VIRTUAL REALITY
IN PUBLIC LIBRARIES

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Original illustrations courtesy of Pixabay
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This research was generously funded by Washington State Libraries, Office of the Secretary of State, and Oculus.

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Proposed reference:

Dahya, N., Lee, J.H., Lee, K.J., King, W.E., Goel, M., & Yassin, H. (2019). ***Virtual reality in public libraries.*** Retrieved from https://ischool.uw.edu/vrinlibraries

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EXECUTIVE SUMMARY

(1) Patrons and librarians carried preexisting and often persistent perceptions and beliefs about virtual reality. These beliefs were distinct from their actual experiences with VR in the library.

- Research participants believe that VR is a tool to support learning, empathy, and engagement.
- Librarians and patrons alike believe that VR is an expensive piece of technology that is not yet a necessity.
- Some participants expressed concerns about potentially negative impacts of VR on physical and mental health.
- Research participants had limited ideas about VR as a tool for social engagement.

(2) Patron and librarian experiences with VR programs centered on immersion and learning about VR technology.

- Patrons overall had positive experiences with VR.
- Many patrons experienced an intense sense of immersion described as being transported to a different world.
- Some felt disorientation, specifically with the duality of how real and simultaneously unreal the VR experience can be.
- Some VR experiences can cause disorientation or dizziness.
- VR inspired curiosity to learn.
- Patrons learned more about VR technology than VR content.
- Patrons had a range of opinions regarding the ease of using VR.

(3) There were various connections made between VR and video games by patrons and librarians.

- Many patrons saw VR as an extension of video games, with a few new qualities.
- Patrons and librarians had mixed feelings about VR as a social tool, sometimes imagining it as a tool for social engagement and other times for social isolation.
- Existing gender and racial divisions in video gaming surfaced in relation to who used VR and how people perceived VR users.

(4) Patron demographics and identities were examined to understand if and how VR could support equity and access to this technology.

- White boys and men, as well as video game players, often tried VR in the libraries.
- More research may be needed to understand the value of VR for non-White communities.
- VR is believed to be a strong tool for social equity without clear supporting evidence.
- We had few chances to test VR's capacity to interrupt marginalization of ethnoracial minorities using VR programs.
- We need to carefully consider the complexity of class and how people are imagining the value of VR, particularly with regard to accepting VR as a replacement for reality in the face of poverty.
- VR's impact on individuals with disabilities varied significantly and requires additional support from librarians.

(5) Through this study, we identified a number of practical and programmatic findings to inform future VR library programs.

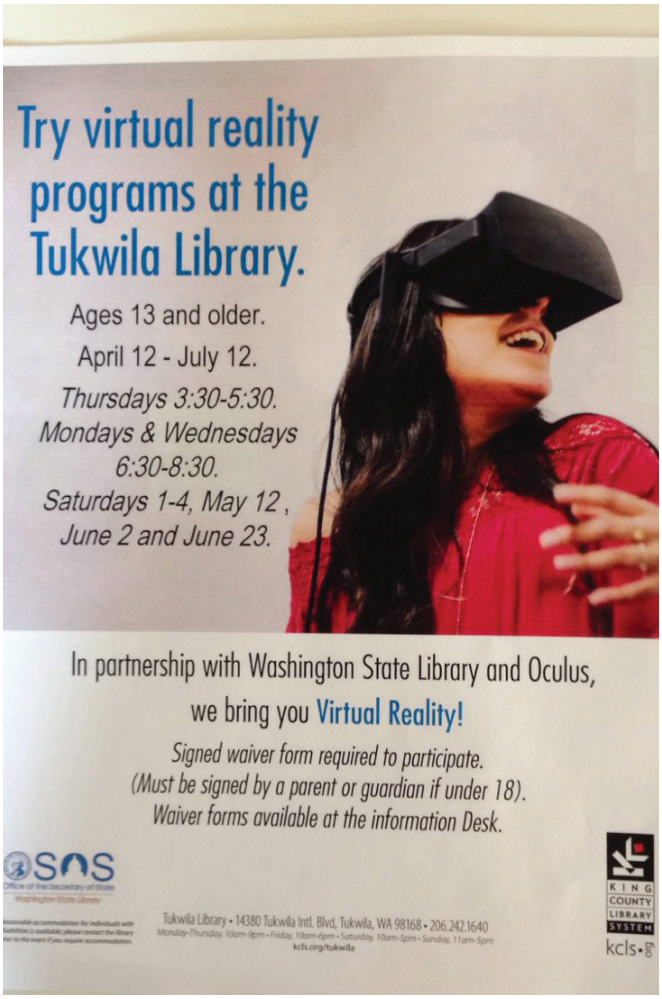
- The belief that VR is more for teens and "techie" people and "probably not for me" was broken down when a new patron tried VR.
- Librarians require ample time and planning to put together good quality VR programs.
- The age restriction (13+) was disappointing for tweens, and other activities are important to maintain their engagement while waiting for friends or siblings.
- The physical space where VR is set up can have an impact on program success and recruitment; librarians need to think carefully about space, privacy, sound, and visibility.
- A thoughtful promotion and outreach plan that informs the public about why they should be interested in VR is important to garner public interest.

INTRODUCTION

Virtual reality (VR) has been envisioned as a tool for learning–from job skills training to exploring the human body and outer space–as a means of youth engagement and as an opportunity to defy the rules and consequences of the real world. VR has also been described as a technology that can bring people together across geographic boundaries, revolutionize common workplace practices such as meetings, and enhance formal education and learning. At the same time, VR is seen as an elite, cutting-edge technology not yet available to the masses. Public libraries are key locations for making VR technology more accessible to the public, exploring its role in supporting community engagement, and understanding its potential to offer informal as well as more structured learning opportunities. In 2018, Washington State Libraries, the VR technology company Oculus, and the University of Washington Information School came together to explore the role of VR technology in the public library.

