Virtual Libraries in the New Metaverse: An Exploratory Study on Community Libraries in Meta Horizon Worlds*

Jonathan M. Hollister**

ARTICLE INFO

ABSTRACT

Article history: Received 01 December, 2024 Revised 03 December, 2024 Accepted 05 December, 2024

Keywords: Virtual Libraries, Virtual Reality, Metaverse, Meta Horizon Worlds To explore the presence and status of libraries in the metaverse, focusing on the social virtual reality (VR) platform Meta Horizon Worlds. This study employs unobtrusive observation by collecting data within public VR library worlds and from their listings on the platform. Data was interpreted using qualitative data analysis and open coding. Forty-four virtual libraries were identified in Meta Horizon Worlds, serving as art and asset libraries, community libraries, personal libraries, or other library-themed spaces for games and socialization. Few virtual libraries seem to be associated with "real-world" libraries, suggesting that there may be opportunities for growth if Meta Horizon Worlds remains a stable part of the metaverse. This study appears to be among the first to explore virtual libraries in Meta Horizon Worlds *in situ* via VR-based data collection.

1. Introduction

Libraries have existed in virtual worlds for around two decades. Within virtual worlds such as Second Life¹, librarians have created virtual libraries and offered a wide variety of digital collections of e-books and media as well as virtual reference services (Chow et al., 2012; Dey, 2012; Grassian & Trueman, 2007; Hill et al., 2017; Mon, 2012; Parry, 2008; Webber & Nahl, 2011). Virtual worlds and virtual reality have also been used in Library and Information Science education to train pre-service librarians in skills they need for the real world as well as the virtual world (Condic, 2009) as well as educate library users (Chen & Tasi, 2012; Lim, 2021; Tudin, 2016). Virtual reality technology is an increasingly common part of library collections and services, especially in academic and medical libraries (Bardyn et al., 2018; Baryshev et al., 2020; Green & Groenendyk, 2019; Hannah et al., 2019; Lischer-Katz et al., 2019). Smith (2019) argues that virtual reality in libraries is a no-brainer, that can be used for services and educational programs,

^{*} This work was supported by a Humanities Social-Science Research Promotion of Pusan National University (2022~2024).

^{**} Associate Professor, Department of Library, Archive and Information Studies, Pusan National University, Korea (hollisterjm@pusan.ac.kr) International Journal of Knowledge Content Development & Technology, 14(4): 113-133, 2024. http://dx.doi.org/10.5865/IJKCT.2024.14.4.113

¹⁾ www.secondlife.com

such as information literacy instruction. In addition to providing access to extended reality (XR) technologies, libraries are likely to expand their collections, services, and programs to virtual worlds within the emerging metaverse.

Recent technological advancements and interest from major technology companies have created renewed interest in the metaverse. Facebook recently re-branded to Meta as it focuses on the metaverse and developing its social VR platform, Meta Horizon Worlds (Griffin, 2021, October 29). The city of Seoul, South Korea plans to launch various services via the metaverse starting in 2022 (Lee, 2021). While much time, resources, and research have been invested by librarians and LIS researchers into Second Life, librarians should look to new virtual worlds likely to supplant Second Life, which is nearly two decades old. Kim (2020) identifies virtual reality, digital three-dimensional environments accessible through computers or head-mounted displays (HMDs), as one key technology for libraries to be ready for in the 21st century. However, there seems to be little prior work exploring libraries in the new metaverse.

This research project aims to explore and describe virtual libraries in the nascent social VR platform Meta Horizon Worlds²), which launched in the USA in 2021 and became available in South Korea in mid-2024 (Meta Quest Blog, 2024, June 24). As such, the guiding research questions of this study are as follows:

- RQ1: To what extent, if any, are libraries present in Meta Horizon Worlds?
- RQ2: What characterizes the libraries in Meta Horizon Worlds?

2. Selected Literature Review

This brief literature review will discuss previous work on libraries in virtual worlds, and extended reality (XR) technologies in libraries and provide background information on the metaverse, XR technologies, and Meta Horizon Worlds to provide context for the reader.

2.1 Libraries in Virtual Worlds and XR in Libraries

Libraries in virtual worlds, such as Second Life, have provided access to digital resources, programs, and services for about two decades (Chow et al., 2012; Dey, 2012; Grasian & Trueman, 2007; Hill et al., 2017; Mon, 2012; Parry, 0208; Weber & Nahl, 2011). The Community Virtual Library³) continues to provide access to e-books, programming, and reference services in Second Life. The Uncensored Library⁴), created and maintained by Reporters Without Borders, provides access to censored journalism in Minecraft, bypassing government censorship and IP blocking by containing the content within a downloadable game world save file (Maher, 2020).

