

**MEDIA
GROUP**

Immersive Education Initiative

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Psychology of Immersive Environments Working Group (PIE.TWG)

CHARTER

Name: Psychology of Immersive Environments Working Group (PIE.TWG)

Identifier: PIE.TWG

Web site: <http://MediaGrid.org/groups/technology/PIE.TWG>

Discussion forum: <http://MediaGrid.org/groups/technology/PIE.TWG/forum>

Email list: PIE.TWG (at) lists.mediagrid.org

Standards process: http://MediaGrid.org/process/Immersive_Education_Initiative_Process_Document.pdf

IP policy: http://MediaGrid.org/policy/Media_Grid_Intellectual_Property_Policy.pdf

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MISSION STATEMENT

The Psychology of Immersive Environments Working Group (PIE.TWG) is responsible for 1) advancing basic and applied research on the psychology of immersive environments, 2) promoting immersive experiences and programs that are psychologically beneficial, 3) defining best practices for the early identification and assistance of at-risk users of immersive environments and the treatment of individuals currently manifesting symptoms of immersive disorder, and 4) collecting and disseminating scientific and professional information on the psychology of immersive environments.

MEMBERSHIP CRITERIA

The PIE.TWG is open to all members of the Immersive Education Initiative whose background and skills are in one or more of the following categories:

1. Psychological Researchers/Academics with experience in the design, implementation, and analysis of publication-quality psychological research.
2. Mental Health Professionals with experience providing psychological counseling or therapy for any problems linked to excessive technology use and/or an interest in investigating the therapeutic use of immersive experiences.
3. Participants with extensive experience using virtual worlds, simulators, or immersive games and the capacity to thoughtfully discuss the psychology of these immersive environments.

In the ideal case, the PIE.TWG will be composed of multiple representatives from each category in order to ensure that the perspectives of the scientific, professional, and experienced-user communities are reflected in its activities and work products.

TO JOIN: Please complete this form to join the TWG.

OVERVIEW

A. The Psychological Implications of Immersive Environments

The development of interactive, 3D graphical environments is a technical advance with major implications for human psychology, particularly in the areas of social interaction and personality and identity.

1. The impact of immersive environments on social interaction.

The rise of immersive social spaces has produced a significant increase in the power and realism of remote interactions. While text-based remote interactions have been available since the introduction of written letters centuries ago, and telephonic and video-based mediators of distance interaction have been used for years, the introduction of three-dimensional social spaces has added a powerful experience of embodiment and physical presence to remote interactions. For the first time, individuals have a sense of “being inside,” “inhabiting,” or “residing within” the remote environment rather than being outside of it, thus intensifying their psychological experience.

While the senses of taste, smell, and touch remain exclusive to proximate interaction, the addition of a compelling bodily sense to remote interaction constitutes a significant narrowing of the distinction between proximate/visceral and distant/virtual human interaction. Ongoing progress in the graphical realism of immersive environments will continue to lessen the experiential divide between real and virtual environments and create a parallel, competing, context for human interaction.

2. The impact of immersive environments on personality and identity

Users of immersive environments are able to create avatars (3D digital representations of the self) whose physical and/or psychological qualities are very different from their human form. This capacity has major implications for the nature of personality and identity.

In real life, an individual's identity is closely linked to physical characteristics such as age, sex, race/ethnicity, and health as well as his or her inborn temperament and personality traits. However, the ability for participants in immersive environments to customize their avatar (or avatars) into almost any form of imagined self involves an unprecedented separation between the body, consciousness, and identity. In the future, as individuals spend more time in immersive environments and grow increasingly accustomed to creating and using diverse digital representations, it is possible that the concept of the self or personality will be viewed more as an organization of multiple diverse identities rather than as a more stable, unitary entity.

B. Understanding the Psychology of Immersive Environments

Summary

Systematic research in three broad areas of investigation can help provide a more detailed understanding of the psychology of immersive environments. Each of these areas -- assessing the psychological characteristics and behaviors of active users of immersive

environments; determining similarities and differences between real world and virtual world psychology; and evaluating the impact of virtual experiences on real-life behavior and psychology – is briefly discussed below. Two additional sections highlight the importance of identifying best practices for conducting scientifically-sound, ethical research on the psychology of immersive environments and disseminating scientific and professional information on the subject.