To understand the role of VR in library education programs, researchers from the University of Washington conducted a study in Washington state public libraries. The goal of the project was to better understand the impact of offering VR in public libraries, with a focus on community engagement and informal learning. We conducted a case study of seven library sites using qualitative research and mixed methods to understand the meanings librarians and patrons associate with VR and learning in the context of libraries, including their perceptions of the potential uses of VR, as well as why they think it is important to have VR in libraries. Participating libraries include King County Library System (Federal Way; Tukwila), Mount Vernon City Library, Puyallup Public Library, Richland Public Library, and Timberland Regional Library (Shelton; Hoquiam). Each library was responsible for its own programming, and Oculus provided a suggested list of educational games and experiences that were freely available. The field sites chosen reflect the diversity and variety of libraries in the state, and include urban sites as well as regional and rural sites.

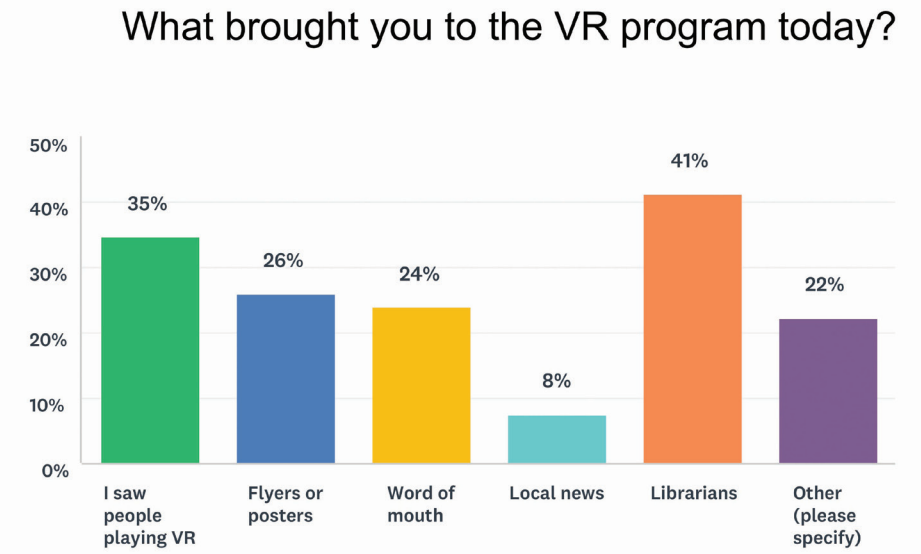
We interviewed 23 librarians at the start and end of the project (36 interviews total) from participating sites,



including those who were involved in the day-to-day VR programming and a few in administrative roles who were not directly involved in facilitating VR experiences but had some goals or visions of how VR might be used in each library. Approximately 400 patrons experienced VR throughout the study period, with some patrons coming back to try VR as many as five times. After experiencing VR, patrons were invited to complete an online survey and participate in an interview with one of the researchers. We collected 185 survey responses and interviewed 39 patrons. We conducted site visits from March 2018 through June 2018 to observe patrons using VR and the overall structure of the programs. In this report, we present a summary of our research findings as well as practical recommendations for public librarians who are interested in offering access to VR technologies in their libraries.

SURVEY RESULTS

After experiencing VR, 185 patrons completed a survey about their experience. All seven libraries offered patrons the opportunity to complete the survey, with 28% of responses collected from Hoquiam, 19% from Puyallup, 16% from Tukwila, and less than 10% of total survey respondents from each of the other library sites. The higher response rates from Hoquiam, Puyallup, and Tukwila are likely attributed to a variety of factors, including programming and library location.



There were slightly more males (53%) than females (45%) who took the survey, while two percent identified as having non-binary gender identities or wrote in a custom gender identity. Of the survey responses, 60% were from teens and people in their 20s, with 12% of respondents in their 30s, nine percent in their 40s, eight percent in their 50s, and 10% in their 60s and above. We invited survey respondents to self-identify their ethnoracial designation, and responses included more than half identifying as White (69%), followed by Hispanic (13%), Asian (7%), Indigenous (6%), African American (5%), or mixed (10%). These demographics align closely with population trends of the state, which reports that the Hispanic/Latino population has reached 13.1% of the population in 2018 and 8.8% identify as Asian.[1]

The majority of the survey respondents (81.6%) reported that they play video games, with around 35% playing games almost every day or a few times a week. In our interviews, we inquired about video games further and discuss our findings in the section on VR, games, and video gaming culture.

The respondents stated that the librarians were the strongest factor for bringing people into the library VR programs (41%) followed by seeing other people playing VR (35%). Flyers, posters, word of mouth, and online information were noted as other forms that brought respondents to the libraries to use VR.

Nearly everyone surveyed (99%) reported that they enjoyed their VR experience at the library, with 84% reporting that they "really enjoyed it." This is consistent with our interview findings that most research participants were excited about using VR. The most used application was First Contact, which we recommended because it is highly interactive and offers a smooth learning process for first-time users. Among the respondents, 69% were first-time users, with 31% having tried VR before.

From their VR experience at the library, 97% of respondents reported that they learned about using VR technology and 78% learned about the content of the VR experience (i.e., topic of the game or experience). However, our findings from patron and librarian interviews complicate these survey results and are discussed throughout this report. Overwhelmingly, survey respondents were in favor of continuing VR programming at their library.

1 State population statistics from https://www.ofm.wa.gov/washington-data-research/statewide-data/washington-trends/population-changes/population-race.