²⁾ https://horizon.meta.com

³⁾ https://communityvirtuallibrary.org

⁴⁾ https://www.uncensoredlibrary.com/en

Kim et al. (2021) found that some public libraries in the USA provide VR services and access to XR technologies to their communities, but noted a lack of high-quality, accessible content. VR technologies are also employed in medical and academic libraries to help train medical professionals and public health workers on topics ranging from surgery preparation, information searching, patience interaction, and data management and visualization (Lessick & Kraft, 2017; Moore et al., 2018; Napa, Moore, & Bardyn, 2019). Academic librarians have collaborated with computer science students to provide access to HathiTrust Digital Library⁵) digital resources and reference services in VR (Han, 2018). Library users can also be oriented to library collections and services using VR (Chen & Tasi, 2021; Lim, 2021; Tudin, 2016).

Virtual libraries have seen success in training future librarians as well. Pre-service librarian students were able to develop professional librarian skills, such as reference interviewing, content creation, and community engagement, in Second Life (Webber & Nahl, 2011). Condic (2009) also found that role-playing in Second Life may improve reference interviewing skills, facilitate diversity training, and foster mentoring between new and experienced librarians. Previous work from the Lee et al. (2022) argues that VR-based training may help pre-service librarians develop empathy and cultural competency skills. Emergency preparedness planning for librarians and archivists can also be done via virtual learning environments (Bertini & Budassi, 2010). However, previous work from Hollister and Lee (2022) found the inclusion of XR technologies in terminal LIS programs in the USA and South Korea is limited, and typically focuses on content development.

2.2 The Metaverse, XR technologies, and Meta Horizon Worlds

The metaverse concept is not new; it was first coined and described in the science fiction novel, Snow Crash, by Neal Stephenson (1992). Jaynes et al. (2003) describe the metaverse as an interconnected network of virtual worlds that can be accessed across devices and platforms. Ball (2021, para. 30) defines the metaverse as a:

"massively scaled and interoperable network of real-time rendered 3D virtual worlds which can be experienced synchronously and persistently by an effectively unlimited number of users with an individual sense of presence and with continuity of data, such as identity, history, entitlements, objects, communications, and payments."

Ball (2021) notes that while the metaverse is often associated with video games, virtual reality (VR), augmented reality (AR), mixed reality (MR), and, or collectively, extended reality (XR) technologies, XR technologies act as a channel to access virtual games and the metaverse. VR technologies allow users to interact with simulated environments from a first-person perspective using VR headsets (Kim, 2020). AR technologies use an overlay of digital objects on a user's view of the real world through smartphones and AR-enabled wearables such as AR glasses and some VR headsets (Kim, 2020). MR technologies combine and connect VR and AR experiences (Kim, 2020). Given these

⁵⁾ https://www.hathitrust.org

Jonathan M. Hollister 116 International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024)

technologies' interrelated and often overlapping nature, they can be collectively referred to as extended reality (XR) (Kim, 2020).

Meta Horizon Worlds was publicly launched in the USA in 2021, with official expansion to other countries later, such as South Korea in June 2024 (Meta, 2024d; Meta Quest Blog, 2024). Meta Horizon Worlds serves as a metaverse-like platform where users interact with one another and the environment to socialize, play games, explore, and create virtual content (Meta, 2024a; 2024b). Meta Horizon Worlds is accessible via the range of VR headsets developed by Meta, including the original Meta Quest, Quest 2, Quest 3, Quest 3S, and Quest Pro (Meta, 2024b). As of October 2022, the platform had around 200,000 active users (Clement, 2023). Meta Horizon Worlds is also available on mobile devices, through web browsers, and desktop computers, though access to all VR worlds is limited and still in the early access stages (Meta, 2024a; 2024b). Users can create and publish worlds for free and eligible users may qualify for the Creator Monetization Partner Program which allows users to sell items they create virtually (Meta, 2024c).

3. Methods

Data for this pilot case study was collected via unobtrusive observation through multiple site visits to user worlds within the case VR platform of Meta Horizon Worlds from June to October 2024. All in-platform site visitations were conducted in VR using a Meta Quest 2 headset. Screenshots were captured from the author's first-person perspective during site visits, with field notes taken after each visit. Descriptive information about the worlds was collected from each world's listing on Meta Horizon Worlds, as listed within the in-world app or on the website. Data was collected from publicly listed worlds containing "library" in their title or description; no worlds featuring "도서관," the Korean word for library, were available or accessible during the data collection period. The author only joined publicly listed worlds and did not interact with other users by only joining worlds when empty or using closed or private sessions as needed.

This study employs conventional qualitative content analysis of the observational and descriptive data collected from site visits, field notes, and world listings, using theory, concepts, and themes from the research literature to interpret findings in later discussion rather than guide data collection and analysis (Hsieh & Oh, 2005). Emergent themes and coding categories were identified and consolidated during qualitative content analysis via open coding, axial coding, and selective coding processes as commonly used in qualitative content analysis and grounded theory work (Corbin & Strauss, 1990; Glaser & Strauss, 1967; Charmaz, 2006). However, the goals of this study are to identify themes and descriptive categories as guided by the research questions and not to generate a contextualized theory, aligning it with qualitative content analysis rather than grounded theory (Cho & Lee, 2014).

