Pol. J. Environ. Stud. Vol. 33, No. 2 (2024), 1183-1190
DOI: *10.15244/pjoes/172760* ONLINE PUBLICATION DATE: 2023-11-21

Original Research

Second Life Multimedia Online Platform in Landscape Design: How do Multiverse Technologies Help Designers in Creating Environmentally Safe Projects?

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Received: 30 June 2023
Accepted: 21 September 2023

Abstract

The research is focused on finding ways to develop safe environment design using virtual worlds like Second Life and Metavers and identifying the best opportunities for this. The novelty of the study lies in a wide representative survey of experienced participants in the process of designing a secure environment using virtual tools and obtaining their generalized Delphi assessment of the prospects and optimal capabilities of this process. The survey involved 228 participants from 31 countries. The participants formulated a set of possibilities and patterns of possible development and then gave them an assessment. The results of the study showed that designers and planners tend to distrust the possibilities of modeling and predicting the state of the urban safe environment in virtual spaces and tend to perceive it as a means of creating projects, revealing the imagination and talent of the designer and a space for communication and co-design with the expert community and communities. It was revealed that they see the use of augmented reality for the presentation of real objects in the virtual world and information about objects in the real world as the most promising direction of development.

Keywords: landscape, multimedia, online platform, safe environment, urban areas

Introduction

Designing a safe environment in today's urban environment is a major challenge, which includes both the prevention of man-made hazards and the creation of a green environment in cities, environmental support, community environmental education, and tourism development [1, 2]. A safe environment includes preventing the destruction of the optimal space for people to live and creating a sustainable and developing space that includes both public and private components [3, 4]. Greening cities, energy conservation and the creation of an urban ecosphere that includes not only controlled plantings and park areas, but also pet walking areas

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and habitats for some adapted wild species are only part of the design of cities of the future [5]. These challenges require multi-factorial modeling of both technical and social processes and the active participation of society and local communities in shaping and maintaining the landscape [6, 7]. Virtual spaces and worlds may be the most important modern means of such collaborative design [8].

Virtual universes are sizable artificially created information spaces that largely replicate or in some form recreate elements of the real world and allow users to literally live in this world, performing many functions [9]. Virtual worlds, the most famous of which are Second Life and Metavers, are extended three-dimensional spaces filled with numerous objects that simulate urban and natural environments in the real world. Some of such a model may be a copy of real spaces, some are a product of fantasy and design [10].

These spaces are multi-user and include a large number of users who can act independently and simultaneously, shaping relationships, social conditions and their own economy. Second Life used its own currency, a stock market, and a functioning virtual economy that trades both virtual objects and information and supports the exchange of goods and services in the real world [11, 12]. Many companies and individual entrepreneurs are moving part of their workday and other activities to virtual spaces, which allows some researchers to talk about the "transformation of work" and the emergence of a new type of employment associated with permanent residence in virtual spaces [13].

Most of the most actively developing metaverses are focused on the development of cryptocurrencies and are tied to their own cryptocurrency platforms, through which the sale of virtual land holdings is carried out. A typical example is Decentralend, which has its own MANA crypto platform and uses other cryptocurrencies. Local spaces can be explored, bought, sold, rented out and even hosted casino games. These virtual venues are often used for virtual events such as parties and concerts by popular artists. Other metaverses such as The Sandbox are being developed as open game content. In The Sandbox, the player can not only play, but also create and monetize game content, transactions are carried out on the basis of tokens, most often the ERC-20 standard for most popular platforms. Roblox is a multiplayer gaming platform with a long history of development since 2006, first created as a website that is available on different devices. Various additional features and avatars are available for purchase, in addition, here you can also be creative, explore and monetize your game actions. The creation and functioning of metauniverses are greatly influenced by the vision of cyberpunk as a direction in cinema, literature and computer games, reflecting the idea of the world of the near future with the implementation of newly emerging technologies. A typical example is Metahero, a decentralized platform based on the specialized Binance Smart Chain (BSC) blockchain, which supports ultra-realistic 3D graphics and creates a typical cyberpunk world with a future in which technologies are still conceived or developed. However, the platform allows you to live and invest in this future right now in an economy based on the local HERO token. This type of game incorporates and facilitates the integration of NAE in order to make content infinitely diverse with the help of users, stimulate development and the virtual economy.