PERCEPTIONS & BELIEFS ABOUT VIRTUAL REALITY

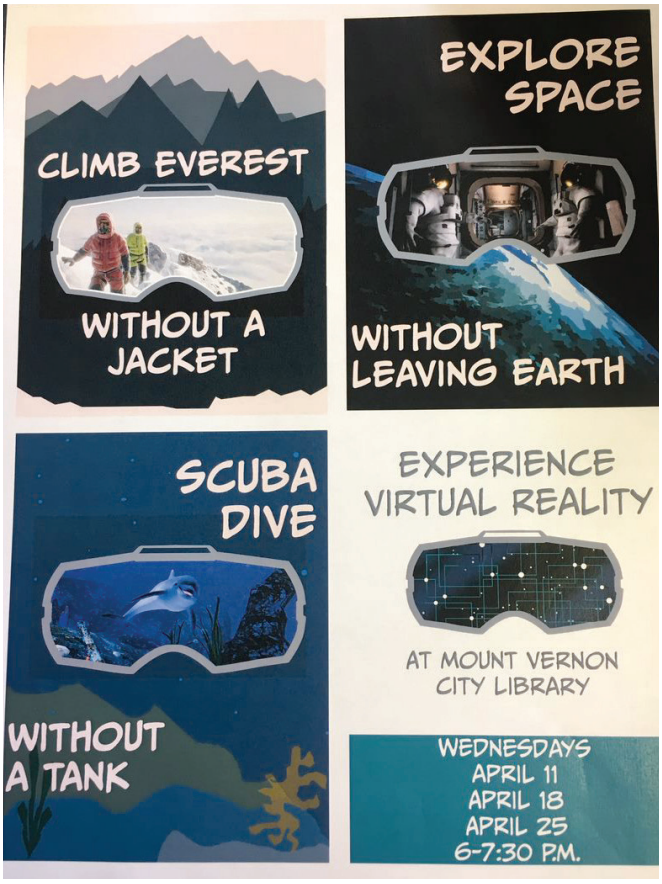
In our study we asked librarians and patrons for their thoughts on VR in regard to how they might use the current technology and what they envision VR could or could not do. The conversations revealed our research participants' perceptions of the technology, including informed speculations about cost and prevalence, imagined possibilities for learning, and concerns about mental health.

Perceptions about learning, empathy, and engagement through VR.

Research participants expressed strong interest and hope in the possibilities VR might afford in the future, even though the actual experiences of librarians and patrons throughout this study did not directly support many of these interests and hopes. For example, many research participants discussed their beliefs about developing empathy and engaging in empathy-building experiences through VR.

Research participants talked about how people could visit war zones, refugee camps, and understand the perspective of people with autism through VR, although these types of VR experiences were not part of those provided to the libraries in this study. Some librarians described how engaging in these types of programs could serve as a foundation to expanding someone's knowledge and empathy.

Our research shows no clear evidence of empathy building through the type of drop-in and short-program VR engagements that were available in the library. Additionally, we note that there lacks a clear definition of what constitutes



> "I would say it'd be a wonderful idea to have someone experience another person's life through their eyes … 'This is how I'm living my life.'"
>
> *– Library patron*

empathy and empathy building across participants interested in this conversation. We engage further in discussion about this through the findings on learning, considering patron self-reports about what they learned (or did not learn) through their VR experiences.

Many research participants also talked about VR being used as an additional tool for school-aged students to do school work. Others considered VR as a therapeutic tool to escape from reality and simulate a calming environment. Some speculated on how the tool could have a practical use for job training (e.g., building a car or practicing surgery). Research participants carried strong beliefs that the "virtual" nature of VR experiences could create a "safe space" where a person might practice skills in an environment that is forgiving of failure.

Most research participants–especially first time VR users–were amazed by the immersive and interactive experience that VR can provide and focused on how VR could help overcome constraints related to time, money, and physical limitations. The idea that people could visit a different location in the world through VR fascinated people. Additionally, visiting places such as outer space, underwater, and inside the body, as well as fictional or imagined places, was mentioned by research participants as something people would likely enjoy and from which they might benefit.

Finally, some research participants imagined VR being used to support accessibility; for instance, by allowing senior populations with various motor impairments to be able to visit familiar places in VR. These many hopes and imaginings about the possibilities for VR were strong among research participants after their use of VR even if the programs they were able to try did not engage them in something therapeutic, in a training program, or in ways that defied the realities of their physical mobility. We want to highlight here that there is a gap between what people believe VR is capable of and what they actually experienced in VR in the library.

An expensive piece of technology, not yet a necessity.

Research participants frequently commented on the perceived costs of VR technology. For the majority of participants, VR was still seen as an expensive piece of technology and a luxury item as opposed to a necessity. This was true among people who felt that the technology cost $150 and those who thought it cost over $1,000. Interestingly, many people did speculate about VR becoming more pervasive in the not-so-distant future. While patrons acknowledged that free access to VR in the library is important for people who can't afford it, many still questioned why they should try it now. The social value and purpose of VR in the public eye are still unclear. Librarians were also concerned about the required maintenance of the technology–such as constant updates and the need to purchase newer platforms–and both librarians and patrons questioned if the novelty of the experience would wear off over time.

Concerns about potentially negative impact on physical and mental health.

Despite the many positive outcomes research participants imagined for VR technology, there were also several

worries. One major concern was about the impact VR could have on physical and mental health. Regarding physical health, patrons were concerned that prolonged use of VR could have negative impact on vision and that even minimal use might cause nausea or seizures. Some librarians and patrons were worried that VR could make people more anti-social and that the virtual experiences could be so engrossing that people might become removed from the real world as they spent more time in VR.

