

A Room of One's Own: The Virtual Study Room as an Information Services Delivery Model

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Abstract

Libraries are facing the challenge of innovation to meet user needs. Virtual worlds offer unique opportunities for curated, immersive, integrated, interactive, and flexible spaces. The Virtual Study Room is a unique design concept leveraging these opportunities and supporting information behavior in a virtual world. Participant feedback from a research event in Second Life indicates that the Virtual Study Room is a useful environment for individual and group information problem-solving, and serves as a model for the delivery of online library information services.

Keywords: digital library, library services, information behavior, digital culture, online communities

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1 Introduction

Facing changing patterns of use and demand, many libraries are innovating creative options to better serve user information behaviors. Virtual Worlds (VWs) offer immersion, integration, and flexibility in the delivery of information services. Through the development of a virtual study room in a virtual world, the Virtual Information Behavior Project (VIBE) explored the potential of offering information services as a 3D, immersive, integrated, interactive, and flexible experience. The Virtual Study Room (VSR) was part of a unique research event in Second Life (SL), a social virtual world in which residents interact via groups, events, meetings, classes, etc.

The purpose of the VIBE project is to investigate the nature and patterns of everyday life information problem-solving behavior in immersive virtual environments. VIBE researchers learned from the first phase of the project that users typically enter SL to participate in groups, attend events, engage in activities, and to interact socially with others. Information access, evaluation, use, and sharing behaviors are generally by-products of social interactions. Researchers concluded that SL is not yet used or perceived as an environment for information problem-solving; that is, addressing the need of seeking, assessing, organizing, synthesizing, and sharing information in everyday life situations.

However, immersive virtual environments such as SL do offer rich potential as information problem-solving settings because of emerging patterns of use and expectations (Wasko et al., 2011; Berente et al., 2011), immersive 3D capabilities, and integration of cutting-edge technologies. Project findings made it clear that this potential has not yet been realized, and led to the design and implementation of the Future of Information Seeking and Services Exposition (Future InfoExpo). Users and information providers need experiences with new affordances. Therefore, this Future InfoExpo was a milestone in enabling users and information providers to experience and envision the future of their information practices and to provide feedback on their experiences.

The Virtual Study Room (VSR) exhibit of the Future InfoExpo provided participants a curated, immersive, integrated, interactive, and flexible environment for the express purpose of information problem-solving. Participants were given a scenario of a specific research task, and asked to think about how they

might use the various features and elements of the VSR to conduct their research. This exhibit integrated many of the single features of the other exhibits: additional avatar profile detail information; unique, unusual tools for information organization; and in-world web access.

Moreover, the VSR is a design concept offering a new model for library information systems and the delivery of services. Libraries, faced with the challenge of meeting user needs in a digital environment, typically replicate the model of information service delivery applied to physical libraries (Chow et al., 2012). Information seekers and problem-solvers already familiar with VWs are beginning to demand social networking and information tools and services that are seamlessly integrated into a 3D, immersive virtual environment (Wasko et al., 2011). A growing number of these users are becoming accustomed to the affordances of VWs through social exploration (e.g., Club Penguin, Second Life) and gaming (e.g., League of Legends, World of Warcraft). The VSR is designed to be a curated, immersive, integrated, interactive, and flexible environment, conducive to information problem-solving and suggestive of a new direction for the delivery of library information services.

The questions guiding this investigation ask:

- How do SL residents view the concept of the VSR in terms of usefulness, ease of use, and their likelihood of using one?
- What would a VSR look like in terms of capabilities and functions?

2 Background

Facing the challenge of meeting user needs in a digital environment, libraries typically provide information services online that replicate the physical library model. Users entering the physical library expect access to a catalog of the library's collections of print and digital resources. Users also expect access to information databases and a reference desk staffed by a librarian. Users could also expect displays of books related to a particular author or theme, and scheduled events such as book talks, book groups, career training sessions, etc. The typical library presence online does not stray from this model of services. The library home page will likely include a catalog for the library's collection of print and digital resources, links to information databases, and perhaps a live chat box for support from a librarian. Online tools may organize resources on a particular topic or literary genre (e.g., Libguides, Shelfari), video tutorials may address career and training needs, and users may interact via any number of social networking tools to share reading experiences. Simple replication, however, fails to support focused study and research, since the associations among information elements are dispersed among many separate tools and pages.