1. Assessing User Characteristics and Activities

While some data are available that provide general descriptions of active users or “residents” of immersive environments (e.g., their ages and nationalities), there is a lack of information on the psychological and behavioral characteristics of these participants. Very little is known about their real-life social relationships, family histories, personality features, or mental health status. There is also an absence of systematic studies on typical patterns of social behavior and activities that occur within the virtual world itself. In sum, very little is known about the psychological qualities of active users of immersive environments and what their lives within virtual worlds entail.

Given this void in objective data, current perceptions of virtual worlds and their active inhabitants are largely based upon popular press accounts of the oddest and most extreme processes within 3D virtual environments or are a matter of unanchored personal opinion. As the number of avatars worldwide continues to grow, policy makers, community leaders, parents, and teachers will increasingly be called upon to respond to the presence of 3D graphical environments and the availability of immersive experiences. Systematic investigations of the real-world characteristics and typical in-world activities of active users of 3D graphical environments can provide realistic data to underpin these responses.

2. Determining Similarities and Differences Between Real-World and Virtual-World Psychology

A basic question related to the psychology of immersive environments is whether the principles of psychology that apply in the actual world also operate in the virtual world. Preliminary findings indicate that there are both common and distinct psychological processes between the real and virtual realms. On one hand real-world findings related to the dynamics of personal space and obedience to authority have been replicated in the virtual world. In contrast, there is evidence that the pace in which relationships form and dissolve in virtual environments is significantly greater than in the real world and that social anxiety and inhibition is less prevalent in the virtual realm.

Going forward, an extensive set of studies can be undertaken across many areas of psychology to derive a fuller understanding of which psychological processes show consistency or variability across real and immersive, graphical environments.

3. Evaluating the Impact of Virtual Experiences on Real Life Behavior and Psychology

The key applied question related to the psychology of immersive environments is whether experiences in virtual worlds have the capacity to influence behavior and subjective experience in the real world in either positive or undesirable ways.

With respect to positive effects, a number of early studies have demonstrated that virtual experiences can have beneficial consequences for real-world behavior and subjective experience. For example, individuals who controlled avatars that exercised in the virtual realm increased the frequency of their real life workouts in the week following the research. Similarly, individuals who controlled avatars that reflected aged versions of their real selves tended to make more conservative decisions in a post-experiment survey on financial management. A wealth of studies, across many domains of behavior and experience, are possible to assess the extent to which virtual experiences can be a constructive influence on real life functioning and to determine the durability of these effects over time. These include the use of immersive environments as a context to deliver counseling, psychotherapy, and other mental health services.

It is also important to assess potential negative effects of immersive experiences. Each new phase of the Internet has prompted expressions of concern regarding its addictive potential and possible adverse consequences of excessive use such as social isolation, impaired job performance and relationship problems. With respect to Web 1.0 and Web 2.0, a number of research studies have found that the lives of heavy internet users experienced disruptions that were similar to those experienced by addicts or alcoholics and some treatment approaches and programs have been developed to address these concerns. With respect to Web 3.0/3D, there have been many blog postings and articles in the popular press raising concerns about the addictive potential of the immersive Internet. Indeed, because of the power and compelling nature of 3D virtual environments the potential for addiction and negative impacts on psychology and behavior is often considered more severe with immersive environments. To date, however, no systematic studies have been conducted to determine the nature and extent of psycho-behavioral disturbances related to excessive uses of immersive environments. Should these negative impacts be shown to be prevalent, developing prevention and treatment programs for immersive Internet disorder, and assessing their efficacy, will be important.

4. Identifying Best Practices for Research

Research in each of the content areas can be enhanced by identifying best practices for conducting scientifically sound, ethical studies on the psychology of immersive environments. To what extent do ethical guidelines related to obtaining informed consent and ensuring confidentiality that have been established in real-world research with human subjects also apply to conducting research with avatars in immersive environments? Similarly, are the methods for establishing the reliability and validity of data, or the recommended research designs and types of statistical analyses, the same or different within the real and virtual realms?