Research participants commented on the importance of real, physical, lived experiences, and expressed hesitation about VR becoming a replacement. In these ways, there was a certain amount of ambivalence in librarian and patron perceptions about what VR could and could not do for learning and community engagement, and in relation to social life.

Limited perceptions and ideas about VR and social engagement.

Librarians and patrons largely believed that VR could be a powerful social tool to connect with others around shared interests and across geography. Generally, perceptions about VR's social capacity were positive, especially for getting young people involved. These discussions with librarians and patrons were focused on using existing VR experiences, sometimes together in a shared VR environment. There was no discussion about the social potential of co-creating VR programs or co-designing art using programs such as Quill (3D illustration) or Medium (3D sculpting). We make note of this to expand the purview of what is possible in regard to social engagements and VR.

In interviews, librarians and patrons also expressed an interest in exploring different communities and experiences through VR to garner richer perspectives about the world. This includes the idea of "walking in someone else's shoes." Much like the idea of building empathy, this perception or belief about VR's role in shared and sharing experiences is complex. The depth of consideration for what it might mean to "walk in someone else's shoes" or how to ensure that happens meaningfully and responsibly was not widely discussed in interviews for this study and warrants further attention when discussing this possibility in the future of VR. The actual social experiences of patrons using VR in the library opens the following section on patron experiences.

VR EXPERIENCES: IMMERSION & LEARNING

In our analysis of library site visits and observations along with survey data and interviews, we distinguished between participants' statements of their perceptions, ideas, and beliefs about VR and their actual VR experiences in the library. These findings about people's actual experiences are organized under sub-themes related to social engagements, experiences of immersion in virtual worlds, learning, and video gaming. They are presented following the preceding section on perceptions and beliefs to contrast how people thought about VR with how they experienced it.

Patron engagements around VR experiences.

The actual social experiences of patrons with VR were fairly clear. In some cases, particularly among youth patrons, social interactions around and about VR were influenced by preexisting social dynamics of the group coming into the library. If a group of friends came into the library together, they typically either all did or all did not try the technology. At the same time, when people did try VR, it generated some conversation around that experience for spectators, including among people who might not otherwise have talked to one another. People responded and reacted to what was happening in VR, as shown on an outward-facing display screen, and onlookers had fun interacting with and around the person in VR. This social engagement was described as a happy surprise to patrons and librarians. Many people also commented on the individual and isolating experience of being a single VR user and of being watched while in VR, where you cannot see the people around you. Although this sensation generated some discomfort for certain patrons, overall they still

> My daughter, she did the Google Earth, and she was looking at a village in Tuscany, and stuff like that, and she's like, 'Oh, Mom. You know, that makes me wanna go to Europe that much more.' And I may not be able to take her to Europe, but through VR, she might be able to experience it a little bit.
>
> *– Library patron*

expressed that the benefits of having VR in a public space where people could get interested in and chat about the experiences outweighed feelings of self-consciousness.

Intense immersion and being transported to a different world.

One of the unique qualities of the VR experience is providing people an opportunity to forget the world around them, if only for a moment, and to engage, remember, or learn something through a more intense and visceral experience. Research participants reported having a strong sense of immersion during their VR experience, describing their sensation as "feeling like it was real" or "feeling as if they were really there."

In addition to immersion, interactivity in VR was often mentioned as a favorite element of the experience, with many patrons preferring simulations where they could touch or control objects and interact with the environment in some way rather than simply watching or following a story. In some cases, this ability allowed research participants to imagine themselves in a completely different situation from their reality, such as one patron who was in a wheelchair describing her feeling as if she could get up and walk.

A few VR users expressed having a sense of empowerment or ownership over the virtual world, being in a space where they could have control and could imagine being able to do anything. Some suggested interesting ideas for using VR for social engagement, such as sharing their past travel experiences with other people by showing the places they had visited in a VR app such as Google Earth.

Feelings of disorientation: Real but not completely real.

Some research participants reported duality and fragmentation in their VR experience; patrons expressed a sense of wonder at how real the experiences felt and were simultaneously aware that what they were experiencing was not real. In some cases, people felt confused when their interaction with virtual objects did not align with their real-world expectations, such as when patrons could walk through virtual objects. A few participants talked about having to remind themselves that what they were experiencing was not real, despite the multisensory and immersive VR experience, resulting in a bit of disorientation.

Learning experiences: VR inspired curiosity to learn.

VR in the public space gives patrons the opportunity to become familiar with the technology. The most significant accounts of learning came from repeat patrons, who were able to master skills, gain more knowledge of controls, and recollect specific content from the VR experience. Notably, there was more learning about the technology, including how to use it, than about the content of the VR experiences. Learning about the technology inspired curiosity about what kind of VR experiences are available as well as about the VR industry overall, including developing VR apps. Whether wearing the VR headset or watching others using VR, patrons were learning from one another and helping one another navigate these immersive experiences.

A challenge to documenting learning outcomes from these VR experiences relates to patrons not going into VR experiences with the goal or expectation to learn, as well as librarians not approaching their own programming with specific learning outcomes in mind. Introductory programs such as First Contact and Dreamdeck afforded patrons opportunities to learn how to use VR and navigate a VR environment, while other programs available through the pilot study offered experiences to learn specific content, such as exploring the ocean through Ocean Rift, learning about the inner body in Body VR, and journeying to outer space with Star Chart.

In any educational programming, if learning is indeed the goal, having clear learning outcomes and a structured process for teaching and learning engagements (curriculum and pedagogy) is important. With that in mind, however, we also note that there is value in patrons learning about VR technology itself. Formal or prescriptive learning related to specific subjects or content does not need to be the focus of VR programming in the library to make it worthwhile. The question remains, perhaps, as to what exactly libraries want to promote as the value of this tool and these programs for patrons where many possibilities abound.