Literature Review

Virtual worlds clearly originate from the virtual video game industry and are a logical extension of those game universes that were created by game projects [14, 15]. Some game universes such as Minecraft have acquired the features of full-fledged virtual worlds and have training. commercial and communications applications [16, 17]. Virtual universes have attracted the attention of architects, landscape designers, and urban environment designers from the outset as a unique modeling and design tool [18, 19]. There are numerous successful projects to transfer copies of real objects and even entire settlements into virtual space [20-22]. However, the use of Second Life or Metaverse, as well as specialized virtual spaces for urban planning, is still in its early stages of development [13, 23].

The interaction of virtual worlds and the real world may become more diverse in the near future thanks to the proliferation of wearable gadgets with broadband Internet access. This will enable the introduction of multiple elements of augmented reality into everyday experience and will allow you to connect virtual universes like Second Life with real locations [24, 25]. Such a connection opens up new opportunities for the tourism business, advertising, education, security and other development areas [26, 27].

Researchers view virtual worlds in terms of their evolution from concepts of virtual twins and mirroring landscapes to the creation of large spaces that facilitate play, simulation of reality, and true planning [13, 15]. Learning concepts such as STEM and distance learning greatly benefit from the use of already permanently existing virtual spaces such as Second Life. Such spaces allow you to save resources on creating your own virtual representations and use a large number of modeling tools already created by others [9, 25, 28]. On this basis, even the economy of selling virtual spaces and tools arises, well developed in Second Life [12]. The design possibilities of a safe environment, as researchers point out, are in virtual space at the stage of offering numerous modeling tools and creating models of individual areas, zones and objects [5, 6, 27]. The use of Big Data and AI for urban planning is yet to be separated from the design of green environments [1, 2].

A significant group of studies is devoted to the transfer of real objects into virtual space and the use

of such reflections for various purposes [11, 19, 22]. Also, part of the research focuses on understanding virtual worlds as centers of new economic and design development, considering them mainly as spaces of unlimited freedom [24, 26, 29]. There is a noticeable gap in the research, which misses the opinion of direct mass participants in the creation and implementation of projects in virtual worlds (designers and designers). They have first-hand experience of both living in the virtual world and creating it, as well as experience and analysis of the results of attempts to create safe environments or urban design. The proposed study intends to partially close this gap in order to obtain feedback from the direct participants in the creation of virtual projects to identify ways to use virtual sites to create a sustainable and safe space for urban development.

Method

Study Design

The study was aimed at achieving two important goals: to obtain a reliable and valid definition of the main patterns, problems and significant directions for using virtual platforms like Second Life for the safe design of urban environments; and getting sub objective assessment of the level of implementation and significance of these patterns and problems from participants in the design process. At the first stage, the method for creating a sample of participants was determined, which is described further in the Participants section, and the sample was taken.

At the second stage of the study, participants were asked to formulate a common consensus list of the main advantages and opportunities that virtual worlds can give to urban safe environment design using social networking, videoconferencing with the widest possible number of participants and using email correspondence. Participants were asked to use only those interaction methods that could be captured and stored for further processing; all correspondence and communications were recorded and saved with the permission of the participants.

To achieve consensus formulations, the Delphi method was used, during which each participant formulated the possibilities that were significant to him and then submitted them for discussion. During the discussion, wordings were accepted into the general list, the wordings of various authors were brought to a single meaning, or unsuccessful, repeated or irrelevant ones were discarded. A total of four iterations of meetings and discussions were held to reach the list of opportunities presented in Table 1.

The third stage of the study included obtaining a subjective assessment of each of the list of possibilities for some parameters. Which assessment parameters to use was also the subject of the Delphi process, during which 3 parameters were formulated, discussed and approved by consensus: utility measure, degree of implementation and impact.

Degree of implementation represents the participant's opinion on the extent to which the discussed opportunity or development pattern is implemented in modern virtual worlds on platforms such as Second Life.

Impact is an assessment of the extent to which a given feature or pattern can influence the design of a secure environment. In this case, both positive and possible negative impacts were taken into account, if they were implied.

Participants rated each of the parameters for each of the features on a 5-point Likert scale, with 1 being the most useless feature and 5 being the most helpful feature. The higher the score, the higher the score. The results obtained are presented in Table 2.