Jonathan M. Hollister International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024) 117

4. Findings

4.1 World Details Summary

During the data collection period, 49 worlds with the term "library" within their title or description were identified. However, five worlds were removed from the sample as they were either empty, inaccessible, or created by Meta employees, leaving a sample of 44 worlds (n=44) with at least intermediate development. World creators described and listed their worlds under 9 categories: 18 (40.91%) are categorized as Hangouts, 10 as Art (22.73%), 3 as Puzzle (6.82%), 2 as Narrative (4.55%), 1 (2.27%) each with the category tags of Adventure, Exploration, or Party Game. Seven worlds (15.91%) were uncategorized. World creators may assign one category tag for their world on the listing.

Minimum age ratings for worlds ranged from 10 years old to 18 and up, with 13 (29.55%) worlds for 10 and up, 20 (47.73%) for 14 and up, and 9 (20.45%) for 18 and up. Only worlds rated at least 14 and up are available in South Korea (Meta Quest Blog, 2024). Four (9.09%) of the worlds have content advisories in their listings or world titles for sensitive content including weapons, alcohol, sexual content⁶), mild or strong language, and spooky moments.

All 44 worlds were designed for VR experience using a Meta Quest headset. Meta Horizon Worlds are also rated for ease of accessibility: 39 (88.64%) of the sample worlds are rated as comfortable, 4 are moderate (9.09%), and 1 is intense (2.27%). World capacity ranged from 4 to up to 32, with an average of 14.02 participants and a median of 10.00 (n=44, SD=8.94). Meta Horizon Worlds does not display user reviews of worlds but does display likes. Among the sampled world, likes ranged from 0 to 544, with an average of 47.02 and a median of 15.00 likes (n=44, SD= 98.35).

Age of the sample worlds, as calculated from their date of creation to the end of the data collection period, ranged from 15 days (.04 years) to 1,289 days (3.53 years), with an average of 423.41 days (1.16 years) and a median age of 349.50 (0.96 years) (n=44, SD=329.26 days or 0.90 years). The sample's oldest world was likely created during beta testing. The amount of time between a world's creation and its latest update, up until the data collection completion date (on 10/31/2024), is an average of 82.66 days (n=44, median=15.00, SD=151.11), ranging from zero to 703 days (1.93 years). Each world has a singular owner as well as additional approved editors. Including world creators and editors together, the sample averaged 2.84 editors per world, with a median value of 2.00, a standard deviation of 2.30 (n=44), and a range from 1 to 10.

⁶⁾ The author did not enter worlds with advisories or warnings for sexual content. Data analyzed for these worlds is based on text from their world listings.

Jonathan M. Hollister 118 International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024)

4.2 Content Analysis

Qualitative content analysis identified several recurring themes in categorizing and describing virtual libraries in Meta Horizon Worlds: Art & Asset Libraries, Community Libraries, Personal Libraries, and Library Aesthetics: Games & Social Spaces. These emergent codes are described at the beginning of their respective sections below. While world creators may assign one category tag for their world on the listings, worlds often fall into multiple categories. Similarly, the coding of worlds is nonexclusive as many worlds exhibit more than one theme, as noted throughout. Screenshots from relevant worlds are presented; displayed usernames have been covered for privacy.

4.2.1 Art & Asset Libraries

Many community-created and maintained virtual worlds focus on providing access to virtual art objects and assets that can be brought into and used in other users' worlds.

Some assets are built into Horizon Worlds's Asset Library which can be accessed by any user when creating a world. The community also creates and provides access to art and assets of their design. Some of these are focused on certain types of assets. For example, the "devkit 01// shapes" world provides access to more than 600 different shapes, and the "theatrical lighting fixture library" offers various types of lighting assets for sale. "Vince's Mechanics Library" provides demonstrations and access to different mechanical processes or interactions that can be created with or between virtual objects and assets built into Meta Horizon World's Asset Library or those made by community members.

The Asset Library Games 2 is a world that allows users to socialize and play games from the Asset Library, as seen in Figure 1.



Fig. 1. Asset Library Games 2

The "Community Asset Library" provides access to a large collection of community-made access and indicates how users can access them and attribute their use, as seen in Figure 2. The signage specifies that the assets are free to use by the community if they are properly attributed and not sold.

Jonathan M. Hollister International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024) 119



Fig. 2. Community Asset Library * User name covered

Some Art & Asset Libraries housed collections of portals to other worlds in a library structure. For example, the "Horizon World Building Library" features a curated collection of world portals providing access to assets or instructional how-to guides for building worlds. As seen in Figure 3, the portals are arranged by type within an open library building.



Fig. 3. Horizon World Building Library

Jonathan M. Hollister 120 International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024)

4.2.2 Community Libraries

A few worlds appear to be designed to function as virtual community libraries, providing access to resources as well as programming, such as active events and passive exhibitions, in a fashion similar to real-world libraries. However, only two (4.55%) of the virtual libraries appear to have connections to real-world libraries: "The Geisel Library Dr. Seuss Matrix" and the "AANHPO Heritage World #AAPI #WOA #Asian."