5. Collecting and Disseminating Information on the Psychology of Immersive Experience

In order to assist both researchers conducting scientific studies on immersive environments and mental health professionals interested in treatments related to immersive experience, it would be helpful to collect copies of relevant research studies and professional papers, to house them in a digital (possibly immersive) library, and to facilitate their dissemination. In this way, the body of existing work on the psychology of immersive experience will be easily available, facilitating the goal of having work in this area be cumulative and progressive.

OBJECTIVES

1. Promote basic and applied research to increase knowledge and understanding of the psychology of immersive experience.
2. Define best practices for conducting scientifically sound, ethical research on the psychology of immersive experience.
3. Identify immersive experiences and programs that are psychologically beneficial.
4. Define best practices for the delivery of mental health services within immersive environments.
5. Define best practices for the early identification and assistance of at-risk users of immersive environments and the treatment of individuals currently manifesting symptoms of immersive disorder.
6. Collect and disseminate scientific and professional information on immersive psychology

CRITERIA FOR SUCCESS

1. Prepare document defining best practices for conducting research on the psychology of immersive experience.
2. Initiate research studies by PIE.TWG members (including multi-site, collaborative efforts) on the psychology of immersive experience.
3. Present research findings at professional conferences and publish them in journals and chapters.
4. Prepare document summarizing immersive experiences and programs in current use that are psychologically beneficial.
5. Prepare document on best practices for delivering mental health services within immersive environments.
6. Prepare document on best practices for the early detection and assistance of at-risk users of immersive environments and the treatment of individuals manifesting symptoms of immersive disorder.
7. Develop a digital library of scientific and professional information related to the psychology of immersive environments.

RELATED MediaGrid.org GROUPS

1. LIB. TWG.

The efforts of the Library Technology Working Group (LIB.TWG) can facilitate the

construction of an effective digital library of scientific and professional papers on the psychology of immersive environments.

2. OFF. TWG

An objective of the open file formats working group is to enhance interoperability between immersive platforms, promoting continuity of immersive experience both within and between immersive worlds. Progress on this front has major implications for the psychological power and realism of virtual experience. To the extent that users are able to move fluidly within and between virtual realms, with minimal or no interruption in their immersive experience, the variability and complexity of their virtual experience will more closely approximate that of real life.

USE CASES

Assessing User Characteristics and Activities

Scenario 1: Acquiring Data on the Psychology of Virtual World Participants.

A college professor teaching a basic accounting class has set up a clothing store in a virtual world that is being run by student-created avatars. The teacher's intent in developing this immersive exercise is to teach students basic accounting and business practices in a manner that more closely approximates real-world experiences than traditional methods of instruction in this subject area. While the course is underway, the teacher learns that several parents have contacted the university administration and expressed concerns that having students create and operate avatars was encouraging aberrant behavior. Several of the parents mentioned that they had read reports of participants in virtual worlds engaging in strange and objectionable behavior and had heard that these worlds are largely populated by socially isolated and emotionally unstable individuals. The parents insist that the professor use healthier and more appropriate ways to teach their children, while the professor states that the parent's views are alarmist and unfounded and objects to any restriction on academic freedom. The university administration seeks to investigate the issue further and finds no empirical data on the psychological characteristics or typical in-world behaviors of active users of immersive environments.

Investigating Similarities and Differences Between Real and Virtual World Psychology

Scenario 2: Assessing Physiological Responses to Virtual-World Experiences

A researcher conducts several studies to explore whether physiological responses to experiences within immersive environments are similar or different to physical reactions to real-life events. To the extent that the form and magnitude of physiological responses to experiences in virtual domains mirror those found in visceral settings, he believes it would be difficult to dismiss immersive experiences as game-like and psychologically

inconsequential. In one study he startles an avatar by arranging for a large object to fall from space and crash next to it and assesses whether the heart rate and galvanic skin response of the human driver indicates an increase in physiological arousal. In another study the investigator has an avatar experience social criticism or rejection from other avatars to determine whether the human driver produces higher levels of the stress hormone cortisol as occurs following social rejection within real-life interactions.