2.1 Information Curation

Library services can remain effective, not through information provision, but through information curation. In a study of the information behaviors of college-age students, Head & Eisenberg (2009) found that students did not readily turn to a librarian for help with academic and everyday life-related tasks. Gross (2005, 2007) found that college students inaccurately identified themselves as information literate, based in large part on their familiarity with locating and accessing information, despite struggling with other stages of the information problem-solving process. Historically, limited availability of relevant sources of information presented a barrier to successful problem-solving. Successful problem-solving, however, involves not only the access of information, but also problem definition, determination of appropriate resources, evaluation of source relevance and reliability, comprehension of information, synthesis of information from a variety of sources into a coherent response, and evaluation of the product and process (Eisenberg, 2008). Offering information services to meet user needs and practices requires that the information service provider have a good understanding of how people approach addressing their information needs. Information needs may be framed as information problems. Many models exist describing how users approach information problem-solving.

The field of Library and Information Science offers several models of information problem-solving. The Big6 Skills approach by Eisenberg & Berkowitz (1990) describes the stages of successfully solving an information problem. This and similar models (e.g., Kuhlthau, 1991; Stripling & Pitts, 1988) provide a framework for organizing the many aspects of information behavior as described by Wilson (1999). The traditional model for library systems and services focuses on meeting the user at the middle stage of information Location and Access, as described by the Big6 model, through connecting to collection catalogs, information databases, and reference desk services. Models of the information problem-solving process identify the stages before and after the access of new information that are crucial to success. Therefore, a guiding principle for the development of a new model for library information systems and services is to address every stage of the information problem-solving process. The VSR offers users a space, both intellectual and virtual, to meander through these multiple stages.

The concept of information curation addresses the needs of library users at every stage. Adopted from the field of archival studies, information curation is being developed in educational contexts to describe the need for students to synthesize, personalize, and share information of various types from various channels and sources (Mihailidis & Cohen, 2013). Jenkins (2009) identifies processes that are enabled in an environment of real-time and constant information flow: archiving, annotating, appropriating, and recirculating. As students engage in these processes to answer questions, complete tasks, solve problems, or simply make sense of the world, value is added to this synthesis of information—it becomes a unique mix of personal, social, professional, and civic information (Mihailidis & Cohen, 2013). Students become users and producers of information and ideas (AASL/AECT, 1998) and engaged in the participatory culture as described by Jenkins (2009). Information curation offers the promise of a dynamic and personalized learning space that integrates information access, evaluation, use, and sharing tools into one immersive environment. This concept of information remix serves as a guide in the crucial development of a new model of library information systems and the delivery of services as users become increasingly networked.

2.2 Virtual World Affordances

The advent of virtual worlds provides a range of affordances that hold promise for realizing this vision. VWs are “3D immersive, computer-simulated environments where users are represented by avatars through which they interact in real time with other avatars, objects, and the environment,” (Wasko et al., 2011, p. 646). VWs are distinct from other online forms of social interaction, such as independent discussion forums or web-based social networking tools, in that VWs can bring users to a state of immersion. In this state, the user is mentally and/or physically engrossed in the environment to the extent that the user’s self-awareness is changed. The related concept of cognitive absorption is a factor determining the quality of the user’s experience, and the likelihood of returning to the environment (Goel et al., 2011). Immersive environments offer a richer experience than two-dimensional counterparts (Nah et al., 2011). Contributions to this enhanced experience include multiple channels of communication; synchronous contact with others, objects, and the environment; a distinct set of social cues; and, typically, opportunities for co-creation. Like other VWs, SL affords users extraordinary capabilities in an immersive 3D environment. However, unlike VWs known as MUDs (multi-user domains) or MMOGs (massively multiplayer online games), SL is not based on a win/lose competitive paradigm (Ostrander, 2008). Rather, the bulk of SL activity is in its residents’ social interactions through groups, activities, events, and meetings. Therefore, SL is a social virtual world.

