Social Affordances for People with Lifelong Disability Through using Virtual Worlds

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Abstract

In the information age, information and communication technology (ICT) is an asset for supporting people with disability to participate and be included in society. Research indicates that virtual worlds may help this group to gain independence and improve social participation. The aim of the present research was to explore the role that virtual worlds play in facilitating people with disability to experience a self-perceived improvement of social participation, independence and well-being. Using qualitative methods our results indicate that people with lifelong disability perceive that they reach a larger and more diverse network through the use of virtual worlds. Based on identified Quality of Life factors, we found that people with lifelong disability perceived that they obtained increased independence, social participation and well-being. The social affordances offered by virtual worlds are promising for improving these identified factors. This area of research warrants further empirical investigation to understand the implications in a broader social context.

1. Introduction

Recent research concerning virtual worlds (VWs) has focused on virtual collaboration [1] and the business opportunities available in VWs [2]. Additionally, VWs, such as Second Life, offer a wide variety of social affordances for individuals who engage in these environments. People with lifelong disability (PWLD) are active users of VWs [3], but as yet there has been scant attention from the research community to understand the social benefits the technology offers PWLD [4].

One of the greatest challenges experienced by people with disability is community exclusion [5]. Negative perceptions from the community about disability is a common experience for PWLD [6]. Nevertheless, information and communication technology (ICT) is important in assisting PWLD to overcome some of the barriers to participation and inclusion, and to facilitate experiences of independence [7].

The United Nations Convention (2006) defined people with lifelong disability as: *"Persons with disabilities include those who have long-term physical, mental, intellectual, or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others."* [8]. Lifelong disability includes disability that occurred before the age of 22 years and includes diagnoses such as intellectual disability, autism, deafness, epilepsy, polio and cerebral palsy [9].

VWs, for example Second Life, offer a wide range of opportunities for their residents. One of the reasons people use and continue to use VWs is the social affordances they offer [10]. Affordances, in this context, are understood as a variety of capabilities which may become an affordance when the user is able to take advantage of them (e.g., dancing with a friend). In the context of PWLD, VWs have shown promise in educational [11] and rehabilitation settings. However, how PWLD use and experience VWs for social and

leisure activities is an under-explored area of research [4].

The main focus of the present research was to understand and explore the social affordances VWs offer PWLD. Through an exploratory study, based on interviews and observations, we aimed to answer the following research question:

How do people with lifelong disability experience the social affordances offered by virtual worlds?

The goal of the study was to contribute to an understanding of whether VWs create an environment where PWLD can overcome some of the social barriers created by society in the physical world. Our findings are drawn from observations of and interviews with novice and experienced users of Second Life (SL), and focus on how participants experienced independence, social participation and well-being through use of the VW.

2. Related Literature

In discussing the social affordances that VWs may offer PWLD we have drawn on domains identified through Quality of Life (QOL) research [12], which includes individuals' perception of independence, social participation and well-being as important focal points. The QOL research analyses data in the micro (personal), meso (technology functional level) and macro (social context level) domains [13]. The factors identified in this study are only at the micro-level. In addition, we discuss how currently VWs are thought to offer value for PWLD.

2.1 Social factors and domains

QOL is a multi-dimensional concept which includes independence, well-being and social participation [12]. These social factors and domains, presented in Table 1, create a roadmap for identifying social affordances, which may be applicable in a VW context.

Table 1 Quality of life factors and domains [12]

Factor	Domains
Independence	Personal development
	Self-determination
Social Participation	Interpersonal relations
	Social Inclusion
	Rights*
Well-being	Emotional well-being
	Physical well-being*
	Material well-being*

(* factors not addressed in this paper)

In this study we did not consider the Well-being related domains of Material (e.g., employment and housing) and Physical (e.g., health care) well-being [13], as the research was conducted solely in-world. Also, the domain of Rights was not addressed, as the analysis was not extended to a larger social context.