Differing opinions on ease of use.

Some users reported that having VR in libraries presented a low barrier of use due to the technology's easy access in the public space. Other patrons perceived VR to have a high barrier of use due to the learning curve the technology itself presented. Although some found it to be as easy as putting on the headset and watching a video, others found that they had to learn how to use the controls and get used to the environment, and overall found it not to be "the right natural movement." There was a strong belief that VR is a gaming tool and therefore an easier technology for gamers to get accustomed to–for example, in learning the controls.

Emotional responses and physical reactions: More hesitant of using VR before than after.

VR was seen as a new technology inducing fear or anxiety for some patrons before and during their experiences. A few patrons expressed anxiety about physically running into people around them, whom they could not see while they were in VR. Others were frightened by the content of the Dreamdeck experience, which offered short VR scenes including a simulation of standing at the top of a tall building as well as being chased by a T-Rex dinosaur. Librarians were aware of this subject matter and were trained to inform patrons about it beforehand. Some patrons who were anxious about trying VR often became less anxious as they watched others.

Some VR experiences can cause disorientation or dizziness.

Concerns about physical reactions were founded. Some research participants reported falling down, running into

people, or experiencing dizziness or nausea. A few participants mentioned feeling disoriented and had to sit down or leave the experience. All VR participants were given a waiver to sign that informed them of the risks of participation before they tried VR, and librarians also gave verbal instructions and warnings about specific content, especially for users who expressed concerns.

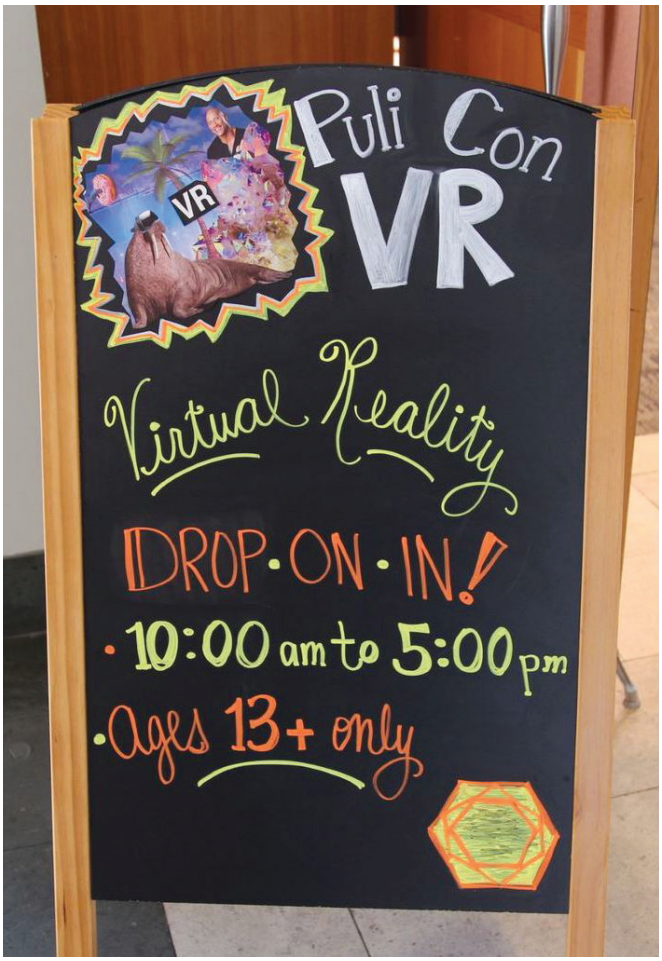
Most patrons were excited about their VR experience.

Librarians noted that initially there were fewer people "lining up" and excited to try VR than they expected. Even so, most patrons who did try VR reported some level of enthusiasm and amazement. Most users wanted to share their excitement about VR by inviting friends and family to try it for themselves. Others wanted to come back and use it again and a few asked about how they could purchase VR equipment for themselves.

VR, GAMES, & VIDEO GAMING CULTURE & INDUSTRY

Patrons saw VR as an extension of video games.

For many patrons and librarians, VR's use was often associated with a game console such as a Nintendo Wii or a PlayStation rather than with a computer or an iPad. Some raised concerns about the VR gear becoming outdated as quickly as other gaming consoles, and questioned how often they would have to purchase updated gear, how long they would be able to use the current model, how long companies would provide the updates and continue to support it, and how much backward compatibility the software might have. Librarians also were uncertain if VR would become something more or different than yet another gaming console. Several participants expressed disappointments about how educational games are typically just not fun to play and therefore not appealing. Some believed that perhaps VR games in the future might be more interactive and could support multi-users, to make such games more enjoyable. Some also tried to imagine how their favorite video games might look in the VR environment.



Patrons had mixed feelings about VR as a social tool.

There were mixed opinions on the effectiveness of video games and VR–sometimes seen as an extension of video games–as social tools. Some valued the potential of video games to bring people with shared interests together and imagined how these experiences could look in VR, such as gathering with friends and watching videos inside the VR environment. Others questioned if engagement with video games, and especially in VR, would intensify anti-social behavior by taking away time from interactions with people in real life. Some parents, who said they perceived video games to be isolating children as they become more screen focused and addicted to gaming, preferred them to experience things in real life rather than inside a video game, and worried that VR might exacerbate isolation.