SL currently fails to offer seamless integration of tools supporting information access, evaluation, organization, and sharing. Users interviewed for the initial phase of the VIBE project described situations in which they needed to leave SL in order to access a web browser or other tool, or they attempted to maintain focus simultaneously on the access or evaluation of information outside of SL and interaction with other users inside of SL, typically failing in the attempt. In order to maintain the sense of immersion in SL,

it was necessary to design tools that were seamlessly integrated into the SL environment and adhered to the following principles: 1) they supported distributed collaboration in a collocated VW place, such as a slideshow presentation that could easily be viewed by all assembled avatars; 2) they maintained super-real qualities, in that they appeared as objects and functionalities that were logical within the SL environment and afforded 3D-specific properties; and 3) they provided social interaction across platforms, enabling integration across other computational and social media applications without needing to exit the immersive environment of SL. Other exhibits in the Future InfoExpo provided designs for tools that were seamlessly integrated into the SL platform to support these information behaviors and enabled undisrupted immersion. The Virtual Study Room (VSR), however, brought many of these tools together to provide a near-seamless integrated experience.

Immersion and integration are principles guiding the design features conducive to information problem-solving in a digital environment. Other principles explored in this design study are interactivity and flexibility. In SL, users interact via avatar and other communication modes such as text chat and audio chat; these modes are all available in the VSR, enabling group information problem-solving. The VSR exhibit addresses the problem of limited space in the physical world by investigating the possibilities of flexible study spaces in VWs. Space for work and study is precious in the physical world—places to think, to carry out various information activities (e.g., search and collect, store and organize, process and create), and to meet with others and share. It's not feasible to have a different space for every major task, project, or topic. However, this can be done in virtual space. In VWs, it's possible to have multiple work or study areas—spaces for gathering resources, materials, and tools for a specific purpose, and for keeping those things exactly in place so that they may be accessed at the user's convenience. In a VW, users can have a different study room for every major topic, project, or question they wish to investigate. Thus, a room may be initially curated around a particular topic, and then offered as an information tool through the library for the user to archive, annotate, appropriate, and recirculate as the user sees fit.

2.3 Libraries in Virtual Worlds

Virtual environments hold the promise that information problem situations will be facilitated by an immersive and flexible environment in which information and communication systems are seamlessly integrated. Wasko et al. (2011) note the shift in the Gartner Hype Cycle of virtual worlds to, “a phase where real benefits, rather than hyped expectations, are starting to hit the mainstream with potentially transformational technologies,” (p. 654). They note anecdotally that typical 10-year-olds are far more interested in the avatar experience in virtual environments than in what other people are doing on social networking sites. In time, these users and those of the online gaming generation will likely demand changes in the way that, “socializing and work occur to the extent that we will most likely see the borders between work, play, and learning dissolved or at least be reshaped,” (p. 646). Chaturvedi, Dolk & Drnevich (2011) conclude that VWs form a new type of information system, a type that is not yet accurately described by current information system design theories, but will become increasingly integral to a comprehensive conception of information systems. Livingstone (2011) recently noted: “Through successive waves of hype and anti-hype, the educational use of Second Life has quietly, slowly, and gradually developed and grown—seemingly impervious to the media din,” (p.62).

These findings are corroborated by a comprehensive study focusing on virtual world libraries by Chow et al (2012). This study found that re-creation of the traditional services model found in physical libraries would likely result in ineffectiveness and low usability; virtual users were experience-oriented rather than information object-oriented, and expected to experience the full potential that VW technology affords in interacting with information and other users. While they identified the distinct information needs and expectations for the groups of traditional and virtual users participating in the study, they found that traditional users were interested in using the virtual library once they were aware that it existed and saw

its potential. Researchers state: “Overall, efficiency, effectiveness, and satisfaction for patrons therefore could be considered low for both traditional and virtual patrons” (Chow et al., 2012, p. 504). They conclude with recommendations for the design of virtual libraries, which include taking advantage of the 3D, immersive, and social affordances of the SL environment, and avoiding duplication of traditional systems and services in the VW. They cite the success of two popular SL libraries, the Caledon Libraries and the Alliance Virtual Library, as being linked to the focus on community programming and exhibit creation. These libraries offer live chat help with an avatar (versus a textual chat box), readings and storytelling events using the multiple communication modes available in SL (text, audio, and visual), workshops on a variety of topics of interest to users (SL object creation, job-seeking, and social networking), and experiential learning opportunities.