Independence is important to all humans. PWLD may experience low levels of independence as care givers or family members may act as gatekeepers and make decisions for them [9]. Nevertheless, PWLD experience an increased independence when they have access to ICT. This independence includes access to information and the ability to make decisions [14]. Using technology PWLD can explore locations and situations in their own time and at their own pace in contexts of their choosing [15]. Experiencing this increased control over their own life creates a sense of *personal development* [14]. An important issue in personal development is education [16]. Indeed, education and learning are paths to empowerment and independence [11].

Self-determination is defined by Wehmeyer [17]. He stated that self-determined people determine their own fate or course of action without compulsion. Intrinsic and extrinsic motivations are important factors within self-determination. Intrinsic motivation implies people engage in an activity because of an interest in the activity, and derive satisfaction from the activity itself [18]. Extrinsic motivation occurs when the reason for engaging in an activity is external and the satisfaction for performing the task is physical or verbal rewards [18]. The likelihood for continuous use of technology is higher when the motivation for use is intrinsic [19].

Social participation is a barrier that PWLD experience in their daily life [5]. *Interpersonal relationships* are the relationships between humans. PWLD are less likely to have interpersonal relationships than their non-disabled peers [5]. The sense of social connection is central to community participation. This includes both very personal and intimate connections (e.g., friendships and partnerships), as well as connections of a more public and social nature such as those with colleagues and student-teacher social connections [6].

Social Inclusion, the opportunity to be included in society and feel part of the community is also a barrier for PWLD. Treating people with disability as if a disability in one area invalidates them in all areas creates limits to opportunities offered to people with disability [6]. The feeling of being treated as equal is not only important for all humans, but is a human right.

Emotional well-being includes mental stability, self-concept, and lack of stress and negative feelings.

When people experience emotional well-being they are content with life and have a good self-concept [16].

2.2 Virtual worlds and PWLD

VWs are 3D online representations of the physical world, where users are represented in-world by 3D representations of themselves called avatars [20].

Ford [21] viewed VWs from both a positive and a negative angle for PWLD. He stated that although VWs may remove many prejudices created by stereotypes about PWLD found in the physical world, simultaneously they may present potential disservice for PWLD. For example, some VW applications fail to provide users with the option to conceal a disability, thus preventing users from interacting on their own terms and concealing their disability if they choose to do so [21]. Nevertheless, VWs may have positive potential for PWLD [3, 22]. VWs enable people with minimal physical mobility to explore virtual spaces with the same freedom as people with no disability [22]. The ability to walk and move freely is identified as an advantage of VWs [3].

From a rehabilitation standpoint skills learned in virtual realities can transfer to physical world situations for PWLD [23]. In addition to these advantages, the main benefit of VW technologies for people with disability may be the ability to engage in a wide range of activities relatively free from the limitations imposed on them by their disability or by the community [24].

In a literature review conducted in 2005, Standen and Brown [25] stated that VW technologies are proving to be beneficial for people with intellectual disability to learn social skills, skills for independent living and manufacturing skills. They also indicated that there is no evidence that the skills learned in a virtual environment cannot be transferred to physical world settings, although they suggested that this may not hold true for all people with disability. People who experience difficulties in generalizing the social rules from one setting to another may find transferring learning from a VW to the physical world difficult [25].

Further, a literature review conducted by the first author in 2012 [4] showed how there is limited empirical research concerning the social affordances of VWs for PWLD and how this group experience these affordances. Few identified studies focused on the opportunities VWs offer people with disability (e.g., [26]). Based on a limited qualitative study the researchers suggest that VWs may enrich the overall quality of life for people with disability and may enhance their physical, emotional and social adjustment [26]. In our study we contribute to further extend the understanding of the social affordances of VWs for PWLD, through empirical studies of different user groups.

3. Research Method

This exploratory study included two groups of participants, a group of novice users and a group of experienced users of the VW Second Life (SL). All participants were over the age of 18, diagnosed with a lifelong disability, able to give informed consent, had access to and could use a computer with broadband. Aligned with previous research SL was chosen due to (1) the large number of users, (2) the range of activities available and (3) the wide range of opportunities (i.e., business, education, and leisure) [27]. Because of these particular features, SL is a suitable platform for both new and experienced users to explore and prosper in the VW. All participants gave informed consent and understood that they could withdraw from the project at any time with no reason given and no penalty. Ethical clearance for the research was obtained from the Norwegian Social Science Data Services (NSD). This work is part of a Strategic College Project funded by the Norwegian Research Council.

