附訓片仮名本・巻第十零冊 古活字 [寛永] 刊
Heike Monogatari, Fukun katakana-bon (Annotated Katakana text) 1 vol. and 1 fascicle from Book 10, Keio Institute of Oriental Classics

47. 慶應義塾大学附属研究所 斯道文庫 091・ト 327・1
『史記』（しき）『史記』　巻三十一〔慶長〕刊 古活字版
Shiji, [J. Shiki, Records of the Grand Historian], vol. 31, Keich era (1596-1615), movable type, Keio Institute of Oriental Classics

48. 慶應義塾大学附属研究所 斯道文庫 091・ト 367・23
『万葉集代匠記』（まんようしゅうだいしょうき）契沖撰・二十三冊（松平定信・桑名藩松平家旧蔵）
Keichū, Man’yoshū daišoki, 23 vols, formerly in Matsudaira Sadanobu’s collection, Matsuda Family, Kuwana fief, Keio Institute of Oriental Classics

49. 慶應義塾大学附属研究所 斯道文庫 091・ト 49・6
『平家物語』（へいけものがたり）十一行平仮名本・古活字 河原町仁衛門刊六冊
Heike Monogatari, Jūichigyō hiragana bon (11-line Hiragana text), published by Kawaramachi Niemon, Keio Institute of Oriental Classics

50. 慶應義塾大学附属研究所 斯道文庫 092・ト 106・2
『文筆問答鈔』（ぶんぴつもんどうしょう）二巻永禄三年（一五六○）、四年空賢写二帖
Bunpitsu mondō-shō, [Conversations on Literature], Keio Institute of Oriental Classics

51. 慶應義塾大学附属研究所 斯道文庫 092・ト 119・1
『新撰蒐玖波集』（しんせんしゅくぼしゅ）新撰蒐玖波集二十巻存巻一 〔明応四年（一四九五）頃〕細小路基綱写 伝宗牧筆一軸
Shinsen Tsukuba-shū, Book 1, around 1495, Keio Institute of Oriental Classics

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『源氏のこかみ』（げんじこかがみ）〈源氏小鏡〉〈江戸初期〉写一冊
Genji kokagami, [The Little Mirror of the Genji], Keio Institute of Oriental Classics

53. 慶應義塾大学附属研究所 斯道文庫 092・ト 121・1
『長六文』（ちょうろくぶみ）〈室町後期〉写紙背「大宝積経摩訶迦葉会第二十三之二」一冊
Chōroku bunumi, late Muromachi, Keio Institute of Oriental Classics

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『万葉集』（まんようしゅう）万葉集二十巻存巻十九 〈江戸前期〉写一軸
Man’yoshū, vol. 19, Keio Institute of Oriental Classics

55. 慶應義塾大学附属研究所 斯道文庫 092・ト 133・1
『鴨御祖社歌合建永二年三月七日』（かものみおやしょうたあわせ けんえいにね

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   『近代秀歌』（きんだいしゅうか）飛鳥井雅俊（あすかいまさとし）筆 永正十二年（一五一五）写一帖
   Kindai sbika, Asukai Masatoshi (?-1523), Eisho 12 (1515), manuscript, 1 booklet, Keio Institute of Oriental Classics

57. 慶應義塾大学附属研究所　斯道文庫 092・ト 25・1
   『僻案抄』（へきあんしょう）僻案抄 文明十三年（一四八一） 飛鳥井雅康写一帖
   Hekianshô, [Notes on False Views] Bunmei 13 (1481) copy, Keio Institute of Oriental Classics

58. 慶應義塾大学附属研究所　斯道文庫 092・ト 27・1
   『詠歌大槻』（えいがのたいかい）詠歌大槻 [室町中後期] 雲紙
   Eiga no taigai, [Essentials of Composition], mid-to-late Muromachi period manuscript, kumogami, 1 booklet, Keio Institute of Oriental Classics