The development of library information systems and the delivery of services in VWs have been exploratory to date. Recognizing the potential of VWs for effective systems and services, many public and academic physical libraries established a VW presence, designing VW library branches that closely resembled their brick and mortar counterparts. The initial phase of the VIBE project revealed that users of SL typically do not turn to SL for information purposes. Rather, information is accessed, evaluated, used, and shared in the course of social interaction for most users, and much of this information is related to SL-specific operations and events rather than factual information related to specific topics like health or politics. Moreover, while the proportion of first-time users is high, there are a number of persistent users; that is, those who enter SL regularly, have been engaged in groups or events over a long period of time, and contribute to the VW community through creation of objects, planning of events, and leadership within groups. For these users, a significant amount of in-world information behavior was identified; they identified accessing others as sources of information in-world, and accessed textual information outside of SL, thus moving in and out of the virtual environment to satisfy their information needs. This was surprising to the VIBE project team, given the number of virtual libraries set up in SL. These locations were rarely inhabited, and users interviewed during observations in these locations were there for exploratory purposes rather than information seeking purposes. Clearly, there is a real opportunity for digital libraries to provide users with meaningful interactions and experiences, such as that of a Virtual Study Room.

3 Method

This investigation sought to demonstrate that a digital space curated around a particular topic would provide users immersion, integration, interactivity, and flexibility – key hallmarks of the virtual worlds (VW) experience. We also sought to demonstrate the usefulness of such a space because of its ability to support information problem-solving, supporting the processes identified by Jenkins (2009) of archiving, annotating, appropriating, and recirculating. The goal was to offer participants a sense of the nature and scope of such virtual spaces, demonstrating some of the capabilities, functions, and uses.

3.1 Study Design

The Virtual Study Room (VSR) was one of six exhibits of the Future of Information Seeking and Services Exposition (Future InfoExpo), an event in Second Life (SL) enabling users and information providers to experience and envision the future of their information practices and to provide feedback on their experiences. The VSR exhibit (Figure 1) provided participants a curated, immersive, integrated, interactive, and flexible environment for the express purpose of individual and group information problem-solving. The room integrated in-world information access, evaluation, and organization: tools to access web-based information sources, tools to organize information, and 3D artifacts for tagging and manipulation. Participants wore a heads-up display (HUD), a unique tool that is visible only to the participant, tracks progress through exhibits, and enables assistance from a researcher via chat box. The participants could

modify the various information elements in the room; however, the room was not uniquely customizable for each individual participant because other participants were simultaneously making changes.

Participants first viewed a 10 minute video based on a scenario. This VSR focused on medical information: “Mike,” a university teacher who has been suffering from chronic back pain, has decided to address his problem as a major research task and conduct a thorough investigation in order to find out more about the nature of back pain and treatment. Participants were then given a scenario of a specific research task, and asked to think about how they might use the various features and elements of the VSR to conduct their research.



Figure 1: The Virtual Study Room immerses users in their information, thus allowing libraries to fully realize a robust, comprehensive service delivery platform; *Figure 1 illustrates an example of a VSR focused on information related to chronic back pain.*

3.2 Data Collection

Participants were asked to complete a pre-survey after viewing the video in addition to a post-survey after experiencing the VSR. Both surveys asked the same questions in the same order to make comparisons possible, and offered both Likert-scale and open-ended response options. Both surveys asked participants about whether the VSR met expectations, whether it was seen as useful, likelihood of using a VSR, likelihood of entering SL explicitly for using a VSR, and opinions on its ease-of-use. A total of 85 participants responded to these survey questions.

4 Results

132 participants were asked to evaluate the Virtual Study Room in terms of their expectations prior to entry, usefulness, likelihood of use if it were available in Second Life, likelihood of entering Second Life specifically for the purpose of using the Virtual Study Room, and overall ease-of-use.