3.1 Data Collection

Using factors and domains identified in the QOL research as a guide, we used interviews and observation to explore the experience of social affordances offered by VWs to PWLD. With the first group of novice users we aimed to explore how new users with lifelong disability experience the VW. This group consisted of 11 participants recruited through organizations in their local community such as adult learning centers. Over a period of 8 weeks in 2011-12, the 11 participants met with the first author (hereafter referred to as 'the researcher') in weekly sessions lasting one and a half hours, and engaged in different activities in SL. In the fourth and eighth week of the study, all participants were interviewed about their experiences in the VW. Interviews were conducted by phone, in order to keep the SL session times solely for activities and in-world interactions.

The second group of participants consisted of seven experienced users, with experience level in SL ranging from one to seven years. These users were recruited with the help of Virtual Ability Inc. (ref. virtualability.org), which operates an island in SL to support people with disability entering into the VW. During two in-world presentations of the project, people attending the presentation were invited to participate in this study. The experienced users

participated in two longer in-depth interviews of approximately two hours, to explore their experiences with the VW. All interviews with the experienced users were conducted in SL, in private instant messaging (IM) or private voice chat.

Table 2 summarizes the characteristics for participants in this study. To ensure the anonymity of the participants all avatar names found in this paper are pseudonyms. Figure 1 depicts an interview with an experienced participant in SL.

Table 2 Participants in this study

Group	Participant	Disability	Location	Primary language
Group 1 Novice	Pevit Torana	ID	NO	NO
	Mix Mofat	ID	NO	BG/NO
	Solvita Silka	CP	NO	NO
	Trinaka Lika	ID	NO	NO
	Rolatina Endora	ID	NO	NO
	Gjagra Gralt	CP	NO	NO
	Missara Melsa	ID	NO	NO
	Siltar Siana	ASD	NO	NO
	Sophy Salk	ID	NO	NO
	Artol Merlit	PW	NO	NO
	Leos Marth	DS	NO	PL/NO
Group 2 Experienced	Agonra Sircka	PD	US	ENG
	Kalnika Gublic	PD	US	ENG
	Sunger Alista	HI	US	ENG
	Ahroun Wolf	ASD	US	ENG
	Maria Butterfly	PD	US	ENG
	Kirana Merkini	HI	ZA	FI/ENG
	Landira Crunge	HI	US	ENG

Abbreviations: Cerebral Palsy (CP), Autism Syndrome Disorder (ASD) and Hearing Impairments (HI), Downs Syndrome (DS), Prader Willis syndrome (PW), mild to moderate intellectual disability (ID) and physical disability (PD). Norway (NO), United States (US), South Africa (ZA), Polish (PL), Bulgarian (BG), Finnish (FI) and English (ENG).

Figure 1 Interview in SL

3.2 Data Analysis

Based on the QOL domains presented in Table 1 [12], the data were analyzed using a content analysis. Content analysis is used to identify, code and categorize primary patterns in interview and observation data [28]. Interview data from different individuals were grouped together and along with observations were analyzed for different perspectives on common issues [28], which were considered important for understanding how PWLD experience the social affordances offered by VWs.

4. Findings

Observation and interviews conducted with the novice users of SL were in Norwegian, and any quotes from these participants have been translated to best reflect their meaning. The interviews with the experienced users of SL were conducted in English and quotes are taken directly from the interviews (through voice chat or IM). The findings in this study are presented in accordance with the QOL factors and domains presented in Table 1.