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   『廿八品井九品詩歌・現存卅六人詩歌』（にじゅうはっぽんならびにくほんしこか・げんそんざんじゅうろくにんししょう）廿八品井九品詩歌・現存卅六人詩歌 [鎌倉後期] 写
   Nijûhappon narabi ni kubon sbika, Gensonzanjûrokunin shiika, late-Kamakura period, Keio Institute of Oriental Classics

60. 慶應義塾大学附属研究所　斯道文庫 092・ト 34・1
   『八雲御抄』（やくもみしょう）六巻存巻一 [室町後期] 写一軸
   Yakumo mishô, [His Majesty’s Eight-Cloud Treatise], vol. 1 of 6, late Muromachi copy, 1 scroll,
   Keio Institute of Oriental Classics

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61. 慶應義塾大学附属研究所 斯道文庫 092・ト 35・1
『愚門賢注』（ぐもんけんちう）[江戸前期]写-一帖
Gumonkenchū, early Edo period manuscript, Booklet 1, Keio Institute of Oriental Classics

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『勧撰名所和歌抄出』（ちょくせんめいしょうかしこうしゅつ）[室町後期]写-伝岩山道堅筆-一軒
Chokusen meisho waka shōtsu, late Muromachi period manuscript, wrote by Iwayama Douken, 1 Scroll, Keio Institute of Oriental Classics

63. 慶應義塾大学附属研究所 斯道文庫 092・ト 38・12
『平家物語』（へいけものがたり）『平家物語』古活字（下村本）西蔵文庫旧蔵
Heike Monogatari, Shimomura-bon (Shimomura-text), Keio Institute of Oriental Classics

64. 慶應義塾大学附属研究所 斯道文庫 092・ト 39・11
『平家物語』（へいけものがたり）（中院本）十二巻欠巻十 [江戸初期]刊古活字十一冊
Heike monogatari, (Nakanoin text) 11 booklets, Keio Institute of Oriental Classics

65. 慶應義塾大学附属研究所 斯道文庫 092・ト 40・1
『平家物語』（へいけものがたり）（中院本）第十二零冊 跡文あり・古活字
Heike Monogatari, Nakanoin-bon (Nakanoin text) with editorial note; 1 fascicle from book 12, Keio Institute of Oriental Classics

66. 慶應義塾大学附属研究所 斯道文庫 092・ト 41・11
『平家物語』（へいけものがたり）古活字（十二行平仮名本）[寛永]刊 安田文庫旧蔵 一冊
Heike Monogatari, Jūnigyō hiragana-bon (12-line hiragana text); two versions, with the type set differently., Keio Institute of Oriental Classics

67. 慶應義塾大学附属研究所 斯道文庫 092・ト 42・1
『平家物語』（へいけものがたり）古活字 第三巻零冊 安田文庫旧蔵
Heike Monogatari, vol3, Old movable type, Yasuda bunko collection, Keio Institute of Oriental Classics

68. 慶應義塾大学附属研究所 斯道文庫 092・ト 45・11
   『平家物語』（へいけものがたり）平家〈平家物語百二十句本〉十二巻欠巻八 〔室町末〕写 十一冊
   Heike monogatari, Hyakunijū-ku text, Keio Institute of Oriental Classics

69. 慶應義塾大学附属研究所 斯道文庫 092・ト 46・1
   『中しやう姫』（ちゅうじょうひめ）〈中将姫〉二巻存下 〔江戸初期〕写 奈良絵本 一冊
   Chūjohime, Early-Edo period, Nara ehon, Keio Institute of Oriental Classics

70. 慶應義塾大学附属研究所 斯道文庫 092・ト 56・4
   『貞観政要』（じょうかんせいよう）十巻存巻四～六，九〔鎌倉〕写 四帖
   Jōkan Seiyō, Keio Institute of Oriental Classics

71. 慶應義塾大学附属研究所 斯道文庫 09A・98・15
   『歌仙家集』（かせんかしゅう）『歌仙家集』（契沖書入本・椎本文庫）十五冊
   Kasen kashū, (with marginalia by Keich, Shiigamoto bunko) 15 vols., Keio Institute of Oriental Classics