As seen in Figure 4, "The Geisel Library Dr Seuss Matrix" world replicates the brutalist architectural design of the actual Geisel library. It also provides a space for socializing and events. In the rear courtyard, users can listen to recorded readings of some of Dr. Seuss' works with a light display and a large Cat in the Hat statue.



Fig. 4. Geisel Library Dr Seuss Matrix * User name covered

"The AANHPI Heritage World" is a collaborative world featuring educational resources about and created by Asian Americans, Native Hawaiians, and Pacific Islanders and is sponsored by Horizon Worlds of Asia (WOA). It features a library of oral history recordings and educational resources that highlight aspects of AANHPI history, culture, and contributions to the world. It also includes portals to worlds featuring content from AANHPI creators. As seen in Figure 5, community members are invited to contribute their own stories to the oral history project. Some of the assets are interactive and contain historical facts with sources. As seen in Figure 6, there are quiz books/tablets that users can turn over to learn the answers. Jonathan M. Hollister International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024) 121



Fig. 5. AANHPI Heritage World (Set 1)



Fig. 6. AANHPI Heritage World (Set 2)

Jonathan M. Hollister 122 International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024)

Several community worlds provide or simulate library spaces and services. "The Library" features a modern building design complete with library stacks, a performance space, seating, and portals to other worlds, though the space was still in development. "The Library" also seems to focus on African and African American culture and history, showcasing art, historical facts, quotes, and other resources throughout the space, as seen in Figure 7.



Fig. 7. The Library

The small world of "The Library of Banned Books" was created to "host book clubs, lectures, debates and creative networking," as seen on the left side of Figure 8. The "Reading and computer club/libray" [sic] similarly provides a library space for reading, meetings, and relaxing, as seen on the right side of Figure 8.



Fig. 8. Library of Banned Books (Left) & Reading and Computer club/libray [sic] (Right)

As seen in Figures 9 and 10, "The Library III/Children's Bookend," and its previous iteration "The Library II/Bookend Lounge," provides a library space containing programming including exhibitions and events, such as community performances, hosts a curated collection of portals to other worlds, and promotes reading and anti-bullying with signage throughout the space.

Jonathan M. Hollister International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024) 123



Fig. 9. The Library II/III (Set 1)

The screenshots in Figure 10 show an upcoming event poster on the left and the performance stage on the right.



Fig. 10. The Library II/III (Set 2) * Username covered.

4.2.3 Personal Libraries

Some worlds featured personal spaces designed with library themes or features, such as personal libraries or reading rooms. These tended to be smaller in scale, focusing on one room rather than a full building though some did feature small buildings.

Jonathan M. Hollister 124 International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024)

"The Sandwich Library" is a cozy one-room personal library featuring a roaring fireplace, flying books, an interactive map, and a purring cat, as seen in Figure 11.



Fig. 11. The Sandwich Library

The "Sunflower Library" provides a sunflower-themed yet modern library space to "chill." As seen in Figure 12, the "Winter Library" invites users to "hang" in a warm-looking private library with a snowy environment outside.



Fig. 12. Winter Library * Username covered

Assets for sharing and reuse can be found throughout the sampled worlds, even those whose primary purposes are not providing access to art or assets. For example, "Mama's Library" is another cozy personal library space or reading room. As seen in Figure 13, the creator displays a few of their art assets above its virtual fireplace. The creator also seemed to be integrating an eBook feature to allow users to read excerpts from different books. The personal library also includes a small, curated grouping of portals to the creator's favorite worlds.

Jonathan M. Hollister International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024) 125



Fig. 13. Mama's Library

Some personal libraries replicate libraries portrayed in other media. For example, the "Belle's Library" world is a recreation of the library in Disney's 1991 animated film *Beauty and the Beast.*⁷) As seen in Figure 14, the "Breakfast Club Library" faithfully recreates the library in the iconic 80s movie, *The Breakfast Club*,⁸) complete with call number labels on the library stacks.



Fig. 14. Breakfast Club Library

4.2.4 Library Aesthetics: Games & Social Spaces

Several worlds use library themes or aesthetics to provide ambiance or a setting for other purposes. This was seen most often as using library aesthetics to create the setting for games or to inform the design of space for socializing or hanging out with other users.

⁷⁾ Trousdale, G., & Wise, K. (1991). Beauty and the Beast. Walt Disney Feature Animation.

⁸⁾ Hughes, J. (1985). The Breakfast Club. A&M Films; Channel Productions.

Jonathan M. Hollister 126 International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024)

"The Library Bar 18+" exemplifies both as a library-themed bar that provides a place for adults to socialize and play bar games. The "EPIC TRIVIA: Stephen King Library" hosts a trivia puzzle game set in a library featuring information about Stephen King and his works, as seen in Figure 15.