4.1 Independence

4.1.1 Personal Development. There were differences among the novice participants concerning their ability and wish for personal development during the sessions in SL. Novice participants displayed a varying degree of interest and ability in exploring the new environment independently. For example, when teleporting from one location in SL to another, one group of novice users always waited for the researcher to arrive and lead the way. Alternatively, Sophy Salk, Artol Merlit and Leos Marth, would all be exploring the new environment by the time the researcher arrived. Artol Merlit described how being able to travel around and explore new locations independently was of great importance. He enjoyed being able to visit Virtual Africa and Virtual Japan within a short period of time, and explore the possibilities these virtual locations offered. *"It was very exciting to explore by myself, especially in Japan. I went back there on my own once, but then I didn't meet anybody."* (Artol Merlit). The ability to easily visit locations was also seen as a great opportunity offered in SL by the experienced users. Agonra Sircka explained *"For example, I can log on and visit someone at the Grand Canyon and spend a half hour or an hour recreationally. To do the same in RL* [Real Life]*, it would take months of planning."*

SL also gave the participants the opportunity to be independent from support staff when exploring new environments. When asked if she was used to exploring on her own Sophy Salk explained: *"I can explore by myself in town* [where she lives]*, but to go to new places I need to have someone with me."* This

notion of being independent from others was also reported from the experienced users. *"Here* [in SL]*, hanging out and dancing and chatting for a half hour takes a half hour. In RL, for me, it would take...oh.. let's see... 1 hour or more to get ready, and I would have to hire my PCA* [personal care attendant] *to help, then, the time to get myself out of my apartment, into my van, drive there, find a place to park... get out of the van...get myself into the club (assuming it was accessible to a wheelchair), so... for a half hour of dancing... maybe 3 or 4 additional hours."* (Agonra Sircka). When Maria Butterfly was asked why the VW was an important tool for her she answered: *"Because it gives me a sense of independence. I can teleport, travel, without planning, preparation or giving notice to anybody."*

In addition, SL offers PWLD the opportunity to be independent from their disability. Gjagra Gralt, who has severe CP and uses a wheelchair in the physical world, had a new experience when she was able to spend time in SL dancing. *"For me, using a wheelchair in the physical world, dancing has been a little different. I would not be able to do those dance moves in the physical world"* (Gjagra Gralt). Maria Butterfly explained about being free from her disability in SL: *"Maria* [her avatar] *taught me how it would be like to have an able body, and going through the motions of having an able body. You can do so much more, why restrict yourself in SL like in RL?"* These positive views were presented not only by the participants with mobility challenges, but also were important for the participants with a hearing impairment. Although mobility is not an issue for them, communication with others is perceived as easier through SL, however there are some disadvantages. *"I'm deaf, so I only use text in SL. So, it's actually EASIER for me than RL. I just choose to hang around with people willing and able to use text only. Of course, I am left out of trainings or classes or seminars only offered in voice...that's frustrating, but it's exactly the same as RL."* (Sunger Alista).

Personal development through educational activities in SL was also reported by some participants. The novice users did not take part in any classes or courses in SL during the sessions, however during their eight sessions in SL they did learn about the VW. When asked what she liked best about SL, Solvita Silka answered: *"Being around others and learning new things"*. Gjagra Gralt supported this view and described her time in SL as enlightening. The sense of learning something new and different was an important factor for all the novice users, yet was challenging for some. Even though most of the novice participants were reluctant to admit having difficulties performing actions in SL, the researcher observed how they all

needed support during the sessions. They all had support from an assistant in the lab and from the remotely located researcher during sessions. When they experienced a sense of achievement they were keen to express this, such as Trinaka Lika who in her last session exclaimed with excitement: *"I teleported by myself this time"*.

The experienced participants use SL for learning at a different level than the novice participants. Maria Butterfly first started using SL to participate in a college course, and she has taken more courses in SL after that initial experience. Also, Landira Crunge and Sunger Alista use SL to learn. *"Learning- I am a learner by genetic make-up. SL has offered me opportunities to develop deeper knowledge and understanding on a wide variety of professional topics, including some in peripheral professional fields."* (Sunger Alista). The experienced participants learned to build, modify and create new objects in SL, both through courses and from other users of SL.

Furthermore, some of the experienced participants are doing volunteer work for Virtual Ability Island (VAI). Through this work they help novice users of SL to overcome the initial barriers of use, and help them become familiar with the VW. A couple of the novice users felt they had learned enough to be able to help others in their local community to start using SL. *"Last week I met some others that were thinking about starting to use SL. I might be able to show them how they can use it now"* (Gjagra Gralt). Mix Mofat also spent some of the time with his group in SL helping his fellow participants. He expressed joy with being able to give back to the others and help them enjoy SL as much as he did.