Participants

Since the purpose of the study was to collect relevant and valuable approaches and opinions of real designers, the question arose of creating a representative sample. In the course of its solution, difficulties arose that are associated with the nature of the functioning of virtual worlds such as Second Life and Metaverse. The contingent of participants in virtual worlds is unstable and employment or activity on these platforms. The specialists who create the design can either belong to the companies that create certain parts of the virtual space or be hired on a project basis or only to perform part of the tasks. The number of participants in the design and creation of virtual worlds, even on a professional basis, is tens of thousands and they live in countries around the world and work remotely. Therefore, it was decided to form a sample that would represent geography, age, gender and specialization as fully as possible. On the other hand, restrictions were imposed for the formation of the sample: the participant must at the time of the study be involved in the implementation of an actual project in Second Life; he/she must have at least 5 years of experience in landscape and urban planning and design; he/she must have at least 3 years of experience participating in the design of a secure environment; the participant must have experience in completed safe environment projects in urban design.

For the purpose of the study 358 possible participants from 39 countries were identified by contacting Second Life companies, recruiting agencies, non-governmental organizations related to environmental design and urban design. They were invited via e-mail to participate in the study and requested data confirming their compliance with the established restrictions mentioned above. As a result, 228 participants from 31 countries provided the necessary consent and confirmation. The distribution of participants was as follows: no more than 8 private traders from the same country and no less than 3. The gender division was reached equal: 114 men

and 114 women. The age ranges from 23 to 68 years and, according to the chi-square distribution, corresponds to a normal distribution in the sample.

The age ranges were obtained randomly from a random sample and thus may be representative of the industry's age range. An equal sample of participants by gender was also formed randomly. It should be emphasized that the sample is specialized in the sense that it does not represent software engineers working in the field of virtual universes or blockchain, but professionals who combine these skills and experience with experience in landscape and urban planning and design and experience in creating a secure environment. On the one hand, this greatly narrows the segment of participants for sampling, and on the other hand, it brings the proposed sample closer to being representative as far as possible, given the described limitations. The sample by country can also be considered as representative, since the random selection of participants sifted participants from all countries and the fewer specialists described experience in a particular country, the less statistical chance they had to be included in the study sample. Thus, if the sample cannot be considered completely representative, then it should be recognized that it is sufficiently representative and representative for the purposes of the study.

Data Analysis

The data analysis involved the presentation of descriptive statistics and percentages in relation to individual parameters in order to obtain an overall picture of how designers and designers see the process of shaping the interaction of virtual environments and secure environment design. A more complex statistical analysis suggests further in-depth research in this area based on the data obtained in this study. The use of more specialized methods of statistical research or statistical testing of hypotheses in this case seems inapplicable due to the need for a more accurate study and definition of the subject field of the study to determine the significant variables needed for statistical analysis. The narrow and utilitarian goals of this study do not require such methods of analysis.

Statistical Processing

Data processing was carried out using the SPSS 25.0 program, and the presentation of descriptive data was prepared using the Excel 2019 program.

Ethical Issues

All participants provided written consent to participate in the study on condition of anonymity. No personal data of participants during the course of the study was collected, stored or used outside the purposes of the study.

Research Limitations

Given the specific difficulties in determining the size and content of the general sample for the purposes of this study, it can hardly be considered strictly statistically representative. It should be borne in mind that a narrow sample for a particular country, a particular Second Life sector, or other selection parameters can provide very different data. The author sought to form a sample that summarizes as much as possible the whole range of opinions and representatives of design working in the field under study.

Results

During the formulation of individual opportunities and patterns of development, an important trend was recorded: some of the opportunities were formulated only by a certain part of the participants. A significant part of the participants never thought about such possibilities and did not formulate them. A small number of participants strongly rejected these possibilities and considered them unrealistic, useless or even dangerous and such that they would bring the opposite effect to what was expected (see Table 1). Participants showed complete unanimity regarding a small number of opportunities, in particular, those that have already been implemented and are successfully used and are rapidly developing within Second Life and Metaverse. These ideas are old and have already managed to take root in the IT environment and become generally accepted for virtual projects.

Also, the vast majority of participants came up with the ideas of using augmented reality (87%), presenting a vision of a desirable future as a goal of gradually changing urban and environmental design (88%), and using virtual reality as a means of stimulating further technical development (98%). These ideas appeared later than the ideas and capabilities of the first group, and they are already closely related to the implementation of virtual and augmented reality and could not have arisen only based on computer technology. It can be assumed that designers and authors of safe environment projects are largely subject to the dependence of thinking on the level of penetration of a certain idea, its dissemination and popularization. In part, these data also confirm the adequacy of the sample of participants, which reflects the generalized thinking trends for this group of people.