Fig. 15. Stephen King Library

"The Library: No Escape," depicted in Figure 16, features an escape room-styled puzzle game, with subtle threats about a hungry grue. The "Silence in the Library" also has a survival game and the "Hidden Key Library" tasks users with relaxing or challenging them to locate a key.



Fig. 16. The Library: No Escape

The "SPACE BAR" is a futuristic bar that provides a social place for "writers, readers, and all language lovers" and a curated library of portals to other storytelling narrative Horizon worlds. As seen in Figure 17, the SPACE BAR is still in development but welcomes both "feedback and collaboration."

Jonathan M. Hollister International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024) 127



Fig. 17. SPACE BAR's Greeting Signage

5. Discussion

5.1 Status of Virtual Libraries in Meta Horizon Worlds

While virtual libraries exist within Meta Horizon Worlds, most are created and maintained by community members, and few appear to be affiliated with "real-world" libraries. While several community libraries simulate library spaces, offer programming, and provide access to some curated resources, few provide the level of access to digital resources and virtual reference services seen in the virtual libraries in Second Life, as described by Chow et al. (2012), Dey (2012), Grassian and Trueman (2007), Hill et al. (2017), Parry (2008), and Webber and Nahl (2011). That said, at least two of the worlds do seem to involve relationships with real-world libraries and it may be likely that some of the more robust library community worlds are created and maintained by librarians.

Additionally, virtual libraries in the sample had an average age of 1.16 years, with an average of 82.66 days between the first publishing of the worlds and their last update. Worlds in the sample also averaged nearly three editors per world. These findings may suggest that library world development in Meta Horizon Worlds is relatively new and requires significant amounts of time and effort to create and update their worlds. Relatively speaking, libraries in virtual worlds like Second Life have been around for substantially longer and seem to have significant organization and adequate volunteering, as seen via the Community Virtual Library⁹ and Hill et al. (2017). However, as noted in the findings, many of the sampled worlds appeared to be at various stages of development, and Meta Horizon Worlds may not provide features or assets necessary for easy implementation or permission of features seen in Second Life. For example, while books and library stacks and shelving were common throughout the sampled worlds, few of the books were interactive, and if so, typically only contained text on the front or back of a virtual book. Further exploration of the world-building process is needed.

The library aesthetic and space also appear to have enduring appeal. While some of the sampled

⁹⁾ https://communityvirtuallibrary.org/

Jonathan M. Hollister 128 International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024)

worlds did not seem to want to simulate full library services, many seemed to appreciate the aesthetics of libraries and perceive and use them as meeting places. Audunson (2005) and Aabø and Audunson (2012) argue that public libraries provide low-intensive meeting places that promote social inclusion, democracy, and multiculturalism by allowing community members to interact and learn from one another, regardless of background. The "AANHPI Heritage World" and "The Library" (Figures 5, 6, and 7) and The Library III/Children's Bookend" (Figures 9 and 10) can be seen promoting themes related to diversity, equity, and inclusion. Lee et al. (2022) argues that VR may be a useful tool for preparing the cultural competency skills of librarians. Lee et al. (2020) argue that librarians should consider the inclusion of marginalized communities when preparing and evaluating VR programming and services.

Additionally, many community and personal libraries feature curated collections of simulated books, shelving, cozy reading spaces, and welcoming places to socialize or perform. Noh and Kim (2022) found that people often associate books and reading with perceptions of libraries. In place of or in addition to book collections, many worlds included curated collections of portals to other worlds, often narrative or instructional in nature. World creators may be trying to provide access to resources given the limitations inherent in the system or leveraging the new interactive content available elsewhere in Meta Horizon Worlds rather than rely on older or traditional formats. Hollister (2019) found that online role-players in massively multiplayer role-playing games creatively use technology to facilitate immersion.

Libraries have long provided their communities with access to resources and technology. Younger generations of library users (Millennials and Generation Z), as well as librarians, have expressed interest in using and expanding access to XR technologies, among other technologies important to the 4th Industrial Revolution, such as artificial intelligence and 3D printing (Kim, 2020; Noh, 2014a, 2014b; Noh et al., 2020; Park et al., 2020). As the 4th Industrial Revolution proceeds, access to XR will likely expand. However, the use and landscape of VR platforms will likely change over time as the market shifts; two other VR platforms, Altspace and Mozilla Hubs, recently shut down (Mozilla.org, 2024; Roth, 2023). Previous work has found that developing quality content, fostering stakeholder partnerships, and promoting accessibility and inclusion are important for libraries to find success with XR (Hollister & Lee, 2022; Kim et al., 2021; Kwon, 2019; Kwon & Koo, 2020). As such, libraries and librarians should invest in resources and training related to XR and be sure to continually assess and revise their XR services (Hollister & Lee, 2022; Noh et al., 2020; Park et al., 2018).

There are other challenges related to the adoption of XR technologies, including accessibility and cost. The recently released Meta Quest 3S VR headsets¹⁰ start at \$299 (#439,000) and, as such, libraries must consider their budgets, raise funds, or consider building stakeholder partnerships with organizations or companies that may help cover costs (Hollister & Lee, 2024). Motion sickness can also be experienced by users, making them feel physically ill¹¹ (Chattha et al., 2020). Librarians express interest in VR as well as concerns about limited content, spaces, privacy concerns, and accessibility issues for users with cognitive or physical disabilities (Lee et al., 2020).