72. 慶應義塾大学附属研究所 斯道文庫 213・ト 3・15
   『日本書紀』（にほんしょき）大本，[宽永]刊 十五冊
   Nihon shoki, (Chronicles of Japan), Kan'ei-era edition, 15 vols., Keio Institute of Oriental Classics

73. 慶應義塾大学附属研究所 斯道文庫 215・ト 2・2
   『大坂物語』（おおさかものがたり）『大坂物語』二冊 一六六八年刊
   Ōsaka monogatari, 2 volume, Keio Institute of Oriental Classics

74. 慶應義塾大学附属研究所 斯道文庫 B1・ト 4・2
   『秋の夜の長物語』（あきのよながものがたり）二巻正德六年（一七一六）刊（江

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75. 慶應義塾大学附属研究所 斯道文庫 SagabonIseMonogatari
『嵯峨本伊勢物語』（さがばんいせものがたり）嵯峨本伊勢物語 円福寺蔵
Ise monogatari, Saga-bon, 1608, Enpukuji temple, Keio Institute of Oriental Classics

76. 慶應義塾大学附属研究所 斯道文庫
『延文百首』（えんぶんひゃくしゅ）[室町末]写 三冊
Em bun hyaku shu, [One-hundred Poem Sequence of the Enbun era], late Muromachi period, 3 vols., gift of Professor Kubota, Keio Institute of Oriental Classics

77. 慶應義塾大学附属研究所 斯道文庫
『竹取物語』（たけとりものがたり）三巻〔江戸前期〕写 奈良絵巻 三軸
Taketori monogatari, 3 scrolls, Early-Edo period, Keio Institute of Oriental Classics

78. 慶應義塾大学附属研究所 斯道文庫 シ 09·2·1·1
『四分律』（しほんりつ）四分律蔵第三分尼出家善退巻第四十〈五月一日経〉天平十二年（七四〇）頃写 一軸
Shibunritsu, (Ch. Sifen Lu, Vinaya in Four Parts) (a.k.a. Gogatsu tsuitachi-kyō), Keio Institute of Oriental Classics

79. 慶應義塾大学附属研究所 斯道文庫 シ 21E·D262
『鈴屋集』（すずのやしゅう）本居宣長『鈴屋集』九冊
Suzunoya-shū, Motoori Norinaga, 9 vols., Keio Institute of Oriental Classics

80. 慶應義塾大学附属研究所 斯道文庫 シ 34·216·53
『湖月抄』（こげつしょう）北村季吟『湖月抄』
Kogetsushū, Kitamura Kigin, Keio Institute of Oriental Classics

81. 慶應義塾大学附属研究所 斯道文庫 ハ 09·ト 4·70·1
『和名類聚抄』（わみょうるいじゅうしょう抄）（浜野文庫・真福寺本模刻）
Wamyō ruijūbō, [Hamano bunko · Shiinpuuki-text facsimile reprint], 1801 edition, Keio Institute of Oriental Classics

82. 慶應義塾大学附属研究所 斯道文庫 ハ 32・13・3
『歌文要語』（かぶんしようご）小本『歌文要語』小本三冊
Kabun yōgo, kohon (small books, 12x 17 cm), Keio Institute of Oriental Classics

83. 慶應義塾大学附属研究所 斯道文庫 ハ 38C・4・79・1
『谷口樵唱』（こっこうしょうしょう）特小本『谷口樵唱』特小本一八
Kokkō sbōbō, Toku-Kohon (Extra-small books), Keio Institute of Oriental Classics

84. 慶應義塾大学附属研究所 斯道文庫 ハ 38C・6・32・1
『竹田莊詩話』（ちくでんそうしぶ）縦長本『竹田莊詩話』縦長中本一冊
Chikutaden-sō shiwa, Tatenaga-bon (“Higher-than-wide” books), Keio Institute of Oriental Classics