ENGAGED COMMUNITIES: PATRON IDENTITIES & DEMOGRAPHICS

In our research we identified differences between perceptions about who would most enjoy VR and who actually used VR in the library programs. These perceptions about users and the evidence about engagement in the VR programs were fairly well aligned, particularly in regard to young people, who did show enthusiasm for using VR. Surprising to many librarians was that senior library patrons who tried VR also enjoyed it.

Boys and men as well as video game players tried VR in the libraries often.

Patrons and librarians alike believed that boys and men as well as people with experience playing video games would be most interested in using VR. This proved to be true, and our research shows that experience with video games and self-identifying as a video game player were often defining characteristics of people using VR in the library. Girls who tried VR also enjoyed it, but fewer girls than boys expressed interest in engaging with the library VR programs. Librarians noted that patrons with previous gaming experience using other consoles were more likely to want to try the VR in the library. These observations surfaced some obvious concerns related to access and equity in a

video gaming landscape, where the stereotypical image of a video game player remains white and male (despite statistics not supporting this reality in the gaming world, with more gamers who are female and people of color).[2] Some also expressed very stereotypical ideas about what male versus female game players prefer, such as the notions that boys like shooting things and girls like exploring things; however, our actual user data based on observation and interviews did not support these assumptions at all.

2 2019 Sales, Demographic, and Usage Data. Essential Facts about the Computer and Video Game Industry. Entertainment Software Association. http://www.theesa.com/wp-content/uploads/2018/05/EF2018_FINAL.pdf

More research needed to understand the value of VR for non-White communities.

According to librarian interviews and patron survey data, the majority of patrons using VR in the library during this study period were White. One exception was at the Tukwila Public Library, which serves a patron population comprising predominantly non-White communities, both long-standing American people of color and more recent immigrants and refugees. In this case, it is important to note that VR programs were highly successful and that the case study of Tukwila suggests that VR programs were simply of interest to the most prominent and regular existing library patrons.

Some librarians noted that they struggled to get non-White communities, especially new immigrants and refugees, into the library altogether. Some also expressed a belief that immigrant and refugee families do not necessarily see the value in VR for themselves or their children. Importantly, signing legal waivers of use and research consent forms may have been a barrier to participation. Our study team did translate research documents into Somali, Russian, Korean, and Spanish to mitigate this problem, though only a few research forms in these languages were returned to us.

Few chances to test VR's capacity to interrupt marginalization of ethnoracial minorities.

Many librarians and some patrons believed that VR technology could be used to share experiences and broaden the view of White and/or Western-centric people through VR experiences about other places, cultures, or by "walking in someone else's shoes". Other interesting ideas included immigrant communities using VR to visit their homelands and share a more immersive view of their worlds. None of these ideas were explored through the experiences available, and with few non-White patrons, there was no opportunity to study these ideas. Our review of existing literature also suggests more research in this area is needed to identify if these types of equity-oriented ideas can be realized.

Complex considerations related to class and the value of accessing VR in the library.

Making VR available through the public library was, from the outset, intended to be an access and equity project. This project was in service of those community members who might not otherwise have exposure to VR through their social and professional networks, and for those who cannot afford to purchase a VR system.

Findings from this study complicate this effort in several ways. Patrons were excited about using VR to travel and have experiences otherwise unavailable to them from the standpoint of access to resources. Yet critical discussions about the limits of such an alternative to physically traveling the world were overlooked. The use of Google Earth to "travel" was very popular. However, there were no examples of people questioning how these experiences are designed and curated by their corporate creators (i.e.,

> I definitely saw more excitement with learning through VR, both from the teens and adults. From adults especially, I heard multiple times that, 'If this had been around when I was in school, I would have done so much better.'
>
> *– Librarian*

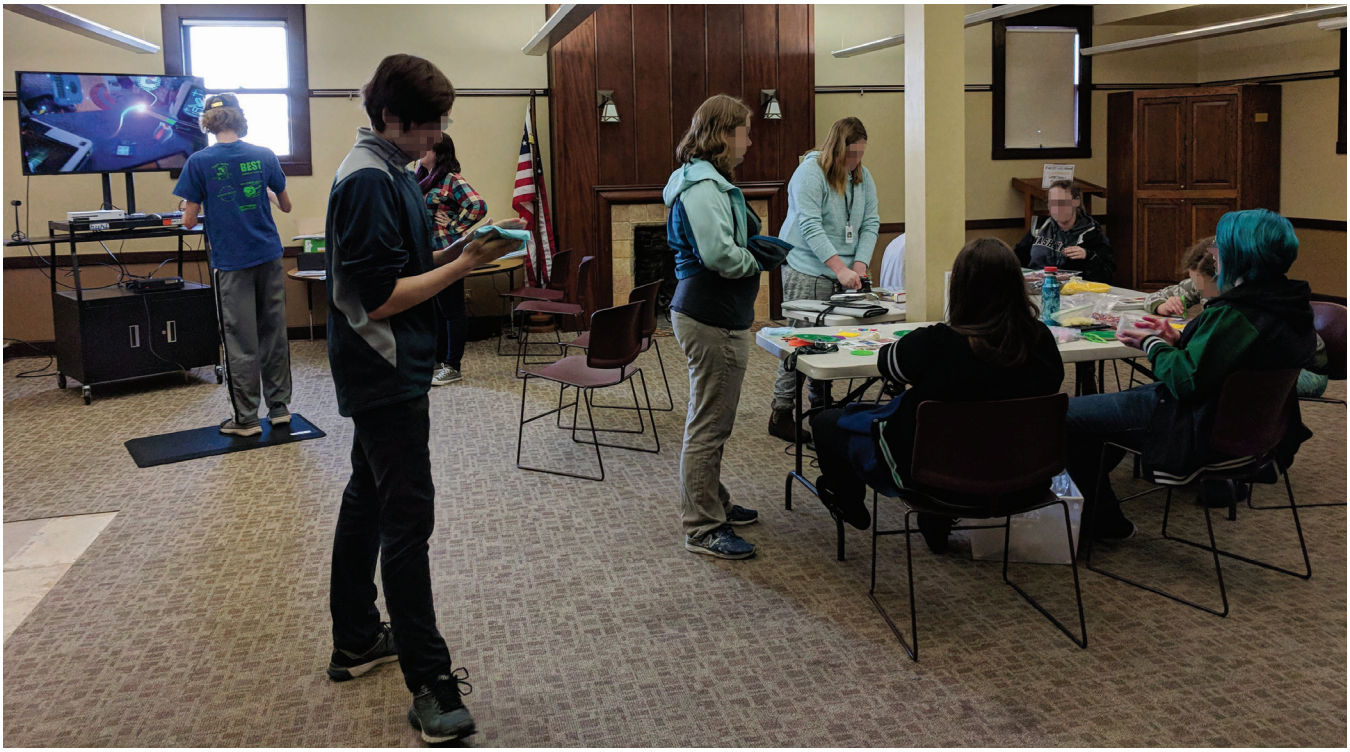
Google). There was also a seeming acceptance of wealth inequality and lack of opportunity as the inevitable future, with VR being the answer to this growing gap.