4.1.2 Self-determination. Initially, the researcher observed the novice users' motivation for use of SL to be extrinsic. Even though they showed signs of having an internal motivation to experience something new, the choice of application and setting was pre-set for them. However, through the sessions their motivation for use clearly became an intrinsic motivation. The excitement of exploring and spending time in-world became apparent when they started suggesting activities and locations they wanted to visit or revisit. A few participants indicated that they intended to continue to use SL after the sessions were completed.

The experienced users demonstrated a high level of intrinsic motivation for using SL. Most use SL daily, a few hours each day. When asked why SL is such an important tool, most answered that the social aspects and new experiences were important factors for them. *"But for me, it's primarily a social venue for 'physical' contact with people I may never see or touch or hear in person. Plus it's a venue for exploring new ideas and*

experiences, solo or collaboratively.” (Ahroun Wolf). *“I use SL for education, socialization and exploring. It is a wonderful tool for disabled people; it opened my world, made me more social.”* (Maria Butterfly). While they are now highly self-motivated to spend time in SL, they reported a range of reasons for first entering the VW. Ahroun Wolf first entered SL as an escape from the physical world: *“Mostly escape. I was always such an outcast in my peer group that finding company and companionship was nearly impossible in real life. I never really had a need for a great many friends but finding even a few was challenge enough that I looked elsewhere.”* Landira Crunge was introduced to SL by a friend, who eventually helped her get started: *“A friend told me about it and suggested I might like it. I did come in with another Avatar back in 2007, but could not figure out what I was doing. The same friend talked me into coming back about 6 months later and this time she helped me get orientated.”* In addition, the experienced participants explained that they started using SL to seek a new environment for educational or professional purposes. *“I heard about it through a nonprofit organization in which I participated relative to using technology in the nonprofit sector. I decided to see what a "virtual world" was like. I found my way to Virtual Ability and that was what has been most relevant for me in SL.”* (Sunger Alista) *“I have a long time interest in computers and technology. And a buddy told me about role playing in SL. And so I got involved in that for a long while.”* (Agonra Sircka)

4.2 Social Participation

4.2.1 Interpersonal relationships. As mentioned earlier, one of the most important affordances for the experienced participants in this study when engaging in SL is the social factor it offers. They reported experiencing interpersonal relationships from brief meetings to close personal relationships. *“Professional relationships- educators, techies, advocates, volunteers, etc. Friendships and I guess "acquaintances" which are not as deep as real friendships- but are social interactions of meaning.”* (Sunger Alista). *“I have been partnered with a guy if that's the kind of relationship you mean. Mostly now it's just good friends, someone who I go dancing with, or sailing, or surfing, just enjoying each other's company”* (Landira Crunge). Ahroun Wolf moved his in-world relationship with his partner into the physical world. When asked if it is easy to develop relationships with others in SL their answers varied: *“Hard, there is the obvious reality that you're dealing with words in a window, pixels on a screen. That pesky anonymity makes you wonder if the person you're talking to is*

merely a character or represents the real person. Easy though, because that very same anonymity means that people ironically are free to be themselves.” (Ahroun Wolf). *“Hard, takes time to form real relationships, like RL. Just takes an effort. Over time you learn more and reveal more about yourself.”* (Kalnika Gublic).

Another important factor the experienced participants reported is the opportunity to meet people and create friendships across geographical boundaries. *“Global interconnecting- interactions with folks I would never have had a chance to interact with, on topics of mutual interest”* (Sunger Alista). *“Ok, I have hearing loss and it's so much easier to communicate with people in SL than it is in RL. So not only that, but just the variety of folks in SL is great. I mean, I've* [got] *friends from all over the world.”* (Landira Crunge)