85. 慶應義塾大学附属研究所 斯道文庫 ハ 210・13・10
『日本後紀』（にほんこうき）『日本後紀』一七九九年刊 十冊
Nihon kōki, (Chronicles of Japan), 1799 edition, 10 vols., Keio Institute of Oriental Classics

86. 慶應義塾大学附属研究所 斯道文庫 玉かつら
『玉かつら』（たまかつら）光悦謹本『玉かつら』（特装本）
Tamakatsura, Ketsuutaibon (Tokushon), Keio Institute of Oriental Classics

87. 慶應義塾図書館 110X@186@1
『妙法蓮華経』（みょうほうれんげきょう）妙法蓮華経 巻二一帖 [銀倉] 刊 貴重書
Myōbō rengekyō, [Lotus Sutra of the Wonderful Law], vol. 2, Kamakura printing, 1 scroll, Keio University Library

88. 慶應義塾図書館 110X@1@1
『往生拾因』（おうじょうじゅういん）往生拾因一帖（粒葉装）浄土教販宝治二年（一応四八） 刊 貴重書
89. 慶應義塾図書館

『橋姫』（はしひめ）はしひめ 二巻横本二冊 [江戸前期] 写 貴重書

Hashihime, [The Lady of the Bridge], early-Edo period, 2 horizontal vols., Keio University Library

90. 慶應義塾図書館

『天狗の内裏』（てんぐのだいり） [天狗の内裏] 一帖 [室町後期] 写 貴重書

Tengu no dairi, Late Muromachi copy, 1 booklet, Keio University Library

91. 慶應義塾図書館

『毘沙門の本じ』（びしゃもんのほんじ）ひしゃもん 三巻横本三冊 [江戸初期] 貴重書

Bishamon no honji, [The True Form of Bishamon], early Edo period, Keio University Library

92. 慶應義塾図書館

『常磐の姥』（ときわのうば）常磐の姥 [室町末] 写 一冊 貴重書 19.5 × 21.6

Tokiwa no uba, [Old Lady Tokiwa], late-Muromachi period, 1 vol., Keio University Library

93. 慶應義塾図書館

『岩屋の草子』（いわやのそうし）二巻存巻上 一冊 [寛永] 貴重書

Iwaya no sōshi, [Lady in the Cave], originally 2 scrolls of which only 1 extant), 1 vol., Kan'ei era (1624-1644), color movable type book, Keio University Library

94. 慶應義塾図書館

『狭衣の草子』（さごろものそうし）折紙縦葉装の例 一帖 慶長二年（一五九七）写 貴重書

Saguromo no sōshi, 1 booklet, Keichō 2 (1597) copy, Keio University Library
95. 慶應義塾図書館 110X@37@1
『歴代帝王編年互見之図』（れきだいていおうへんねんごけんのず）歴代帝王編年互見之図一冊 永和二年（一三七六）刊 貴重書
Rekidai tetō hennen goken no zu, (Illustrated Genealogies of Emperors and Kings), 1 volume, Eiwa 2 (1376) printing, Keio University Library

96. 慶應義塾図書館 110X@399@3
『物物集』（ほうぶつしゅう）ほうぶつしゅう 三巻三冊 紫式部説話の部分 貴重書
Hōbutushū, Taira no Yasunori, Keio University Library

97. 慶應義塾図書館 110X@403@1
『後拾遺和歌抄』（ごしゅういわかしょう）後拾遺和歌抄 一冊 貴重書
Goshūi wakasbō, [Later Gleanings of waka, 1086], 1 vol., Keio University Library

98. 慶應義塾図書館 110X@406@2
『日本書紀』（にほんしょき）存神代巻二巻 慶長十五刊 二冊 古活字貴重書
Nihon shoki, Chronicles of Japan, “old” movable type edition, 2 vols., Keio University Library

99. 慶應義塾図書館 110X@409@2
『祇王』（ぎおう）きわう 二巻横本二冊 〔江戸初期〕貴重書
Giō, early Edo period, Keio University Library