VR's impact on individuals with disabilities varied significantly.

Findings on the use of VR for people with differing physical and cognitive abilities were complex. Librarians believed that people with motor impairments could benefit from VR experiences such as climbing Everest or traveling the world. One example of this was documented in a library program where a patron in a wheelchair and with limited hand and arm mobility was enthralled by her VR experience. In this case, it should be noted that the librarian used the hand controls on behalf of the patron who wore the headset, highlighting the importance of a collaborative, supported experience. In a different library and observation, a group of young people with cognitive disabilities ranging from autism to Down syndrome came to the library to try VR. Some enjoyed it, but others pulled off the headset immediately.

Belief that VR could support learning for people with nontraditional learning styles.

Librarians and patrons believed that VR could support learning for individuals with nontraditional learning styles–those who are not inclined to sit in a classroom or learn from a book. As noted, learning VR content was not clearly evidenced in this study, and we additionally note that learning styles and multimedia content were typically discussed in novice terms. For example, librarians and patrons talked about experiential learning and hands-on learning but about neither curriculum nor pedagogy. More information about what experiential learning and hands-on learning mean, what kind of models exist, and for whom they are successful would benefit librarians in particular, who are educators but have varying degrees of training in education and instructional design.



LIBRARIES: PRACTICES & PROGRAMMING

The inclusion of virtual reality programming in the public library came with a range of noteworthy administrative, practical, and programming considerations. The first series of lessons learned is related to coordinating VR programming. This can be summarized in relation to planning, use of library space, and time.

> "VR was able to introduce the idea that ... there's so much available from the library. So in some cases, experiencing VR, I think, kind of provided a jump-start to patrons' curiosity, and a thirst for knowledge. And the VR experience has inspired them to ask questions, to find out what types of resources they can engage with, and has given them a bit of confidence in their ability to engage in the library world."
>
> *– Librarian*

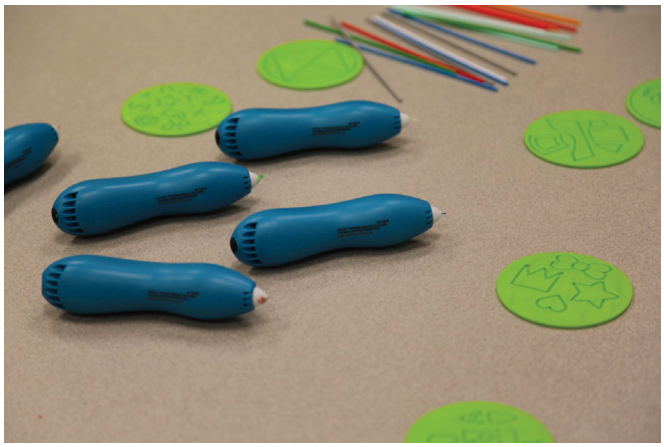
Time and planning to prepare VR programming and experiences.

Planning for VR requires a significant amount of preparatory time, ranging from librarians having time to play with the VR machine and available games and experiences, to librarians having time to creatively explore programming ideas with several months of lead time. Librarians indicated wanting more freedom to engage with VR and to think about valuable and relevant opportunities for patron engagement.

Time was also a factor in regard to patron access, where in some cases more time for deeper engagement with a VR experience was wanted. Librarians expressed the need for significant lead time and preparation to ensure that the program would be well staffed, the technology would be updated, and that if legal waivers of use were in place they could be distributed and collected. This last concern is especially important for underage participants, as libraries want to secure parental permission for their participation.

Age restrictions, learning VR, and inclusion for tweens.

Interestingly, some of this preparatory time might be spent learning about VR technology including its risks and implications for use among children under the age of 13, as questions often surfaced about the age limit, with few answers from the librarians. Study results show that librarians and patrons were frustrated and disappointed by the age restriction, which is set by Oculus (and is similar for other comparable VR platforms). Few of our interview participants addressed or inquired about why this rule was in place, specifically as it related to the visual and cognitive development of children and tweens. More time to learn about VR for participating librarians might strengthen the comfort level and successful planning and delivery of VR programming in a way that could establish better responses to questions about the age restriction and allow for strong wrap-around programming to entertain underage patrons.



Clockwise from top left: Cubelets robot blocks, Perler beads, 3D pens, and Ableton Push 2 music-making software and hardware.