¹⁰⁾ https://www.meta.com/quest/quest-3s

¹¹⁾ The author also experienced motion sickness during data collection and had to take frequent breaks and sit rather than stand while wearing the VR headset.

5.2 Limitations & Future Work

As with all qualitative studies, there are limitations in the generalizability of the findings of this study (Schutt, 2009). The findings reported below are also based on a limited period and focus on one VR platform. However, the findings of this study are likely transferable or comparable to similar research contexts, such as other VR platforms or virtual worlds. The data analysis and findings also limited to the subjective interpretation of a single researcher. To strengthen the trust-worthiness, dependability, and credibility or confirmability of the findings, this study employs triangulation of multiple data types and supplies direct evidence from the data to support identified themes (Cho & Lee, O'Leary, 2005; Pickard, 2013; Schutt, 2009).

Future work on this topic may also address the scope and methodological limitations of this study. Research could be done to explore libraries in other VR platforms as well as conduct surveys or interviews with library world creators and users about their experiences and motivations for creating library worlds. Fieldwork or case studies featuring participant observation may also better describe the types of activities and behaviors in VR library worlds. Findings from such studies may help establish guidelines or best practices for creating libraries and providing library services in VR and the metaverse.

6. Conclusions

The results of this study suggest that while libraries exist on Meta Horizon Worlds, they are relatively few, and fewer still provide typical library services. That said, some community and personal libraries provide access to programming and resources and serve as meeting places. It also appears that virtual libraries in Meta Horizon Worlds will likely continue to be created and updated over time to a point where they may reach parity with the resources and services provided in other virtual worlds, like *Second Life*, or, perhaps, real-world libraries. As such, Meta Horizon Worlds may create an opportunity for libraries and librarians looking to expand their presence and services into the metaverse. Library and information science researchers, educators, and practitioners, such as librarians and archivists should be knowledgeable of and prepared for emerging technologies. As limitations to content and accessibility are addressed, real-world libraries may consider opening branches on VR platforms in the metaverse. If so, this may continue the long legacy of libraries providing access to resources and technology and meeting their communities where they are.

Acknowledgments

This work was supported by a Humanities Social-Science Research Promotion of Pusan National University (2022~2024).

Jonathan M. Hollister 130 International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024)

References

- Aabø, S., & Audunson, R. (2012). Use of library space and the library as place. Library & Information Science Research, 34(2), 138-149. doi: 10.1016/j.lisr.2011.06.002
- Audunson, R. (2005). The public library as a meeting-place in a multicultural and digital context: The necessity of low-intensive meeting-places. Journal of Documentation, 61(3), 429-441. doi: 10.1108/00220410510598562
- Ball, M. (2021). Framework for the Metaverse.
- https://www.matthewball.vc/all/forwardtothemetaverseprimer
- Bardyn, T. P., Patridge, E. F., Moore, M. T., & Koh, J. J. (2018). Health sciences libraries advancing collaborative research data management in universities. Journal of eScience Librarianship, 7(2). doi: 0.7191/jeslib.2018.1130
- Baryshev, R. A., Tsvetochkina, I. A., Babina, O. I., Kasyanchuk, E. N., & Manushkina, M. M. (2020). Transformation of university libraries during the digital era. Journal of Siberian Federal University: Humanities & Social Sciences, 13(7), 1073-1089. doi: 10.17516/1997-1370-0627
- Charmaz, K. (2006). Constructing grounded theory: A practical guide through qualitative analysis. London, UK: Sage.
- Chattha, U. A., Janjua, U. I., Anwar, F., Madni, T. M., Cheema, M. F., & Janjua, S. I. (2020). Motion sickness in virtual reality: An empirical evaluation. IEEE Access, 8, 130486-130499. doi: 10.1109/ACCESS.2020.3007076
- Chen, C. M., & Tsai, Y.-N. (2012). Interactive augmented reality system for enhancing library instruction in elementary schools. Computers & Education, 59, 638-652. doi:10.1016/j.compedu.2012.03.001
- Cho, J. Y., & Lee, E. (2014). Reducing confusion about grounded theory and qualitative content analysis: Similarities and differences. The Qualitative Report, 19(32), 1-20. doi: 10.46743/2160-3715/2014.1028
- Chow, A. S., Baity, C., Zamarripa, M., Chappell, P., Rachlin, D., & Vinson C. (2012). The information needs of virtual users: A study of Second Life libraries. The Library Quarterly, 82(4), 477-510. doi: 10.1086/667436
- Clement, J. (2023, Feb 3). Global active users of Meta Horizon Worlds VR platform 2022. Statista. https://www.statista.com/statistics/1362347/meta-horizon-worlds-users/
- Condic, K. S. (2009). Using Second Life as a training tool in an academic library. The Reference Librarian, 50(4), 333-345. doi:10.1080/02763870903096419
- Corbin, J., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. Qualitative Sociology, 13(1), 3-21.
- Dey, T. (2012). Cybrarian: The librarian of future digital library. International Journal of Information Dissemination and Technology, 2(3), 209-201.
- Glaser, B., & Strauss, A. (1967). The discovery of grounded theory: Strategies for qualitative research. London, UK: Weidenfeld & Nicholson.
- Grassian, E., & Trueman, R. B. (2007). Stumbling, bumbling, teleporting and flying... librarian