As the evaluation results show (Table 2), in most cases, those who formulated a certain idea (opportunity) and those who recognized it during the discussion, as a rule, gave higher ratings that overcame the lowest ratings of those who rejected the corresponding idea. The data in Table 2 are broadly consistent with the data in Table 1, with the assessment of the level of impact of the corresponding idea on the current state of virtual worlds and their use for the design of a safe environment

Table 1. Consensus list of features and development patterns provided by virtual worlds for safe environment design.

	Interpretation	Formulate the idea	Reject the idea
The future of work and workspace organization	Transformation of work into a form of virtual and remote employment; changes in the mode and time of work.	47%	13%
Method for predictive modeling of physical reality	The ability to simulate real expected climatic, social and physical events in virtual space and change the design to prevent them.	27%	24%
Unleashing Designer Creativity	The ability for the designer to create any form of environment without taking into account the limitations of the real space of social and physical laws.	100%	0%
Interactivity of solutions and methods of communication with stakeholders	Ensuring the introduction of changes and wishes from all participants in the habitation of the designed space; interact with stakeholders in real time to control the project.	86,50%	0%
Representing a desired future	The ability to create a design as a presentation of an optimal or ideal future, to which the real landscape is gradually approaching.	88%	9%
Ethical Sustainability	The possibility of virtual simulation of ethical problems that arise in the interaction of people with each other and with the natural and urban environment to prevent and eliminate such conflicts.	24%	36%
Finding Important Missing Details	A virtual reflection of a real design project allows you to gradually discover and fix errors or make important changes through constant testing by many users and experts.	100%	0%
Reflection and interaction with the object in real life	The ability to interact with a copy of the real environment and design elements from the virtual world in the real world (through augmented reality mechanisms: to obtain information, improve interaction, ensure security, etc.).	87%	2%
Advertising and promotion of a real object	Using the virtual environment for a wider presentation of real objects, their advertising promotion, dissemination of information about local communities, local business opportunities, etc.	56%	12%
Penetration of virtuality into reality to preserve and maintain the real landscape	The use of virtual space and its modeling and gaming capabilities to present projects of safe design of the environment, inform and warn about changes in the natural environment and create conditions for adequate interaction of the community with the living environment and technological environment.	64%	9%
Environmental Learning and Design Pedagogy	Possibilities of a virtual environment for remote learning and research interaction, and in particular for environmental education of local communities.	100%	0%
Technical improvement	The expansion of the possibilities of the virtual space should spur the development of technologies and the improvement of the virtual world itself and the tools for its interaction with the real world and the information space.	98%	2%

mostly much lower than other parameters. In fact, the participants recognized the high impact of just freeing the imagination of designers, promoting real objects in the virtual space, and envisioning a desirable future. The high impact scores are exactly in line with the most widely developed and shared ideas in Table 1, which is what you would expect.

The degree of implementation of all possibilities except three (Unleashing Designer Creativity – 3.69; Representing a desired future – 3.06; use in education – 3.06) was recognized as very low – significantly below the average line of 2.5 points. This may indicate that the actual level of development and implementation of the most effective and socially significant ideas in virtual worlds remains extremely low, which may explain the technological lag and gradual decline in activity in projects such as Second Life.

In contrast to the other two parameters, the assessments of the utilitarian usefulness of the possibilities under consideration are very diverse. The representation of a desirable future (4.87) received the highest utility rating. This may suggest that, until now, virtual spaces like Second Life and Metaverse are, perhaps unconsciously, viewed not as a real current possibility, but as part of the future that we are now only thinking about. This unconscious attitude can be an important deterrent to development in safe space design as well.

Table 2. Evaluation of the parameters of the possibilities of virtual worlds for the design of a safe environment.

	Utility measure		Degree of implementation		Impact	
	Mean	SD	Mean	SD	Mean	SD
The future of work and workspace organization	2.86	.32	1.93	.12	1.92	.19
Method for predictive modeling of physical reality	1.88	.12	1.01	.09	1.99	.22
Unleashing Designer Creativity	4.19	.29	3.69	.18	4.48	.34
Interactivity of solutions and methods of communication with stakeholders	3.59	.22	2.23	.14	2.18	.19
Representing a desired future	4.87	.19	3.06	.31	4.09	.25
Ethical Sustainability	2.05	.34	.89	.13	1.22	.11
Finding Important Missing Details	3.77	.17	2.14	.18	3.56	.16
Reflection and interaction with the object in real life	3.02	.28	1.18	.09	3.02	.19
Advertising and promotion of a real object	3.59	.31	1.56	.08	4.01	.13
Penetration of virtuality into reality to preserve and maintain the real landscape	1.95	.15	1.06	.14	.99	.08
Environmental Learning and Design Pedagogy	3.88	.17	3.06	.16	3.51	.31
Technical improvement	4.21	.29	1.92	.18	3.09	.19