Space can have an impact on program success and recruitment.

Deliberate planning regarding the use of library space is also an important aspect of developing strong VR programming. For example, librarians had to consider the location of the VR setup carefully, ensuring enough space for safe and relatively free movement and proximity to quiet spaces or teen spaces. Enough space for an expanded floor mat helped spectators stay clear of the play space and helped VR users build confidence in relation to how far they could move.

With regard to setup location in the library, in one example, setting up VR in the main space of the library near a general reading area and computers enticed patrons to try VR when they otherwise might not have; seeing other patrons use VR was a good incentive to test it. In other cases, setting up in a separate meeting room with surrounding activities and wrap-around programming like Ozobots, Perler beads, slime, 3D pens, and coloring also worked well, and better supported participants who desired privacy during their VR experience.

Construct a thoughtful promotion and outreach plan.

One of the main takeaways to coordinate successful VR programming involves a focus on program promotion. For example, posters and website advertisements were not the most effective forms of outreach. Rather, purposeful promotion of VR in relation to broader themes, fairs, or festivals was successful, and personal invitations coming directly from librarians or other patrons fostered participation. Although some patrons were interested in trying new technology, others required more information or explanation about why VR might be worth trying in the first place. In summary, libraries need to identify where the value in using VR is located for their local region and patrons and promote based on those interests, rather than simply promoting VR as valuable to try in and of itself.

Combining VR drop-in with larger library events, making VR part of a themed activity such as art making or world exploration, might reach a wider audience of patrons and build on the rich resources and activities already and

otherwise available at the library. Interactive, wrap-around programming and other related activities seem to be important elements for garnering interest in VR and for running meaningful programs. This type of programming also makes it easier to include VR experiences that are purely fun and entertaining, an idea that was noted to be of interest to youth and adult patrons.

Programming ideas and tensions in open vs. structured programming.

Understanding the impact of VR as a service and resource for library patrons is important to successful programming. Our study has shown that there is a tension between a desire for structured programming and open time with regard to VR programs. Librarians, in general, felt restricted by the given list of educational experiences that were recommended by Oculus as part of this study.

In some cases, libraries let users explore the Oculus library and select other games and experiences of interest to their patrons. In other cases, librarians were happy to have a list from which to start but often wanted more time to explore these environments on their own before offering them to the public. As libraries serve a diverse range of patrons, librarians recognized the importance of providing a wide variety of apps in VR, such as apps that are educational but also entertaining, allowing them to be used for open game nights, for instance.

Some librarians thought about using VR as a tool for community engagement by taking the technology to senior centers and nursing homes. Librarians also thought about possibly connecting the technology to storytime programs and speculated about how it could also be used for job training for librarians, such as for sorting books inside VR. Last, some of the librarians discussed how having VR in a makerspace area could encourage people to tinker around with the technology, make mistakes, and figure out what the technology is. Many of our research participants thought having VR in the library could help people try different technologies that they would otherwise be hesitant to use.

Patrons and librarians wanted multiplayer options and interactivity.

Patrons and librarians were interested in exploring multiplayer options where more than one person could be in the same VR environment at the same time, which would require multiple headsets. VR experiences that were interactive were also popular—more so than 360-degree films and VR animation, or non-interactive experiences. One interesting outcome of hosting VR in the library was that it enabled conversation between librarians and patrons as well as across librarians and library staff. Many librarians in the study saw a clear place for VR as one tool among many in a library makerspace to bring people together to make art, create 3D models that might be actualized through 3D printing, or simply explore the worlds and experiences available in VR.

VR is more for teens and "techie" people, and probably not for me.

Before having VR in the library, many research participants associated VR with being a technology for teens and for "techie" people. However, when the VR technology was made accessible in libraries, not only teens, but also other populations—including senior patrons—participated and enjoyed it.

FUTURE WORK

Games, fun, and entertainment.

The researchers and project partners involved in this study sought to understand the role of VR in public libraries for informal learning and community engagement. Findings suggest that there is strong reason to continue with VR programming in libraries. Patrons immensely enjoyed experiencing VR. Librarians enjoyed introducing patrons to their first VR experience. Young people and seniors found the technology to be fun, exciting, engaging, and inspiring. Many patrons and librarians had positive social and technological experiences that could lead to stronger relationships between librarians and patrons and also to patrons' active and continued participation in other library programs.

Building out opportunities for creation in VR.

In our survey and interview questions, we observed a key omission in the responses of research participants: Very few people talked about the potential value of VR in relation to opportunities to create art and media in new, multimodal, immersive ways. Some patrons and librarians did use the creation tools available as part of the educational VR experiences that were initially and freely made available to the libraries, such as Quill and Medium. In these cases, the individual using the experience required longer time periods to master the art creation tool, and also expressed a strong interest in continuing to explore those VR environments and keep drawing or sculpting. More frequent, varied, and prolonged exposure to VR may be necessary to have patrons start to actively imagine themselves as VR content creators rather than only as consumers.

Defining the value of VR in the public library.

This study presents an opportunity for public libraries as early adopters of the technology to shape the value of VR for the public and for the library. Data collected for this study show that most research participants do not feel that VR is something that they would personally own at the moment, partially due to the cost of the gear and its setup, and also because they do not yet have ongoing and meaningful examples of how VR could be used in their lives. Empathy building and perspective taking may be areas that are worthy of further exploration, even though such experiences were not a part of this study. A belief that VR is a technology that will enable people to have such experiences was enormously strong. From our study, it is clear that free access is valuable to the public. It is unclear what deeper and ongoing value of VR will persist for patrons. Experiencing VR sparked many ideas from both librarians and patrons that are worth exploring in the future.

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