4.1 Expectations

Many participants reported the introductory video helped them envision a VSR, and they were positive about the concept. After entering and experiencing the room, most participants remained positive:

- “ ... so much cooler, Very interactive, I brought a couple of pictures right into the [VSR], and also browsed the web too.”
- “ ... Numerous screens granting the ability to keep many projects open at once. Resources surround Mike. He is immersed.”
- “ ... nice way to combine several different methods of research into one area.”

Participants highlighted the VSR's technical ability to support many different information modes simultaneously as well as its utility as an information collection, organization, and immersion space.

4.2 Usefulness

Most participants saw the room as useful and could see the potential for 3D VWs to support information problem-solving:

- “ ... this gives you the real time capability of chat, communication, and interactivity via avatar to make changes and complete documents- many steps above google docs ...”
- “ ... useful to have the browser, the notes and the 3D models in once place.”
- “ ... VW are persisitant. [sic] I can leave materials out and not fear that they will be lost or changed.”

By leveraging affordances of the virtual, the usefulness of the VSR resonated with participants because it brought together many separate elements. The persistence of VWs, unlike the churn of the Web, offered a convenient and reliable storage capability.

4.3 Likelihood of Use if Available in Second Life

After viewing the video, 69% of participants responded “likely” or “very likely” to use this tool, if it were available in SL. Encouragingly, 72% of participants were equally positive after experiencing the VSR:

- “I find it helpful to be able to visualize projects im [sic] working with if i lay out a miniature mock up of it.”
- “It's useful to be able to back and forth from working spaces to designing spaces and vice versa.”
- “I like to step away from ideas and return to them. Leaving a project in place and easily editing/adjusting them in such an environment gives me time to reflect. Also, the value of having others "drop by" to give you feedback on work is invaluable.”

Because information can be highly conceptual and abstract, participants valued the visual and immersive aspects of information organization offered by the VSR. Participants also appreciated the way that the VSR offered consistent storage methods, which affords both individual reflection and team collaboration.

4.4 Likelihood of Entry into Second Life for the Purpose of Use

After viewing the video, a majority of participants (62%) were “somewhat likely” or “very likely” to enter SL explicitly to use a VSR. After experiencing the VSR, 72% felt similarly. Qualitative explanations were positive and similar to those reported above. Participants offered these insights, however:

- “ ... the user needs to be inside SL to access it. If the user has an idea while not in SL, they would have to remember it, write it down and add it later.”
- “If it just replicates my existing desk environment, it only offers marginal utility. If instead it can short circuit some of the manual steps one has to make in research, then it has unique value.”
- “ ... may be in the future.”

Participants felt that the current VSR design may be too cumbersome to supplant their current practices.

4.5 Overall Ease-of-Use

After viewing the video and experiencing the VSR, participants were surveyed concerning ease of use: 83% reported that the VSR was “very” or “somewhat” easy to use. When asked if they encountered difficulties when using the VSR, participants reflected on the limitations of current technology:

- “Not familiar with the interface; there's a learning curve.”
- “The Posted Notes are not easy to move around.”
- “ ... other people still managed to be in the way.”

- “ ... better if I could see the print more clearly.”
- “If there were any way to physically draw, like on a real whiteboard (i.e. chemical compounds is not easy to make on a keyboard) that would be a plus.”
- “ ... Focus only on what SL can UNIQUELY offer, don't just blindly replicate the RL [real life].”
- “Elements to facilitate interaction with people doing parallel research ...”
- “showing the community what is useful ...”

These comments demonstrate a high level of engagement with the VSR by offering both concrete and conceptual ideas for improvement. Participants have a need to communicate visually, and feel limited by text-oriented input devices. The social and collaborative potential of the VSR resonated with participants, since research can often be a needlessly lonely journey. Participants' insights and reflections offer strong suggestions for researchers and designers of VWs as well as digital libraries.

5 Discussion

The first question guiding our investigation asked:

- What would a VSR look like in terms of capabilities and functions?