100. 慶應義塾図書館 110X@410@2
『文殊姫』（もんじゅひめ）もんじゅ姫 〔江戸前期〕写 二冊 貴重書
Monjubime, [Princess Monju], early-Edo Period, 2 vols., Keio University Library

101. 慶應義塾図書館 110X@434@2
『依藤太物語』（たわらとうだものがたり）〔寛永〕刊 二冊 貴重書
Tawara Tōda monogatari, [The Tale of Tawara “Rice-bag” Toda], Keio University Library

102. 慶應義塾図書館 110X@441@3
『鶴の草子』（つるのそうし）鶴のさうし 三巻 寛文二年（一六六二）刊 三冊
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103. 慶應義塾図書館 110X@443@1
   『ぶんしゃうのきょうしき』（ぶんしょうのきょうし） ぶんしゃうのきょうし 二巻二冊
   [近世初] 刊 丹絵本 貴重書
   Bunshō no sōshi, [The Tale of Bunshō], 2 vols., early Edo period printing, tanroku-bon, Keio University Library

104. 慶應義塾図書館 110X@446@1
   『四十二乃物語』（しじゅうのにものあらそい） 四十二乃物語  [室町末江戸初]
   貴重書
   Shijūni no monoarai, [The 42 contests], late-Muromachi/early-Edo period, Keio University Library

105. 慶應義塾図書館 110X@448@3
   『たなばた』（たなばた） たなばた (雨わかみこ) 三帖 貴重書
   Tanabata, [Tanabata, a.k.a. Ame no wakamiko], 3 vols., Keio University Library

106. 慶應義塾図書館 110X@457@1
   『てんくのたいり』（てんぐのだいり） てんくのだいり 二巻二冊  [近世初] 刊
   丹絵本 貴重書
   Tengu no dairi, [The Palace of the tengu ], 2 vols., Early Edo printing, tanroku-bon, Keio University Library

107. 慶應義塾図書館 110X@464@2
   『磯崎』（いそざき）いそざき [江戸前期] 写 横大二冊 貴重書
   Isozaki, [Isozaki], early Edo period, 2 vols., Keio University Library

108. 慶應義塾図書館 110X@506@1
   『御成敗式目』（ごせいばいしきもく） 御成敗式目 一冊 小幌伊治享禄二年（一五二九） 刊 貴重書

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Goseibai shikimoku, (Formulary of Adjudications). Goseibai shikimoku, 1 volume, Otsuki Koreharu, Kyôroku 2 (1529) printing, Keio University Library

109. 慶應義塾図書館 110X@53@1
『万賀物語方記』（よろずかいものちょうほうき）貴重書
Yorozu kaimono chôbôki, 1692, Keio University Library

110. 慶應義塾図書館 110X@590@2
『絵本栄家種』（えほんさかえぐさ）勝川春潮　寛政二刊半二冊　色刷貴重書
Ebon sakaegusa, (Leaves of Prosperity), Learning to write,Katsukawa Shunchô, 1790, 2 vols., Keio University Library

111. 慶應義塾図書館 110X@5@1
『金剛頂経大瑜伽秘密心地法門義訣』（こんごうちょうきょうだいゆがひみつしんじほうもんぎけつ）金剛頂経大瑜伽秘密心地法門義訣一帖　高野版正応四年（一二九一）刊　貴重書
Kongôchôkyô daiyuga bimitsu shinjî hōmon giketsu, (Chinese, Jingangding jing da yujia bimi xindi famen yijue), “Instructions on the Gate of Teaching about the Secret State of Mind of the Great Yoga, the Vajra Pinnacle Scripture”, late 8th c., 1 booklet, Kôya-ban Shôô4 (1291), Keio University Library

112. 慶應義塾図書館 110X@622@1
『扇の草紙』（おうぎのそうし）一冊　［室町末江戸初］写　貴重書
Ôgi no sôbi, [A Book of Fans],1 vol., late Muromachi/early Edo period, Keio University Library