Scenario 3: Comparing the Basis of Mate-Selection across Real and Virtual Worlds

Research on real-world intimate relationships indicates that individuals tend to be attracted to others who have complementary personality traits (e.g. introversion/extroversion), symmetrical values (e.g., religious, political, philosophical perspectives), and are broadly matched on perceived physical attractiveness. Do these bases for interpersonal attraction also apply to close relationships that form in the virtual world?

Using Immersive Experiences to Achieve Psychological Benefits

Scenario 4: Enabling Safe Dialogue between Violently Opposed Groups

Violence has erupted between two rival gangs competing for turf and drug markets in the inner city. In the last week, not only have six gang members been murdered, but two innocent children have been killed in drive-by shootings. Members of the community are demanding action to halt the violence. City officials want to negotiate a truce but fear that any direct contact between the gangs could get out of control and become a context for a bloody gun battle. As an alternative, they have representatives from the rival gangs meet via avatars in a virtual world and attempt to reach a negotiated settlement without risking further violence. One city official involved in the plan notes that, should the immersive negotiation lead to a cease fire among the warring gangs, the same methodology could be applied to safely bringing together members of intra and inter-national groups currently engaged in violent conflict for direct talks.

Scenario 5: Reducing Stereotyping and Intolerance through Diversity Simulations

A high school teacher working within a racially-mixed school wants to challenge the stereotypic and intolerant views held by many of her students toward peers outside their racial group. She has each student in her class open a virtual world account, create a race-discrepant avatar, and spend several hours a week interacting within the virtual world with this avatar. Students are asked to reflect upon these experiences in a journal. At the end of the assignment, she has students meet in small groups to discuss the diversity simulation exercise and assess its impact on attitudes and feelings toward real-life members of other racial groups.

Scenario 6: Addressing the Emotional Consequences of Severe Physical Disability.

An occupational therapist is working at an inpatient rehab facility that serves individuals

with advanced cerebral palsy, many of whom are largely bedridden. She observes that many of her patients suffer from low self-esteem and significant depression as a consequence of their disability. In response, she works with these patients to open accounts in a virtual world and helps them to customize avatars that represent their beauty ideals and are fully enabled physically, with the capacity to walk, run, and even fly within the immersive setting. After several weeks she notices that the patients who have been operating attractive, enabled avatars seem more confident and less depressed. One patient tells her how he feels like a normal person within the virtual world, and how good it feels to interact with others who don't see him through the lens of his physical disability.

Scenario 7: Conducting Graded-Exposure Treatments of Anxiety-Disorders

A therapist specializing in anxiety disorders such as phobias and post-traumatic stress disorder often uses graded-exposure techniques in which clients are progressively exposed and desensitized to escalating levels of an anxiety-producing stimulus or context (e.g., heights, social speaking, etc.) While the therapist realizes that real-life or "in-vivo" exposure is more powerful than imaginary exposure (evoking mental images of the feared stimulus), the former is too time consuming and costly for most clients. As an alternative, the therapist sets up a virtual environment where he can simulate progressive exposure to vivid, 3D graphical representations of the source of the client's fears and reduce their anxious response to the stimulus over time.

Developing Methods for the Early Detection and Treatment of Immersive Disorder

Scenario 8: Identifying At-Risk Users

As 3D graphical environments become increasingly vivid and compelling, some individuals may become involved in these worlds in a manner that is compulsive and psychologically harmful. Others may enjoy using immersive environments without being consumed by these experiences or suffering any negative consequences. The question is: Are there psychological variables (e.g. family history of addiction, current or historical personality problems, the presence of co-morbid compulsive or addictive behaviors) or physiological indicators found during early use (measures of arousal, dopamine levels) that are associated with constructive or detrimental usage? The identification of psychological and/or physiological predictors of susceptibility to later symptoms of immersive disorder can promote efforts at prevention and early intervention.

Scenario 9: Treating Immersive Disorder

A woman contacts a therapist because her husband is concerned that she's addicted to experiences in 3D virtual worlds. She tells the therapist that she spends hours in-world every day, often staying up most of the night and being sleep-deprived the next day. Her work performance and real-world relationships have begun to suffer, not only with her husband but with her friends and family members as well. She finds herself craving her time in-world and being irritated when her husband tries to prevent her from going on-

line even for one night or on the weekends. Sometimes she feels that her in-world life is more real than her life off-line and this frightens her. Still she is unable to stop or limit her time in-world. She asks the therapist if he has ever treated anyone who was addicted to virtual reality and if he could help her.