Jonathan M. Hollister International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024) 131

avatars in Second Life. *Reference Services Review*, 35(1), 84-89. doi: 10.1108/00907320710729373

- Greene, D., & Groenendyk, M. (2018). Blurred lines-between virtual reality games, research and education. http://library.ifla.org/id/eprint/2133/1/075-greene-en.pdf
- Griffin, A., (2021, October 29). Facebook changes name to 'Meta' as it focuses on metaverse and tries to move on controversies. *Independent*. https://www.independent.co.uk/life-style/gadgets-and-tech/facebook-meta-name-new-metaver se-b1947245.html
- Hannah, M., Huber, S., & Matei, S. A. (2019). Collecting virtual and augmented reality in the twenty-first century library. *Collection Management*, 44(2-4), 277-295. doi:10.1080/01462679.2019.1587673
- Hill, V., Vans, M., & Dunavant-Jones, A. (2017). Metaverse libraries: Communities as resources. Journal of Virtual Studies, 8(2), 27-37.
- Hollister, J. M. (2019). An ethnographic study on digital literacy practices of role-players in a massively multiplayer online role-playing game. *Journal of the Korean Library and Information Science Society*, 50(4), 429-467. doi: 10.16981/kliss.50.4.201912.429
- Hollister, J. M., & Lee, J. (2022). An exploratory study on virtual reality and related technologies in terminal LIS degree programs in the United States and South Korea. *International Journal* of Knowledge Content Development & Technology, 12 (Special Issue), 85-106. doi: 10.5865/IJKCT.2022.12.S.085
- Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288. doi: 10.1177/1049732305276687
- Kim, B. (2020). Moving forward with digital disruption: What big data, IoT, synthetic biology, AI, blockchain, and platform businesses mean to libraries. *Library Technology Report*, 56(2). doi: 10.5860/ltr.56n2
- Kim, J. S., Kim, S. J., Park, S. N., Shin, J. W., & Kwon, S. Y. (2021). A study on the development of VR-based education and culture program in public libraries. *Korean Society for Information Management*, 38(2), 87-112. doi: 10.3743/KOSIM.2021.38.2.087
- Kwon, S. Y., & Koo, J. H. (2020). University librarians' perception and Nneeds assessment of library services development applying virtual/augmented reality (VR/AR) Technologies. *Journal* of Korean Library and Information Science Society, 51(40), 375-403. doi: 10.16981/kliss.51.4.202012.375
- Kwon, S. Y. (2019). College students' needs and perception assessment to apply virtual reality (VR) techniques to library services. *Journal of the Korea Convergence Society*, 10(5), 141-148. doi: 10.15207/JKCS.2019.10.5.141
- Lee K. J., King, W. E., Dahya, N., & Lee, J. H. (2020). Librarian perspectives on the role of virtual reality in public libraries. *Proceedings of the Association for Information Science* & Technology, 57, (e254). doi:10.1002/pra2.254
- Lee, J., Hollister, J. M., Lim, T., Kim, K., & Ryu, J. (2022). A case review for the design of VR-based training for enhancing empathy and cultural competency of public librarians. *International Journal of Knowledge Content Development & Technology, 12*(Special Issue),

Jonathan M. Hollister 132 International Journal of Knowledge Content Development & Technology Vol.14, No.4, 113-133 (December, 2024)