The novice users tried to make contact with strangers in SL to varying degrees. One of the main obstacles for this group was the language barrier. The first language for all but two of them was Norwegian, and although some understood a little English, only one spoke enough English to hold a conversation. Throughout the eight sessions we did not have many opportunities to enter situations where other Norwegians were present. Furthermore, even when exposed to situations where other Norwegian speaking people were present, these participants did not succeed in making contact. The researcher observed that the novice participants at times could be described as "stalking" the crowd. They moved into others' personal space, and when the others moved away, they would move their avatars after them but did not initiate any other contact. When the novice participants were asked if they had made any friends in SL, all but three indicated the other participants in their group and the researcher as their only friends in SL. Gjagra Gralt, Missara Melsa and Sophy Salk reported that they had made friends in SL that were not part of their groups. Gjagra Gralt stated: *“Yes, I have got other friends. The one DJ at Ohana* [island in SL]*, I meet him once in a while. Once I logged in when I was at home, he sent me an IM to tell me I had to come dancing. He wanted to know how I was doing.”*

4.2.2 Social Inclusion. Being socially excluded is a known challenge for PWLD. The experienced participants in this study are all very active users of SL. They spend from one to two hours a week to four to eight hours a day in SL. They are members of various groups which complement their interests. When the experienced participants were asked if they felt part of a community in SL, they said they did. *“Yes, definitely. Virtual Ability. Well, I have a sense of identity as part of a group with shared experiences and values. I have a sense of mutuality- I both give to the*

group members and receive from them. I have friends, as well as acquaintances, from the group. I look to the group for input, advice, and fun. And I feel I have contributed to the group, as well as it contributing to me." (Sunger Alista). *"Absolutely, of which community can change with time, and sometimes the transition from one community to another can be a bit lonely and draining... but yeah, absolutely."* (Ahroun Wolf).

Ahroun Wolf found the questions concentrating on the social aspects of VWs hard to answer. The researcher asked him if he thought some of the challenges he experienced in the physical world were due to his ASD. He answered *"Yeah, more than likely. There's a lot less social anxiety here* [in SL]. *I can just be myself, and if someone doesn't like it, oh well. RL... if someone doesn't like your social presentation, real harm, physical, legal, financial... can be a result."*

The experienced participants all have both a "friends list" with connections in SL and "groups" in SL of which they are members. When asked which was more important for them, they indicated both are important in different ways. *"One-to-one lead probably to good friendships, but the community connection gives a sense of belonging"* (Landira Crunge) For Ahroun Wolf, one-on-one relationships are more important. *"In my case, the one-on-one is far more important than the group, if for no other reason than being nearly blind to group dynamics"* He is supported by Kalnika Gublic in this notion, however for a different reason: *"I find even group-originated connections (i.e. I meet the person via a group) evolve into one on one, which is where I find the most value and opportunity."* Important to note is that the experienced participants indicated there is the same prejudice in SL as found in the physical world. Kalnika Gublic, who uses a wheelchair in the physical world, has chosen not to use a wheelchair in SL. *"I see how people move away from people with disabilities in here* [in SL]*"* (Kalnika Gublic).

The novice users did not explicitly express any indication of social inclusion. However, through observation, the researcher noticed they continued to ask for locations where they would be around other avatars. A few times the researcher took them dancing in a location where they were by themselves. However, this soon became boring. Although they still wanted to dance, it was important to be around others when engaging in this activity. When taken to a location where there were other avatars present, the novice users could spend the entire session in one location. One example is Sophy Salk's experience. At Second Norway, the Norwegian Island in SL, she had the opportunity to dance with a male avatar. She did not like the style of dance they were doing and asked

the researcher how to change it. The researcher suggested she should click on a dance ball, an object to animate the avatar, to choose her own style of dancing. She then answered: *"No, I want to dance with him."* The opportunity to dance with another individual was more important than the style of dance. At the next session Sophy Salk asked the researcher to go back to Second Norway to see if she could meet her dance partner again. However, this time nobody else was present at Second Norway when we arrived. She was very disappointed that she was not able to meet her dancing partner again.