Promoting Best Practices for Research on the Psychology of Immersive Experience

Scenario 10: Establishing Ethical Guidelines

A researcher is preparing to conduct a study in a virtual world using avatars as subjects and wonders what is the best way to have the avatar's human driver provide informed consent for participating in the study. The researcher also wonders how he can be certain that the human driver hasn't already completed the study using another avatar or alt, which would create duplicate cases or non-independent subjects. Is it sufficient to have the human driver indicate that they have never completed the study before? Is it ethical to determine the ISP number of the computer being used by the human driver to see if it is a duplicate of a computer used by a previous subject?

Scenario 11: Establishing Confidence in the Validity of Data

A researcher is excited by the presence of tens of millions of avatars in the virtual world and the prospect of accessing a global pool of subjects for his work rather than relying upon students enrolled in introductory psychology classes. However, he is uncertain about the scientific validity of data collected via avatar subjects. He has read accounts of "cyber disinhibition" and wonders if this phenomenon will result in data that is less subject to social-desirability effects (and therefore have increased validity), or whether it will have an arbitrary and capricious character that will reduce its accuracy and scientific value. He wonders if any prior work has been done to assess the scientific validity of data obtained in immersive environments. In order to answer his question he accesses a digital library of scientific and professional papers on the psychology of immersive environments.

RELATED OPEN STANDARDS AND OPEN TECHNOLOGIES

(Leave blank for now.)

RESOURCES AND RELATED WORK

I. USER CHARACTERISTICS AND ACTIVITIES

Yee, N., & Bailenson, J.N. (2008). A method for longitudinal behavioral data collection in Second Life. *PRESENCE: Teleoperators and Virtual Environments*, 17(6), 594-596.

Yee, N. (2006). The demographics, motivations and derived experiences of massively-online graphical environments. *Presence*, 15(3), 309-329.

II. SIMILARITIES AND DIFFERENCES BETWEEN REAL LIFE AND VIRTUAL WORLD PSYCHOLOGY

A. Personality and Identity Issues

- Bailenson, J.N., Blascovich, J., & Guadagno, R.E. (2008, in press). Self representations in immersive virtual environments. *Journal of Applied Social Psychology*.
- Ranon, Neallie, (2006). Young women's use of the Internet to explore secret identities. *Dissertation Abstracts International: The Sciences and Engineering*, 67, 3498.
- Second Life Herald. (2005, Dec.). Woot! 100K dormant alts. *Second Life Herald*. Retrieved Nov. 10, 2008, from http://www.secondlifeherald.com/slh/2005/12/woot_100k_dorm.html.
- Stenvaag, S., Traveler, C., (2008, Feb.) Self and SL: dialog between immersionist & augmentationist. *NWN Blogs*. Retrieved Nov. 18, 2008, from <http://nwn.blogs.com/nwn/2008/02/self-and-second.html>.
- Talamo, A., Ligorio, M. (2000, June). *Identity in the cyberspace: The social construction Of identity through on-line virtual interactions*. Paper presented at the 2000 Dialogical Self conference. Retrieved Nov. 10, 2008, from <http://www.activeworlds.com/edu/research/identity.pdf>.
- Turkle, Sherry (1997). *Life on the Screen: Identity in the Age of the Internet*. Simon and Schuster.
- Van Gelder, Lindsey (1991, 1985). "The strange case of the electronic lover." In *Computerization and Controversy: Value conflicts and social choices*. Charles Dunlop and Robert Kling (eds.) 364-375. Boston: Academic Press.