113. 慶應義塾図書館 117@106@3
『大和俗訓』（やまとぞっくん）半紙本　貝原篤信『大和俗訓』
Yamato zokkuin, by Kaibara Ekken, Hanshi-bon (half-size Books, 17 cm x 24 cm), Keio University Library

114. 慶應義塾図書館 121@101@1

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『平安朝摺仏』（へいあんちょうすつぶつ）阿弥陀如来座像摺仏 〔平安後期〕刊一枚 貴重書
Amidanyorai zaz¯o suributsu, Heian-period Printed Buddhas, 1 scroll, Keio University Library

122. 慶應義塾図書館 132X@158@54@1〜54
『源氏物語』（げんじものがたり）五十四巻 五十四帖 〔江戸初期〕 写 貴重書
Genji monogatari, [Tale of Genji], all 54 books, 54 booklets, early Edo period copy, Keio University Library

123. 慶應義塾図書館 132X@16
『妙法蓮華経』（みょうほうれんげきょう）一軸 〔鎌倉刊〕 春日版装飾経貴重書
Myōhō rengekyō, (Lotus Sutra of the Wonderful Law), 1 scroll (Kamakura period) Kasuga-ban, sōshokukyō, Keio University Library

124. 慶應義塾図書館 132X@172@1
『小倉山百人一首』（おぐらやまひゃくにんいっしゅ）紫式部の画像部分 貴重書
Ogurayama hyakunin isshu, [One Hundred Poets, One Poem Each], early-Edo period, 1 vol., Keio University Library

125. 慶應義塾図書館 132X@176@1（58）
『空騒』（うつせみ）断簡 〔鎌倉中期〕 小津家襲蔵古筆切コレクション 貴重書
Utsusemi, [The Cicada Shell], mid-Kamakura period, Keio University Library

126. 慶應義塾図書館 132X@17@1
『妙法蓮華経』（みょうほうれんげきょう）巻三 〔南北朝〕刊 一軸 貴重書
Myōhō rengekyō, (Lotus Sutra of the Wonderful Law), vol. 3, Nambokuchō period printing, 1 scroll, Keio University Library

127. 慶應義塾図書館 132X@180@1
『伊勢物語』（いせものがたり）伊勢物語 一帖 〔室町中期〕 写・伝飛鳥井雅
康筆貴重書

Ise monogatari, 1 booklet, mid-Muromachi period, attributed to Asukai Masayasu (1436-1509), Keio University Library

128. 慶應義塾図書館 132X@191@1

『未摘花』（すえつむはな）[鎌倉中期] 写 一帖 貴重書

Suetsumubana, [The Safflower], mid-Kamakura period, Keio University Library

129. 慶應義塾図書館 132X@192@1

『宿木』（やどりぎ）断簡 [鎌倉前期] 写 掛軸一幅 貴重書

Yadorigi (Ivy), fragment, early-Kamakura period, Keio University Library

130. 慶應義塾図書館 132X@195@2

『源氏物語』（げんじものがたり）[源氏物語抄出] [江戸前期] 写 二帖 貴重書

Genji monogatari, [selected passages], early-Edo period, 2 vols., Keio University Library

131. 慶應義塾図書館 132X@20@1

『法隆寺百萬塔陀羅尼』（ほうりゅうじひゃくまんとうだらに）無垢浄光大陀羅尼経 一巻 附法隆寺百萬塔七七〇年刊 貴重書

Hōryūji Hyakumantōdarani, 1 scroll, 770 printing, Keio University Library

132. 慶應義塾図書館 132X@23／2@1

『重家集』（しげいえしゅう）一帖 [鎌倉初期] 写 貴重書

Shigeie-shū, 1 vol., early Kamakura period, Keio University Library

133. 慶應義塾図書館 132X@26@1

『後鳥羽院御錦』（ごとばいんみしょう）貞応二年（一三五一） 貴重書

Gotoba-in Mishō, Kannō 2(1351), Keio University Library

134. 慶應義塾図書館 132X@35@1

『鳥歌合画巻』（とりうたあわせえまき）＜雀の発心＞ [室町末江戸初] 写 貴重書
135. 慶應義塾図書館 132X@48@1
『あめそめ川』（あいづめがわ）[あめそめ川] [室町後期]写 首欠一軸
Aizomegawa, late Muromachi manuscript, one incomplete scroll, Keio University Library