4.3 Well-being

The experienced participants stated that VWs were important to them in their personal lives and enhanced their well-being. When asked how SL may have improved his quality of life Ahroun Wolf answered: *"I have none without my computers. Without my cocoon of technology... there would be no quality to my life at all."* His views are to some extent supported by some of the other experienced participants in this study: *"SL has given me a reason to exist more than just so because of my kids. I do feel a sense of being needed in SL more so than in RL. Part of that is because of my hearing loss."* (Landira Crunge) Kalnika Gublic indicated there is a digital divide which in some cases prohibits PWLD from participating in the VW and taking advantage of the possibilities. *"I'd say my entire experience of interconnectedness via SL has helped me to better understand myself in a technologically interconnected world.... and also to better see where the "digital divide" leaves so many out of the dialogue."*

5. Discussion

Both the novice and experienced participants described social affordances offered by VWs as valuable. Nevertheless, VWs may not be suitable or accessible for all PWLD. The learning curve to use VWs is steep, as shown by the experienced participant who gave up SL when she did not have the required support. We also note through this study that those novice participants with an intellectual disability required high level of assistance and support to fully appreciate the opportunities offered by VWs. However, for those who were able to overcome these initial barriers, VWs prove to be of great importance and value, also for PWLD.

5.1 Independence

Independence and participation is important for all humans, however, for PWLD it is not always easily obtained [6]. Previous research has shown that ICT can provide some PWLD the opportunity for inclusion and VWs have great potential for this group [4]. Both the novice and experienced participants described that VWs have potential for offering personal development experiences.

VWs have been said to provide an opportunity to be independent from physical constraints [25]. Both novice and experienced users in this study discussed the importance of being able to experience an environment free of physical constraints. Being able to walk and dance when unable to do this in the physical world were experiences of great value. The ability to visit a new location without having to engage in extensive planning was another important affordance. This has previously been explained as one of the potential values offered by VWs to PWLD [21].

Another important part of personal development is the possibility to be independent of care givers [15]. The novice participants expressed joy about being able to experience new locations without the need for a chaperone. This was also an important factor for the experienced participants, who found it fulfilling to go to a bar in SL, free of physical constraints and the arrangements required in the physical world.

Previous research has explored the educational aspects of VWs; however there is more to learning than formal education [29]. The experienced participants in this study used SL to learn how to build and create new objects, such as building houses and virtual artifacts for support. The novice participants learned to interact with a new environment. In addition, a few of the novice participants experienced the possibility to help others enjoy the VW as they did. The opportunity to give back in some way is important to all humans; however, PWLD in many situations are left out of this opportunity [6]. The experienced participants noted that the opportunity to be a volunteer at VAI was a meaningful and valuable experience, whereby they were able to contribute to others by helping novice users with disability overcome the initial barriers of entry to the VW.

Self-determination is an important factor in any use of technology. Research indicated that continuous use of technology is more likely if the motivation to use it is intrinsic [19]. The experienced users expressed high levels of internal satisfaction with using SL. They stated the social affordance offered by the VW was one of the most important and compelling reasons for them to spend time in-world. The novice participants were not specific in their statements of motivation. This may

have been, in part, because their supported time in SL was only eight sessions. However, the researcher noticed their increasing eagerness to explore new locations and experience new things. In addition, some of the novice participants found activities they enjoyed and wanted to return. This may indicate that there was a move from extrinsic to intrinsic motivation for these participants. Three of the novice participants intended to continue use of SL. The other novice participants either did not know if they would continue to use SL, or were clear this was not something for them.

5.2 Social Participation

VWs offer a variety of social connection opportunities independent of geographical boundaries. The experienced participants in this study stated they experienced different types of relationships in the VW, from acquaintances to deep personal relationships. Three of them stated that they have had or currently have partners in the VW. The main relationships the experienced participants focused on were the deep and meaningful friendships they experience in SL. SL gives them the opportunity to be independent of physical location, so that if they move in the physical world or are unable to go out they still have the opportunity to keep in contact with their connections in the VW. Although the novice participants did not develop interpersonal relationships in SL during their limited time there, they did state they made friends with each other and the researcher. The experienced participants stated creating close relationships with others in SL takes time, as it does in the physical world.

The experienced participants confirmed that being able to choose what to disclose gives PWLD the opportunity to meet on equal terms, which previously was suggested as one of the possible benefits VWs offer PWLD [21].