Discussion

The findings obtained in the study presented here partially confirm the data of a number of sources on the current state of the Metaverse and other virtual universes in relation to their practical use for modeling and designing a safe environment. First of all, it reflects significant expectations and very high doubts about the real effectiveness of this tool [5, 30]. Previously, researchers have pointed out that virtual worlds originate from computer games and game universes, which form an irresponsible perception of virtuality. The incredible ease of existence, the absence of habitual physical limitations, form a persistent repulsion pattern for undertakings associated with limitation or responsibility [13]. This creates a poor environment for modeling social behavior in real life or implementing projects that involve restrictions on social behavior [10, 18]. This situation also resonates in the real world, in particular in the populist strategies of politicians or in shaping the urban landscape only on the basis of satisfying the needs shaped by a growing market [3].

From the point of view of creating an efficient and safe environment, the most valuable tools of Metaverse, Second Life and other virtual universes, participants in the design process, as shown by this study, recognize the space for communication and testing projects. It is the ability to involve a large number of users and experts in the habitation and security checks of a space, as well as the ability to communicate in this space and learn from immersive, identical to real material, that makes metaverses so valuable for environment design [31]. At the same time, the general enthusiasm for the possibilities of the virtual world does not fully reflect the fact that the work and solution of applied problems, in particular, those related to the technical aspects of design, architecture and design, are limited to being transferred to virtual worlds [32]. Sources point out that in most cases, the created models for laying communications, security systems for buildings and urban complexes, landscape design, including the treatment of water masses, etc. serve to present and conveniently place all visual material in one place [12, 23]. An important role is also played by the possibility of an immersive experience of settling in the design space in the virtual body of the virtual twin. This experience provides an opportunity to see the future reality of construction in the context of landscape, communication, real conditions of use, etc. [33]. It also allows you to open access to the project to many participants. At the same time, the possibilities of modeling the behavior of the social and natural environment in the virtual space remain doubtful: participants prefer to fly and pass through walls, rather than fulfill the requirements imposed by natural physics.

A number of studies already offer practical experience of using Big Data and Artificial Intelligence as tools for accurately modeling the behavior of the environment, in particular in urban design [1, 28]. However, now in these projects, the desire for the release of fantasy and the realization of a vision of an ideal future, noted by the participants in our study, is realized to a greater extent, rather than providing a safe environment. Elements of creating a safe environment are included in the projects of Dubai and others mentioned in these studies, but do not play a decisive role. These are nothing more than elements of normal technical safety, rather than a defining design

philosophy. AI can learn from the long history of the formation and development of the environment of a certain city, including elements of the behavior of the natural environment (the state of air, water, the presence of vegetation, domestic or adapted wild animals, etc.). Predictive models that capture elements of the natural environment remain less reliable than those that model man-made elements of the environment [4].

Conclusion

The study is aimed at establishing the most relevant ways, from the point of view of the participants in the design process, to use virtual spaces and tools to create a safe environment design. Rapid technological development and accelerated urbanization in the modern world poses environmental challenges for designers. social development and application of technology. During the four Delphi sessions, the participants formulated a list of opportunities and patterns of possible development and, during a repeated delayed survey, assessed these opportunities in terms of usefulness, impact and degree of implementation at the moment. The study showed that designers and planners are very distrustful of the possibilities of modeling and predicting changes in the urban safe environment in virtual spaces. Their perception may be related to the process of perception and addiction to technology, which is why they tend to perceive virtual worlds as a means of creating projects, freeing the designer's imagination and space for communication and joint design with local communities and the expert community. Participants see the use of augmented reality for the presentation and promotion of real objects in the virtual world as the most promising direction for development, as well as providing information about objects in the real world to involve residents in a safe environment and its development processes. The results obtained can be used in the processes of urban planning and design, in the preparation of safe environment projects and in the strategic planning stages of such projects.

Funding

Yanli Song was supported by the First-class professional construction project of environmental design in Guangxi Zhuang Autonomous Region in 2021.

Conflict of Interest

The authors declare no conflict of interest.

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