B. Social Interaction, Relationships, Sexuality

- Bailenson, J.N., Blascovich, J., Beall, A.C., & Loomis, J.M. (2003). Interpersonal distance in immersive virtual environments. *Personality and Social Psychology Bulletin*, 29, 1-15.
- Bailenson, J.N. & Yee, N. (2007). Virtual interpersonal touch: Haptic interaction and copresence in collaborative virtual environments. *International Journal of Multimedia Tools and Applications*, 37(1), 5-14.
- Blascovich, Jim (2002). Social influence within immersive virtual environments. In Ralph Schroeder (Ed.) *The social life of avatars: Presence and interaction in shared virtual environments*, 127-145, London: Springer-Verlag.
- Ducheneaut, N., Yee, N., Nickell, E., and Moore, R.J. (2006). "Alone together? Exploring the social dynamics of massively multiplayer games." *In conference proceedings on human factors in computing systems CHI 2006*, pp. 407-416. April 22-27, Montreal, PO, Canada.
- Hoyt, C., Blascovich, J., & Swift, K. (2003). Social inhibition in immersive virtual

- environments. *Presence: Teleoperators and Virtual Environments*. 12:183-196.
- Lynn, R. (2007, June 22). Second life without sex would be a sad life, indeed. *Sex-Drive Daily*, Retrieved October 21, 2008, from <http://www.blog.wired.com/sex>
- Ross, M.W. (2005). Typing, doing, and being: Sexuality and the Internet. *The Journal of Sex Research*, 42(4), 342-352.
- Ruberg, B. (2006, June 13). Sex in games: It's a turn-on. *Wired*, Retrieved October 21, 2008, from <http://www.wired.com>.
- Park, S. & Catrambone, R. (2007) Social facilitation effects of virtual humans. *Human Factors*, 49(6), 1054-1060.
- Williams, D., Ducheneaut, N., Li, X., Zhang, Y., Yee, N., Nickell, E. (2006). From tree house to barracks: The social life of guilds in World of Warcraft. *Games and Culture*, 1, 338-361.
- Yee, N., Bailenson, J.N., Urbanek, M., Chang, F., & Merget, D. (2007). The unbearable likeness of being digital: The persistence of nonverbal social norms in online virtual

III. THE IMPACT OF VIRTUAL WORLD EXPERIENCES ON REAL LIFE PSYCHOLOGY AND BEHAVIOR

A. Positive Experiences

- Ersner-Hersfield, H., Bailenson, J. & Carstensen, L.L. (2008). A vivid future self: Immersive virtual reality enhances retirement saving. *Poster presented at the Association for Psychological Science Annual Convention*, Chicago, IL.
- Groom, V., Bailenson, J.N., & Nass, C. (2008, in press). The influence of racial embodiment on racial bias in immersive virtual environments. *Social Influence*.
- Parsons, C. (2008, July 13). Second life offers healing, therapeutic options for users. *San Francisco Chronicle*, Retrieved October 21, 2008, from <http://www.sfgate.com>
- Riva, G. (2005). Virtual reality in psychotherapy: Review. *CyberPsychology and Behavior*, 8(3), 220-230.
- Yee, N. & Bailenson, J.N. (2006). Walk a mile in digital shoes: The impact of embodied perspective-taking on the reduction of negative stereotyping in immersive virtual environments. *Proceedings of PRESENCE 2006: The 9th Annual International Workshop on Presence*. August 24-26, Cleveland, Ohio, USA.
- Yee, N. & Bailenson, J.N. (2007). The Proteus Effect: Self-transformations in virtual reality. *Human Communication Research*, 33, 271-290.
- Yee, N., Bailenson, J.N., & Ducheneaut, N. (2008, in press). The Proteus Effect: Implications of transformed digital self-representation on online and offline behavior. *Communication Research*.
- Yellowlees, P.M. & Cook, J.N. (2006). Education about hallucinations using an Internet Virtual Reality System: A Qualitative Survey. *Journal of Psychiatric Education*, 30(6), 534-539.
- Slater M., Antley A., Davison A., Swapp D., Guger C., et al. (2006) A Virtual Reprise of the Stanley Milgram Obedience Experiments. *PLoS ONE* 1(1): e39. doi:10.1371/journal.pone.0000039