Social inclusion in the VW was also important to the experienced participants. Exclusion is a major barrier for PWLD [6], and the opportunity to meet on equal terms in the VW is of value to this group. The experienced participants stated they felt part of a community, based on interests and being treated as equals by others when interacting in SL. The novice participants did not express this in words; however, they did express a wish to spend their sessions in SL where there were other avatars present. Some of the novice participants showed low appreciation of personal space. As presented earlier, the researcher observed this to be uncomfortable for others who they met in-world. The other avatars would move around in the environment to avoid having their personal space invaded. When this happened the novice participant

would move after, seemingly unaware that the other avatar was trying to avoid the situation in a subtle manner. This may suggest a need for social training also in VWs, where the social rules of respecting personal space also apply. Eight sessions in SL were insufficient amount of time for the novice participants to fully experience the social inclusion reported by the experienced participants in this study.

Compared to other online social networking sites (e.g., Facebook, MySpace), VWs offer the opportunity to interact with and meet both friends and strangers while collaborating in activities. Thus, they offer a real and relatively safe opportunity to extend and develop social networks and gain new experiences. VWs also offer an environment free of physical constraints [25], which has been of value for the participants in this study.

5.3 Well-being

VWs may present a valuable tool for PWLD to increase their sense of well-being [26]. This premise is supported by the experienced participants in this study. They perceive that VW's impact positively on their day to day life, self-esteem and quality of life. Ahroun Wolf explained his quality of life would be poor without VWs. Because of his disability, social settings are difficult for him in the physical world and the VW gives him the opportunity to be a part of society in a new way. SL offers him an opportunity to feel good about himself, enjoy meeting others and feel part of a community. These feelings were echoed by other participants to some extent. Thus, VWs offer a way for some PWLD to be included without fear of the prejudice met in the physical world. Nevertheless, this is not to say that there is no prejudice in the VW. The same prejudices met in the physical world may also be present in the VW, but may be easier to avoid or work around in the VW [30]. It is important to be aware of the challenges prejudice present to PWLD in the VW. In contrast, the language barriers experienced by the novice participants are not possible to avoid or work around in VWs. Yet, our findings indicated that participants' sense of well-being was positively affected by their social connections and leisure activities in the VW.

6. Limitations and Future Research

A limitation of this study is the small number of participants in each disability group. However, as this was an exploratory study and one of the first to examine the social aspects of VWs for PWLD, it creates a starting point for further empirical research in this area. In addition, we did not attempt to show any cause and effect among the QOL factors, domains and the overall feeling of well-being so these trends must be interpreted with caution.

An empirical examination of the importance of VWs, and how VWs can best be introduced to PWLD is warranted. Future research could aim to examine the social impact VWs have on PWLD and how community dynamics and participation may create a new arena for PWLD. While this study examines QOL factors at a micro-level (personal), further analysis could be applied at the macro-level (social) and meso-level (functional). In addition, a possible future research area could include a longitudinal study with quantitative measurements of the domains of QOL. Also, comparing the impact of VWs and other social media and Web 2.0 to further understand the value for PWLD may be an important future research venue.

7. Conclusion

This study aimed to explore how PWLD experience social affordances through the use of VWs. We drew on factors and domains identified by QOL research. We conclude that VWs have a positive effect on some QOL factors for the group of PWLD in particular independence, social inclusion and emotional well-being. Further, our findings indicate that VWs offer an opportunity for PWLD to be independent, particularly once they are able to access the VW without support. In addition, VWs offer an environment for learning and an opportunity to experience increased social participation and well-being.

Drawing on our findings, it is important to note that not all the participants were able to take advantage of these affordances. Indeed, we suggest eight sessions in SL may not be sufficient time for novice users with lifelong disability to take full advantage of these affordances. In summary, this study indicated that VWs offer valuable tools for PWLD to create friendships, relationships and experience personal growth and social participation. Our findings demonstrate that using previously identified factors of QOL can help us understand these experiences. In addition, our research empirically examines the promising issues indicated by previous conceptual research.

8. References

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