107-134. doi: 10.5865/IJKCT.2022.12.S.107

- Lee, M. Y. H. (2021, November 28). Seoul wants to build a metaverse. A virtual New Year's Eve ceremony will kick it off. The Washington Post. https://www.washingtonpost.com/world/asia pacific/metaverse-seoul-virtual/2021/11/27/039 28120-4248-11ec-9404-50a28a88b9cd story.html
- Lessick, S., & Kraft, M. (2017). Facing reality: The growth of virtual reality and health sciences libraries. Journal of the Medical Library Association, 105(4), 407-417. doi: 10.5195/jmla.2017.329
- Lim, S. K. (2021). Virtual reality-based library user education program development. Journal of Information Science Theory and Practice, 9(4), 63-74. doi: 10.1633/JISTaP.2021.9.4.5
- Lischer-Katz, Z., Cook, M., Hall, N., Hardesty, J., Wittenberg, J., Johnson, J., ... & Carlisle, T. (2019, September). Supporting virtual reality and 3D in academic libraries: defining preservation and curation challenges. International Conference on Digital Preservation.
- Maher, C. (2020, March 18). This Minecraft library is making censored journalism accessible all over the world. The Verge. https://www.theverge.com/2020/3/18/21184041/minecraft-library-censored-journalim-reporte rs-without-borders
- Meta Quest Blog. (2024, Jun 25). Meta Horizon Worlds v168 release notes. https://www.meta.com/blog/quest/meta-horizon-worlds-v168-release-notes/
- Meta. (2024a). Meta Horizon. https://horizon.meta.com/
- Meta. (2024b). Meta Horizon Worlds. https://www.meta.com/experiences/meta-horizon-worlds/2532035600194083/
- Meta. (2024c). Meta Horizon Worlds Creator Monetization Partner Program. https://www.meta.com/help/quest/articles/horizon/create-in-horizon-worlds/creator-monetizati on-partner-program/
- Meta. (2024d). Supported countries for Meta Horizon Worlds. https://www.meta.com/help/quest/articles/horizon/explore-horizon-worlds/horizon-supportedcountries/
- Mon, L. M. (2012). Professional avatars: Librarians and educators in virtual worlds. Journal of Documentation, 68(3), 318-329. doi:10.1108/00220411211225566
- Moore, M. T., Bardyn, T. P., Garrett, A., Ruhl, D., & Meerovitch, G. (2018). Virtual Reality in Academic Health Sciences Libraries: A Primer. University of Washington Libraries. http://hsl.uw.edu/vr-studio
- Mozilla.org. (2024, Jul 11). End of support for Mozilla Hubs. https://support.mozilla.org/en-US/kb/end-support-mozilla-hubs
- Napa, S., Moore, M., & Bardyn, T. (2019). Advancing cardiac surgery case planning and case review conferences using virtual reality in medical libraries: Evaluation of the usability of two virtual reality apps. JMIR human factors, 6(1). doi: 10.2196/12008
- Noh, Y. (2014a). A study analyzing Y Generation users' needs for next generation digital library service. Journal of the Korean Society for Information Management, 31(3), 29-63. doi:10.3743/KOSIM.2014.31.3.029

- Noh, Y., & Kim, D. (2022). A study on social perceptions of public libraries utilizing the sentiment analysis. *International Journal of Knowledge Content Development & Technology*, 12(4). https://journals.sfu.ca/ijkcdt/index.php/ijkcdt/article/view/673
- Noh, Y., Kang, P. S., & Kim, Y. J. (2020). A study on the activation measures of library's online services to overcome COVID-19. *Journal of Korean Library and Information Science Society*, 51(4), 185-210. doi:10.16981/kliss.51.4.202012.185
- Noh. Y. (2014b). A study suggesting the development direction of the next generation digital library. Journal of the Korean Society for Information Management, 31(2), 7-40. doi: 10.3743/KOSIM.2014.31.2.007
- O'Leary, Z. (2005). Researching real-world problems: A guide to methods of inquiry. Newbury Park, CA: Sage Publication.
- Park, T. Y., Gang, J. Y., Kim, Y., Kim, T. K., & Oh, H. J. (2018). A Study on the Librarians' Perception about the Future Libraries in the era of the 4th Industrial Revolution. *Journal* of the Korean Society for Library and Information Science, 52(1), 203-229. doi:10.4275/KSLIS.2018.52.1.203
- Parry, J. (2008). Librarians do fly: Strategies for staying aloft. *Library Management*, 29(1/2), 41-50. doi:10.1108/01435120810844630
- Pickard, A. J. (2013). Research methods in information [2nd ed.]. London: Facet Publishing.
- Roth, E. (2023, Jan 22). Altspace VR is shutting down as Microsoft's mixed reality division shrinks. *The Verge.*

https://www.theverge.com/2023/1/21/23565188/altspace-vr-shutting-down-microsoft-layoffs

- Schutt, R. K. (2009). Investigating the social world: The process and practice of research [6th ed.]. Pine Forge Press.
- Smith, F. A. (2019). Virtual reality in libraries is common sense. *Library Hi Tech News*, 36(6), 10-13. doi: 10.1108/LHTN-06-2019-0040
- Stephenson, N. (1992). Snow crash. Bantam Spectra.
- Tudin, S. (2016). The benefits of an Enrichment Mini Course for millennials in the library's Discovery Centre. *Carleton University*. https://ir.library.carleton.ca/pub/10695/
- Webber, S., & Nahl, D. (2011). Sustaining learning for LIS through use of a virtual world. *IFLA Journal*, 37(1), 5-15. doi: 10.1177/0340035210397137

[About the author]

Jonathan M. Hollister has a MS and PhD in Library and Information Studies from Florida State University. His research focuses on digital literacies and social information behaviors in recreational popular media, such as online games, graphic novels, and other works of fiction, as well as the professional development of library and information science (LIS) faculty and practitioners, theory development and use in LIS, and the applications of games and extended reality (XR) technologies in LIS contexts. He is an associate professor in the Department of Library, Archive, and Information Studies at Pusan National University.