B. Negative Impacts

1. Block J.J. (2007) Pathological computer use in the USA, in 2007 International Symposium on the Counseling and Treatment of Youth Internet Addiction. Seoul, Korea, National Youth Commission, p 433
 2. Beard K.W. & Wolf EM (2001). Modification in the proposed diagnostic criteria for Internet addiction. *Cyberpsychology and Behavior*. 4:377–383.
 3. Choi, Y.H. (2007) Advancement of IT and seriousness of youth Internet addiction, in 2007 International Symposium on the Counseling and Treatment of Youth Internet Addiction. Seoul, Korea, National Youth Commission, p 20.
 4. Koh, Y.S. (2007) Development and application of K-Scale as diagnostic scale for Korean Internet addiction, in 2007 International Symposium on the Counseling and Treatment of Youth Internet Addiction. Seoul, Korea, National Youth Commission, p 294.
- Ahn, D.H. (2007). Korean policy on treatment and rehabilitation for adolescents' Internet addiction, in 2007 International Symposium on the Counseling and Treatment of Youth Internet Addiction. Seoul, Korea, National Youth Commission, p. 49.

IV. RESEARCH ISSUES AND APPROACHES

A. General Issues

- Bainsbridge, W.S. (2007). The scientific research potential of virtual worlds. *Science*, 317, 472-476.
- Blascovich, J., Loomis, J., Beall, A., Swinth, K., Hoyt, C., & Bailenson, J.N. (2002). Immersive virtual environment technology as a methodological tool for social psychology. *Psychological Inquiry*, 13, 103-124.
- Yee, N., & Bailenson, J.N. (2008). A method for longitudinal behavioral data collection in Second Life. *PRESENCE: Teleoperators and Virtual Environments*. 17(6), 594-596.

B. First Person/Ethological Accounts

- Boellstorff, Tom (2008). *Coming of Age in Second Life: An anthropologist explores the virtually human*. Princeton: Princeton University Press.
- Guest, Tim (2007). *Second Lives: A journey through virtual worlds*. New York: Random House.
- Meadows, Mark Stephen (2008). *I, Avatar: The culture and consequences of*

having a second life. Berkeley, CA: New Riders.

V. OTHER RESOURCES: WEB SITES, BLOGS, ON-LINE NEWSPAPERS

www.secondlifeherald.com (one of oldest and most read Second Life blogs: resident perspective, irreverent, challenging tone, roster of plugged-in writers.)

www.3pointd.com (Mark Wallace, veteran journalist, intelligent/analytic view of Second Life and other virtual worlds.)

http://news.com.com/2990-5_3-1.html?target=&query='Second%20Life'&tag=srch
(news and articles from CNET News.com on Second Life)

<http://terranova.blogs.com> (most influential academic blog about virtual worlds, leading researchers, economic, social, intellectual elements)

<http://blog.secondlife.com> (official Linden Labs blog, written by staff)

<http://nwn.blogs.com> (the original Second Life blog edited by Wagner James Au, veteran observer)

www.metaversemessenger.com (weekly Second Life newspaper, news and events from in-world)

<http://forums.secondlife.com> (official community site for Second Life, post products and services, residents discuss events of day)

www.the-avastar.com (newspaper available in Second Life: touch to download)

www.opencroquet.org (Web site of the Croquet Consortium, which is developing an open source alternative to Second Life)

www.virtualworldnews.com (excellent source for new developments in the virtual world)

MEETINGS

Technology Working Group telephone conferences and/or virtual world meetings are held once a month, with additional telephone conferences or in-world meetings arranged at the discretion of the group.

Face-to-face (f2f) meetings are one to three-day sessions held approximately twice a year, with additional meetings arranged at the discretion of the group. To maximize

working relationships between the Technology Working Group and relevant standards bodies and vendor organizations, f2f meetings may be held in conjunction with industry events, standards meetings, or on location at member or collaborator organizations. All f2f meetings are announced through the group's email list and Web page.

CONFIDENTIALITY

The proceedings of this Technology Working Group are confidential and restricted to members of this group. As an open-standards organization, and in recognition of the need for ongoing accountability to the general public, MediaGrid.org will periodically publish a public summary of all technical decisions (together with rationales for these decisions) made by this group since the last public summary. Deliverables produced by this group, such as specifications and software implementations, will be provided to experts and collaborators for review prior to being furnished to the general public.