The design for the VSR imagined how that kind of space might function in SL. The capabilities and functions included were curated, immersive, integrated, interactive, and flexible to support information problem-solving. The VSR provided tools for users to access, evaluate, organize, and share information. The Heads-Up Display may be modified to enable real-time assistance from a librarian via in-world chat or as an avatar, providing an immersive experience not currently available through “librarian chat” applications. Since countless rooms may be curated around a particular topic and made available to users for archiving, annotating, appropriating, and recirculating, this model offers greater potential for usability than many examples of digital libraries currently available.

The VSR model may serve as an example for library programs striving to provide information systems and to deliver services that users find useful. A library could offer template VSRs based on frequent topics of inquiry. These templates could be age-appropriate. For example, a VSR about giraffes for 4th-graders need not match the complexity or volume of resources of a VSR about the African savannah ecosystems for a high-school or undergraduate student.

For libraries, VSRs could be curated multi-media collections: articles, books, maps, magazines, web sites, links, videos, podcasts, images, etc. All collocated, curated, equally accessible, and simultaneously available. Leveraging the virtual space affordances, libraries could offer as many VSRs as requested, customizable by topic, grade level, level of experience (e.g., “Knitting for Newbies!”). Content could be updated or revised as needed.

VSRs need not replace traditional ‘Readers’ Advisory’-type displays or services. Rather, VSRs may complement these by being customized for specific interests. For example, a general Readers’ Advisory on ‘Historical Romances’ can be complemented by a VSR on ‘Steampunk Romances with a Strong Female Protagonist’ (e.g., Cooper’s *St.Croix Chronicles* series or Clare’s *Infernal Devices* trilogy). VSRs have the additional benefit of presenting readers with related material: historical-era popular music could be playing, or readers could experience era-specific technologies (e.g., penny-farthing bicycles), or their avatars could wear historical clothing, etc. In this way, VSR could expose readers to the broader contexts behind many library materials.

The second question guiding our investigation asked:

- How do SL residents view the concept of the VSR in terms of usefulness, ease of use, and their likelihood of using one?

The design principles of immersion, integration, interactivity, and flexibility were confirmed by participants as appealing and useful aspects of the VSR. Other patterns in the responses from participants became evident as well. In conceptualizing new information practices, the introductory video was useful in communicating to participants a bold and unusual vision of future information practices and in creating a picture of how the space could be used. Participants quickly grasped the purpose and functions from the video introduction, and responded favorably both to the video and to experiencing the proof of concept exhibit afterward. A similar approach would likely increase the perceived usefulness and effectiveness of similar tools offered by a library program. A majority of responses to surveys, both before and after experiencing the VSR, was very positive in terms of willingness to use or seek out the VSR, its ease of use, and its usefulness. Users first need to know that such capabilities exist, so strategies for promoting and demonstrating the value of the VSR must be implemented.

Specific features were identified as particularly useful. Participants recognized the potential of creating objects to embody information, to tag for access, and to manipulate in creative ways. They also recognized that this VSR space could be curated around a topic of interest, updated dynamically with related information, and visited by collaborators for additional input via multiple communication channels. The potential for mixing content, methods of research, and lines of inquiry greatly increased the likelihood of serendipitous discovery, a key component of research.

6 Conclusion

The VSR, as one of the exhibits in the Future InfoExpo, is important because it demonstrates “proof of concept” of new or expanded functions and capabilities in 3D, immersive, virtual environments and offers clear directions for future research. Users and information providers experienced, envisioned, and evaluated possible information practices in virtual environments and provided feedback on their experiences. Many contend that the potential of VWs has yet to be realized (Wasko et al., 2011); VWs will likely transform the way we access, evaluate, organize, use, and share information. Kuhlthau (2004) identifies the affective dimension of the information problem-solving process; further research is needed to investigate the impact a VW environment would have on affect. Further research is also needed to determine the efficacy of delivering information services via the VSR, and the potential for the VSR as both a personal and collaborative information management system. The VSR offers a glimpse of how an immersive, integrated, interactive, and flexible information problem-solving environment can support and change information practices, and serve as a model for library information systems and the delivery of services.

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