136. 慶應義塾図書館 132X@56@2
『ともなか』（ともなか）[江戸前期]写 二軸 貴重書
Tomonaga, early Edo-period copy, 2 scrolls, Keio University Library

137. 慶應義塾図書館 132X@65@1
『古今和歌集序注』（こきんわかしゅうじょちゅう）享禄三年（一五三〇）尊顯親王令写 貴重書
Kokinwakashū jochū, Kyōrokū 3(1530) copy commissioned by Prince Sonchin, Keio University Library

138. 慶應義塾図書館 132X@70@3
『しゅてんとうし』（しゅてんどうじ）三巻三軸 [江戸前期]写 貴重書
Shuten tōshi, [Shuten dōji], early-Edo period, Keio University Library

139. 慶應義塾図書館 132X@90@2
『やひようえねずみ』（やひょうえねずみ）[江戸初]写 貴重書
Yahyōe nezumi, [The Tale of Yahyōe, the White Rat], early 17th c., Keio University Library

140. 慶應義塾図書館 133@20@1
『絵本庭訓往来』（えほんでいきんおうらい）葛飾北斎画『絵本庭訓往来』
Ehon teikin orai, illustrations by Katsushika Hokusai (19th c.), Keio University Library

141. 慶應義塾図書館 133X@143@1
『伊勢物語小絵巻』（いせものがたりこえまき）伊勢物語小絵巻断簡 [江戸前期]写 貴重書
Ise monogatari koemaki, pieces, early Edo period, manuscript, Keio University Library
142. Ogisawase monogatari, [The Fan Contest], also known as Kachō-fūgetsu [Lady Flowers-and-Birds and Lady Wind-and-Moon] late-Muromachi copy, 1 vol., Keio University Library

143. Kinsei onna daigaku, by Doi Kōka, 1874 printing, Keio University Library

144. Musukobeya, (The Young Man’s Quarters, 1785), Santō Kyōden, Keio University Library

145. Nihon shoki, Divine-age Chapters, Keio University Library

146. Issun bōshi, Otogi Sōshi, 23 items, early-Edo printing, Keio University Library

147. Tamakura, Motoori Norinaga, 1792 edition, Keio University Library

148. Sagara Tametsugu’s Renga sōshi, Meiō 4 (1495), Keio University Library
Appendix C

Access Log Data

C.1 Log Data (Book View and Bookshelf View)

Book View

All data related to the Book View is stored on the web hosting server (https://gc.sfc.keio.ac.jp/fl_img/course010). The following is a summary of the access log:

Table C.1: Summary of the access log (Book View)

<table>
<thead>
<tr>
<th>Duration (Month/Date/Year)</th>
<th>Total Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>09/24/2017 - 10/22/2017</td>
<td>26,994</td>
</tr>
<tr>
<td>10/22/2017 - 10/24/2017</td>
<td>8,640</td>
</tr>
<tr>
<td>10/25/2017 - 10/29/2017</td>
<td>9,284</td>
</tr>
<tr>
<td>10/29/2017 - 11/05/2017</td>
<td>90,436</td>
</tr>
<tr>
<td>11/05/2017 - 11/12/2017</td>
<td>377,482</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>512,836</strong></td>
</tr>
</tbody>
</table>

Bookshelf View

As for the Bookshelf View, google analytics (http://www.google.com/analytics/) has been implemented to the website (https://narrative-book-collection.com/), and
all access log was generated based on the clicks statistics. The following is a summary of the overview access (google analytics snapshot).

Figure C.1: User Access Overview (Bookshelf View)